Feathered Friends and Human Animals: General Biology and Comparative Description within the New Zealand Poultry Industry Press c. 1900-1960

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Abstract

Within the New Zealand poultry industry press between 1900 and 1960, scientific approaches were promoted and 'sentimentality' discouraged, yet comparative and anthropomorphic description suggesting similarities between chickens and humans persisted. *Feathered Friends and Human Animals* explores this phenomenon within poultry journals, newspapers, advice books and official publications. Four key themes of comparson are identified: ideas about the chicken mind, the chicken-as-worker, poultry 'eugenics', and health and hygiene.

It is argued that humanitarian, theological, and philosophical ideas, the 'natural' empathetic and humoured identification that arises through everyday contact with animals within relatively small systems, and the rationalisation of industry, were all significant factors contributing to sustained comparison. However, the public articulation of fundamental biological ideas – encapsulated in the modern, overarching concept of 'general biology' – validated and integrated these discourses.

General biology influenced new trends in education and in the popular and public articulation of research into the life sciences of this period. It encouraged the integration of sympathetic naturalist persepctives, including evolutionary-based ideas about 'natural laws', with emerging new science that continued to establish many fundamental biological principles through extrapolation from experimental animals to human animals. This study demonstrates that poultry experts' attended to this same blend of older naturalist science and new scientific knowledge.

Historians' focus on emerging specialist science in the early twentieth century has tended to obfuscate the realities of science education within the applied sciences and amongst lay audiences, and the continued interest in fundamental aspects of biology within professional science. The findings of this study reveal that farming ideas did not develop within a bubble, determined only by animal

husbandry traditions and industry-specific applied research. They also suggest that practitioners' conceptions of biology within applied fields of this era were not as distinct as has been supposed.

As a 'bottom-up' cultural history of science, this study illustrates the articulation of general biology within an agricultural context. This is the key contribution offered to local and international historiography. However, other elements of the study expand existing scholarship. In exploring ideas about race and eugenics, it offers a broader framework for social historians, who, while cognisant of the eugenic mind-set of this period, have granted little attention to general biology as a professional trend. It offers insight into the agendas and tensions within school nature study and elementary science. It is also the first comprehensive history of the New Zealand poultry industry. Poultry-keeping engaged up to around 60 percent of the nation's households in this period, including thousands of farmers who kept sideline flocks, but as a predominantly domestic (as opposed to export) industry it has been overlooked by social and agricultural historians.

The field of human animal studies, which has tended to gloss over both this era of transition prior to modern agribusiness and scientific discourses, is also advanced by this study, and this is the first New Zealand agricultural history to engage with this field and examine animal husbandry ideologically. It reveals how fundamental science knowledge, entwined with moral perspectives, continued to shape ideas about animals' needs and behaviour well beyond the Victorian period. Assumptions of similarity however, were not always beneficial for the animal, and human-bird comparison was used to both justify and deny kind treatment.

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Abbreviations

ABA: American Breeder's Association

AJHR: Appendix to the Journals of the House of Representatives

ANZ: Archives NZ (Wellington, unless stated otherwise)

ATL: Alexander Turnbull Library

DNWC: Dorothy Neale White Collection, NLNZ

EPCC: Evening Post Clippings Collection, WCL

Hocken: Hocken Collections, University of Otago Library

JHistBio: Journal of the History of Biology

NEd: National Education

NLNZ: National Library of New Zealand

NZC: Census of New Zealand

NZCW: New Zealand Countrywoman

NZEES: New Zealand Eugenics Education Society

NZF/NZFW: New Zealand Farmer: Bee and Poultry Journal or New Zealand Farmer Weekly (title changes 1885-1936)

NZLC: New Zealand Libraries' Catalogue

NZJA: New Zealand Journal of Agriculture

NZJH: New Zealand Journal of History

NZOYB: New Zealand Official Year Book

NZPA: New Zealand Poultry Association

NZPB: New Zealand Poultry Board

NZPBUL: New Zealand Poultry Bulletin

NZPJ/NZPJSup: New Zealand Poultry Journal or NZPJ Supplement

NZPP: New Zealand Poultry Producer

NZPPF: New Zealand Poultry Producers' Federation

NZPW: N.Z. Poultry World

NZSJ: School Journal (from 1907) or NZ School Journal (1919-36)

NZUPC: New Zealand Utility Poultry Club

NZWPSA: New Zealand branch of the World's Poultry Science Association (WPSA)

PP: Papers Past

SAFE: Save Animals From Exploitation

SHPBBS: Studies in History and Philosophy of Science Part C: Studies in History and Philosophy of Biological and Biomedical Sciences

TPRSNZ: Transactions and Proceedings of the Royal Society of New Zealand, 1868-1961

RNZSPCA/SPCA: [Royal New Zealand] Society for the Prevention of Cruelty to Animals

WCL: Wellington City Library (central)

WDFU: Woman's Division of the Farmer's Union

Historical Newspaper Abbreviations

AG: Ashburton Guardian

AS: Auckland Star

AWN/WN: Auckland Weekly News or Weekly News

BH: Bruce Herald

BOPT: Bay of Plenty Times

DSC: Daily Southern Cross

EG: Ellesmere Guardian

EP: Evening Post

HNS: Hawera & Normanby Star

MEX: Marlborough Express

NA: Northern Advocate

NEM: Nelson Evening Mail

NL: Northern Luminary

NOT: North Otago Times

NZH: New Zealand Herald

NZT: NZ Truth

ODT: Otago Daily Times

OW: Otago Witness

PBH: Poverty Bay Herald

ST: Southland Times

TARH: Taranaki Herald

TIMH: Timaru Herald

TT: Tuapeka Times

WCT: West Coast Times

WDT: Wairarapa Daily Times

WH: Wanganui Herald

WI: Wellington Independent

WT: Waikato Times

Introduction

In the decades between 1900 and 1960, contributors to New Zealand poultry industry journals, newspaper columns, pamphlets and books articulated the specific and distinct needs of chickens. However, they also spoke generally, comparing farm systems to analogous human regimes, and the biology and psychology of the bird to human functioning and experience. Culling was compared to eugenics, farms to factories and laying hens to workers. They observed chickens 'enjoying' their dust-baths and 'relishing' food. They compared 'forced' hens to fatigued mothers who would produce debilitated offspring, advocated attention to chick nutrition on the basis of trends in infant feeding, and the adjustment of housing plans for more sunshine in keeping with changes in schools and hospitals.

Human-bird comparison, including, but not confined to intentionally anthropomorphic description, spanned all spheres of husbandry.[1] My analysis, which encompassed text, illustrations, photographs and advertising material within the poultry press, revealed four key themes: ideas about the chicken mind and psychology; the chicken as worker; race and eugenics; and health and hygiene.

This material was striking relative to today's industry publications, which tend to be technically-focussed and devoid of any sense of connection.[2] How could this content best be explained within this period of emerging industry? Could the tendency to compare be explained by the relatively small farm sizes and the

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[1] Throughout this thesis I refer to 'comparative description', which is my abbreviated term for the comparison of non-human animals (or specifically, chickens) and humans. For further discussion, see 'Theoretical Frameworks, Language and Scope' in this introduction.

[2] As a point of comparison I examined the *Poultry Digest* and *The Drumstick* given to me by New Zealand industry contacts. On present-day concerns about the human-animal disconnect, see for example, SAFE, *Battery Hen Farming in New Zealand: A Critical Evaluation* (Christchurch: SAFE, 2007).

humoured and sympathetic connection possible within less intensive industry? Was it indicative of humanitarian attitudes? Could it be understood as anachronistic, due to a sustained Victorian-era anthropomorphism of an older generation? Clearly ideological and practical factors, as well as the function of this material, had to be considered, and, as with most cultural phenomenon, a matrix of contributing factors was identifiable. However, was it also valid to examine the themes collectively? In people's minds at the time, were comparative ideas related to different spheres of husbandry *connected*? Throughout the period, commentary also included many references to 'natural laws', so did comparison reflect poultry breeders' naturalist science tradition? Did it reflect adherence to evolutionary ideas? How much was simply due to Social-Darwinist trope?

Historians have tended to focus on the divide between naturalist science and professional specialisation within the early twentieth century, but as my research progressed I became increasingly interested in scientific perspectives within the poultry industry, and what was considered modern.[3] I found that evolutionary as well as humanitarian, theological and other philosophical ideas, the 'natural' identification that arose through everyday contact with chickens, and the anthropomorphic rationalisation of industry 'workers', were all significant factors contributing to human-bird comparison. However, my central finding was that this description was consistent with the way in which the fundamental principles of biology were conveyed to general or popular audiences in this period. The point I seek to highlight, is that the overarching notion of 'general biology' validated and integrated these discourses from the turn of the century to 1960.

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[3] See for example, Joseph Caron, "'Biology' in the Life Sciences: An Historiographical Contribution," *History of Science* 26, (1988): 223-268; Narisara Murray, "From Birds of Paradise to Drasophila: The Changing Roles of Scientific Specimens to 1920," in *A Cultural History of Animals in the Age of Empire*, ed. Kathleen Kete (Oxford: Berg, 2007), 113-134.

Human-bird comparison in the poultry press thus reflected a modern scientific view that facilitated the unification of old and new: the evolutionary-based and theologically-entwined naturalist tradition of older breeders in which common-sense notions of natural laws were inherent, with new ideas from twentieth-century experimental science. I argue that in order to do justice to farmer conceptions of this time, we should not dismiss human-animal comparison of this period as rhetorical metaphor, which has been the predominant approach to date within agricultural and social historiography, as shall be explained shortly. The culture of industry was shaped by farmer cognisance of the fact that the modern, new biology, and its sub-disciplines of the so-called 'life-sciences', affirmed and reinforced the notion that many fundamental biological principles applied to animals or birds, as to human beings. The following literature review will clarify the concept of general biology as it has been variably discussed within recent scholarship.

General Biology

American historian, Philip Pauly, has described the first half of the twentieth century as 'the age of biology'. Although biology as a term was coined around 1805, it did not begin to be commonly employed within public discourse until the first half of the twentieth century. From the late nineteenth century, leading Western scientist-writers and educationalists began to utilise the umbrella term of biology or general biology as they identified a need for unified perspectives on the fundamental principles of living things within the increasingly specialist life sciences. General biology as a term became common within the titles of Western educational texts and university courses for biology and medical students from the 1890s and subsequently, within early twentieth-century secondary school courses. This trend was accompanied by a reaffirmation of

integrative, naturalist perspectives, and a reassertion of the biologist's role as a public communicator and philosopher of the life sciences.[4]

General biology as a reforming trend with school science education in the first half of the twentieth century has also been discussed by historian Robert Kohler. He explains that turn-of-the-century reformists sought to re-energise a popular interest in general biology, which was referred to as the 'new natural history' within primary schools. In re-emphasising naturalist approaches and field science, reformists sought to counter the narrow and unsympathetic, experimental 'necrology' of laboratory biology that influenced turn-of-the-century approaches to education.[5]

Historian Lynn Nyhart has also identified an integrative, new natural history conveying evolutionary-based ecological ideas underpinning reform within German civic institutions, such as museums, zoos and schools during the late nineteenth and early twentieth century, which she identifies as a broader Western phenomenon. She notes an interchange of ideas between professional discussions of the 'new biology' and civic articulation of the new natural history.[6]

Staffan Möller-Wille and Hans-Jörg Rheinberger have explained that within research, general biology stimulated a greater focus on 'model organisms', and

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[4] Philip J. Pauly, *Biologists and the Promise of American Life* (Princeton: Princeton University Press, 2000); Staffan Möller-Wille and Hans-Jörg Rheinberger, *A Cultural History of Heredity* (Chicago and London: University of Chicago Press, 2012), 127-139; Keith Benson, Jane Maienschein, and Ronald Rainger, eds., *The Expansion of American Biology* (New Brunswick, New Jersey: Rutgers Univiversity Press, 1991).

[5] Robert E. Kohler, *Landscapes & Labscapes: Exploring the Lab-Field Border in Biology* (Chicago: University of Chicago Press, 2002). 23-59.

[6] Lynn K. Nyhart, *Modern Nature: The Rise of the Biological Perspective in Germany* (Chicago: University of Chicago Press, 2009); Lynn K. Nyhart, "Natural History and the 'New' Biology," in *Cultures of Natural History,* ed. N. Jardine, J.A. Secord and E.C. Spary (Cambridge: Cambridge University Press, 1996), 426-443.

generalisation from experimental animals to human animals. The public communication of general biology by influential leaders within professional biology, was aided by career paths, which, especially prior to World War Two (WWII), were characterised by shifts between generic (or 'pure') and applied spheres of human and animal (and to a lesser extent, plant) research.[7]

Thus, general biology within scholarship has been discussed in respect to trends in education and public communication in the life sciences, but also in terms of a focus on generalisation within experimental research. The latter included the comparative focus of experimental sub-disciplines of general biology which are discussed in this thesis: comparative psychology, general physiology (including comparative embryology), heredity science and eugenics, comparative pathology (and related fields such as comparative medicine and comparative nutrition).

Additional scholarship related to aspects of general biology

Existing Australasian scholarship examining New Zealand biology education is limited. However, historian Sally Gregory Kohlstedt's study of international networks influencing Australasian education notes German and North American initiatives were absorbed by Britain and the colonies, and that North American university biologists such as Liberty Hyde Bailey were instrumental in establishing these programmes. She observes that nature study broadly aimed to convey the principle of the unity of life through observation of living plants and animals, and to inculcate moral, aesthetic and spiritual values, as well as fundamental science skills. Kohlstedt observes that nature study was variably interpreted and implemented, and that the sympathetic attitude to

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[7] Möller-Wille and Rheinberger, *A Cultural History of Heredity*: 127-139; Benson, Maienschein, and Rainger, *The Expansion of American Biology*; Michael A. Little and Ralph M. Garruto, "Raymond Pearl and the Shaping of Human Biology." *Human Biology* 82, no. 1 (2010): 77-96.

nature and animals inherent within nature study programmes created tension with those advocating vocational, agricultural approaches.[8]

Kirstie Ross's chapter in *Going Bush* draws upon Kohlstedt's study. She details the shift, commencing around 1905 from theologically-infused nineteenth-century 'object lessons', to the new nature study approaches. However, like Kohlstedt, Ross does not examine how nature study informed ideas about the human-animal continuum.[9] Other New Zealand scholarship on agricultural education similarly overlooks the changing context of animal husbandry and science education, though notes agrarian ideology underpinning educational reform.[10] In arguing that husbandry ideas were shaped by school nature study and elementary science education, this thesis addresses this gap within scholarship.

Internationally, science historians have highlighted the influence of several popularisers who were actively engaging with public media and publishing books aimed at self-educating and scientifically-engaged mass audiences in this era. Erika Milam's study of twentieth-century narratives of gender and sex, for example, highlights the popular ideas of the evolutionary biologist Julian

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[8] Sally Gregory Kohlstedt, "Nature Study in North America and Australasia, 1890-1945: International Connections and Local Implementations," *Historical Records of Australian Science* 11, no. 3, (1997): 439-454; Sally Gregory Kohlstedt, *Teaching Children Science: Hands-On Nature Study in North America, 1890–1930* (Chicago University of Chicago Press, 2010). 103-110, 137-139.

[9] Kirstie Ross, *Going Bush: New Zealanders and Nature in the Twentieth Century* (Auckland: Auckland University Press, 2008). 19-50.

[10] Howard Lee and Tom Brooking, "A Cautionary Tale: Rural Education in New Zealand, 1900-1940," in *Rural Education in Australia and New Zealand*, ed. R.C. Petersen and G.W. Rodwell (Casuarina, Australia: William Michael Press, 1993), 51-74; Delyn Day, "Education, Generation, and Gender: The Rural Youth Movement in New Zealand, 1920-1973 " (M.A. thesis, Victoria University, 1996). See also discussion of Nancy Swarbrick's recent publication on p.26.

Huxley.[11] In this study I discuss Huxley, John Arthur Thomson, E. Ray Lankester and a number of other influential scientists and biologists of the early to mid-twentieth century, including the New Zealand medic, Dr Frederic Truby King (Truby King, 1858–1938). New Zealand historians have predominantly focussed upon King's child health advocacy from 1905 through the Society for the Promotion of the Health of Women and Children (later, the Plunket Society). His ideas on scientific infant management, disseminated through Plunket publications, newspapers and nationwide lectures, and which, as Erik Olssen observed, were willingly accepted within rural areas, have been primarily framed as eugenic. In addition, Olssen observed generally that King instilled disciplined scientific analysis into the everyday life and mindset of generations, and his agricultural and health perspectives have been discussed as foreshadowing later ecological approaches.[12] My analysis of King as a proponent of general biology offers another reframing.

Generalisation from experimental animals (described as 'animal models' or 'model organisms' depending on the type of research and the specific animal or organism) was a feature of professional biology in this period that has been well-documented.[13] Poultry industry generalisation from chickens to people and visa-versa was particularly aided by the fact that the chicken played an

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[11] Erika Lorraine Milam, *Looking for a Few Good Males: Female Choice in Evolutionary Biology*, ed. Harriet Ritvo, Animals, History, Culture (Baltimore: John Hopkins University Press, 2010). 37-42; Pauly, *Biologists and the Promise of American Life*: 198-206.

[12] See for example, Erik Olssen, "Truby King and the Plunket Society: An Analysis of a Prescriptive Ideology," *New Zealand Journal of History* 15, no. 1, (1981): 3-23; Philippa Mein Smith, "Truby King in Australia: A Revisionist View of Reduced Infant Mortality," *NZJH* 22, no. 1, (1988): 23-43; Margaret Tennant, "'Missionaries of Health': The School Medical Service During the Inter-War Period," in *A Healthy Country: Essays on the Social History of Medicine in New Zealand*, ed. Linda Bryder (Wellington: Bridget Williams Books, 1991), 128-148; Lloyd Chapman, *In a Strange Garden: The Life and Times of Truby King* (Auckland: Penguin Books, 2003); Paul Stock and Chris Brickell, "Nature's Good for You: Sir Truby King, Seacliff Asylum, and the Greening of Healthcare in New Zealand, 1889–1922," *Health & Place* 22, (2013): 107-114.

[13] See for example, Möller-Wille and Rheinberger, *A Cultural History of Heredity*: 127-128.

important role as an experimental animal within many spheres of biological investigation due, as science and technology historian William Boyd observed, to its quick reproductive cycle. While this hastened the development of specialist aspects of poultry science, including genetics, physiology, nutrition and disease, which commenced relatively early in the 1910s and 1920s,[14] as this thesis elucidates through examples in later chapters, comparative analysis remained important to poultry research.

An emerging body of scholarship stimulated by the work American science historian Adele Clarke, has highlighted the intersection between livestock breeders and research into human biology and medicine, or between 'the farm and the clinic' as she phrased it. Clarke noted the general biological knowledge which emerged simultaneously with specific agricultural science such as poultry and dairying.[15] More pertinent to this thesis however is British historian Jenny Marie's investigation into the close working relationship between British poultry breeders and eugenic-geneticists, and American historian Kathy Cooke's study of the corresponding American scene. However, all these studies differ to my own in that they centre upon the scientific community and how breeder knowledge informed human spheres.[16]

'Bottom-Up' Scholarship: Human-Animal Comparison on the Farm

Human-animal comparison within Victorian society and agriculture has been a central concern within the work of historian, Harriet Ritvo. Her documentation

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[14] William Boyd, "Making Meat: Science, Technology, and American Poultry Production," *Technology and Culture* 42, no. 4, (2001): 636.

[15] Adele Clarke, *Disciplining Reproduction: Modernity, American Life Sciences, and "The Problems of Sex"* (Berkeley: University of California Press, 1998). 40-59; Sarah Wilmot, "Between the Farm and the Clinic: Agriculture and Reproductive Technology in the Twentieth Century," *SHPBBS* 38, no. 2, (2007): 303-315.

[16] Kathy J. Cooke, "Science and Art Among the Chickens: Practical Breeding in the Work of Raymond Pearl," in *Humanities Working Paper 158* (Pasadena, California: California Institute of Technology, 1994); Jenny Marie, "For Science, Love and Money: The Social Worlds of Poultry and Rabbit Breeding in Britain, 1900-1940," *Social Studies of Science* 38, no. 6, (2008): 919-936.

of farmer engagement with popular natural history in the late nineteenth-century, explored how ideas about human nature, gender, reproduction, inheritance and race were applied to farm animals.[17] The blend of scientific, theological and philosophical concepts within this naturalist biology,[18] in which many evolutionary principles and 'natural laws' were understood to apply to animals and people alike, is now well-documented. Ritvo refers to the 'animal analog' as a dominant cultural construct within Victorian society generally.[19]

Twentieth-century historiography does not tend to consider animal psychology, breeding, the animal-worker body and ideas about physiology, and health collectively in terms of any cultural tendency towards comparison. However, culturally-orientated human-animal studies scholarship alludes to this phemomenon. Annie Potts' cross-cultural study *Chicken*,[20] and Susan Merrill Squier's *Poultry Science, Chicken Culture,* note transferred ideas about humans and chickens between several spheres of science and industry.

Squier's book is particularly pertinent as although, comparative description within farming perspectives is not the central focus of her work, Squire teases out the eugenic culture of twentieth-century American agricultural fairs that juxtaposed poultry-breeding and beauty contests, and farming discourse comparing the perfection of human and chicken bodies and hens to 'beauty queens'. In her examination of poultry books featuring champion bird and

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[17] Harriet Ritvo, *The Animal Estate: The English and Other Creatures in the Victorian Age* (Cambridge, Mass.: Harvard University Press, 1987). 1-81; Harriet Ritvo, *Noble Cows and Hybrid Zebras: Essays on Animals and History* (Charlottesville: University of Virginia Press, 2010). 13-28, 132-156; Harriet Ritvo, "The Animal Connection," in *The Boundaries of Humanity: Humans, Animals, Machines*, ed. James Sheehan and Morton Sosna (Berkeley: University of California Press, 1991), 68-84; Harriet Ritvo, *The Platypus and the Mermaid, and Other Figments of the Classifying Imagination* (Cambridge, Mass.: Harvard University Press, 1997). 120-121.

[18] I use the terms natural history, naturalist science or naturalist biology synonymously, usually in reference to traditional breeder perspectives or twentieth-century popular biology.

[19] Ritvo, *Noble Cows and Hybrid Zebras: Essays on Animals and History*: 7.

[20] Annie Potts, *Chicken* (London: Reaktion Books, 2012).

breeder portraits she discerns a 'eugenic gaze' in the way they were similarly displayed. Squire also examines children's literature portraying the chicken-as-worker, and the chicken as an experimental animal within spheres of human medicine and biology, including eugenics, oncology and embryology. [21]

British veterinary historian Abigail Woods' recent article on British pig farming from 1910 -1965 makes broad observations that concur with my own. She observes that husbandry, particularly within the interwar period, was influenced by concurrent thinking about human health. She also comments that breeders referred to eugenics and natural laws, and expressed romantic, moral sentiment, acknowledging pig individuality, sentience and agency. Wood does not consider her findings in terms of education or popular concepts of general biology, but does acknowledge the influence of 'medical' and 'cultural cross-currents'. Her primary observation is that the prevalent humanitarian ethos challenges conceptions of modern agriculture as utilitarian and ruthless. My study extends her preliminary observations beyond a primary focus on moral attitudes.[22]

Comparative Psychology and Anthropomorphism

Comparative (or 'evolutionary') psychology as a sub-discipline of general biology has not received scholarly attention in respect to its impact on farmers' ideas about the animal mind in the early twentieth century. The assumption of psychological experience in animals is commonly associated with anthropomorphism and with the sentimentality of the Victorian age and pet-keeping.[23] Human-animal studies scholarship notes declining attention to

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[21] Susan Merrill Squier, *Poultry Science, Chicken Culture: A Partial Alphabet* (New Brunswick, N.J.: Rutgers University Press, 2011). 22-26, 36-40, 48-58, 82-87, 142-145, 168-171.

[22] Abigail Woods, "Rethinking the History of Modern Agriculture: British Pig Production, c.1910-65," *Tweniteth Century British History* 23, no. 2, (2012): 165-191.

[23] Ritvo and numerous other scholars have examined the Victorian craze for pet-keeping for example. See Harriet Ritvo, "The Emergence of Modern Pet-Keeping," in *Animals and People Sharing the World*, ed. Andrew Rowan (Hanover, New Hampshire: University Press of New

animal psychological experience in the twentieth century. This is contextualised within behaviourist orthodoxy which posited the assumption of human psychological experience in animals as a category-error.[24]

Further scholarship on the topic of anthropomorphism is helpful in considering farmers' assumptions of bird psychology, and other assumptions of similarity. Ritvo identified different forms of anthropomorphism within Victorian discourse. She argues that anthropomorphism arose through people's close proximity to animals as daily companions. Pets were considered part of families and animal workers much like labourers. Criticisms of anthropomorphism in this context where animals and people shared perceptions and responses, she notes, deny a social reality. However, she also observed cognitive dissonance in farmers' ideas about kinship with animals in the nineteenth century, noting that they would rationalise psychological similarity or deny it, as was convenient.[25] To assist differentiation between modes of description, I utilise chicken advocate and scholar Karen Davis's terms 'empathetic anthropomorphism' and 'false anthropomorphism' in this study. The latter refers to the use of analogous rhetoric that portrays animals mirroring human goals (as when descriptions of chicken workers are employed to imply this).[26]

England, 1988), 13-31; Dorothee Brantz, "The Domestication of Empire: Human-Animal Relations at the Intersection of Civilization, Evolution, and Acclimitization in the Nineteenth Century," in *A Cultural History of Animals in the Age of Empire*, ed. Kathleen Kete (New York: Berg, 2007), 73-93.

[24] Emanuela Cenami Spada, "Amorphism, Mechanomorphism, and Anthropomorphism," in *Anthropomorphism, Anecodtes and Animals*, ed. Robert W. Mitchell, Nicholas S. Thompson, and H. Lyn Miles (New York: State University of New York Press, 1997), 37-49; Elliott Sober, "Comparative Psychology Meets Evolutionary Biology: Morgan's Canon and Cladistic Parsimony," in *Thinking with Animals: New Perspectives on Anthropomorphism*, ed. Lorraine Daston and Gregg Mitman (New York: Columbia University Press, 2005), 85-99.

[25] Ritvo, *Noble Cows and Hybrid Zebras: Essays on Animals and History*: 6-9.

[26] Karen Davis, "Chicken-Human Relationships: From Procrustian Genocide to Empathetic Anthropomorphism," *Spring: A Journal of Archetype and Culture* 83, (2010): 264-270.

Historian Kathleen Kete usefully cites Philippe Descola's model which highlights that comparison in itself does not necessarily imply psychological empathy and kind treatment. Descola postulates conceptions of human-animal similarity on two axes: physicality – ideas about the body, and interiority – ideas about consciousness or the mind. The hegemonic Western scientific (behaviourist) worldview, he argues, advanced human similarity with animals on the physical axis, but difference in terms of interiority.[27] His notion of a sliding scale highlights another point: observations of similarity do not indicate the *degree* of similarity or the closeness perceived. Recognising sensitivity to pain, for example, does not imply the acknowledgement of emotional lives or intelligence.

Contemporary science and human-animal studies scholarship generally rejects the classical behaviourist assumption that hypotheses of animal psychology are anthropomorphic. Chicken behaviourist Marion Stamp Dawkins, while refusing to state that animals experience emotion as humans do, acknowledges the limitations of the 'window' of science for exploring the animal mind.[28] Evolutionary biologists now advocate the use of empathetic observation as a starting point for generating hypotheses.[29] Various scholars still debate whether empathetic anthropomorphism is an innate tendency.[30]

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[27] Kathleen Kete, "Introduction: Animals and Human Empire," in *A Cultural History of Animals in the Age of Empire*, ed. Kathleen Kete (Oxford: Berg, 2007), 19-20.

[28] Bernard Rollin, "Anecdote, Anthropomorphism and Animal Behaviour," in *Anthropomorphism, Anecodtes and Animals*, ed. Robert W. Mitchell, Nicholas S. Thompson, and H. Lyn Miles (New York: State University of New York Press, 1997), 125-133; Marian Stamp Dawkins, *Why Animals Matter: Animal Consciousness, Animal Welfare, and Human Well-being* (New York: Oxford University Press, 2012). 27-28.

[29] Neil A. Campbell, Jane B. Reece, and Eric J. Simon, *Essential Biology*, 2nd ed. (San Francisco: Pearson, 2004); Sandra Mitchell, "Anthropomorphism and Cross-Species Modelling," in *Thinking with Animals: New Perspectives on Anthropomorphism*, ed. Lorraine Daston and Gregg Mitman (New York: Columbia University Press, 2005), 100-117; Dustin J. Penn and Iver

Eugenics and Social Darwinism

New Zealand historians have paid scant attention to human-animal comparison, generally attributing farming 'parallels' and 'metaphors' to Social Darwinist, eugenic rhetoric of the first half century.[31] Philippa Mein Smith, for instance, observed the organisation of children's health camps for 'fattening stock', and that child health and diary and meat exports were correlated within images of the Dominion as the Empire's farm.[32] Angela Wanhalla's 2001 thesis noted eugenist analogies between animal and human husbandry and their propagandist, pedagogical use by women's groups, including the Women's Division of the Farmer's Union.[33] Eugenic ideas clearly had particular resonance within the scientifically-inclined farming community.

Despite the fact that a number of scholars have noted both the eugenic culture of today's livestock industries, and its origins in the intertwined history of agricultural science and the eugenic atrocities of WWII,[34] the notion that there may have been an interplay between eugenics and early twentieth-century farming approaches, has been largely ignored or dismissed by agricultural historians. Canadian historian and animal breeder Margaret Derry, for example,

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Mysterud, eds., *Evolutionary Perspectives on Environmental Problems* (New Brunswick, New Jersey: Aldine Transaction, 2007).

[30] Edward O. Wilson, *Biophilia* (Cambridge, Mass.: Harvard University Press, 1984); Harold Herzog, "Darwinism and the Study of Human-Animal Interactions," *Society & Animals* 14, no. 4, (2002): 361-367.

[31] I initially observed transferred cultural attitudes and parallels within farming discourse and imagery in Janine Cook, "Stock Portraiture. Bulbous Udders and Beefy Sides. A&P Livestock Photographs in the Otago Witness" (P.G.Dip. research essay, University of Otago, 2006).

[32] Philippa Mein Smith, *A Concise History of New Zealand*, 2nd ed. (Cambridge: Cambridge University Press, 2012). 143-144.

[33] Angela Wanhalla, "Gender, Race and Colonial Identity: Women and Eugenics in New Zealand, 1918-1939" (M.A. thesis, University of Canterbury, 2001), 73-83.

[34] For example, Charles Patterson, *Eternal Treblinka: Our Treatment of Animals and the Holocaust* (New York: Lantern Books, 2002).

refutes claims that breeders were influenced by eugenics,[35] and in *Art and Science in Breeding*, an examination of North American poultry breeding, attributes eugenic references to Social Darwinist rhetoric. She argues that breeders largely ignored genetic-eugenic science (which she acknowledges as one and the same thing in the minds of farmers) prior to WWII. Derry observes the initial close relationship between breeders and eugenicist scientists as I and others have. She also identifies, as I have in relation to the New Zealand scene, that there was not a wholesale, keen adoption of professional scientific advice. In her early study, *Bred for Perfection*, she claims that animal breeders in general resented being linked to eugenic theory. She surmises that this contributed to their retrenchment into traditional artistic practice.[36]

Derry's analysis helpfully highlights the limited practical impact of specific aspects of genetic-eugenic research upon lay breeding practice prior to WWII. However, she does not consider the integration of lay eugenic perspectives into breeder practice, which affirmed traditional methods, nor how eugenic thinking was reinforced by conceptions of general biology influencing other areas of poultry husbandry.

I argue that eugenic ideas aligned with the traditional visual selection of birds by beauty and form. This would be in keeping with Ritvo's observations of race theory that informed nineteenth-century husbandry. Historian Keith Thomas also demonstrated that even prior to 1800 scientific and philosophical musings such as Rousseau's about the mutual degradation of civilised humans and improved livestock underpinned advocacy for attention to beauty and utility

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[35] Derry, Margaret, e-mail to author, 27 March 2014.

[36] Margaret Elsinor Derry, *Bred for Perfection: Shorthorn Cattle, Collies and Arabian Horses Since 1800* (Baltimore: John Hopkins University Press, 2003). 14-16; Margaret Elsinor Derry, *Art and Science in Breeding: Creating Better Chickens* (Toronto: University of Toronto Press, 2012). 60, 67-105.

within livestock breeding.[37] I argue that twentieth-century ideas demonstrated continuity with the past pattern of attention to popular science, and that in the absence of viable alternatives, the essential principle of generally-applicable natural laws, continued to influence breeder thinking and practice.

Moving beyond rhetorical explanations, the influence of broad Social Darwinist ideas upon farmer reasoning and practice has been noted within agricultural histories. New Zealand historians Tom Brooking and Eric Pawson in *Seeds of Empire*, although ignoring attitudes to the animals eating the grass on which their discussion is centred, observed Social Darwinist attitudes to progress in the twentieth century. They also discerned a 'moral landscape', observing that farm efficiency, beautification and order were associated with moral improvement, and farming failure within the Depression era with spiritual decline.[38] This echoed historian Bert Theunissen's identification of the 'moral economy' of early twentieth-century Dutch dairy farming, which notes that attention to maintaining an organised, attractive farm and well-cared for, well-proportioned stock reflected broader 'cultural attitudes'.[39]

Historian Mike Hawkin defines Social Darwinism as a worldview during the first half of the century in which fundamental biological laws related to natural selection, adaptation, improvement and degeneration – those articulated by Darwin and his advocates – were extrapolated to social and political behaviour. He observes vague, over-use of Social Darwinism as a term within scholarship, noting that it is commonly conflated with eugenic rhetoric and with the catchphrases, 'struggle to survive', Herbert Spencer's meme, 'survival-of-the-fittest', and with 'degenerationist' and 'energist' references to decline and

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[37] Keith Thomas, *Man and the Natural World: A History of the Modern Sensibility* (New York: Pantheon Books, 1983). 285-288.

[38] Tom Brooking and Eric Pawson, *Seeds of Empire: The Environmental Transformation of New Zealand* (London and New York: I.B. Tauris, 2011). 179, 201.

[39] Bert Theunissen, "Breeding without Mendelism: Theory and Practice of Dairy Cattle Breeding in the Netherlands 1900-1950," *JHistBio* 41, no. 4, (2008): 637-676.

'waste'. The latter terms stemmed from combined thermodynamic and retrogressive evolutionary theories. Darwin's observation of cooperation in nature also underpinned the Social Darwinist theory of 'mutual aid'.[40] These ideas are all evident within poultry farming discourse. However, while I acknowledge farmers' use of Social Darwinist tropes, I argue that these ideas had meaning beyond the rhetorical.

Poultry experts commonly intertwined Darwinist ideas and modern research within their reasoning, consistent with general biology. It is also inaccurate to reduce modern experimental biology to Social Darwinism, as is evident in recent histories. While evolutionary ideas were inherent in generalised experiment, as far as scientists of this time were concerned, Darwin was, to borrow Lynn Nyhart's imagery, a distant 'ghost'.[41] As historians have warned, a key problem with the use, or over-use, of Social Darwinism as an explanatory tool is its white-washing effect upon the intersecting ideological threads that inform history.[42]

The Animal-Worker

Livestock-worker analogy has been examined by British historian Keith Thomas and others in respect to pre-twentieth century theological and humanitarian ideas. Thomas observed in *Man and the Natural World* that worker analogy signalled variable attitudes to dominion, but that in the nineteenth century, the

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[40] Mike Hawkins, *Social Darwinism in European and American Thought, 1860-1945: Nature as Model and Nature as Threat* (Cambridge: Cambridge University Press, 1997). 3-20. See also Carl N. Degler, *In Search of Human Nature: The Decline and Revival of Darwinism in American Social Thought* (New York: Oxford University Press, 1991); Paul Crook, *Darwin's Coat-Tails: Essays on Social Darwinsm* (New York: Peter Lang, 2007).

[41] Nyhart, *Modern Nature: The Rise of the Biological Perspective in Germany*: 25-26; See for example, Erika Milam's aforementioned *Looking for a Few Good Males: Female Choice in Evolutionary Biology.*

[42] Christopher R. Versen, "What's Wrong with a Little Social Darwinism (In Our Historiography)?," *The History Teacher* 42, no. 4, (2009): 403-423.

animal rights movement correlated animal and worker plights within capitalist industry.[43]

In the twentieth-century, existing animal-worker analogy was reinforced by evolutionary and physiological concepts about workers and their machine-bodies. This study demonstrates that farmers understood that the emerging 'science of work' applied to animal workers, and as with eugenic description, that degenerationist and energist ideas related to the worker-hen were not simply rhetorical, but grounded in the general biology of the period with its entwined moral and metaphysical ideas.

The physiological investigations into the 'animal-machine' that underpinned late nineteenth and early twentieth-century ideas about the human-worker body are detailed within historian Anson Rabinbach's *The Human Motor.* He details how physiological thermodynamic theory was enmeshed with evolutionary ideas and spiritual beliefs.[44] This latter point has been widely acknowledged within interdisciplinary scholarship, as has the dominance of the animal-machine metaphor within modern Western thought.[45]

Sociological agribusiness and human-animal studies scholarship of recent decades has acknowledged historical conceptions of the animal-machine and the application of scientific management principles within modern agriculture,

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[43] Thomas, *Man and the Natural World: A History of the Modern Sensibility*: 44-50, 185-190. On Christian dominion see also Rod Preece and David Fraser, "The Status of Animals in Biblical and Christian Thought: A Study in Colliding Values," *Society & Animals* 8, no. 3, (2000): 245-263.

[44] Anson Rabinbach, *The Human Motor: Energy, Fatigue, and the Origins of Modernity* (Berkeley: University of California Press, 1992).

[45] On energist metaphysics see also for example, Amy E. Wendling, *Karl Marx on Technology and Alienation* (Hampshire: Palgrave Macmillan, 2009). 61-92. On metaphor, see for example, Mark Seltzer, *Bodies and Machines* (New York: Routledge, 1992); Deirdre Coleman and Hilary Fraser, *Minds, Bodies, Machines, 1770-1930* (Basingstoke and New York: Palgrave Macmillan, 2011).

but focuses on the industrialised agriculture of the post-WWII period.[46] Earlier scholarship examining agricultural human-animal relations within post-WWII agribusiness continued capitalist critiques with Marxist analyses of animal-workers.[47]

The concept of animal-workers has not been examined by New Zealand historians, although the farming sector's promotion of technological efficiency in the late nineteenth and early twentieth centuries has been. Margaret McClure, in her analysis of mid-1890s *New Zealand Farmer* magazines identified a (sometimes ambivalent) fascination with the factory world. The mastery and invention of machines, she observed, embodied the pioneering spirit of action and conquest within entrepreneurial modernity.[48] James Belich noted that by 1891 meat processing was the largest factory sector in monetary terms in the nation.[49] B.L. Evans, in his early survey of New Zealand agricultural production, observed the massive uptake of technology within the 'age of

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[46] See for example, Adrian Franklin, *Animals and Modern Cultures: A Sociology of Human-Animal Relations in Modernity* (London: Sage, 1999). 34-40; Mark Finlay, "Hogs, Antibiotics, and the Industrial Environments of Postwar Agriculture," in *Industrializing Organisms: Introducing Evolutionary History*, ed. Philip Scranton and Susan Schrepfer (New York: Routledge, 2004), 237-260. William Boyd's aforementioned study which addresses the broiler (chicken meat) industry also falls within this category. Agribusiness', originally an American term, refers to integrated chains of specialist, subcontracted businesses for the production of agricultural commodities, such as poultry meat. See further texts on this under 'Other poultry industry scholarship'.

[47] Worker alienation in respect to broiler birds is a particular focus within Barbara Noske, *Humans and Other Animals: Beyond the Boundaries of Anthropology* (London; Winchester, Massachusetts: Pluto Press, 1989).

[48] Margaret McClure, "Body and Soul: Heroic Visions of Work in the Late Nineteenth Century," in *Fragments; New Zealand Social & Cultural History*, ed. Bronwyn Dalley and Bronwyn Labrum (Auckland: Auckland University Press, 2000), 109-113.

[49] James Belich, *Paradise Reforged: A History of the New Zealanders From the 1880s to the Year 2000* (Albany, New Zealand and London: Allen Lane, 2001). 73.

mechanised farming' between 1922 and 1939.[50] The impact of scientific management principles on interwar farming has been discussed in general terms within American historiography, but this topic is as yet uncharted within New Zealand scholarship.[51]

Health

Abigail Wood's study highlighting constitutional health perspectives is situated within the burgeoning field of international veterinary medicine and 'one health' historiography.[52] The World Association for the History of Veterinary Medicine congress in 2014 examined topics such as comparative medicine, animals as experimental models, veterinary-medical relationships and zoonotic diseases.[53] A significant founding work in this field is Lise Wilkinson's history of comparative medicine, which examines ancient traditions and their modern origins within the comparative anatomy, physiology and zoonotic pathology of European and British veterinary institutions in the late nineteenth-century, and the institutions supporting American experimental research in the first half of the twentieth century.[54]

New Zealand historian Katrina Ford's recent examination of attitudes to hygiene up until WWI documents the significance of agricultural discourse on zoonotic disease to public health discourse in New Zealand. She argues that ideas about hygiene were not solely generated by scientists as standard

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[50] B.L. Evans, *A History of Agricultural Production and Marketing in New Zealand* (Palmerston North: Keeling & Mundy Ltd., 1969). 17.

[51] For example, Deborah Fitzgerald, *Every Farm a Factory: The Industrial Ideal in American Agriculture* (New Haven: Yale University Press, 2003).

[52] 'One health' as a contemporary term refers to an international movement concerned with fostering interspecies research on health issues. See "Mission Statement," One Health Initiative, accessed 15 June 2014, http://onehealthinitiative.com/mission.php.

[53] World Association for the History of Veterinary Medicine, "41st International WAHVM Congress 2014 " accessed 15 May 2014, http://wahvm.org/tag/one-health/.

[54] Lise Wilkinson, *Animals & Disease: An Introduction to the History of Comparative Medicine* (Cambridge: Cambridge University Press, 1992).

histories of germ theory suggest, but by various intersecting 'health cultures' of agriculture, schools, hospitals and personal health.[55] My analysis of farmers' comparative health perspectives in chapter six, observes links within general public discourses as these scholars have done, but situates it within the broader discourse of general biology through the first half of the century.

Other Poultry Industry Scholarship

Historiography on the New Zealand poultry industry is negligible. A handful of accounts of family poultry farms and cooperative industry groups exist.[56] Other scattered offerings summarise aspects of the industry.[57] This dirth of material is interesting given the significance of poultry produce within today's national diet, contemporary interest in the way chickens are farmed,[58] and the

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[55] Katrina Ford, "The Tyranny of the Microbe: Microbial Mentalities in New Zealand, c.1880–1915" (PhD thesis, University of Auckland, 2013).

[56] David Yerex, *The Pride of Poultrymen: A 50 Year History of the Poultrymen's Co-operative Ltd* (Auckland: The Co-operative, 1994); Poppy Watts, *This was Speldhurst: The Story of an Early Stokes Valley Family* (Lower Hutt: Harvey Watts, 2001); Graham Salisbury, *What Came First? including the Tegel Chicken Story* (Tauranga: Lighthouse, 2004); Elena Gee, *Poultry Farming at Henderson Valley Park: An Essay* (Waitakere City: West Auckland Historical Society, in association with Waitakere Library and Information Services, 2010).

[57] The most significant example is Vanessa Wintle and Stacey Lepper, "Poultry Industry - Early Twentieth Century," Te Ara - The Encyclopedia of New Zealand, accessed 11 October 2012, http://www.teara.govt.nz/en/poultry-industry/page-1. A history of the breeding standards is provided in Ian Selby, *New Zealand Poultry Standards*, 3rd ed. (Waitara: I & G Selby Ltd., 2013). 8-22. Some contemporary poultry welfare history has been outlined. See for example, J.K. Gibson, "An Economic Analysis of the 1986 Deregualtion of the New Zealand Egg Industry," (Canterbury: Agribusiness and Economics Research Unit, Lincoln College, 1988), 495-514; Michael Morris, "The Ethics and Politics of the Caged Layer Hen Debate in New Zealand," *Journal of Agricultural and Environmental Ethics* 19, (2006).

[58] Lilian Grace, "New Zealand Annual Meat Consumption Per Capita, 1970-2013, kg," Wiki New Zealand, accessed 25 June 2014, http://wikinewzealand.org/?tag=consumption; "Good Eggs: Farming Welfare-Friendly & Affordable Eggs for New Zealand," Egg Producers Federation New Zealand, accessed 25 June 2014, http://eggfarmers.org.nz/eggfarmers/wp-content/uploads/2013/04/brochure-good-eggs.pdf. Example of public media attention: Battery

historical significance of poultry-keeping as a domestic activity and food industry. New Zealand's numerous agricultural histories tend to document large primary export industries.[59] Overviews of Government agricultural services also focus on larger departments.[60]

Most international historiography on the poultry industry exists within American business history, agri-food and welfare critiques of the post-WWII period and contemporary industry. These explore the development of food commodity chains, intellectual property protection in breeding, and labour force, environmental and animal welfare issues.[61] Numerous theses align with these themes.[62] Some groundwork for these studies was laid by American industry experts and welfare critics in the 1970s.[63]

Hens on *Sunday*, TV1, 7.30pm, 13 November 2011; Sue Kedgley, "Antibiotics: The Danger of them Ruling the Roost," *Dominion*, 12 December 2013, B4.

[59] For example, Irene Waswo, *Farming Progress in New Zealand, 1814-1995* (New Plymouth: I. Waswo, 1996); Tom Brooking, "Economic Transformation," in *The Oxford History of New Zealand*, ed. Geoffrey Rice (Auckland: Oxford University Press, 2000), 230-253; David Greasley and Les Oxley, *The Pastoral Boom, the Rural Land Market, and Long Swings in New Zealand's Economic Growth 1873-1939* (Christchurch: Dept. of Economics, University of Canterbury, 2008).

[60] Tony Nightingale, *White Collars and Gumboots: A History of the Ministry of Agriculture and Fisheries, 1892-1992* (Palmerston North: Dunmore Press, 1992); Philip Journeaux, P. R. Stephens, and R. W. M. Johnson, *The Development of Agricultural Advisory Services in New Zealand* (Wellington: Ministry of Agriculture, 1997).

[61] See for example, Glenn E. Bugos, "Intellectual Property Protection in the American Chicken-Breeding Industry," *The Business History Review* 66, no. 1, (1992): 127-168; Donald D Stull and Michael J. Broadway, *Slaughterhouse Blues: The Meat and Poultry Industry in North America, Case Studies on Contemporary Social Issues* (Belmont, California: Wadsworth, 2004); Steve Striffler, *Chicken: The Dangerous Transformation of America's Favorite Food* (New Haven: Yale University Press, 2005).

[62] For example, Monica Richmond Gisolfi, "From Cotton Farmers to Poultry Growers: The Rise of Industrial Agriculture in Upcountry Georgia, 1914-1960" (PhD thesis, Columbia University, 2007); Solomon lyobosa Omo-Osagie II, "Commercial Poultry Production on Maryland's Lower Eastern Shore and the Involvement of African Americans, 1930s to 1990s" (PhD thesis, Morgan State University, 2007); Brent E. Riffel, "The Feathered Kingdom: Tyson Foods and the

Cultural historian Karen Sayer has authored a number of articles investigating aspects of British poultry-keeping culture and industry from the Victorian period through to the 1970s, including welfare concerns about the 'chicken-machine' within the agribusiness era. Sayer examines women's central involvement in Britain's early industry, focussing on sustained family farm operations up until the late 1970s. She argues that her account lends support to Abigail Wood's observations that a teleological narrative of modernisation within histories of twentieth-century agriculture requires reassessment.[64] New Zealand had different patterns of women's involvement as is explained in chapter one. My attention to women within industry extends Sayer's observations, drawing attention to their role in preserving attitudes to natural laws and moral sentiment. Besides Sayer, other British scholars have documented the poultry meat industry, including its relationship with the post-WWII pharmaceutical industry.[65]

Transformation of American Land, Labor, and Law, 1930-2005" (PhD thesis, University of Arkansas, 2008); James Russell Pryor, "Work, Nature, and the American Dinner Plate: Making Chicken in the Twentieth-Century United States" (PhD thesis, Carnegie Mellon University, 2013).

[63] John L. Skinner, Oscar August Hanke, and James Harold Florea, eds., *American Poultry History, 1823 - 1973: An Anthology of 150 Years: People, Places, Progress*, 1st ed. (West Lafayette, Indiana: American Poultry Historical Society, 1974); Page Smith and Charles Daniel, *The Chicken Book* (Boston: Little, Brown & Co., 1975).

[64] Karen Sayer, ""Let Nature Be Your Teacher": Tegetmeier's Distinctive Ornithological Studies," *Victorian Literature and Culture* 35, no. 2, (2007): 589-605; Karen Sayer, "Battery Birds, 'Stimulating' and 'Twilighting': The Ecology of Standardised Poultry Technology," *History of Technology* 28, (2008): 149-168; Karen Sayer, "'His footmarks on her shoulders': The Place of Women Within Poultry Keeping in the British Countryside, c.1880 to c.1980," *Agricultural History Review* 61, no. II, (2013): 305; Karen Sayer, "Animal Machines: The Public Response to Intensification in Great Britain, c. 1960-c. 1973," *Agricultural History* 87, no. 4, (2013): 473-501. On women in the Irish poultry industry, see Joanna Bourke, "Women and Poultry in Ireland, 1891-1914," *Irish Historical Studies* 25, no. 99, (1987): 293-310.

[65] Brian Short, "'The Art and Craft of Chicken Cramming': Poultry in the Weald of Sussex 1850—1950," *The Agricultural History Review* 30, no. 1, (1982): 17-31; Andrew Godley and Bridget

The Australian industry has received slightly more attention than the New Zealand scene. Desmond Cain uncritically documented the post-war industry and sociologist Jane Dixon has examined historical patterns of Australian poultry meat consumption.[66] A counterpoint to agribusiness histories has been provided by Andrea Gaynor's examination of backyard poultry-keeping as an aspect of urban Australian food production.[67]

Theoretical Frameworks, Language and Scope

This study is a cultural history. Cultural histories typically examine intersecting ideological influences through discourse analysis, that is, the 'reading' of source material to determine patterns of ideas and shared meanings. The sustained use of analogy and metaphor is typically a focus. The comparison of chickens to workers is a clear metaphorical analogy. However, within this thesis I have generally employed the term 'comparison' rather than 'analogy' in order to avoid the assumption of metaphorical use and intent. As is illustrated in later chapters, for example, farmers were not speaking metaphorically when describing chickens as happy, or as degenerate specimens of their race. The broader term 'comparative description' also corresponds with the various

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Williams, *The Chicken, the Factory Farm and the Supermarket: The Emergence of the Modern Poultry Industry in Britain*, Working Paper Series (Reading: University of Reading Business School, 2007); Andrew Godley and Bridget Williams, "Democratizing Luxury and the Contentious "Invention of the Technological Chicken" in Britain," *Business History Review* 83, no. 2, (2009): 267-290; Andrew Godley and T.A.B. Corley, "Veterinary Medicines in Britain: Output and Industry Organisation since 1900," *Medical History* 55, (2011): 361-364.

[66] Desmond Cain, *History of the Australian Chicken Meat Industry 1950-1990* (Sydney: The Australian Chicken Meat Federation, 1990); J. Dixon, *The Changing Chicken: Chooks, Cooks and Culinary Culture* (Sydney: University of New South Wales Press, 2002).

[67] Andrea Gaynor, "From Chook Run to Chicken Treat: Speculation on Changes in Human-Animal Relationships in Twentieth Century Perth, Western Australia," *Limina* 5, (1999): 26-39; Andrea Gaynor, "Regulation, Resistance and the Residential Area: The Keeping of Productive Animals in Twentieth-Century Perth, Western Australia," *Urban Policy and Research* 17, no. 1, (1999): 7-16; Andrea Gaynor, "Animal Agendas: Conflict over Productive Animals in Twentieth-Century Australian Cities," *Society & Animals* 15, (2007): 29-42.

branches of biology (comparative psychology, comparative pathology and so forth), which are central to this thesis.[68]

This study aligns with the culture of science or the history of ideas rather than traditional science historiography. Lay perspectives and what historian Charles Rosenberg refers to as 'ecologies of knowledge', are my central concern rather than 'internalist' perspectives of professional science communities. As has been discussed, previously-assumed boundaries between lay, applied and professional fields are being challenged, but Rosenberg's 1976 criticism of historians for sustaining a shallow understanding of the relationship between science and society, science and values, and science and social thought, remains relevant, as is evident from the gaps within literature on my topic.[69] As I am concerned with the intersection of science, culture and ideology, the term 'science' in this thesis is used to describe ideas such as eugenics and anthropometry, which are now discredited. I do not refer to 'pseudo-science' but preserve contemporary conceptions and discussion of these areas of investigation as science, however much they were debated, rejected or transformed within their integration into lay knowledge-systems.[70]

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[68] On discourse analysis and arguments for using a range of tools in combination with this see Lynn Hunt, ed. *The New Cultural History* (Berkeley: University of California Press, 1989), 5-14; Bryan Palmer, *Descent into Discourse: The Reification of Language and the Writing of Social History* (Philadelphia: Temple University Press, 1990). 5, 8, 41-47; Susan Pearson and Mary Weismantel, "Does "The Animal" Exist? Towards a Theory of Social Life with Animals," in *Beastly Natures: Animals, Humans and the Study of History*, ed. Dorothee Brantz (Charlottesville: University of Virginia Press, 2010), 17-57.

[69] Charles E. Rosenberg, *No Other Gods: On Science and American Social Thought* (Baltimore: John Hopkins University Press, 1976). ix, 26. Garland Allen referred to the 'internalist' focus of one branch of science historiography. See Garland Allen, *Life Science in the Twentieth Century* (Cambridge: Cambridge University Press, 1978). xii.

[70] On the ideological shaping of biological discourse throughout history and to the present time, see Denis R. Alexander and Ronald L. Numbers, *Biology and Ideology from Descartes to Dawkins* (Chicago: University of Chicago Press, 2010).

Human-animal relations, including but not limited to the study of animal rights and welfare, is of central concern to the field of human-animal studies (HAS), which Ritvo argues, may be comprehended within the postmodern or democratising trend within historiography.[71] Although New Zealand historiography on human-animal relations and farmed animals in particular is sparse, scholarship is emerging.[72]

In regard to farmed animals, New Zealand historians have recently begun to explore moral perspectives. Past agricultural historiography, James Beattie and John Stenhouse have observed, has characterised nineteenth-century settler-farmers as unsympathetic – filled with progressive, utilitarian zeal for the technological and scientific mastery of nature, with little attention given to notions of Christian stewardship.[73] In the early twentieth century, science and religion were not mutually exclusive, Beattie observes, and religion continued to influence attitudes to nature, including, he surmises, animals.[74] Revisionist challenges to the 'secular New Zealand' arguments of past historiography, including Stenhouse's observation of sustained Christian 'habits of the heart', at least until the 1960s, inform this view.[75] Nancy Swarbrick's recent study of New

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[71] Harriet Ritvo, "History and Animal Studies," *Society & Animals* 10, no. 4, (2002): 404; Harriet Ritvo, "Animal Planet," *Environmental History.* 9, no. 2, (2004): 204-220.

[72] For example, Carolyn J. Mincham, *The Horse in New Zealand; Attitude & Heart* (Auckland: David Bateman, 2011); Annie Potts, Philip Armstrong, and Deidre Brown, *A New Zealand Book of Beasts: Animals in Our Culture, History and Everyday Life* (Auckland: Auckland University Press, 2013); Catherine Amey, *The Compassionate Contrarians: A History of Vegetarians in Aotearoa New Zealand* (Wellington: Rebel Press, 2014).

[73] James Beattie and John Stenhouse, "God and the Natural World in Nineteenth-Century New Zealand," in *Christianity, Modernity and Culture: New Perspectives in New Zealand History*, ed. J. Stenhouse and G.A. Wood (Adelaide: ATF Press, 2005), 180-190, 203.

[74] James Beattie, "Rethinking Science, Religion and Nature in Environmental History," *Historical Social Research* 29, no. 3, (2004): 103.

[75] John Stenhouse, "God's Own Silence: Secular Nationalism, Christianity and the Writing of New Zealand History," *NZJH* 38, (2004): 52-71. See also Alison Clarke, "Churchgoing in New Zealand, 1874-1926: How 'Mediocre' Was It?," *NZJH* 47, no. 2, (2013): 106-135.

Zealand pet-keeping, *Creature Comforts*, includes sections on poultry fancy clubs and the teaching of kindness to animals within school agricultural clubs. She identifies a strong humanitarian culture within this period, but makes only passing reference to naturalist biology.[76]

This study thus intersects with, but departs from, existing local (and international) HAS scholarship, as it is centrally concerned with exploring the persistence of human-animal comparison, and with demonstrating how scientific ideas contributed to this. The primary agenda is not to discuss how a sense of connection contributed to sympathetic attitudes and approaches to livestock. However the exploration of ideas about fundamental similarities, especially in respect to the animal mind, and the melding of scientific and moral perspectives, clearly has implications for our insight into attitudes to animal welfare on the farm. These aspects are repeatedly touched on throughout the thesis, but a broad reflection upon this will be reserved for the conclusion.

Other Aspects of Language and Scope

Poultry refers to a range of domestic fowl, including ducks, geese and turkeys which were also farmed prior to 1960. However, the chicken is the focus of this thesis as it was always New Zealand's bird of choice.[77] The term 'poultry' is also employed for simplicity and historical accuracy (as in 'the poultry industry'), but I am mindful of its reduced association with the chicken's flesh (poultry meat), and refer to the actual bird, the chicken or 'fowl' as it was commonly called, where possible. Readers should also be aware that within poultry press commentary 'chicken' referred to baby chicks prior to the chicken

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[76] Nancy Swarbrick, *Creature Comforts: New Zealanders and their Pets: An Illustrated History* (Dunedin: Otago University Press, 2013).

[77] F.C. Bobby, "How Poultry Farming has Developed," *NZJA* 97, no. 2, (1958): 123. Early in the century duck and goose meat was popular at Christmas and duck eggs, as they were cheaper, were used for baking. See Watts, *This was Speldhurst: The Story of an Early Stokes Valley Family*: 34.

meat industry around 1960. At times I employ the term 'livestock', rather than farm or 'farmed' animals, in keeping with its historical use.

Within the science community a return to integrated perspectives and 'comparative biology' is currently in vogue.[78] In its broadest sense, general or comparative biology has always incorporated the study of plants (botany) as well as human and non-human animals, and modern reincarnations may be understood as a continuation of the Western tradition of natural philosophy. Denis Alexander and Ronald Numbers, in examining these ideological underpinnings of biology noted Aristotle's observation of the plant–animal–human continuum, and that observers of nature since this time have continued to compare and differentiate living things, variably placing them along the scale of the Great Chain of Being (a conceptual hierarchy of nature which placed humankind at the apex, just below heavenly beings).[79]

However, chicken-plant comparison is not a focus of this thesis. This is due to a need to limit the scope of this study, but also because they were less common. There were turn-of-the-century references within the poultry press to industrialised chickens as comparable to the all-year harvesting of hot-house plant crops, and in the interwar poultry press to egg 'harvests' and 'hen fruit'. Post-WWII changes in breeding, as is discussed in chapter five, and the growth of the poultry meat industry, resulted in more frequent references to birds as 'crops' from the 1960s and 1970s.[80]

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[78] On the recent reinvigoration of comparative biology, see "Mission Statement," Society for Integrative & Comparative Biology, accessed 27 May 2014, http://www.sicb.org/about/.

[79] Alexander and Numbers, *Biology and Ideology from Descartes to Dawkins*: 17-29.

[80] For chicken-plant comparison see for example, *Reliable Poultry Journal* cited in "Poultry Yard. Poultry Notes," *AWN*, 12 March 1903, 42; E. Griffiths Hughes Ltd., "The Summer Egg Harvest. Gleaning the Last of Hen Fruit," *NZF*, 2 January 1922, 119. In terms of institutional alignment generally within professional biology in the twentieth century, comparative animal (zoological) research was more common than zoological-botanical alignment. See, for example, Wilkinson, *Animals & Disease: An Introduction to the History of Comparative Medicine*: 214-216.

Time Period

This thesis examines the New Zealand poultry industry from 1900 to 1960. In 1897 the Government Poultry Department, and a position for a Chief Poultry Expert, was established – as a 'wing', so to speak, of the newly-formed Department of Agriculture.[81] The tremendous nationwide response to the official campaign to develop a national industry within the subsequent decade was noted at the time and evident in surging poultry numbers in the New Zealand census (see Appendix A).[82] Between 1900 and 1960, poultry-keeping engaged around 25 to 60 percent of New Zealand households (Appendix A). This period was dominated by egg production and it was not until 1960 that sustained 'table' (meat) chicken production, at this stage in the form of the modern 'broiler' industry, emerged. This study concludes at this point. Graham Salisbury's account of his family's business identified 1960 as the commencement of the agribusiness era with integrated businesses and the mass-production of faster-growing (then twelve, though now five and a half week-old) broiler chicks.[83] Around 1960 was a period of industry intensification generally, though not on the scale of today's farms whereby, typically, three to

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[81] Poultry Department funding from 1897 is detailed in "Government Poultry Department (Cost and Revenue of the) Since Its Creation," in *AJHR, 1903, Session I, H-37*; "Local and General. Poultry Expert," *EP*, 12 May 1897, 4. On the formation of the Department of Agriculture in 1892, see Nightingale, *White Collars and Gumboots: A History of the Ministry of Agriculture and Fisheries, 1892-1992*: 9.

[82] See also J.A. Henderson, *Poultry and Eggs for Market and Export* (Wellington: New Zealand Department of Agriculture, 1886). 1; "The Poultry Industry. Mr D.D. Hyde's Lecture," *Colonist*, 14 September 1900, 2.

[83] Salisbury, *What Came First? including the Tegel Chicken Story*: 110-112. The change in chick maturing time, largely due to breeding, was noted by industry consultant, John McBride, (interview with author, New Plymouth, 6 February 2012) and by the first New Zealand 'grower' of Tegel birds hatched by Salisbury, Bruce Burmester (interview by author, New Plymouth, 2 March 2012).

ten large barns each house 40 000 meat chickens or caged egg layers.[84] Census figures indicate that between 1956 and 1961 the number of farms with flocks of 1000 or more birds increased by 48.4 percent, which was the largest increase in the 1951 to 1971 period (Appendix A). This was matched by a significant fall in both the number of household flocks and the price of retail eggs (which were beginning to be sold through supermarkets).[85]

Comparative description was less discernible within the poultry press beyond 1960. This change can be explained by the focus of production beginning to be concentrated on larger farms from around this time, with the poultry press catering less to the basic educational requirements of the domestic poultry-keeper and side-line farmer. It also correlated with the application of specialist poultry science and the standardisation of industry. This mirrored international trends and was commonly described in revolutionary terms.[86] Standardised, proprietary feeds were developed, which prior to this point had been in an experimental phase.[87] In 1958 there were two live vaccines in use within the New Zealand poultry industry, and although tightly regulated, their uptake,

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[84] "Shed Housing," Poultry Industry Association of New Zealand, accessed 8 June 2014, http://www.pianz.org.nz/farming-systems/housing/shed-housing. An average of 40 000 was cited by the Wellington SAFE office (telephone conversation with author, 13 March 2012).

[85] J.T. Ward, *Indicative Planning for the Poultry Industry* (Canterbury: Agricultural Economics Research Unit, Lincoln College, 1964), 12-17. On agribusiness trends see also "Editorial... "Takeover"," *NZPW* 29, no. 11, (1966): 1.

[86] The growth of specialist areas was evident in international publications. See for example, "Review of Poultry Publications," *World's Poultry Science Journal* 9, no. 1, (1953): 34-52; "Review of Poultry Publications," *World's Poultry Science Journal* 15, no. 1, (1959): 35-76. On 'revolutionary' discourse, see for example, W. & R. Fletcher (N.Z.) Ltd., "Aurofac Revolutionizes Poultry Keeping," *NZPW* 17, no. 12, (1954): rear cover; Nicholas Proprietary Limited, "A Revolution in Poultry Farming," *NZPW Supplement* 21, no. 7, (1958): 1; "The Revolution in Poultry Feeding," *NZPW* 21, no. 7, (1958): 6; F. P. Moss to A.C. Bridle, 17 November 1959, NZWPSA, AAAOZ 6117 W3346/160 7/18 (ANZ).

[87] See for example, Jean Miller, "Experiments to Develop Test for Poultry Feeds," *NZPW* 23, no. 12, (1960): 51-56.

along with antibiotics, testified to their efficacy but also signalled changing attitudes to preventative health as is explained in chapter six.[88] Poultry breeding was, according to the *NZPW* in 1958, now 'a science' as systems of genetic breeding that continue to be utilised today were beginning to be discussed and geneticists employed.[89] The commercial value of specialised behavioural research into poultry behaviour for the management of mating, nesting and feeding gained recognition by the late 1950s.[90] A greater focus on specialist poultry science was facilitated by the establishment of the New Zealand branch of the World Poultry Science Association (WPSA) in 1960.[91] Around this time a position for a poultry scientist at a New Zealand university and bursaries to enable overseas study for instructors was mooted.[92]

Methodology and Sources

Initial scoping for the project included fifteen interviews with ex-industry workers, farmers, poultry club members, and backyard poultry-keepers who had been involved in these activities from the 1920s onwards. Besides enhancing familiarity with poultry industry practice and culture, interviewees' book and journal collections affirmed attention to these sources and enabled supplementation of holdings at the National Library (NLNZ), Archives NZ

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[88] "Monthly Poultry Notes," *NZPW* 21, no. 2, (1958): 8. Wallaceville staff were coming to terms with diagnosing variant New Zealand disease strains at this time. See also R.M. Salisbury, "Poultry Diseases of Recent Interest and Possible Importance," *NZPW* 23, no. 12, (1960): 43-49. On today's numerous vaccinations see Pacificvet, "Immunity and Poultry Health (An Excerpt from the Pacificvet Poultry Vaccination Manual)," accessed 21 November 2014, http://tinyurl.com/op9u8ac.

[89] J. H. Kissling, "Modern Trends in Poultry Breeding," *NZPW* 21, no. 3, (1958): 30.

[90] For commentary on this emerging field, including some history of chicken behaviourists and attention to ethology, see D.G.M. Wood-gush, "Poultry Behaviour: Expert Discovers Many Interesting Facts," *NZPW* 21, no. 1, (1958): 30-32.

[91] J. H. Kissling to London WPSA Office, 29 February 1960, NZWPSA, AAAOZ 6117 W3346/160 7/18 (ANZ).

[92] "Training of Students in Poultry Science," *NZPW* 21, no. 1, (1958): 1; Norman Smith, "Monthly Notes," *NZPW* 23, no. 5, (1960): 39.

(ANZ), the Massey University library and other libraries.[93] British historian Karen Sayer recently observed the importance of industry journals for the farming community, and their underutilisation by historians,[94] a statement that holds true within the New Zealand context.

New Zealand's first poultry industry journal, the *New Zealand Poultry Journal* (*NZPJ*), was published monthly from 1906 to March 1928 at a relatively affordable price of 6d prior to WWI and 9d or 8/- per annum after this.[95] It was published initially by the *Greymouth Evening Star* with poultry breeder John Bouverie Merrett as editor. From 1908 it was published privately from Christchurch where Merrett established his modestly-named business, the 'N.Z. Poultry Institute'. In 1912 the journal was subtitled the 'Official Organ of the New Zealand Poultry Association' of which Merrett was secretary-treasurer. A new editor was appointed in 1926 until its demise in 1928 by which time Merrett had obtained a position assisting the egg export trade in Australia. As the only regular New Zealand publication dedicated solely to poultry matters, this was the primary mouthpiece for breeders and others engaged seriously with the industry until it was supplanted by a series of Government-supported journals.[96] The need for up-to-date, local debate was not entirely met by books

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[93] Massey University library has a significant agricultural collection. Chapter one explains the University's connection with the poultry industry.

[94] Sayer, "'His footmarks on her shoulders': The Place of Women Within Poultry Keeping in the British Countryside, c.1880 to c.1980," 306.

[95] In 1934, the *NZPJ* was briefly revived by the New Zealand Poultry Association. 6d was the price of a pound of cheese or a small loaf of bread. See 'Wages and Prices' under "45. Section XX.—Accumulation, Prices, and Wages". In NZOYB, 1910. http://www3.stats.govt.nz/New_Zealand_Official_Yearbooks/1910/NZOYB_1910.html

[96] "The New Zealand Poultry Journal," *NZPJ*, 20 November 1912, 5; J.B. Merrett, "Our Ninth Round," *NZPJ*, 20 May 1914, 5-7. Merrett's 'Institute' is noted in the journal's advertisements. See for example, "Poultry Houses," *NZPJ*, 20 November 1910, 21. This notes an initial variation of its name. On later editorship see the covers of the NZPJ, 20 February and 20 May 1926. On Merrett's move to Australia see R. J. Terry, "Poultry Keeping," *AS*, 24 July 1926, 24; "Market For Eggs," *NZH*, 27 December 1929, 5.

and newspaper poultry columns. As one breeder explained in 1912, although he read newspapers, overseas material with advice such as how to protect flocks against foxes and snow was irrelevant to the New Zealand setting.[97]

The *NZPJ* conveyed the views of industry leaders, with Merrett exerting a strong editorial voice. However, varying opinions, including those of hobbyists and part-time farmers were recorded through letters to the editor, conference reports, beginners' advice columns, accounts of individual farms' experimental approaches, reports of egg circle and poultry club meetings, Government farm research, Department advisor articles and international poultry research. Other content included national and international egg-laying competition results and advertisements for prize-winning stock, poultry tonics, equipment and assembly housing. The journal catered to 'fancy and utility' (that is, hobbyist and commercial) interests. Prior to World War One (WWI) articles on dogs were also included. Fancy poultry exhibitions and club reports continued within all journals throughout the period under study.[98]

Divergent opinion and debate was not uncommon. Merrett proclaimed that readers appreciated the journal's 'flexibility'. Openness to debate was required in these years of experimentation within non-standardised farm systems.[99] However, serious critics of industry were attacked and viewed as unconstructive.[100] Industry leaders acknowledged that newspapers served a

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[97] "Poultrymen Visited. A Chat with Mr Davis of Napier Poultry Fame," *NZPJ*, 20 November 1912, 23.

[98] "Kennel Notes," *NZPJ*, 20 May 1907, 41-42.

[99] J.B. Merrett, "The Export Trade " *NZPJ*, 20 October 1910, 3.

[100] See for example, J.B. Merrett, ""Cackler" and His Methods. How a Misguided Poultry Writer Loses His Judgement - An Unwarranted Attitude," *NZPJ*, 20 October 1910, 2; Merrett, "The Export Trade " 3-4; J.B. Merrett, "The Mischief Maker. The Cuttle Fish of New Zealand Poultrydom," *NZPJ*, 20 October 1910, 15.

promotional, propagandist function in respect to the public,[101] and this element to all published material has been borne in mind.

Several historians have noted the historical importance of print media in disseminating international science which was considered vital to the development of a modern, progressive nation.[102] Although later Government-supported journals did not advertise other journals, the many advertisements in the *NZPJ* suggest a fair degree of interest in the international poultry press. One 1926 issue for instance included advertisements for the 1925 *Poultry World Year Book* (England), the *National Poultry Journal* (England), *The Poultry Bulletin* (Australia), *Canadian Poultry Review, Reliable Poultry Journal* (US), *Poultry Tribune* (US), *Petaluma Weekly Journal* (US), and the *South African Poultry Magazine and Smallholder*.[103] Farmers could access international journals and texts through poultry clubs and at conferences and exhibitions.[104] Exchange appears to have occurred in reverse: Merrett noted in 1925 that the *NZPJ* had received international praise, and that 200 American subscribers kept an eye on stock advertisements in particular.[105] International material, from scientists, officials and breeders, was also reported in the local poultry journals.

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[101] J.B. Merrett, "The Official Conference Report. Secretary's Annual Report," *NZPJSup*, 20 April 1914, n.p.

[102] Miles Fairburn, "Is There a Good Case for New Zealand Exceptionalism?," in *Disputed Histories: Imagining New Zealand's Pasts*, ed. Tony Ballantyne and Brian Moloughney (Dunedin: Otago University Press, 2006), 151-155; Brett M. Bennett and Joseph Morgan Hodge, *Science and Empire: Knowledge and Networks of Science Across the British Empire, 1800-1970* (Houndmills, Basingstoke; New York: Palgrave Macmillan, 2011). 16-17; Brooking and Pawson, *Seeds of Empire: The Environmental Transformation of New Zealand*: 3-6.

[103] "What To Read," *NZPJ*, 20 April 1926, 3. See also J.B. Merrett, "On the Editor's Desk. Some Recent Poultry Publications Received," *NZPJ*, 20 October 1910, 24-25.

[104] This is mentioned in J.B. Merrett, "The Journal's Show Report," *NZPJ*, June 20 1908, 21. Conferences and courses in the 1950s also drew international speakers. See for example, "Poultry Farmers' Refresher Course," *NZPW* 19, no. 3, (1956): 97.

[105] J.B. Merrett, "A World-Wide Journal," *NZPJ*, 21 September 1925, 1.

From the late 1920s, other journals were published by industry leaders, and eventually, Government. From Auckland, the North Island Poultry, Pigeon and Canary Association published *The New Zealand Poultry Bulletin* (August 1928-January 1930). Also from Auckland, *The New Zealand Smallholder* magazine included poultry sections from 1927, growing to encompass a large subsection entitled *The New Zealand Poultry Bulletin* from July 1930 to February 1937.[106] From Christchurch the *New Zealand Utility Poultry Club's Quarterly Review* was published from 1932 to 1934. The New Zealand Poultry Board in coalition with the New Zealand Poultry Producer's Federation published the *New Zealand Poultry Producer* (NZPP) monthly from April 1935-1937. Its first issue claimed a circulation of 16 000 (the number of registered poultry producers who automatically received a copy).[107] Finally, from October 1937, a sustained publication, *The New Zealand Poultry World* (NZPW) was published, which continued through to June 1981.[108] This was subtitled the 'Official Organ of the New Zealand Poultry Board and accredited poultry organisations'. All these journals were affordably priced[109] and continued to cater for both fancier and industry groups, although content was increasingly dominated by Government experts, leaders and scientists from the 1930s. This correlates with the pattern of

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[106] The *Smallholder* underwent title changes. Prior to this title it was the *New Zealand Fruitgrower* (1916-1922) and the *New Zealand Fruitgrower and Apiarist* (1922-1927), both of which incorporated poultry sections.

[107] "Poultry Runs Registration Act," *NZPP* 1, no. 1, (1935): 3. This figure does not tally with census figures, suggesting many non-registered poultry flocks.

[108] Public and private holdings and records of publications during the Depression years are scattered, with limited issues at Massey University library and in private collections. The *NZPJ* and *NZPW* are both available in long runs, with minor gaps, within public collections.

[109] Prices for the privately-published magazines in the 1930s were 1/- per copy or 10/- per annum. The Government-supported NZPP if not received for free was 4d or 3/6 per annum. The *NZPW* was initially 7/6 per year, or 4/- half-yearly.

a gradually-reduced lay voice within agricultural publications observed by Vaughan Wood and Eric Pawson.[110]

Newspapers are an important primary source for this thesis, especially for the period prior to 1910 by which time the *New Zealand Journal of Agriculture* (*NZJA*) and *NZPJ* publications, had commenced. Newspapers are also important sources for considering the public communication of general biology throughout the period. Several New Zealand historians have commented on the importance of late nineteenth- and early twentieth-century newspapers within rural areas and New Zealand society generally. Tom Brooking noted that New Zealand's 90 percent basic literacy level in 1890 made it one of the most literate societies in the world, which was reflected in the proliferation of rural and small town papers.[111] Tony Ballantyne validated the use of newspapers as a means of gathering an overview of New Zealand rural and small town intellectual life, while Wood and Pawson highlighted their importance for farmers, including the weekly, rurally-focussed regional papers, particularly prior to the specialist agricultural journals.[112] Francis Reid and Katrina Ford discussed their importance for disseminating late nineteenth-century natural history and health science respectively up until the end of WWI.[113]

International poultry items continued to be published in newspapers and the general farming press throughout the period under study, although they were

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[110] Vaughan Wood and Eric Pawson, "Flows of Agricultural Information," in *Seeds of Empire: The Environmental Transformation of New Zealand*, ed. Tom Brooking and Eric Pawson (London and New York: I.B. Tauris, 2011), 139-158.

[111] Tom Brooking, *The History of New Zealand* (Westport, Connecticut: Greenwood Press, 2004). 72-73.

[112] Tony Ballantyne, "Thinking Local: Knowledge, Sociability and Community in Gore's Intellectual Life, 1875-1914," *NZJH* 44, no. 2, (2010): 138-156; Wood and Pawson, "Flows of Agricultural Information," 144-147.

[113] Francis Reid, "Newspapers as Objects of Natural History," *Environment and Nature in New Zealand* 1, no. 3, (2006): 7-14; Ford, "The Tyranny of the Microbe: Microbial Mentalities in New Zealand, c.1880–1915," 20-21.

more frequent around the turn of the century prior to the establishment of local poultry journals. Regional newspapers employed a handful of local experts who launched columns in response to industry momentum. 'Terror' for example wrote general pet and poultry fancier columns from 1898 to 1909 as well as a regular second *Otago Witness* 'utility' column, 'Poultry Notes'. Merrett praised him in the *NZPJ* as a practical and business-minded writer. There was much repetition between papers and columnists were evidently aware of each other.[114] The *New Zealand Farmer: Bee and Poultry Journal* (and its variously titled versions, hereafter *NZF* or the weekly version, *NZFW*) from 1890 to 1945 revealed much duplicated material from newspaper poultry columns.[115]

This thesis draws upon late nineteenth-century British publications that influenced poultry-keepers and breeders into the twentieth century,[116] as well as twentieth-century New Zealand, United States (US) and British publications

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[114] On Terror see Merrett, "Our Ninth Round," 7. Chanticleer' was a common pseudonym for poultry columnists, but 'Chanticler' (sharing the spelling of a popular play of this name produced in 1910) was the Dominion columnist from 1912 to 1920. See United Press Association, "'Chanticler.' Rostand's Rooster Play," *Star*, 9 February 1910, 2. Chanticleer, reportedly 'a well-known authority in the poultry world', was Melbourne-based T.H. Young, who was widely printed in the New Zealand press from around 1897. See "Literary Column. New Books and New Editions," *EP*, 4 November 1899, 2; "In a recent issue of the 'Australasian'...", *NEM*, 20 May 1904, 3. 'Crow Black' wrote 'The Poultry Yard' for the *Canterbury Times* and the *Star* from 1903 to 1907. On industry debate with one columnist see Merrett, ""Cackler" and His Methods. How a Misguided Poultry Writer Loses His Judgement - An Unwarranted Attitude," 2. See also mention of 'Cackler' of the *Manawatu Times* in Terror [pseud.], "Poultry Notes," *OW*, 23 December 1903, 53.

[115] After WWI the title changed three times but consistently contained the phrase *New Zealand Farmer*.

[116] For example, William B. Tegetmeier, *The Poultry Book: Comprising the Breading and Management of Profitable and Ornamental Poultry, Their Qualities and Characteristics; to Which is Added "The Standard of Excellence in Exhibition Birds," Authorised by the Poultry Club* (London: G. Routledge, 1867); Alfred Saunders, *Our Domestic Birds: A Practical Poultry Book for England and New Zealand* (London: Sampson Low, Marston, Searle & Rivington, 1883); Lewis Wright and Sidney Herbert Lewer, *Wright's Book of Poultry* (London: Cassell, 1912).

that were either loaned to me from interviewees or exist within New Zealand libraries.[117] I did not utilise international texts unless they were referred to within the local poultry press or significant within local private or library collections. I assessed the various published Standards for breeders,[118] along with general farming advice books that would have been referred to by sideline poultry farmers.[119]

Wood and Pawson noted the significant role of the State in the production and distribution of agricultural information in the twentieth century.[120] Poultry Department staff contributed articles for the *NZJA*,[121] which was subscribed to by farmers, particularly those with mixed farms who sought a range of advice. Much of the *NZJA* material was duplicated from or very similar to official contributions within specialist poultry journals. I primarily utilised the *NZJA* as a source for contextual information. Prior to 1910, bulletins on specific aspects of poultry farming could be ordered from the Poultry Department. Booklets on practical topics and updates of a general advice booklet by the Government expert continued to be published by the Department over the decades.[122]

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[117] For example, Arthur A. Brigham, *Progressive Poultry Culture. A Text-Book of Study and Practice in the Keeping of Poultry for Profit and Pleasure* (Cedar Rapids, Iowa: The Torch Press, 1913); J.B. Merrett, *The Sun Poultry Book. A Practical Guide to Poultry Keeping in Australasia for Use and Profit, Together with an Appendix Containing the Utility Poultry Standards, Adopted by the New Zealand Utility Poultry Club* (Christchurch: NZUPC, 1917); Leonard Robinson, *Modern Poultry Husbandry*, 1st ed. (London: Crosby Lockwood & Son, 1948).

[118] For a summary of these see Selby, *New Zealand Poultry Standards*: 8-22.

[119] For example, A. H. Baker, *Live Stock. A Cyclopedia for the Farmer and Stock Owner including The Breeding, Care, Feeding and Management of Horses, cattle, Swine, Sheep and Poultry with A Special Department on Dairying being also A Complete Stock Doctor* (Cleveland, Ohio: R.C. Barnum, 1920).

[120] Wood and Pawson, "Flows of Agricultural Information," 139-158.

[121] '*NZJA*' is used rather than its various title changes between 1910 and 1918. See the NZLC.

[122] For example, F.C. Brown, *Bulletin No. 13. Poultry and Eggs for Market and Export*, 6th ed. (Wellington: New Zealand Department of Agriculture, Commerce and Tourists, 1911); F.C. Brown, *Bulletin No. 066. Utility Poultry-Keeping* (Wellington: Department of Agriculture, 1939); Livestock Division, *Internal Parasites in Poultry* (Wellington: Department of Agriculture, 1941).

A range of primary source material which informed general biology and other lay perspectives form the basis of my discussion of life science communication and education. Newspapers were useful, and highlighted popular biology texts in circulation. State school syllabus guides and around thirty books on nature study and agricultural science were examined. School syllabus material within education journals was reviewed: *The New Zealand Journal of Education*, *National Education* and the *Education Gazette*. The archives of Truby King at the Alexander Turnbull Library (ATL) and at the Hocken Collection were examined. The *NZ Countrywoman* (*NZCW*) was sampled for women's perspectives. The *New Zealand School Journal* (*NZSJ*) and other children's literature and songbooks within the National Library's Dorothy Neale White Collection (DNWC) and other New Zealand libraries were examined for messages to children about chickens and other farmed animals.

Other Sources

The poultry section of the New Zealand Census (NZC, summarised in Appendix A), New Zealand Official Year Books (NZOYB) and Department of Agriculture annual reports provided background information. It has been noted that the notoriously unreliable census data needs to be bolstered with other sources.[123] Non-published poultry industry material was scoped initially and sourced for supplementary information. I examined collections within lower North Island libraries, museums and council archives while travelling to interviews.[124] Poultry Department files and audio-visual material at Archives NZ were reviewed and files were accessed throughout the project for

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[123] Day, "Education, Generation, and Gender: The Rural Youth Movement in New Zealand, 1920-1973 " 9.

[124] For example, interview recordings of ex-poultry farmers were reviewed in New Plymouth: Selwyn Lloyd, Oral History, ARC2008-043 (Puke Ariki); Edwin Lindsay Nicholls, Oral History, ARC2008-075 (Puke Ariki).

supporting industry information. For instance, advisory service records assisted appreciation of the challenges with farmer education.[125]

Chapter Outline

This thesis illustrates how comparative ideas within the poultry press were consistent with modern, general biology. It demonstrates how poultry experts attended to a blend of old and new concepts that reinforced the notion of shared needs and experiences between animal and human animal species. I examine how a range of philosophical and practical factors reinforced general biology perspectives, and how general biology was affirmed by informal and formal modes of education, including poultry club and expert breeder advice, professional scientific reports in the poultry press, and popular and civic discourses. The core of the thesis, chapters three to six, chiefly illustrate how husbandry perspectives were moulded by general concepts within specific sub-disciplines.

Chapters are organised thematically. As an overview of the poultry industry, chapter one provides preliminary contextual information prior to the focus on scientific ideas within later chapters. It introduces the perspectives of key groups, illustrating how these contributed to comparative views, especially psychological empathy. The negotiated tension between the naturalist and moral perspectives of poultry club breeders who provided industry expertise, the similar traditional perspectives of women, and harsher commercial perspectives, is outlined. I also explore the influence of practical industry factors such as the export drive, technology, housing and farm sizes.

Chapter two highlights how other informal and formal modes of education that poultry-keepers were exposed to reinforced attention to general biology. It firstly examines how the poultry industry validated general, rather than

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[125] For example, reports from poultry instructors to the State Advances Corporation re. lack of farmer education in Rehabilitation of Returned Soldiers in the Poultry Industry 1945-1952, AAFZ 412 W5704/346 67/9/211 Part 2 (ANZ).

specialised, science knowledge. Truby King is then introduced as an influential public communicator of general biology and advocate for this within schools. Echoes of King's views and other ideas typical of general biology found within poultry industry advice are highlighted here and returned to in later chapters. The final section of this chapter introduces school nature study and science education, which inculcated human-animal comparison as a modern mode of reasoning. Further examples of this are also returned to in later chapters.

Chapters three to six explore comparative description in relation to four key themes: psychology, the chicken-worker, eugenics, and health. Chapter three argues that poultry press observations of chickens as intelligent and emotional creatures reflected popular debates and professional trends within comparative psychology. This chapter firstly charts beliefs about early comparative psychology – alternatively referred to as evolutionary psychology, which informed the traditional humanitarian perspectives of breeders and the naturalist perspectives on chicken behaviour conveyed through popular biology and school nature study that were discussed in previous chapters. After detailing traditional Darwinian ideas, the remainder of this chapter explores how these views were challenged or modified by changing trends in psychology. These trends included mechanistic perspectives around the turn of the century and the ensuing nature-nurture debate about instincts and learning, the perspectives of ethologists and evolutionary biologists which were reasserted during the interwar period, and classical behaviourist views asserted within the poultry press from the late 1940s.

Chapter four explores chicken-worker analogy and the frequently-entwined description of its body as an egg-machine. Chicken-worker analogy is acknowledged as an anthropomorphic device that assisted the rationalisation of industry. However, it was also used to support consideration of fair treatment and signalled identification with worker plight. The first part of this chapter examines how biological ideas entwined with theological and philosophical ideology enabled and supported these agendas. The central argument in this

chapter is that the chicken was conceived as an industry worker within the factory farm, subject to the same general physiological principles as human workers.

Chapter five examines general conceptions of heredity in regards to race, hybridity and eugenic theory within breeder description. It is argued that the focus on beauty and detailed analysis of the worker-hen and breeder bodies within selection practices were not a static recapitulation of traditional methods, but informed by prevalent eugenic ideas. Other fundamental principles, related to areas such as endocrinology and comparative psychology, reinforced ideas about natural laws in regards to breeding that persisted into the 1950s.

Chapter six considers comparative ideas about chicken health. In this chapter I demonstrate that throughout the period, but particularly in the interwar period, the preservation of flock vitality and preventative (or 'constitutional') health was informed by contemporary notions of human health and disease-prevention. This chapter may be conceived as an extension to chapter five as health discourse was associated with environmental or 'positive' eugenic perspectives in this era.

Chapter One

The Industry: An Overview

> The difference in the sagacity and devotion of different hens is almost as great as that displayed by different mothers of the human race [...] But variable as they are, the generally unselfish devotion, the undaunted courage, the watchful vigilance, the unwearying exertions of the common hen for her offspring have been proverbial in all historic ages, and the theme of moralists and poets; whilst the wonderful transformation that her whole nature undergoes when she becomes a mother is one of the most beautiful and interesting objects in nature.
>
> Alfred Saunders, *Our Domestic Birds* (1883).[1]

The primary purpose of this chapter is two-fold: to provide an overview of industry composition, organisation, and trends, and to highlight practical and moral factors influencing comparative tendencies. New Zealand's poultry industry was comprised of three core constituents: the backyard poultry-keeper, the sideline farmer (who were often also dairy farmers, wheat growers and orchardists) and the specialist breeder.[2] This chapter begins by introducing these groups, and as indicated in the above excerpt from the first book on utility poultry-keeping in New Zealand, some preliminary insight into the traditional views of early leading expert breeders is provided. This includes an examination of the romantic theology of late nineteenth-century natural history in which living creatures were unified by natural laws. This chapter demonstrates that the moral, humanitarian concerns of experienced breeders, and others who adhered to these traditional naturalist views, continued to

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[1] Saunders, *Our Domestic Birds: A Practical Poultry Book for England and New Zealand*: 123-124.

[2] E. J. Fawcett, *Survey of the Poultry Industry in New Zealand by the Farm Economics Section* (Wellington: Department of Agriculture, 1930), 3,36; Bobby, "How Poultry Farming has Developed," 121-124.

moderate the emotional disconnect of business agendas as the century wore on. Practical and economic factors such as farm size, animal 'stock' turnover, and farm methods and technology are discussed in this chapter as they affected empathetic care and observation of animal needs and behaviour.[3]

The Amateur Masses

From the commencement of the Government Poultry Department in 1897, officials promoted poultry farming as 'an industry for the masses', as a relatively low-investment farming option, and as a means of self-employment for 'small capitalists', providing an alternative to existing options at the turn of the century such as timber-felling.[4] It aligned with the Liberal Government's plan for encouraging small farm yeomanry.[5] However, officials were responding to an already growing trend. An upsurge in poultry-keeping from around 1870 coincided with accounts of experimental commercial 'poultry ranches', particularly in the US, reported in poultry books and newspapers.[6] It also coincided with the increased value of poultry and a vogue for pet-keeping. The 'poultry craze' of the mid-nineteenth century[7] precipitated the

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[3] For recent research into how these factors effect farmer empathy and care see Rob Burton, Sue Peoples, and Mark Cooper, "Building 'Cowshed Cultures': A Cultural Perspective on the Promotion of Stockmanship and Animal Welfare on Dairy Farms," *Journal of Rural Studies* 28, (2012): 174-187.

[4] "Local and General," *EP*, 25 September 1897, 4; "Poultry Notes," *OW*, 15 December 1898, 39; Editor, "An Industry for the Masses," *Colonist*, 18 May 1899, 2.

[5] Paul Star and Tom Brooking, "The Farmer, Science and the State in New Zealand," in *Seeds of Empire: The Environmental Transformation of New Zealand*, ed. Tom Brooking and Eric Pawson (London and New York: I.B. Tauris, 2011), 159-177.

[6] The earliest located mention of farming poultry within the nation's newspapers according to the Papers Past website (PP) as at 13 October 2014 was in Editorial, *NEM* 29 August 1867, 2. The first international report of poultry farming (same search) was "Poultry Farming in San Francisco," *TT*, 15 December 1875, 2. The initiation of large scale farms in the US was possible due to the availability of land and inexpensive grain feed. See Lewis Wright, *Book of Poultry* (London: Cassell, 1885). 23.

[7] For discussion of this Western phenomenon see Smith and Daniel, *The Chicken Book*: 204-221.

establishment of 'fancy' pet-appreciation poultry clubs in New Zealand, the first being the Christchurch Poultry, Pigeon, Canary and Cat Society, in 1868.[8] Poultry breeding could be a lucrative hobby, especially for top breeders of award-winning show birds.[9]

The management of fowl was a relatively new concept around the turn of the century. Michael Murphy's *Gardening for New Zealand*, first published in 1885, and *Brett's Colonists' Guide*, first published in 1893, were both popular household manuals with poultry-keeping chapters. They noted that little attention was paid to systematic fowl farming, and explained to readers that runs and coops were required to regulate breeding and enable efficient egg-collecting.[10] Even in the US, as one writer recorded, little thought was given to poultry housing prior to around 1885.[11] Lewis Wright, the British author of the *Book of Poultry,* an authoritative text for leading breeders published between 1872 and 1912, noted that prior to 1840 and the poultry mania in Britain, few

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[8] "Christchurch Poultry Association," *Press*, 12 August 1886, 2; Merrett, "The Journal's Show Report," 17.

[9] See for example *Catalogue of the Seventeenth Annual Show of the Christchurch Poultry, Pigeon, Canary and Cat Society,* (Christchurch: Christchurch Poultry, Pigeon, Canary and Cat Society, 1885). n.p. At this show the award for the best Game cock, the most prized bird, was £5 5s. £1 was warded for most other breeds of fowl. Purchase prices for the public were generally between £1 to £5 for hens or cocks, with some cocks selling for £10 or £20. Announcements of exhibition prize-winners in locally and regionally-distributed papers served as advertisements for breeders. See for example, "South Canterbury Poultry, Canary and Cat Show," *TIMH*, 10 July 1886, 3. The increasing popularity of poultry clubs in the late nineteenth century was noted in Swarbrick, *Creature Comforts: New Zealanders and their Pets: An Illustrated History*: 86-87.

[10] Thomas Allen, "Poultry," in *Brett's Colonists' Guide and Cyclopaedia of Useful Knowledge: Being a Compendium of Information by Practical Colonists* (Auckland: H. Brett, 1883), 403-437; Michael Murphy, *Gardening for New Zealand with Chapters on Poultry and Bee-Keeping*, 3rd ed. (Christchurch: Whitcombe & Tombs Ltd., 1885). 227-228. *Brett's* was published between 1893 and 1902 and Murphy's book between 1885 and 1895.

[11] Brigham, *Progressive Poultry Culture. A Text-Book of Study and Practice in the Keeping of Poultry for Profit and Pleasure*: 38.

people 'kept' poultry, and little was known about their management. As birds, fowl were not generally penned.[12]

In traditional laissez-faire arrangements in New Zealand as elsewhere, roosters and hens with their young roamed freely in small flocks, roosting in trees or makeshift structures. Apart from providing meat, eggs and feathers, chickens served as mobile waste-disposal units, consuming kitchen scraps. On farms, the scratching of fowls helped to aerate and manure pastures and to control infestations of insects and slugs on crops,[13] and they were inexpensive to keep as they could be fed excess produce.[14] Housewives with domestic flocks earned 'pin-money', experimenting with various means of preserving eggs and selling excess to local grocers in the warmer flush season.[15] Eggs were seasonal as hens naturally lay for only one-third to one-half of the year. Hens decrease or cease laying in winter, going into a moult to recover after the laying season. Within flocks with roosters, 'broody' hens, getting ready to lay fertilised eggs, also cease to lay for three to four weeks, then nest in an isolated tree root or hedge, incubating clutches of eggs for another twenty-one days, before raising the brood for five to ten weeks.[16]

The typical late nineteenth-century backyard or barnyard flock consisted of birds of different ages, and although the first three years were acknowledged as the most productive, good layers or mothers could be kept for fifteen years or

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[12] Wright, *Book of Poultry*: 111.

[13] Allen, "Poultry," 156.

[14] This continued to be the case on sideline farms. See M.W. Stewart, *Profitable Poultry Keeping*, 2nd revised ed. (Christchurch: Whitcombe & Tombs, 1946[?]). 8.

[15] See for example, "Preserving Eggs," *TT*, 23 November 1887, 5; Alexander Beck, "Preserving Eggs. Appeal to the Government and Agricultural Societies of the Colony," *Star*, 26 November 1888, 4. On grocers: "Poultry," *WN*, 9 November 1872, 11.

[16] Thomas Allen, "Poultry," in *Brett's Colonists' Guide and Cyclopaedia of Useful Knowledge*, ed. Thomson W. Leys (Auckland: H. Brett, 1897), 386; Smith and Daniel, *The Chicken Book*: 238; Dr G. McBride, "Chickens in the Wild," *NZPW* 34, no. 8, (1970): 53-55.

more depending on the breed, care and owner-attachment.[17] While non-fenced flocks remained common on twentieth-century rural properties, flocks in urban areas were regulated by local authorities prior to WWI. In Wellington city, for example, poultry were required to be housed with a secure run from 1908.[18]

Government officials and experts from the early decades of industry acknowledged 'phases' of utility poultry-keeping, which normally progressed gradually from a part-time or sideline hobby to an independent business.[19] People were urged to enter the business 'in a small way', not only for economic reasons, but because practical experience through observation was important in these experimental years prior to antibiotics, vaccinations and automated, temperature-controlled sheds. As was explained in the *NZPJ* in 1921 in a discussion of raising chicks commercially, 'One's eyes must be trained to see at a glance [if the] chicks are doing well […] One's ears must be trained to distinguish different chirps to note […] whether the chicks are comfortable, [and the] nose must be trained to know if there is any dampness, mustiness, or staleness'.[20] This process of gradual learning meant that farmers often had some familiarity with chickens in the non-commercial, or at least less-intensive, environment.

From 1933, in an attempt to gauge production with more accuracy, poultry-keepers with more than 24 birds who sold produce were required to register their flocks. This requirement was indicative of the fact that, at this stage,

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[17] Amongst the varied opinion on how long to keep hens, see for example, "Waifs and Strays. The Hen and Its Eggs," *New Zealand Tablet*, 21 November 1874, 12; "Poultry Notes," *OW*, 30 November 1893, 5.

[18] *The Wellington City By-Law No. 1, 1908*. Clause 484, Collected Bylaws, 1908-1929. Ref. No. 00251:1:6 (Wellington City Council Archives). Regulations varied over the decades and between regions.

[19] See for example, Brown, *Bulletin No. 13. Poultry and Eggs for Market and Export*: 6; Brown, *Bulletin No. 066. Utility Poultry-Keeping*: 5.

[20] C. J. Cussen, "Artificial Brooding," *NZPJ*, 21 March 1921, 7.

people with 25 or more adult birds were considered, collectively, to be significant contributors to the industry.[21] In the late 1930s and 1940s, frustrated industry leaders continued to struggle with the industry's unskilled, hobbyist base.[22] In 1956 there were 190,000 poultry-keeping households in the country and around this time still only half of the nation's egg production was sourced from semi-commercial and full-time producers.[23]

Specialist Breeders and Fanciers

In 1904, leading breeders established the New Zealand Utility Poultry Club (NZUPC) with the objective of improving egg production through the establishment of egg-laying contests. The New Zealand Poultry Association (NZPA), which represented and coordinated producers, was established in 1910.[24] The NZPA organised annual conferences from this time,[25] and attendees provide an indication of active leadership. At the 1913 conference for example, twenty-nine delegates were recorded at the opening.[26] Thirty to forty delegates remained the norm prior to WWII.[27] Delegates were full-time farmer-breeders, but early conferences were also attended by representatives from local government, Members of Parliament, poultry department staff and sideline farmers.[28] In 1935 the New Zealand Poultry Producer's Federation (NZPPF) and

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[21] "NZOYB, 1940," Statistics New Zealand, accessed 23 April 2013, http://tinyurl.com/n9hbrjc.

[22] See for example, A. E. Knowles, "Problems of the Industry. No. 2 - Labour on a Poultry Farm," *NZPW* 1, no. 11, (1938): 12-13.

[23] See Appendix A; V.H. Logan, "Organisation of Poultry Industry," *NZPW* 17, no. 9, (1954): 293.

[24] "Lest We Forget. Poultry Pioneers in New Zealand - No.4. Mr. Arthur Smith," *NZPW* 3, no. 3, (1940): 17; "N.Z. Utility Poultry Club. Golden Jubilee Dinner Held at Christchurch," *NZPW* 17, no. 9, (1954): 201.

[25] J.B. Merrett, "The N.Z. Poultry Conference," *NZPJ*, 20 November 1910, 12-17.

[26] J.B. Merrett, "The Conference," *NZPJ*, 20 April 1913, 1-2.

[27] "New Zealand Poultry Breeders' Association," *NZPJ*, 20 December 1921, 16; Bobby, "How Poultry Farming has Developed," 121-124.

[28] See for example, Merrett, "The N.Z. Poultry Conference," 12-13.

the New Zealand Poultry Board (NZPB) replaced the NZPA as paid organising and representational bodies.[29]

Figure 1. NZPA delegates at the 1914 national conference

Note the *NZPJ* editor and NZPA secretary, John Merrett, bottom far left.[30]

Fancier poultry clubs were an important training ground for many industry leaders, and this source of expertise remained significant within the period under study, particularly up until WWII. Merrett for instance had grown up on a farm, learning about chickens as a sideline industry and then improving his skills though his Greymouth club.[31] As mentioned, Terror wrote both fancy and utility columns. George (Geo.) Ambler was a *NZPJ* fancy columnist in the 1920s who also provided industry advice for the *NZPJ* and the *NZF* and was active

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[29] "Poultry Runs Registration Act," 3; C. Miln, "First Annual Conference. New Zealand Poultry Producers' Federation," *NZPP* 1, no. 4, (1935): 1-4; J.W. McConnon, "Improving the Status of the Industry," *NZPW* 20, no. 3, (1957): 111.

[30] Zac Studios [photographer], *NZPJSup*, 20 April 1914, n.p.

[31] "Greymouth Poultry, Pigeon and Canary Club's Grand Annual Show," *Grey River Argus*, 15 July 1905, 4; "Obituary," *NZH*, 30 June 1925, 10.

into the 1940s.[32] The journals, which continued to publish for fancy and utility, reveal sustained farmer reliance on the expertise of hobbyist breeders in the interwar period.[33] Some preliminary understanding of the culture within these clubs is therefore necessary to comprehend industry perspectives and debate.

Canterbury was initially a centre for poultry-breeding, partly due to its ready-supply of wheat for poultry feed.[34] Prior to the NZUPC being established there in 1904, the New Zealand Poultry Club was founded in 1886 to promote the 'art and science' of poultry-keeping, differentiating itself from the pet-appreciation club established earlier.[35] Its stated objective – 'to encourage the improvement of the various breeds of poultry, pigeons and canaries; to provide a reading room and reference library […] and to promote genial and social intercourse' – reflected a sustained interest in bird-breeding as a morally and intellectually-improving form of 'rational recreation'.[36] However the focus on improvement at this time mirrored international trends for reform subsequent to the mid-century poultry craze. Fanciers were criticised for degrading breeds through

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[32] See for example, Geo Ambler, "Ventilation of Poultry Houses," *NZF*, 2 January 1922; "Editorial," *NZPJ*, 20 February 1926, 1; Geo Ambler, "Fancy Classes at Shows. To the Editor," *NZPW* 3, no. 5, (1940): 16.

[33] See for example, "Poultry Raising by the Incubator Method," *NZPJ*, 20 August 1927, 3.

[34] Farms were concentrated around Auckland from the 1920s when Australian grain was imported and were generally located on the outskirts of urban areas to avoid high transport costs. See Bobby, "How Poultry Farming has Developed," 121-124.

[35] Many local poultry clubs retained a general pet-keeping membership into the twentieth century. See for example, the Hutt Valley Poultry, Pigeon, Canary, Cage Bird, and Cat Society in "Poultry Awards," *EP*, 7 July 1928, 23.

[36] "New Zealand Poultry Club," *Star*, 4 September 1886, 3. The Christchurch Poultry, Pigeon, Canary and Cat Society was the first fancier pet-appreciation poultry club in New Zealand, established in 1868. See "Christchurch Poultry Association," *Press*, 12 August 1886, 2; Merrett, "The Journal's Show Report," 17. On 'rational recreation' see Caroline Daley, "Modernity, Consumption and Leisure," in *The New Oxford History of New Zealand*, ed. Giselle Byrnes (Auckland: Oxford University Press, 2009), 427-431.

their focus on beauty and creating 'freaks' and 'curiosities' rather than healthy, productive 'utility' birds.[37]

Traditionally, poultry clubs celebrated various chicken breeds as manifestations of the wonders of nature and the diversity of divine creation. Breeders schooled within late nineteenth-century clubs approached poultry according to the naturalist biology of the time, which remained imbued with romantic natural theology. As Ross notes, this theologised, object-lesson approach to nature study was also predominant within nineteenth-century New Zealand elementary (primary) schools from the passing of the 1877 Education Act, which provided for free, and (in principle at least) secular education.[38]

Nature's laws and God's laws were interchangeable concepts within natural theology. The latter was epitomised in William Paley's *Natural Theology, or Evidences of the Existence and Attributes of the Deity collected from the Appearances of Nature* (1802), which was a Victorian best-seller[39] and popular in New Zealand from the time of colonial settlement and into the 1890s.[40] Paley's notion of intelligent design, as science historian Adam Shapiro has noted, was retained within twentieth-century popular biology and Christian perspectives.[41]

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[37] See for example "Poultry Progress," *AWN*, 17 March 1883, 23; Wright, *Book of Poultry*: 18, 111-116. Wright notes that poultry-keeping was rare around 1840 prior to the poultry craze.

[38] Ross, *Going Bush: New Zealanders and Nature in the Twentieth Century*: 19-28.

[39] Alexander and Numbers, *Biology and Ideology from Descartes to Dawkins*: 15-29. See an online edition: William Paley, "Natural Theology; or, Evidences of the Existence and Attributes of the Deity. Collected from the Appearances of Nature," Darwin Online, accessed 4 January 2013, http://tinyurl.com/4s3xp9.

[40] It remained in circulation within libraries and homes in the 1890s. See for example, "Special Advertisements. Wesney Bros. Book Sale," *ST*, 1 June 1896, 2. On Paley's legacy in Darwin's work see A. R. Shapiro, "Darwin's Foil: The Evolving Uses of William Paley's Natural Theology 1802-2005," *SHPBBS* 45, (2014): 114-123.

[41] Shapiro, "Darwin's Foil: The Evolving Uses of William Paley's Natural Theology 1802-2005," 114-23.

This notion of design and pattern in nature encouraged comparison. Students of nature were encouraged to observe similarities (and differences) in animal and human morphology (anatomical form). They were also encouraged to observe animal behaviour or 'habits', taken to indicate feelings and instincts. Paley's observation of the common hen included reflection upon the detail of its feathers as 'a vestment for the body', which he conceived as 'nature's art' and compared to the beauty of the human form. The instincts of the hen were also aligned with fundamental human nature.[42] The hen served as a moral object lesson in the natural law of maternal sacrifice, depriving herself while incubating eggs for the 'greater good' of her species. 'Neither ought it […] be forgotten', Paley said, 'how much the instinct *costs* the animal […] formed for liberty […] delighting in motion, made for motion […] fixed to her nest, as close as if her limbs were tied down by pins and wires'.[43]

Darwin's evolutionary notion of descent reiterated these existing concepts of human-animal continuity and this aspect of his theory was easily integrated with theological views. Stenhouse has noted that evolutionary ideas were integrated with Christian beliefs within the public discourse of New Zealand's leading scientists by the turn of the century, which assisted acceptance of Darwin's ideas.[44] However, this did not necessarily mean acceptance of the theory of natural selection, which continued to be debated even within scientific circles into the 1920s.[45]

Poultry leaders, like other naturalist-scientists, integrated Darwin's theories with philosophical and theological beliefs. Alfred Saunders, whose book was

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[42] Paley, "Natural Theology; or, Evidences of the Existence and Attributes of the Deity. Collected from the Appearances of Nature" 213-216 accessed 4 January 2013, http://tinyurl.com/4s3xp9.

[43] Ibid., 317-318.

[44] John Stenhouse, "Darwinism in New Zealand, 1859 -1900," in *Disseminating Darwinism: The Role of Place, Race, Religion, and Gender*, ed. Ronald Numbers and John Stenhouse (Cambridge: Cambridge University Press, 1999), 63-89.

[45] Möller-Wille and Rheinberger, *A Cultural History of Heredity*: 155-156.

highlighted at the start of the chapter, was a New Zealand Poultry Club founder. His publication was praised for its integration of evolutionary principles and practical advice. He and the internationally influential British poultry expert Lewis Wright were two prominent author-breeders who referred directly to Darwin in their advice books, while also sustaining moral and philosophical arguments.[46]

As the study of beauty in nature was integral to traditional natural history, loss of attention to beauty and breed distinctiveness (determined by 'breed points') was a core concern for fanciers as industry was promoted. Wright's defence of this view was articulated in scientific, practical and aesthetic terms. He explained that breeds had been lost in the past due to breeding from farm birds and was aware of diminished health and size in commercial birds within the new American systems. Fancy breeders bred large birds as they were believed to provide better value for money – they were hardier and could be used for meat and eggs. The fancy poultry craze, he noted, had restored adherence to breed points. However, birds were not expected to be totally uniform. Wright defended attention to aesthetics and birds' individual features.[47]

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[46] Moral arguments are mentioned below. On Darwinist views see for example, "Books by Colonial Authors," *Star*, 3 January 1884, 3; Wright, *Book of Poultry*: 115, 280. Derry acknowledges that nineteenth century farmer engagement with naturalist study strengthened due to Darwin. See Derry, *Art and Science in Breeding: Creating Better Chickens*: 78-79. Wright's book, published in numerous editions between 1872 and 1919, was advertised in New Zealand from 1876 (PP search, 16 April 2013). See "New Advertisements," *WH*, 13 June 1876, 2. On poultry club members referring to this for the British standard for judging, breeding and other aspects of poultry-keeping, see "Poultry Association," *AWN*, 28 April 1883, 23. In this, the American Standard of Excellence was debated as an alternative reference. See also Selby, *New Zealand Poultry Standards*: 8. On Wright's popularity internationally, see Smith and Daniel, *The Chicken Book*: 22.

[47] Wright, *Book of Poultry*: 112-116.

Wright promoted romantic aesthetics but was not overtly theological. However, other poultry experts echoed Paleyian ideas. For example, an American contributor to the *Auckland Weekly News* poultry column in 1884 noted:

> The cluck which is heard when the hen becomes broody seems to express the fact that a change has come over the spirit of her dreams. The tone is decided, and expresses a certain firmness of intention […] She has decided to assume the responsibility of rearing a brood, and at the end of three weeks, when the effect of her patient waiting are apparent, she continues to speak loud and often, giving the sound which is immediately understood by her young brood as the true signal of the headquarters of the family.[48]

The column continued, observing with reference to biblical verse that the mother-hen 'gathereth her chickens under her wings'.[49] The allusion to the bird's 'spirit' and the animal soul was a concept that continued to be propounded by popular naturalists such as Reverend Wood whose book *Man and Beast*, in its eighth edition by 1903, was sold in New Zealand.[50] Naturalist-scientists in New Zealand's scientific community, the New Zealand Institute, around this time also debated the notion of the animal soul.[51]

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[48] "Habits of Poultry," *AWN*, 14 June 1884, 5.

[49] See Matthew 23:37 and Luke 13:34.

[50] Wood's work was circulating from the 1870s. See for example, "Athenaeum Books," *ODT*, 13 May 1875, 2. He was also the editor of Britain's *Boys Own Magazine*. See biblical passages and anecdotes on fowl in Rev. J.G. Wood, *Man and Beast. Here and Hereafter* (London: Gibbings Company, 1903). 147-150, 273, 305-309, 313, 375-376. On the notion of animal souls within Western philosophy see Thomas, *Man and the Natural World: A History of the Modern Sensibility*: 30-34.

[51] William Carlile, "Animal Intelligence," *TPRSNZ* 24 (1891): 349; Charles W. Purnell, *The Intelligence of Animals* (Christchurch: Whitcombe and Tombs, 1893). 44-45. On the New Zealand Institute see Rebecca Priestley, "A Survey of the History of Science in New Zealand," *History Compass* 8, no. 6, (2010): 479-481.

Saunders' advice book was also replete with descriptions reflecting the naturalist's ideological blend of science, religion, romantic and humanitarian sentiment. He incorporated Romantic-era poetry for example, to emphasise welfare priorities.[52] Humanitarian attitudes were considered a mark of respectable citizenship, and of respectable science. Naturalist tradition validated subjective observation and respect for an essential 'vitalism', or 'vital force' in living things, sharing this anti-reductionist impulse with Romantic concern with the 'fraternity of nature'.[53] As it was not unusual for the scientifically-inclined at the turn of the century to identify as 'lovers of nature', fanciers commonly declared their 'love' for the birds. Wright, when discussing the best commercial breeds in 1885, advised that a genuine feeling and 'strong fancy' for a particular breed would overcome any economic disadvantages. Amongst fanciers he disapproved of the 'class of persons who buy and exhibit fowls merely from feeling a pride in their possession; not that they love or care for them in reality'.[54]

New Zealand poultry clubs emerged at around the same time as the Society for the Prevention of Cruelty to Animals (SPCA), branches of which were established in the four main city centres by the late nineteenth century.[55] A

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[52] See excerpt from William Cowper's *Walk at Noon* in Saunders, *Our Domestic Birds: A Practical Poultry Book for England and New Zealand*: 160.

[53] On the intertwining of natural history study and the romantic era of Western science, see Richard Holmes, *The Age of Wonder: How the Romantic Generation Discovered the Beauty and Terror of Science* (London: Harper Press, 2009). On animals specifically, see Rod Preece, "Thoughts out of Season on the History of Animal Ethics," *Society & Animals* 15, no. 4, (2007): 370; Thomas, *Man and the Natural World: A History of the Modern Sensibility*: 171-172, 266-272. On sustained vitalist ideas within biology see Garland Allen, "Mechanism, Vitalism and Organicism in Late Nineteenth and Twentieth-Century Biology: The Importance of Historical Context," *SHPBBS* 36, no. 2, (2005): 262-283. See Wordsworth discussed as 'the poet of nature' at the Auckland Institute in 1893. See Professor C.M. Pond, "Art. LXV.—Tennyson and Browning: A Retrospect of Victorian Poetry," *TPRSNZ* 26, (1893): 548-559.

[54] Wright, *Book of Poultry*: 20, 117.

[55] Swarbrick, *Creature Comforts: New Zealanders and their Pets: An Illustrated History*: 111.

correlation between animal and human abuse was popularly acknowledged as the British welfare movement had arisen in response to the conjoined exploitation of humans and animals within industrial society. The Auckland branch, like the equivalent in England, combined with the Society for the Protection of Women and Children in 1898.[56]

Poultry clubs as a form of morally-improving, but still competitive, rational recreation in Victorian society were intended as a substitute for the blood sport of cockfighting.[57] Cockfighting was legally prosecutable under national law in New Zealand from 1878 and on the decline by the mid-1890s.[58] Although Saunders regarded it and its associated practice of excising ('dubbing') wattles and combs to prevent blood loss in fighting as 'a relic of barbarism that we might now dispense with',[59] a respect for the skill of raising Game breeds (referred to simply as 'Game') and some nostalgia for the ancient sport was retained within poultry circles into the twentieth and twenty-first centuries. Alf Walker, the President of the Christchurch Poultry Club and an authority on Game, for example, freely admitted in 1908, that in his childhood 'my brother

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[56] *Eleventh Annual Report and Balance Sheet of the New Zealand Society for the Protection of Women and Children and Prevention of Cruelty to Animals, 1904-1905* (Auckland: The Society, 1905); Thomas, *Man and the Natural World: A History of the Modern Sensibility*: 181-182; Ritvo, *The Animal Estate: The English and Other Creatures in the Victorian Age*: 132-133.

[57] Ritvo, *The Animal Estate: The English and Other Creatures in the Victorian Age*: 82-166.

[58] The Cruelty to Animals Act, 1878, specifically addressed cockfighting. See p.14 in "Cruelty to Animals Act, 1878 (42 Victoriae 1878 No 7)," New Zealand Legal Information Institute, accessed 10 July 2013, http://tinyurl.com/onzoflp. Nelson and Otago provincial ordinances were replaced by this. See also "House of Representatives. Cruelty to Animals," *AS*, 2 August 1878, 2. On the decline, see Otago SPCA annual reports: "Society for the Prevention of Cruelty to Animals," *ODT*, 31 January 1889, 3; "Prevention of Cruelty to Animals," *ODT*, 16 March 1893, 6. See also the report of declining Game bird numbers at poultry shows after 1890 (also partly due to commercial factors) in Merrett, "The Journal's Show Report," 18.

[59] Saunders, *Our Domestic Birds: A Practical Poultry Book for England and New Zealand*: 166-167.

and I bred many a bird to do battle in the pit.'[60] Cockfighting continued as an underground hobby prior to WWII.[61]

As the New Zealand poultry industry emerged, fanciers echoed Wright and Saunder's concern about lessened attention to beauty and exploitative commercialism.[62] Fancier resistance to industry, especially prior to WWI was frequently acknowledged by industry leaders.[63] Merrett, reflecting on the dominance of fancy breeders within the journal's early readership noted by 1914: 'How the spirit of poultrydom has changed! […] How we had to fight the fancy and make good for the utility men!'[64] By this time leading industry advocates ran speciality hatcheries, along with sideline egg or table bird businesses. Day-old chicks and 'ready-to-lay' (six month-old) pullet hens were sold to household poultry-keepers and farmers with sideline flocks.[65]

Stalwart hobbyist fanciers, who retained a presence as suppliers of purebred stock, and officials throughout the period, urged respect for fancier expertise.[66] However, the 'pure fancy' (the hobbyist breeder of non-utility birds) was cast as a dying breed. The typical obituary comment within the *NZPJ* was that: 'He belonged to that school of fanciers whose love for their birds is greater than any

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[60] Merrett, "The Journal's Show Report," 18. On husbandry skills see Rob Boddice, *A History of Attitudes and Behaviours Toward Animals in Eighteenth and Nineteenth-Century Britain: Anthropocentrism and the Emergence of Animals* (Lewiston, New York: Edwin Mellen Press, 2008). 224.

[61] "Cock Fighting? Scene Near Pukekohe. Police Make Discovery. Charges of Cruelty. Thirteen Men to Appear," *AS*, 25 July 1932, 8. Dubbing was never entirely dispensed with. The National Animal Welfare Advisory Committee (NAWAC) understand that today approximately 500 Game birds a year are dubbed by older breeders (Conversation with policy advisor, Kate Littin, Ministry for Primary Industries, 9 February 2014).

[62] Ambler, "Fancy Classes at Shows. To the Editor," 16.

[63] See for example, Merrett, "The Journal's Show Report," 20.

[64] Merrett, "Our Ninth Round," 5.

[65] J.B. Merrett, "The Day-Old Chick Trade," *NZPJ*, 20 May 1912, 1-2.

[66] Merrett, "The Journal's Show Report," 20; Ambler, "Fancy Classes at Shows. To the Editor," 16.

monetary consideration.'[67] By the post-WWII period this generation had passed, although a contributor to the *NZPW* in 1956 reminded readers not to forget the hobbyist. Hobbyists, it was argued, had time for the careful observation required for scientific breeding, whereas larger firms 'just mass-produced'.[68] Leaders affirmed the importance of hobbyist breeders for maintaining a genetic pool in this later era of hybridisation and tighter national biosecurity.[69]

Women

The ratio of women to men who identified their primary occupation as poultry farmers in the national census, including those assisting on family farms, averaged 1:6 between 1901 and 1956 (Appendix B). Many more assisted in a part-time role on family farms where poultry-keeping was a sideline.[70] Most male industry leaders publicly encouraged women within industry, although usually within a helpmeet role, as was the norm in this half of the century.[71] During the interwar period, frequent references were made to the industry's

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[67] "Passing of a Veteran," *NZPJ*, 20 May 1926, 8.

[68] G.D. Holloway, "How the Hobbyist Helps the Poultry Industry," *NZPW* 19, no. 7, (1956): 292-296; "Interdependence of N.Z. Poultry Industry," *NZPW* 21, no. 5, (1958): 1-2.

[69] "Interdependence of N.Z. Poultry Industry," 1. International disease outbreaks in the 1930s led to a gradual tightening of biosecurity from this time. See "The Customs Import Restriction Prohibition Order 1939, No. 2. Governor General. Order in Council, 18 October 1939," Poultry and Hatching Eggs Importation Restriction 1939 - 1952. AAFZ 412 W5704/294 87/2/20 Part 3 (ANZ); F.C. Bobby to Mr. J.W. Manifold, 25th July 1950, Poultry and Hatching Eggs Importation Restriction 1939 – 1952, AAFZ 412 W5704/294 87/2/20 Part 3 (ANZ).

[70] For example, in 1921, while 54 women identified their primary occupation as 'poultry farmer', 102 in total identified as being involved with poultry farming as poultry-keepers, labourers or in some other capacity. See "Industries by Occupations and Age Groups," In NZC, 1921. Occupations, p. 35. This breakdown of figures was not consistently available in every census.

[71] See for example, "The Poultry Industry. Its Possibilities in Canterbury," *NZPJ*, 20 December 1913, 18. On this norm see Claire Toynbee, *Her Work and His: Family, Kin and Community in New Zealand 1900-1930* (Wellington: Victoria University Press, 1995). 42-61.

reliance on women. The *NZPJ* editorial for instance in 1925 reminded readers that:

> The poultry industry is always dependent upon our women. On a farm a woman is responsible for hatching the great bulk of the chickens [and] small flocks form the bulk of supply […] to depend solely on specialists would be the long way round. We can only secure rapid production by appeal to women.[72]

Men entering the industry, throughout the period under study, were advised to minimise labour costs by utilising the free labour of wives and children.[73]

In terms of establishing independent careers, the census in 1916 recorded 64 women in business on their own or employing others (compared with 384 men). After WWI in 1921 these figures were 45 women and 454 men.[74] Women's involvement with small business during the first few decades was evident in NZUPC competition lists and advertisements such as the one below for Mrs Gorinski's award-winning breeding flock of 300 birds.[75]

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[72] "Back to the Women," *NZPJ*, 21 December 1925, 7. See also X.Y.Z. [pseud.], "Wellington District," *NZPP*, 16 April 1936, 22.

[73] For example, J.B. Merrett, "Beginner's Department," *NZPJ*, 20 November 1913, 23; J.T. McHarg, "Poultry Keeping," *NZPJ*, 20 May 1918, 1; A.G. Mumby, "Well-Known Poultry Farms – No. 5," *NZPW* 1, no. 6, (1938): 12; Memo, 9 July 1946 re. E.A. Carpenter, Rehabilitation of Returned Soldiers in the Poultry Industry 1945-1952.

[74] "Occupations Classified by Sexes and Grades," in *NZC, 1916*, 91; "Occupations by Grade of Employment," in *NZC, 1921*, 143. The latter figures are inconsistent with overall figures in the same volume on p.17, which suggest higher numbers and a similar gender ratio. Break-down by gender and business status was not supplied in other years.

[75] On her business see "Mrs. Gorinski's Success with White Leghorns," *NZPJ*, 20 February 1924, 20.

Mrs. GORINSKI, Southland Noted Utility White Leghorn Breeder

(Records second to no breeder in the Dominion)

These are only a few of our public performances:—**Papanui:** 1920, 1st prize Two-year Test, 6 birds laying 2614 eggs. 1919, second prize, 6 birds, 1518 eggs in 51 weeks. 1921, 5th prize, 6 bird team. 1921, 1st prize, 3 bird team, 725 eggs; big entry. 1921, 1st prize greatest weight of eggs. 1921 1st prize, autumn test. 1922, 2nd prize, 3 bird test (750). 1922, 2nd prize, autumn test. 1922, 1st prize, greatest weight of eggs; 750 2¼oz., beating 815 eggs in weight by 2oz. 6dr. Do you want this strain?

Southland: 1919, 3rd prize. 1919, 1st prize in winter test. 1920, 4th prize in 6-bird test. 1921, 1st prize. Lady Southland, 318 eggs. 1922. 2nd brize 6 birds, 1448 eggs, 50 weeks. 1922, 3rd prize. single hen test, 252 large eggs in 50 weeks. 1922, 1st prize autumn test, 6 birds.

DOMINION RECORD HEN
"Lady Southland," 318 Eggs in 52 weeks

1922, 1st prize autumn test, single bird. 1923, 3rd prize, 285 eggs in 50 weeks. 1923, 4th prize 279 eggs in 50 weeks. 1923, 1st prize, greatest weight of eggs, beating the winner of 300 eggs by many pounds.

Four successive years on top. Three years gaining First prizes for the greatest weight of eggs. Papanui 1921; Papanui 1922; Southland 1923. Beating all winners by numbers of pounds in weight of eggs. Large eggs are what is required for Dominion Export Trade. Book your cockerels early from this 2¼ egg strain—nothing better in the Dominion. Price 30/; Sittings 20/- 15 eggs; 2/6 railage extra. Incubator lots £4 per 100. Railage 5/- extra. Day-old-chicks same strain 1/6 each. Breeding Trios mated at arranged prices.

Mrs. GORINSKI. 181 Bowmont Street, Invercargill

Figure 2. Mrs. Gorinski's advertisement, 1923.[76]

Womens' involvement in industry was boosted during WWII. Mrs Daisy Carter, for example, became New Zealand's first woman 'chick-sexer'. Though this achievement sounds dubious (and there were concerns about harm to the chicks when this practice of speedy, mass genital-identification began), it was a much sought-after skill during the war when struggling egg-producers wanted to quickly identify and dispose of male chicks which they could not afford to feed.[77] However, ex-servicewomen and 'land girls' who wished to farm independently were not well-supported beyond the war.[78]

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[76] "Mrs Gorinski," *NZPJ*, 20 June 1923, 31.

[77] "Chick Sexing. Mrs D. Carter's Success," *NZPW* 4, no. 2, (1941): 12. For the importance of chick-sexing during war-time, see F.C. Bobby, "Chick Sexing in New Zealand," *NZPW* 4, no. 9, (1941): 11.

[78] Ex-servicewomen and 'land girls' were ineligible for the Rehabilitation Board assistance granted to men to establish their own farms. See Daffodil [pseud.], "Women on the Land," *NZFW*, 14 November 1946, 56.

There was little involvement of women in an official capacity in New Zealand compared with Britain.[79] Women faced resistance within leadership roles, although from the mid-1930s a handful of women were prominent as leaders.[80] Most notable amongst these was a British-trained woman, Marion (Marie) Stewart, who besides tutoring at the Massey Agricultural College Poultry Department in Palmerston North from 1932 to 1935, worked actively, particularly through books and *NZF* poultry columns (initially under a pseudonym to disguise her gender), to promote efficient farm methods. Stewart ran her own hatchery-farm after leaving Massey.[81]

Government Farms and Industry Training

Government farms were initially established to improve the nation's breeding and laying stock by supplying affordable 'sittings' (or 'settings') of hatching eggs to the public.[82] The first of these farms were established at quarantine stations and psychiatric asylums throughout the country and at the Burnham industrial school.[83] Burnham and three additional farms established between

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[79] Industry patterns differed in Britain which did not begin exporting eggs until 1965. See Sayer, "'His footmarks on her shoulders': The Place of Women Within Poultry Keeping in the British Countryside, c.1880 to c.1980," 301-329.

[80] See for example, "Notes," *NZPJ*, 20 May 1926, 8; "N.Z. Poultry Producers' Federation," *NZPW* 1, no. 9, (1938): 2.

[81] Chris Birt, "She Masqueraded as a Man," *New Zealand Woman's Weekly*, 25 October 1982, 49-50; "Citation. Marie Stewart, M.B.E. J.P.," *Poultry Forum*, August 1983, 14-15.

[82] "Late Correspondence. The Government and the Poultry Industry," *NZPJ*, 20 November 1912, 14.

[83] "Farming Notes," *BH*, 2 July 1897, 6; "State Farms (Report of the Joint Committee Upon), Together with the Minutes of the Proceedings, and Appendix," in *AJHR, 1898, Session I, I-11*; Edith Searle-Grossmann, "In the City of Fads. Our Industrial School," *OW*, 5 October 1899, 59; D. MacGregor, "Lunatic Asylums of the Colony. Report for 1901," in *AJHR, 1902, Session I, H-07*, 6-8.

1900 and 1902 within the larger experimental farm stations[84] were also explicitly intended as educational demonstration farms.[85] Some practical training was available onsite,[86] and advice pamphlets updated by each successive Government expert included photographs of Government farm buildings and illustrations of equipment and housing. However, the Department received criticism as it struggled to meet demand with industry expansion prior to WWI.[87] Due to Government retrenchment, by 1916 the two South Island poultry farms at Milton and Burnham were closed. Only Ruakura's poultry farm remained after the war.[88]

In 1927, a new demonstration and stock supply farm was established at Wallaceville in Upper Hutt to assist the lower North Island. After WWII, this farm was closed and merged with the nearby table poultry farm that had been established for supplying US troops during the war.[89] Poultry units at Massey and Lincoln Agricultural Colleges (the latter situated in the South Island in

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[84] "Momohaki Experimental Station," in *AJHR, 1899, Session I*, C-04; D.D. Hyde and Robert McNab, *Poultry and Eggs for Market and Export* 5th ed. (Wellington: New Zealand Department of Agriculture, 1908). 6.

[85] "Milton Poultry Farm," *BH*, 4 September 1900, 5; "Ruakura Agricultural Station," *AS*, 25 November 1901, 2; "The Budget. Produce of the Colony," *AS*, 9 July 1902, 2.

[86] Hyde and McNab, *Poultry and Eggs for Market and Export* 6. No tuition was offered in F.C. Brown, *Bulletin No. 66 (New Series). Utility Poultry-Keeping* (Wellington: New Zealand Department of Agriculture, Industries and Commerce, 1916).

[87] J.M. Fergusson, "Correspondence. Experimental Poultry Farms," *NZPJ*, 20 May 1912, 24; "Overproduction," *NZPJ*, 20 May 1912; "The Poultry Industry. Its Possibilities in Canterbury," 18.

[88] "State Poultry Farms (Expenditure and Receipts of), During 1907-8," in *AJHR, 1908, Session I, H-46*, 5335; "Experimental Farms (Location of) and Receipts and Expenditure," in *AJHR, 1912, Session II, H-21*; "State Experimental Farms (Report of the Board of Agriculture on the)," in *AJHR, 1916, Session I, H-40*, 3.

[89] J.D. Tenquist, *Wallaceville Veterinary Laboratory: An Anecdotal History* (Upper Hutt: MAF Technology, Wallaceville Animal Research Centre, 1990). 89; R. T. Stedman, "Letter to the Editor," *NZPW* 11, no. 1, (1948): 2.

Christchurch) also functioned as Government stock supply and demonstration farms from 1929 and 1943 respectively. Lincoln's poultry unit had existed from 1905, but it was not well resourced until after WWII.[90]

In 1931, a 48 week certificate course was offered through Massey College, and from 1933 an advanced course was also available. These programmes were managed by John Kissling, with Stewart as his assistant.[91] Student numbers were low in the pre-war years, with annual enrolment numbers not rising above five prior to 1944. Government funding, boosted for the training of ex-servicemen, increased student intake to 31 students between 1944 and 1946 before numbers declined again. The limited uptake of poultry farming by ex-servicemen was influenced by the reduced viability of poultry farming due to grain (especially wheat) shortages. Shortages resulted in Rehabilitation Board loans for ex-servicemen being restricted to the establishment and support of operations on existing farms. In 1948, policy changes enabled loans for part-time operations with a maximum number of 400 birds. However, feed shortages remained a problem until 1950, at which time issues with seasonal supply and feed quality continued. Consequently, general agricultural degrees and diplomas were considerably more popular in the post-WWII period than specialist poultry qualifications.[92] From 1931, Massey's Poultry Department also

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[90] "State Experimental Farms (Report of the Board of Agriculture on the)," 6; Orpington [pseud.], "Poultry Keeping," *AS*, 16 August 1935, 14; I. D. Blair, *The Seed They Sowed. Centennial Story of Lincoln College* (Christchurch: Lincoln College, 1978). 142.

[91] J. H. Kissling, *Annual Report 1932-33. Egg-Laying Contest. A Progress Report from the Poultry Department* (Palmerston North: Massey Agricultural College, 1933), 4-5; *Massey Agricultural College Calendar For the Year 1933*, (Palmerston North: Massey Agricultural College, 1933), 32. Stewart supported female students who were encouraged to enroll. Regarding the first female student see "Pioneer Graduate Remembered ", *Manawatu Guardian*, 21 June 2012, 2.

[92] On funding see "Department of Agriculture Annual Report for 1943-44," in *AJHR, 1944, Session I, H-29*, 5-6. Student numbers and separate short courses (farming topics unspecified) from 1943 to 1950 run for ex-servicemen were noted in the Massey Agricultural College Annual Reports for the Years Ending 31st December 1931 to 1960. The 1941 and 1942 reports indicate that from this time the College ran general agriculture diploma and degree courses which

hosted annual conferences, but greater interest in training was not evident until 1954, when short refresher courses were offered at both Lincoln and Massey Agricultural Colleges. Although attendance numbers of between 100 and 150 were low relative to the overall poultry farming population, the upsurge of interest in poultry science was considered significant by leaders at this time.[93]

In terms of veterinary advice, from 1928 officials and poultry-keepers were assisted by the Wallaceville research laboratories adjacent to the farm to which diseased birds could be sent for diagnosis.[94] However, there were no specialists in poultry pathology available until 1939, when an Italian expert was appointed. In 1949, as antibiotics were coming onto the market, two dedicated Government poultry field veterinarians were available through the Department of Agriculture's Livestock Division to advise farmers.[95] New Zealand's first veterinary training school was not opened until 1963 at Massey (by then known as Massey University).[96]

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included poultry-keeping. See also: New Zealand National Film Unit, *Graduate Harvest*, 1954. Ref. No. F7962 (ANZ). http://audiovisual.archives.govt.nz/filmplayer/?film=graduateharvest. On loan and feed shortages see Report for the Consideration of the Farms Advisory Committee. Establishment of Ex-Servicemen as Poultry Farmers, n.d., Rehabilitation of Returned Soldiers in the Poultry Industry, 1945-1952. AAFZ 412 W5704/346 76/9/211 Part 2 (ANZ); R.B. Tennent to G. Biss, 27 February 1948, Rehabilitation of Returned Soldiers in the Poultry Industry, 1945-1952. AAFZ 412 W5704/346 76/9/211 Part 2 (ANZ); "Bran and Pollard Needed for Eggs," *EP*, 3 June 1950, 8.

[93] "Poultry Farmers' Refresher Course," *NZPW* 16, no. 11, (1953): 341. On conferences, see "Poultrymen's Conference," *EP*, 23 December 1931, 10; W. V. Dyer, *Massey Agricultural College Annual Report for the Year Ended 31st December 1954* (Palmerston North: Massey Agricultural College, 1955), 3.

[94] "Institution to Help," *EP*, 22 January 1927, 8; F.C. Bobby, *Bulletin No. 211. Backyard Poultry-Keeping* (Wellington: New Zealand Department of Agriculture, 1944). 6.

[95] J.E. McIlwaine, "Department of Agriculture Annual Report for Year 1949-50. Livestock Division," in *AJHR, 1950, Session I, H-29*, 103.

[96] New Zealand Veterinary Association and Massey University. Faculty of Veterinary Science, *50 Years of Veterinary Education: A History 1963-2013* (Palmerston North: Massey University,

Advisory Staff

James Henderson and Mr D.D. Hyde, the first two successive Chief Poultry Experts, both had hobbyist and fancier backgrounds. Hyde frequently emphasised his fancier background and the importance of harmony between fancy and utility sectors for industry success.[97] Frederick (Fred) Brown succeeded Hyde as the Chief Poultry Expert in 1914, having officially worked for the Department of Agriculture as a Government farm manager from 1902 and then as an assistant to Hyde from 1904.[98] Brown was appreciated for being a 'practical poultryman' who made 'no claim to laboratory or collegiate training [nor] theoretical knowledge'. He saw his role as primarily concerned with inculcating the '90 percent of poultrymen' in 'the ABC of the business'. By this he meant the teaching of core skills (such as the culling of birds, scheduling hatching times, providing grit and clean water and liming soil). Brown remained in this role until 1935.[99]

2013). 4-5. On efforts to establish a veterinary college prior to the 1960s see Lee and Brooking, "A Cautionary Tale: Rural Education in New Zealand, 1900-1940," 65.

[97] Henderson worked for the railways when he authored a pamphlet promoting poultry-keeping for the Department of Agriculture and was appointed the following year. See Henderson, *Poultry and Eggs for Market and Export*; "Local and General. Poultry Expert," *EP*, 12 May 1897, 4. On Henderson's sudden death see "Mr. Henderson," *HNS*, 3 February 1898, 2. On Hyde's appointment and views see "Local and General," *EP*, 12 May 1898, 4; Merrett, "The Journal's Show Report," 19-20.

[98] Hyde's retirement is noted in J.B. Merrett, "The Hyde Testimonial. An Appreciative Letter," *NZPJ*, 20 July 1909, 20. On Brown see "Poultry Expert. A Pioneer Worker. Mr Brown's Retirement," *EP*, 29 April 1935, 11; "Obituary. Mr. F.C. Brown," *ODT*, 20 January 1940, 16. Brown died 17th January 1940. See Brown, Frederick Charles (R23123053), Wellington Probate Files, AAOM 6030/3/180 (ANZ).

[99] J.B. Merrett, "The Official Conference Report. Evening Session. A Lecture," *NZPJSup*, 20 April 1914, n.p; "Overproduction," 8; "Poultry Expert. A Pioneer Worker. Mr Brown's Retirement," *EP*, 29 April 1935, 11.

Brown served his initial two and a half year apprenticeship from 1898 with Truby King at the Seacliff Asylum farm in Karitane.[100] King was acknowledged by Brown as an influential industry pioneer.[101] As one of the earliest Government farms, Seacliff's 1000 acres held a range of livestock, including a 'thoroughly up-to-date poultry farm' with 600 to 1000 chickens.[102] Henderson and Hyde promoted Seacliff as a model poultry farm, describing it as the most organised and well-managed in the colony, if not Australasia.[103] King's specially-designed fowl houses, including moveable houses on sledges, and hot water-piped brooders and incubators, featured in a triple-page spread of photographs with additional commentary in the *Otago Witness* in 1900.[104] This paper's poultry columnist acknowledged King as an influential innovator, and people occasionally wrote requesting King's advice.[105] In 1903 the Australian Government expert and author of a utility poultry manual, Mr D.F. Laurie, also acknowledged King's influence.[106] King's methods informed early Poultry

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[100] Brown commenced service at the Seacliff farm on 5th September 1898 and resigned on 13th April 1901 according to F. Truby King, Memo to Department of Agriculture, Wellington, Seacliff Hospital - Medical Superintendent - Outward Letters, 1 January 1882 - 2 October 1888, DAHI 19828 D264/3/a/1 (ANZ Dunedin).

[101] "Obituary. Mr. F.C. Brown," *ODT*, 20 January 1940, 16.

[102] H.P.H.[pseud.], "Seacliff Lunatic Asylum," *OW*, 10 October 1900, 44.

[103] "The Poultry Industry. A Talk with the Expert," *TIMH*, 15 May 1897, 3; "Flashes," *WH*, 3 June 1897, 3; "Lecture on Poultry-Keeping," *BOPT*, 20 December 1899, 2; "Poultry and Poultry Farming. Lecture by Mr D.D. Hyde," *ODT*, 27 November 1900, 2.

[104] Olsen and Guy (photo.), "Photographs of Seacliff Asylum, including the poultry farm " *OW* 10 October 1900, 45-47; H.P.H.[pseud.], "Seacliff Lunatic Asylum," *OW*, 10 October 1900, 44.

[105] Terror [pseud.], "Poultry Notes," *OW*, 16 June 1898, 39; Leghorn [pseud.], "Marking Chickens " *OW*, 25 August 1898, 43; Terror [pseud.], "Poultry Farming at Seacliff Asylum," *OW*, 25 August 1898, 43; Terror [pseud.], "Poultry Notes," *OW*, 14 October 1903, 50.

[106] Terror [pseud.], "Poultry Notes," *OW*, 16 December 1903, 49; "Overproduction," 8. Laurie went on to author a number of poultry books. The manual referred to by Terror was likely to have been: D. F. Laurie and South Australia Department of Agriculture, *Hints and Advice on the Breeding and Rearing of Poultry, with Illustrations* (Adelaide: C.E. Bristow, Government Printer, 1895).

Department pamphlets, including one on egg production.[107] Throughout his career, and upon retirement, Brown attributed his knowledge to the thorough and enthusiastic training on 'scientific lines' that he received from King. He had benefited, he said, from King's advice and lectures, and from observation of his experiments.[108] We will return to King and his promotion of agricultural science in chapter two.

Carrol John Charles Cussen, who succeeded Brown as Chief Poultry Instructor from 1935 to 1939,[109] and Ernest Jarrett, the acting Chief Poultry Instructor from 1940, were both 'practical men' who had gained their experience on Government farms and as instructors.[110] Fred Bobby, appointed as the Superintendent of Poultry Husbandry in January 1941, was the first head of department to hold formal credentials in commercial poultry farming. He was from England and held a National Diploma in Agriculture and a National Diploma of Poultry from the Harper Adams Agriculture College, had taught at the College, managed commercial farms with ten to twenty thousand birds, and had worked in a private research facility concerned with table poultry production.[111]

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[107] Eleanor McLaglan, *Stethoscope and Saddlebags; An Autobiography* (Auckland: Collins, 1965). 75. Reference to the Agricultural Department's leaflet No. 38 featuring the Seacliff hot water brooder is made in "Poultry Notes. The Poultry Establishment at Seacliff Asyulm," *OW*, 30 September 1897, 7. The pamphlet itself, written by Henderson, details a hot water brooder but does not acknowledge King. See also Figure 8, p.89 of this thesis.

[108] See for example, J.B. Merrett, "Leaders in Colonial Poultry Culture. No. 3. Mr Fred. C. Brown, The N.Z. Government Assistant Chief Poultry Expert," *NZPJ*, 20 June 1908, 26-27.

[109] "Poultry Expert. A Pioneer Worker. Mr Brown's Retirement," *EP*, 29 April 1935, 11; "Poultry Expert's Death," *AS*, 25 November 1939, 12; Cussen, Carrol John Charles (R23122939), Letters of Administration, Wellington Probate Files, AAOM 6030/1/68 (ANZ); "Death of Mr. C.J.C. Cussen," *NZPW* 3, no. 2, (1939): 15.

[110] "N.Z. Poultry Instructors - No.1," *NZPW* 4, no. 6, (1941): 10.

[111] "Poultry Superintendent," *NZPW* 4, no. 2, (1941): 27.

The poultry advisor team was increased during and after WWI for the provision of ex-servicemen training, although this was limited. The team which totalled five in 1925 was comprised of men with varied backgrounds, and usually with both hobbyist and commercial experience. Recruitment was an issue as positions were not well paid.[112] From 1945 to 1952 the team was expanded to assist soldier settlement. Fourteen instructors were in place by 1958.[113] Because the Department suffered ongoing difficulties in recruiting staff, in 1949 a Poultry Cadet Scheme was established offering a two year apprenticeship period combining training at the agricultural colleges, practical fieldwork supervised by Department staff, and farm experience.[114] Requirements had changed by 1965 when poultry instructors required a university degree majoring in poultry husbandry from Britain in addition to a minimum of two years' experience.[115]

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[112] On the instructors, see for example, "Poultry Conference," *Dominion*, 6 April 1915, 8; "Mr. L. Cocker, Government Poultry Instructor," *AG*, 15 September 1920, 1; "N.Z. Poultry Instructors - No. 2," *NZPW* 4, no. 7, (1941): 10. On training, see for example, "Returned Soldiers and Poultry-Keeping," *Ohinemuri Gazette*, 23 September 1918, 3; "Our Returned Men," *NZPJ*, 20 June 1919, 21; J.B. Merrett, "Repartiation of Soldiers," *NZPJ*, 20 June 1919, 1; "Training for Soldiers," *Dominion*, 4 February 1920, 8. On remuneration see "Underpaid Poultry Instructors," *NZPJ*, 20 October 1919, 16; J.B. Merrett, "What Can We Do to Save the Industry?," *NZPJ*, 21 December 1925, 1.

[113] "Rehabilitation of Returned Soldiers in the Poultry Industry 1945-1952."; Maurice E. White, Memorandum to Officer in Charge, Rehabilitation Department, Hamilton. 28 August 1947, Rehabilitation of Returned Soldiers in the Poultry Industry, 1945-1952, AAFZ 412 W5704/356 67/9/211 Part 2 (ANZ); "Poultry Instructors and Servicing," *NZPW* 21, no. 10, (1958): 1.

[114] J.H. Etherington, Report on Poultry Cadets. Memo to Secretary, Public Services Commission, 6 September 1950, Staff Training - General - Poultry Study Awards (1949-73). AEKO 19171 SSC1W 2702/22 26/1/30 Part 1 (ANZ); J. L. Robson, Agriculture Department Poultry Cadet Scheme, 4 August 1949, Staff Training - General - Poultry Study Awards (1949-73). AEKO 19171 SSC1W 2702/22 26/1/30 Part 1 (ANZ).

[115] Department of Agriculture Memo. Vacancies: Poultry Instructors, 6 August 1965, Staff - Departmental Establishments - Agriculture - Animal Health Division - Executive Officers, Livestock Instructors, Livestock Superintendents, Poultry Instructors, AEKO 19171 SSC1 W2984/6 24/2/1/38 Part 2 (ANZ).

The WPSA

Opportunities for ongoing training and direct contact with international poultry science and industry specialists were limited for New Zealand leaders. A small number were members of the WPSA prior to 1950: Merrett, Kissling, Stewart, Brown and T.H. Evans (the Auckland Poultry Board representative). Merrett reportedly suggested the establishment of international WPSA congresses in correspondence with international colleagues prior to WWI. These are likely to have included the WPSA leaders discussed later in chapter five: Edward Brown in Britain and Raymond Pearl in the US. WPSA congresses had a commercial trade focus, but were also attended by fanciers and scientists who presented papers. They commenced in 1921, and Merrett attended once during his editorship in 1924. Kissling attended in 1938, but Poultry Department officials were not exempted from duties to attend in the decades prior to WWII. Other breeders attended in a private capacity or representing the NZUPC. Bobby, Kissling and Alf Bridle (chairman of the NZPB) were instrumental in establishing the New Zealand WPSA branch in the late 1950s.[116]

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[116] The WPSA was formed in 1921 to assist technical training. See "Origin and History," World's Poultry Science Association, accessed 6 May 2013, http://www.wpsa.com/organization/history.html. On Merrett's congress attendance and correspondence with the International Association of Poultry Instructors prior to the formation of the WPSA, see Chanticler [pseud.], "The Poultry Industry," *Dominion*, 9 March 1912, 14; "Poultry Congress," *WDT*, 15 March 1912, 5; "Poultry Culture," *EP*, 25 June 1924, 9. On others attending congresses see for example, "Poultrymen's Conference," *AS*, 3 March 1927, 9; J. H. Kissling, "The Seventh World's Poultry Congress," *NZPW* 2, no. 11, (1939): 18. Kissling stated that he and Stewart and a few others were members prior to large numbers joining in the 1950s in J. H. Kissling to the NZ Poultry Board, 1 December 1959, NZWPSA, AAAOZ 6117 W3346/160 7/18 (ANZ); Moss to A.C. Bridle, 17 November 1959, NZWPSA, AAAOZ 6117 W3346/160 7/18." In 1950 the *World's Poultry Science Journal* listed only Kissling and Stewart and two Auckland breeders as members. See "Associate Membership. New Zealand," *World's Poultry Science Journal* 6, no. 4, (1950): 360. Three New Zealand members of the WPSA in 1935 (Brown, Kissling and T.H. Evans), and Merrett representing Australia were noted in "Berlin Congress," *EP*, 26 October 1935, 29. On the congresses as trading zones see Marie, "For Science,

Figure 3. *NZ Truth* cartoon of Merrett in 1935

Caption reads: 'Mine honest friend - will you take eggs for money? – Shakespeare.'[117]

Business Objectives

New Zealand leaders were focussed upon the export trade prior to WWII in order to boost national production through preventing summer egg gluts and lowered prices domestically. The first trial shipment of eggs was made in the New Zealand 1896-1897 summer, which corresponded with England's low season.[118] Trials continued and in 1910 New Zealand's total egg and table poultry produce was estimated at £1 million annually.[119]

Love and Money: The Social Worlds of Poultry and Rabbit Breeding in Britain, 1900-1940," 928-930.

[117] Ellingford (cartoonist), "J. B. MERRETT (Christchurch)," *NZT*, 4 April 1935, 5. Merrett was by this time directing Australian egg exports. See notes on Merrett's career in the introduction to this thesis under 'Methodology and sources'.

[118] "The Poultry Industry. A Talk with the Expert," *TIMH*, 15 May 1897, 3.

Despite early hopes for the establishment of a table bird export market,[120] by 1911 the acting Government Poultry Expert wrote with dismay: 'The raising and feeding of table poultry is an almost neglected branch of the industry in New Zealand […] Egg production is the sole object, and the cockerels and cull hens are regarded as a by-product – often as a waste product.' Prior to 1960 a small domestic table bird market was sustained primarily by sideline farmers keeping hardy 'dual-purpose' (meat and egg) breeds such as Orpingtons, Plymouth Rocks and Wyandottes. When egg prices fell, table birds could be sold.[121] Farmers also returned to these birds in the 1930s due to their disease-resistance and suitability to outdoor range when there was limited money for investment in housing and feed.[122]

The establishment of local egg pulp manufacturers by the 1920s, which purchased, processed and stored summer egg surpluses for baking products, boosted the egg trade.[123] Industry growth revived the export trade which had died prior to WWI,[124] and 1928 was a record year.[125] However between 1929 and 1935 exports again waned. New Zealand's egg exports in 1932, totalling

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[119] J.B. Merrett, "The N.Z. Poultry Conference " *NZPJ*, 20 October 1910, 8.

[120] "The Poultry Industry. An Address by the Government Expert," *WH*, 12 April 1901, 2.

[121] Brown, *Bulletin No. 13. Poultry and Eggs for Market and Export*: 17. On the temporary boost to the industry during WWII provided by US troops see J.H.K.[pseud.], "Table Poultry Prices," *NZPW* 8, no. 9, (1945): 13; Wynnton Poole, "Miss Marion Watson Stewart, M.B.E., J.P," *Historical Review. Bay of Plenty Journal of History* 35, no. 1, (1987): 40. On commercial production in the late 1950s see M.W. Stewart, *Profitable Poultry Keeping* (Christchurch: Whitcombe & Tombs, 1958). 102-107.

[122] "Breed Disease Resistant Birds," *NZPW* 3, no. 3, (1940): 25.

[123] Fawcett, *Survey of the Poultry Industry in New Zealand by the Farm Economics Section*, 6,15.

[124] "16. Section XII.- Agriculture and Live-Stock. Subsection C.-Live-Stock. Poultry," in *NZOYB, 1913*. Statistics New Zealand, accessed 1 May 2013, http://tinyurl.com/c23k8d5; F. H. Cooper, "Report of Fourth Annual Poultry Conference. Consideration of Steps to be taken for Export of Eggs. Discussion on Paper by Mr. F.A. Cooper " *NZPJSup*, 20 April 1914, n.p; "Refrigeration and Cool Storage," *NZPJ*, 21 March 1921, 13.

[125] Fawcett, *Survey of the Poultry Industry in New Zealand by the Farm Economics Section*, 6.

£18,761, lagged behind Australia, (£1,902,261), China (£10,747,237) and Denmark (£12,075,627).[126] Efforts were curtailed prior to WWII and after the war efforts were focussed on expanding the domestic market.[127]

Egg-laying competitions held at Lincoln from 1904 and later at Massey and in Papanui in Auckland, played an important role in shifting the focus of poultry breeding from exhibitions of beauty to demonstrations of productivity. Poultry-keepers could send representative birds from their flocks to be tested for a year.[128] Some breeders initially criticised the close confinement of hens for months on end and pointed out that some breeds would not tolerate this.[129] However, the light White Leghorn tolerated confinement particularly well, as did some larger dual-purpose breeds. As was noted at the NZPA conference in 1914, ultimately it was performance in egg-laying competitions that determined the birds that were bred.[130] Breeders' businesses were boosted by the sale of chicks from record-breaking 'wonder-layers'.[131]

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[126] Miln, "First Annual Conference. New Zealand Poultry Producers' Federation," 4.

[127] Reginald Barker, "Eggs and Economics," *NZPW* 21, no. 5, (1958): 13-19.

[128] Mrs B.F. Wilcoxin, "Keeping Records. The Wonderful Advantages Derived from a Systematic Knowledge of the Possibilities of Your Flock," *NZPJ*, 20 October 1910, 27-28.

[129] W.M. Elkington, "Partridge Wyandottes for Utility," *NZPJ*, 20 May 1907, 32.

[130] Merrett, "The Official Conference Report. Secretary's Annual Report," n.p.

[131] See 'wonder-layers' referred to in, for example, *Reliable Poultry Journal* cited in "Good-Natured Challenge to All and Sundry," *NZPJ*, 20 February 1926, 9.

IRVINE STRAIN

Hatching While You Wait

Irvine strain of winners, bred to **LAY,** and **PAY,** and **WIN.** For exhibition and utility combined. I guarantee my birds second to none in Australasia. **My Birds** are unbeaten **in Exhibitions,** as show birds; and showed their blood in Christchurch laying competition After losing weeks at start of competition, came in the finish and laid 207-3 each and

Broke New Zealand Record

with **167 Eggs** for one month—**6 Birds.** It shows I can breed type and feather, as well as produce layers.

I have two pens now competing in laying competition. They have got started with the rest; see if they can't lay! My birds are also competing in South Australia.

I hatched 9,000 chicks last season, and am booking orders now for this season, and will book 15,000 chicks. My bookings to date are nearly half my complement.

Order Early if you want Chicks

Hatching every week until November 1st. I guarantee my stock, and will pay return freight on it if it is not what I represent.

If you are interested in better poultry and more of it, write for my 36-page Catalogue. It will tell you what others think of Irvine Strain. It contains my prices and selling methods, and pictures of my stock and plant.

Albert W. Irvine

American Leghorn Specialist. Originator Blue Mottled Leghorns.

Linfield Poultry Farm, Pah Rd., Epsom, Auckland

New Zealand

Largest Speciality Stud Farm in the Dominion.

Figure 4. Albert Irvine's record-breaking egg-laying strain advertised in the *NZPJ*, 1912.[132]

Controversy raged about the usefulness of these competitions in terms of improving the productivity of hens, and through the interwar period in particular, experts expressed concern about the emphasis on egg records, as an increased prevalence of disease, poor hatching rates and reduced bird size and egg quality was noted. These problems renewed attention to bird physique and constitutional health. Altered forms of laying trials continued in the 1950s, with breeders remaining hopeful that they would develop healthy '300 eggers' (300 eggs per year average) laying hens.[133]

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[132] Albert Irvine, "Irvine Strain," *NZPJSup*, 20 May 1912, n.p.

[133] In 1905, the average egg yield over 12 months in the national egg-laying competitions was 132 eggs a year, compared with 200 in 1912. See "16. Section XII.- Agriculture and Live-Stock. Subsection C.-Live-Stock. Poultry", accessed 1 May 2013, http://tinyurl.com/c23k8d5. By 1940 the average was 221 eggs. See "Egg Laying Competitions. Address by Mr. S.F. Marshal," *NZPW* 3, no. 3, (1940): 21. On controversy about trials, disease and changing opinion in later decades, see for example, "News of the Day," *EP*, 10 March 1928, 8; J.B. Merrett, "The 300-Egg Hen,"

Incubators and brooders (originally a term for broody hens, but initially simple heated boxes that kept chicks warm after hatching) were important early technologies for poultry farmers and specialist breeders with hatcheries. They enabled early winter and spring hatching when broody hens were scarce, a year-round supply of eggs and better egg prices. However, they also affected keeper relationships with their flocks as farmers who purchased chicks and pullets were no longer involved with the birds twixt birth and death.[134]

Small 50 to 200 egg-capacity hot-water incubators and simple brooders were in use from the 1880s.[135] Merrett installed the first 'Mammoth' 3000-egg incubator in Australasia at his enterprise with 1500 layer birds in 1914. These large machines which enabled mass-production became more common from the 1930s,[136] but prior to the 1950s there were conflicting opinions about the use of incubators and brooders due to health and disease concerns, difficulties with use, fire risks and expense. Most moderate or small-scale farmers combined 'artificial' and 'natural' methods (i.e. small incubators and the broody hen).[137]

NZPW 3, no. 3, (1940): 1-2; "Breeding the Modern Layer," *NZPW* 21, no. 7, (1958): 3. 300-egg averages remain a goal for commercial breeders today (Sue Clarke, interview by author, Levin, 3 February 2012).

[134] See for example, Merrett, "The Day-Old Chick Trade," 1.

[135] Incubators were imported into New Zealand from 1867 and displayed at poultry shows during the 1880s. See "Advertisements. Incubators, or Egg Hatching Machines," *NZH*, 7 September 1867, 1; "Advertisements. Watt's Patent Hydro Incubators," *Star*, 2 July 1884, 2; J. F. Roberts, "Poultry Show," *AS*, 14 June 1887, 2. On brooders, see for example, "Advertisements," *NZH*, 31 August 1883, 8. On hens referred to in this way, see "Breeding Chickens in Heat," *OW*, 23 July 1886, 8.

[136] J.B. Merrett, "Poultry Keepers' Prospects in N.Z.," *NZPJ*, 20 January 1914, 17; C.J. Goldsmith, "Developing Trends in Specialisation in the Poultry Industry," *NZPW* 17, no. 9, (1954): 319. Goldsmith identifies the use of mammoth incubators from the 1930s, although they were advertised in the 1920s. See Orr & Co. Richardson, "Buckeye. The World's Best Incubators and Brooders," *NZPJ*, 20 February 1922, 8.

[137] "Seasonal Items," *NZPJ*, 20 May 1926, 4; "On Chickens," *EP*, 13 July 1935, 28; James Hadlington, *Hadlington's Australian Poultry Book* (Sydney: Angus and Robertson, 1943). 35-43.

Geographical isolation and the cost of imports also contributed to a cautious attitude to becoming dependant on expensive technology.[138] Competitive business perspectives, underpinned by Darwinist ideas, were evident in Merrett's justification for his purchase of machinery in terms of 'the battle of progress' and 'the struggle to survive'. The latter was an economic reality, as he pointed out, with the setbacks of epidemics, seasonal weather changes, the costliness of feed and difficulties with incubators. Success, he said, was dependent upon the 'type' of man. New Zealand's prominent breeders, he declared in 1914, were 'Men of PERSEVERENCE'.[139]

The main farming task that demanded an objective, business attitude was the culling of unproductive birds, which became a monthly, weekly, and at times daily aspect of the commercial poultry-keeper's role. The *Dominion* poultry columnist declared in 1913, in language that was to persist, that whatever people's opinion of eugenics among humanity, in the poultry yard '[s]entiment must have no place with the man who wishes to succeed. Kindness there should be, and a man's fowls will be all the better for it, but [if weak birds were kept] you may look out for failure.'[140] Industry leaders instructed that sickly, broody or non-performing layers were to be culled as they were noticed. The trait of broodiness was particularly unwanted as incubators and brooders improved.[141] Although prior to WWI the *NZPJ* reported that trials in Britain had established that egg-laying White Leghorns produced less in their second year and the suggestion was made to dispose of them after their first year,[142] on

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[138] On the abolition of import duties on poultry appliances see J.B. Merrett, "The Sign of Progress. Annual Catalogue of the New Zealand Poultry Institute, Christchurch," *NZPJSup*, 20 March 1914, n.p. On farmer caution generally, see "The Land," *AS*, 22 July 1921, 8.

[139] See for example, J.B. Merrett, "The Greatest Force," 20 November 1912, 5; J.B. Merrett, "Poultry Culture in New Zealand," *NZPJ*, 20 May 1914, 1-2.

[140] Chanticler [pseud.], "The Poultry Industry," *Dominion*, 9 March 1912, 14.

[141] See for example, C. J. Cussen, "Notes on Poultry-Keeping," *NZPW* 2, no. 1, (1938): 9.

[142] See a Hawkesbury College lecture reported in "Rare Opening for American Poultry Experts," *NZPJ*, 20 January 1914, 24.

New Zealand commercial farms into the 1940s less productive 'end of lay' hens were replaced every one to two and a half years.[143] Breeding birds were permitted a longer life: three to five years was not uncommon.[144] The practice of chick-sexing on large farms by the 1930s became significant as this enabled the economic disposal of males not raised for meat or kept for breeding.[145] Roosters, previously the sentinels of their harems, warning of predators, guiding hens to nests and food and preventing squabbling,[146] were considered 'troublesome' on egg farms, especially where hatching eggs or pullets were brought in as replacement stock. Roosters consumed feed and chased and impregnated hens, and their protective role became unnecessary as indoor brooding, fencing and housing was used. As Cussen explained in 1938, stud roosters were considered 'past the age of usefulness' after their first year.[147]

The economic pressures of wartime required tougher efficiencies. Due to labour and feed shortages, flocks were culled considerably during both world wars. Rhetoric after WWI was militant: One *NZPJ* contributor declared that 'efficiency' was the priority for the 'great army engaged in agricultural pursuits'.[148] Another declared: 'the iron hand of war has forced the necessity of

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[143] See for example, "Third Year Hens," *NZPW* 4, no. 1, (1940): 29. On 'point of lay' (around six months old) and 'end of lay' periods today see Nadine Hall and Sue Clarke, eds., *New Zealand Lifestyle Block. Your Poultry: An Essential Guide to Keeping Chickens* (Auckland: Fairfax, 2011), 13-14.

[144] "A Successful Poultryman," *NZPJ*, 20 November 1912, 16; G.D. Shaw, "Pullet Egg Versus Hen Egg," *NZPW* 21, no. 8, (1958): 21.

[145] "Successful N.Z. Chick Sexer," *NZPW* 2, no. 2, (1938): 7. The means of chick disposal was rarely discussed. Cussen advised that chicks be burnt if weakly, imperfect or obviously diseased. See Cussen, "Notes on Poultry-Keeping," 9. An ex-poultry farm employee who worked in Northland in the 1970s was instructed to drown chicks in lidded barrels, so this may have been an earlier practice (Anon., conversation with author, Wellington, 10 February 2012).

[146] McBride, "Chickens in the Wild," 53-55.

[147] Cussen, "Notes on Poultry-Keeping," 9.

[148] Harry Forster, "Efficiency and the Poultry Business," *NZPJ*, 20 November 1918, 3-4. War casualties and the influenza epidemic had a drastic effect on production and the local market.

commercialism upon us; no matter how much we love the beauty of feathers […] we must have some return for everything we do.'[149] From 1943 to 1944 the Government issued a campaign to increase production[150] which was boosted by State Advances Corporation loans for farm expansion that were largely taken up by North Island farmers and returned servicemen.[151] A *NZPW* contributor commented in 1954, 'We are fast reaching the stage where there can be no sentiment whatever […] The measuring stick is the egg basket.'[152]

Welfare Objectives

These hard-line assertions for reduced sentiment were also indicative of its persistence. From the commencement of industry, leaders strongly promoted humanitarian care as integral to the new regime. In this regard, one poultry columnist observed in 1902:

> Ask an old farmer the best way to break up a broody hen and ten to one he will tell you: "Shut them up and starve them, or duck them in cold water; throw them as far as you possibly can every time you come near the nest; tie a rag on their tails or build a frame where they must always stand on the roost, with no chance of settling down."

See "The Deadly Influenza," *NZPJ*, 20 November 1918, 11; "Prospects are Brighter," *NZPJ*, 20 November 1918, 11.

[149] T.F. McGrew, "Gain by Experience," *NZPJ*, 20 November 1918, 10.

[150] "Controls and Surpluses," *NZPW* 8, no. 9, (1945): 2; "The Food Shortage," *NZPW* 8, no. 2, (1945): 3.

[151] "Loans to Poultry Farmers," *NZPW* 6, no. 4, (1943): 7; See Appendix A: 'Total number of poultry' column. International pressure for primary produce increased following the United Nations Conference on Food and Agriculture in 1943 on poverty and malnutrition. See "Food Production," *NZH*, 8 August 1945, 8.

[152] "Farmers Must Strive for Higher Average Production," *NZPW* 17, no. 6, (1954): 202.

This expert continued, 'There is a new way, and worth trying', and proceeded to appeal to compare the sensitivity of a hen to that of a child or a child-bearing wife:

> Always handle a hen as you would a child, with care and consideration, as they are tender things […] Take the hen carefully from the nest, place her in a comfortable place, but in altogether new surroundings, where there are no nests, and do not starve her by any means. On the contrary, feed her on all the rich, concentrated food she will eat […] Before long the sitting hen has renewed her entire constitution: that old broody feeling passes away, and she feels like getting out and enjoying the air […] The reason this process acts so well is that a hen after laying a large number of eggs becomes worn out […] and she feels a desire, a very natural desire, to sit, because it is in the nature of a hen to sit and raise a brood of chicks at least once a year. By raising this brood she rests herself.[153]

Fanciers encouraged the consideration of chickens as 'feathered friends' and productive pets.[154] They argued that giving birds attention enhanced their growth and productivity.[155] Having a friendship with birds – knowing birds individually and being able to handle them – was regarded as a sign of superior husbandry skills amongst industry breeders prior to WWII. Discussing the feeding of poultry in confinement, one expert in the *NZPJ* in 1927 claimed: 'there is as much satisfaction in being thoroughly acquainted with one's hens and knowing their characteristics, as there is in being acquainted with one's

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[153] "Poultry Yard. To Break Up Broody Hens," *AWN*, 13 November 1902, 44.

[154] For a specific reference to chickens as pets see "Poultry Notes," *AWN*, 17 May 1901, 42. The term 'feathered friends' was commonly employed in pre-WWI advertisements. See for example, George Rhodes & Sons, "Advertisement," *NZPJ*, 20 September 1911, 20.

[155] J. H. R. [pseud.], "The Fine Points in the Art of Producing Exhibition Poultry," *NZPJ*, 20 July 1926, 2.

friends.'[156] Such accounts also served a propagandistic function, demonstrating that connection was possible within industry. Care was emphasised when controversial new methods were being introduced. Jarrett and Merrett in 1912 for example, when promoting trapnesting (whereby eggs, usually of potential breeding birds, are collected via a nest trapdoor for recording purposes), reported that the birds appeared to like the extra handling and attention associated with close-monitoring, and that this enhanced the bird-keeper relationship.[157]

Industry leaders were aware of problems with harm and neglect. Early SPCA records suggest that sympathy for the pain and suffering of animals was generally less in rural regions compared with city populations.[158] The commonest offence noted by SPCA inspectors in the first quarter century in regards to chickens was improper carrying: conveying birds in sacks, tied by their legs or overcrowding in boxes and crates.[159] By the 1930s, SPCA membership and animal cruelty was being proactively discussed by rural women's groups[160] and rural SPCA centres expanded in the 1941 to 1961

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[156] L.M.R. [pseud.], "Feeding Confined Poultry," *NZPJ*, 21 February 1927, 6.

[157] R.O. Jarrett, "Benefits of the Trap Nest," *NZPJ*, 20 November 1912, 9-11; J.B. Merrett, "The Value of Trap Nests," *NZPJ*, 20 November 1912, 25.

[158] *Twenty-Seventh Annual Report of the New Zealand Society for the Protection of Women and Children and Prevention of Cruelty to Animals, 1920-21* (Auckland: Wilson & Horton, 1921), 3. See also *Seventeenth Annual Report and Balance Sheet of the New Zealand Society for the Protection of Women and Children and Prevention of Cruelty to Animals, 1910-11* (Auckland: Wilson & Horton, 1911), 9; Veronika Thornburrow, *An Introduction to the History of the Royal New Zealand Society for the Prevention of Cruelty to Animals* (Auckland: RNZSPCA, 1993). 64.

[159] "Cruelty to Fowls," *WCT*, 9 January 1900, 4; "Cruelty to Animals," *MEX*, 5 May 1902, 4. The records of the Auckland NZSPWC & PCA 1905-1925 reveal an ongoing problem with this. This practice was also noted earlier in Saunders, *Our Domestic Birds: A Practical Poultry Book for England and New Zealand*: 132.

[160] See for example, Peggy [pseud.], "Be Kind to All Dumb Creatures," *NZCW*, 18 December 1933, 7; "Mid-Canterbury," *NZCW*, 18 December 1933, 13; Mrs A. Donovan, "Influence of Women," *NZCW*, 20 February 1934, 2.

period.[161] However, in 1948 farmers were still being chastised for freighting birds in overcrowded and ill-ventilated crates.[162]

Although ex-servicemen of both world wars were advised to 'tackle poultry farming with all its pitfalls in the same manner in which [they were] trained [within] the fighting forces',[163] it is evident that some defied this call to militarism. One disabled ex-serviceman with a 600 bird flock in 1924 admitted to some 'displeasing' aspects of farming, but reportedly compensated for this by befriending his breeder birds whom he identified individually and handled.[164] Similarly, a contributor to the *NZPW* in 1946, after relaying the story of an army battalion which adopted a hen through Libya, Tunisia, Sicily and Italy, advised that hens thought to be a 'pest' might be 'yearning for human companionship'. He encouraged farmers to adopt these birds as 'casual friends'.[165] In 1961, querying some loss of attention to care within intensifying systems by this time, an editorial in the *NZPW* reminded readers that '[a] skilled husbandryman knows and likes chickens' and 'is mindful of their needs'.[166]

Maternal Instinct

Alongside general pleas for empathetic husbandry, a gendered rhetoric emphasised women's nurturing role. Women, who often managed incubators and chick-rearing, were said to possess 'patience' and a 'natural instinct' for this task, and throughout the period under study commentary revealed a conscious

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[161] Thornburrow, *An Introduction to the History of the Royal New Zealand Society for the Prevention of Cruelty to Animals*: 66, 64.

[162] J.W. McGlinchy, "Appeal to Producers," *NZPW* 11, no. 1, (1948): 3.

[163] Kiwi Feathers [pseud.], "Making a Start," *NZPW* 8, no. 2, (1945): 6. Following WWI, Merrett also observed that soldiers exhibited the progressive, fighting spirit, winning in egg-laying competitions and keenly adopting incubator technology. See J.B. Merrett, "Returned Soldiers Show the Way," *NZPJ*, 20 June 1922, 5.

[164] "Soldier Poultryman Makes Good," *NZPJ*, 20 May 1924, 11.

[165] "Poultry as Pets," *NZPW* 8, no. 2, (1946): 19.

[166] Milton Dunk, "Is Husbandry Being Neglected?," *NZPW* 24, no. 4, (1961): 1-3.

alignment of child and chick care. A tacit assumption of transferred maternal skills was evident in the frequent portrayal of women with chicks, incubators or brooders within journals prior to WWII.[167] Brooders were also known as 'foster' or 'artificial mothers'.[168] At the annual poultry conference in 1914 Cussen referred to the brooder as the replacement mother, and the area around it as the 'nursery' and 'playground'.[169]

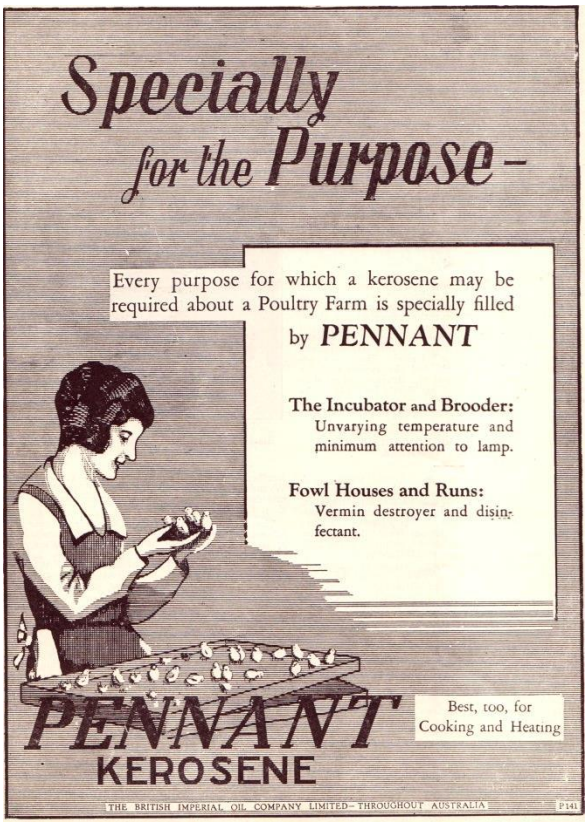

Figure 5. Woman minding chicks in a Pennant Kerosene advertisement, 1928.

This image appealed to women in their maternal role as chick-raisers, but also served to associate the petrochemical with care, visually cueing readers to its use for bringing warmth (and life) to incubators and brooders.[170]

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[167] See for example, H.M. Sheer Co., "How to Build Incubators and Brooders " *NZPJ*, 20 May 1907, 48.

[168] "Breeding Chickens in Heat," *OW*, 23 July 1886, 8; Wickes Limited, "Jubilee Incubators,"*NZPJ*, 20 May 1907, 51.

[169] Mr. P. Cussen, "Report of the Fourth Annual Poultry Conference. Modern Methods of Rearing Chicks," *NZPJSup*, 20 April 1914, n.p.

[170] British Imperial Oil Co., *NZPJ*, 1 March 1928, 6.

Women's involvement in chick-rearing reinforced their traditional role as carer and moral guide.[171] This was appealed to within an article by an American, Julia Flewellyn in the *NZPJ* in 1907 for women considering entering the industry, which highlighted the broader attitude of sympathy and responsibility to all forms of life which poultry-keeping was said to encourage in children:

> […] some poor neglected boy to whom you can give a pair of chicks that will start him in this interesting work, and fill his mind and time to the exclusion of vicious companions. It is hard to imagine a boy who loves little chicks becoming a criminal later in life. And where we see girls so kind to their feathered pets that the chicks fly all over them at feeding time we are not afraid that they will leave their own offspring to the care of ignorant nursemaids.[172]

This Victorian notion of pet-keeping preventing criminality and aiding children's transition into civilised adulthood through the acquisition of compassionate habits was explicit in commentary prior to WWI.[173] Poultry-keeping was in this initial period presented to women as a moral and self-improving activity, as besides providing food for the nation and enhancing self-sufficiency, women would learn 'to love [the birds] and feel the satisfaction of being able to minister to the wants of God's creatures'.[174] Religiously-toned

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[171] Brantz, "The Domestication of Empire: Human-Animal Relations at the Intersection of Civilization, Evolution, and Acclimitization in the Nineteenth Century," 77-78.

[172] Julia C. Flewellyn, "What Women Can Do. Work that is a Pleasure and Not a Task. An Excellent Employment for the Home-Loving Woman," *NZPJ*, 20 May 1907, 10.

[173] On this topic see Brantz, "The Domestication of Empire: Human-Animal Relations at the Intersection of Civilization, Evolution, and Acclimitization in the Nineteenth Century," 73-93.

[174] Flewellyn, "What Women Can Do. Work that is a Pleasure and Not a Task. An Excellent Employment for the Home-Loving Woman," 10.

commentary such as this appealed to women, who were the predominant church-attenders in New Zealand.[175]

A fair New Zealander and her bunch of five hundred chickens. This young lady is typical of the enthusiastic women poultry keepers of the Dominion.

Figure 6. A 'typical' woman poultry-keeper of the Dominion.
NZPJ 'cover girl', 1925.[176]

Throughout the interwar period, journal content indicated a sustained emphasis on teaching children humanitarian responsibility. An image of a girl with chicks on the cover of the 1939 NZPW (below) conveyed maternal preparation, and children's columns of the *NZPW* sought to encourage young fanciers in the ideals of attentive husbandry. However, the focus was on developing skills for commercial industry. In 1938 one young boy wrote of his ten year old bantam hen which accompanied the family on annual holidays. He acknowledged that close 'attention' was an important factor in her longevity and health, but emphasised physical, utilitarian care: plenty of good food, cleanliness in the fowl house and run, a well-ventilated house and regular feeding.[177]

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[175] This appears to have been the case. See Stenhouse, "God's Own Silence: Secular Nationalism, Christianity and the Writing of New Zealand History," 56-57, 65-67.

[176] Cover image, *NZPJ*, 20 October 1925.

[177] John Woodward, "A Corner for Youngsters," *NZPW* 1, no. 11, (1938): 13.

Figure 7. Another *NZPW* 'cover girl', 1939.[178]

The sentimental association of females with the tender care of chicks on the family farm is explicit within visual imagery up until WWII.

The involvement of women and children in small-scale farms contributed to blurred spatial boundaries between domestic and farm environments.[179] *Brett's Colonists' Guide* noted that small brooders could be 'kept on a stand in the living room with its family of little chicks in it' and that these would amuse 'by their cunning ways and funny tricks'.[180] The domestic intimacy of chick-raising was recalled in Poppy Watt's account of her family poultry farm in the interwar period. She noted that people constructed home-made brooders with blankets and hot water bottles and kept their chick brooders in the family's spare

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[178] Cover image, *NZPW* 2, no. 6, 1939.

[179] This included the transfer of physical objects and animals. See reference to 'the danger from the dishcloth' in dairy farming is noted in Ford, "The Tyranny of the Microbe: Microbial Mentalities in New Zealand, c.1880–1915," 152.

[180] Thomson W. Leys, *Brett's Colonists' Guide and Cyclopaedia of Useful Knowledge* (Auckland: H. Brett, 1897). 396-397.

bedroom to protect chicks from rats until they were a fortnight old.[181] Thus in family farm operations these new technologies, although reducing the broody hen to a part-time position, did not necessarily facilitate reduced emotional connection. Watt, reflecting upon her adult life on her family farm, expressed empathy for the basic needs of animals and disapproval of the caged hen industry that ultimately emerged. For example, the hen, she observed, like all birthing animals, sought isolation.[182]

Small Farms and 'Civilised' Cooperatives

Empathy with and observation of birds was assisted by the fact that, as Merrett frequently noted, farm sizes were, throughout the period under study, relatively small by international standards. He commented in 1918 after a visit to Australia, that 'the poultryman in Australia […] keeps thousands where we keep hundreds of fowls'.[183] In America he observed critically in 1920, 'They scarcely regard anyone as a poultryman who keeps less than 3000 birds, while 20,000 is a common flock'. The result, he noted, was that birds 'were small and lacked constitution'.[184]

However, farm sizes did gradually increase over the decades. Whereas in 1911, Brown advised that 500 birds was the minimum needed for full-time farming,[185] by 1932, the minimum was 800 birds.[186] In 1939 the *NZPJ* noted a Papatoetoe farm with 9000 White Leghorns, which was expected to become the largest poultry farm in the country within the year.[187] However, the largest farm in

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[181] Watts, *This was Speldhurst: The Story of an Early Stokes Valley Family*: 58.

[182] Ibid., 149.

[183] J.B. Merrett, "A Maorilander in Australia," *NZPJ*, 20 August 1918, 2.

[184] J.B. Merrett, "Advance New Zealand," *NZPJ*, 20 September 1920, 1.

[185] F. C. Brown, *Bulletin No. 13 (New Series). Poultry and Eggs for Market and Export* (Wellington: New Zealand Department of Agriculture, Commerce and Tourists, 1911). 6.

[186] Brown, *Bulletin No. 066. Utility Poultry-Keeping*: 5.

[187] "A Progressive Poultry Farmer," *NZPW* 2, no. 11, (1939): 2.

Australia at this time, reported in the same journal, kept 120,000 White Leghorns.[188]

In 1956 nearly 3000 farmers kept flocks of between 100 and 1000 birds. Flock numbers were still relatively low at this stage, despite farm expansion policies during WWII.[189] Many small farms existed within city boundaries. Of the 60 poultry farms in Whanganui in 1959 for example, only twenty kept more than 500 birds.[190] Many engaged in full-time farming regarded it as a 'way of life' rather than merely a means of earning a living.[191] These sentiments were expressed by the owner of the largest poultry farm in North Otago in 1940 (2,400 birds), who, when asked about his reason for taking up poultry farming, stated that he enjoyed the outdoor rural lifestyle. Although he sought profit, making 'big money' was not his objective.[192] Debate about the pros and cons of larger poultry farms was an international one in the immediate post-WWII era.[193]

From early in the century, small farms were kept economically viable through the establishment of local cooperative 'Egg Circles'. These farmer collectives were promoted by the NZPA to reduce competition and improve and lower the cost of transport, feed, supplies and marketing, and to achieve better prices for

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[188] "Australian Poultry Farm," *NZPW* 2, no. 11, (1939): 8.

[189] See Appendix A and footnote 151.

[190] "Wanganui District Council Base Plan 1947 with Data Added 1959," in *WDC 00366:0:3* (Whanganui District Council Archives).

[191] Many were sideline poultry farmers (see Appendix A). This retained attitude within the farming community generally was noted in a 1980 study: J. Squire and E. Delahunty, *Farm Business Management* (Auckland: Longman Paul, 1982). vii.

[192] "Well-Known Poultry Farms – No.24," *NZPW* 3, no. 3, (1940): 18.

[193] M.W. Stewart, "The Modern Poultryman," *NZFW*, 14 November 1946, 61; Sayer, "'His footmarks on her shoulders': The Place of Women Within Poultry Keeping in the British Countryside, c.1880 to c.1980," 321-329.

produce.[194] From the outset, smaller producers willingly joined forces, while bigger businesses were harder to convince.[195] However, some large cooperatives were operating prior to WWI. The North Island Poultrymen's Co-operative reformed from one of these in 1943, successfully pooled marketing resources to become commercial leaders within the post-war period.[196]

Just as evolutionary perspectives underpinned ideas about technology, progress and competition, throughout the period appeals for cooperation were also made on this basis. The *NZPW* in 1938 for example, cited a Canadian expert's view that: 'Co-operation has been and is a great spiritual factor in men's upward march […] Its law is the law of friendship […] which makes for a higher and nobler life […] we can measure human progress by the extent to which co-operation has been substituted for competition.'[197] Inspired by Darwin, Russian biologist Peter Kropotkin had popularised the concept of cooperation within nature in his book, *Mutual Aid* (1902). This counterbalanced notions of 'Nature red in tooth and claw' and survival-of-the-fittest and buttressed arguments for collective socialism, animal welfare and other moral perspectives (such as peace activism) in the first half of the century. This idea was instilled through early twentieth-century children's books and it was frequently discussed within the *NZCW*, which reminded readers for example in

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[194] In 1930 the cost of feed was identified as 'the controlling factor', limiting profitability on commercial farms. See Fawcett, *Survey of the Poultry Industry in New Zealand by the Farm Economics Section*, 23-24.

[195] "What Egg Circles & Clubs Are Doing," *NZPJ*, 20 November 1912, 27-28; H.M. Boddington, "Report of the Fourth Annual Poultry Conference. How to Work an Egg Circle," *NZPJSup*, 20 April 1914, n.p.

[196] J.B. Merrett, "Editorial Notes. The Season's Greetings. Co-operation," *NZPJ*, 20 December 1913, 2; "The Auckland Poultry-Keepers' Association," *NZPJ*, 20 March 1914, 24; "Co-operation and Organisation," *NZPW* 3, no. 5, (1940): 1-2; McConnon, "Improving the Status of the Industry," 111; Yerex, *The Pride of Poultrymen: A 50 Year History of the Poultrymen's Co-operative Ltd*.

[197] J.F. Hull, "Human Welfare and Co-operation," *NZPW* 1, no. 5, (1938): 26.

1934: 'The evolution of the whole living world, plant and animal, including man himself [… has] been brought about by division of labour and […] co-operation.' This evolutionary rhetoric continued to be evoked in discussing cooperation in the *NZPW* in the late 1950s.[198]

Housing Systems

Farmers' relationships with their birds and their ability to observe needs and behaviour was affected by housing systems and available land as this in turn determined flock size and the technologies employed. Housing systems also affected the type of behaviour observed and perceptions of bird psychology. In terms of the latter point for example, while Marion Stewart with her Tauranga-based free-range farm environment in the 1950s continued to assert that much enjoyment could be had from the 'friendly and responsive birds',[199] Bobby, advocating cages to alleviate crowded and diseased commercial and backyard systems in the same period concluded, 'Hens are not pleasant sociable creatures.'[200]

Although today's industry officials have cited the early adoption of intensive methods,[201] these were not comparable to present-day systems. Variety and experimentation characterised housing systems throughout the period under study. Around the turn of the century many people assumed that hardy

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[198] Peter Kropotkin, *Mutual Aid: A Factor of Evolution* (London: W. Heinemann, 1902); Crook, *Darwin's Coat-Tails: Essays on Social Darwinsm*: 63-78. Within the NLNZ Dorothy Neale White Collection, see Alfred E. Lomax, *One Hundred New Animal Stories* (London: Sunday School Union, 1896). 18, 77-78. For NZCW see "The Pan-Pacific Women's Association Conference," *NZCW*, 20 October 1934, 10-11. For an example from 1957 see McConnon, "Improving the Status of the Industry," 111.

[199] Elizabeth Cox, "Stewart, Marion Watson," DNZB: Te Ara - The Encyclopedia of New Zealand, accessed 18 January 2014, http://www.teara.govt.nz/en/biographies/5s46/stewart-marion-watson.

[200] "No Cruelty in Batteries," *EP*, 18 May 1954, 9.

[201] Wintle and Lepper, "Poultry Industry - Early Twentieth Century" accessed 11 October 2012, http://www.teara.govt.nz/en/poultry-industry/page-1.

chickens, like hardy humans, could live anywhere. But ideas about habitations for both underwent reform.[202] The Ruakura farm plan, which Hyde recommended for breeding birds in 1908, featured alternated runs with centralised houses. As the pasture became soiled on one side, the birds could be moved to the other, and the old area dug over and re-seeded. This system imitated the natural territories of flocks, encouraging as *Brett's* 1897 guide had put it, 'hen villages.'[203] Alternatively, Hyde recommended moveable houses which were shifted to fresh ground once a week (below).

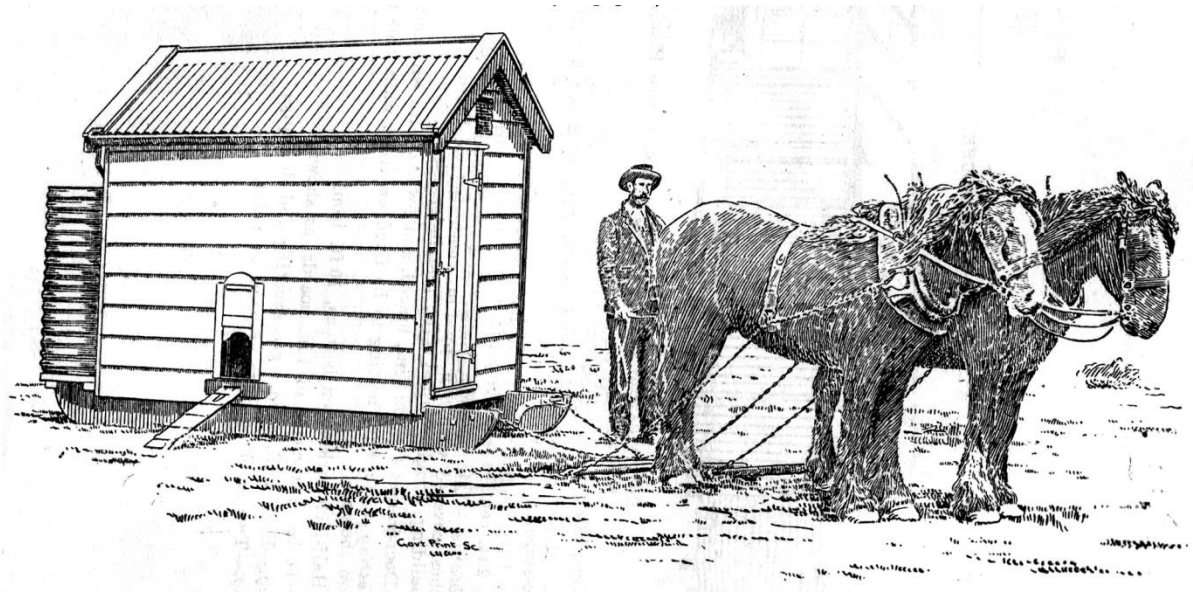

Figure 8. A moveable poultry house c. 1908,
as used on King's Seacliff farm.[204]

'Intensive' was a loose term in the first half of the century, and referred to systems that kept layer birds inside for all or part of the year. Breeder birds were given free-range conditions to maximise health.[205] New Zealand breeders

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[202] For an early reference to this correlation see "Keeping Poultry on a Large Scale," *AWN*, 25 June 1887, 30; "What Others Are Doing. Carterton Notes," *NZPJ*, 20 May 1907, 16.

[203] Allen, "Poultry," 378,383.

[204] Hyde and McNab, *Poultry and Eggs for Market and Export* 16. For Seacliff see Olsen and Guy (photo.), "Photographs of Seacliff Asylum, including the poultry farm " *OW* 10 October 1900, 47.

[205] J.B. Merrett, "Editorial," *NZPJ*, 20 July 1927, 1.

relied on the country's international reputation as a good place from which to buy healthy stock.[206] However, prior to WWI, confined housing for layers was trialled by farmers with limited land, as land near urban areas was already scarce and expensive. Indoor housing was also used for cold seasons, particularly in the South Island.[207] In the 1920s, leaders encouraged experimentation with indoor systems due to problems with diseased and worm-infested soil when farmers had insufficient land to rotate birds around paddocks, or too many birds per acre.[208] Farmers with sufficient land continued the extensive system for layers with alternated runs in paddocks (as below).

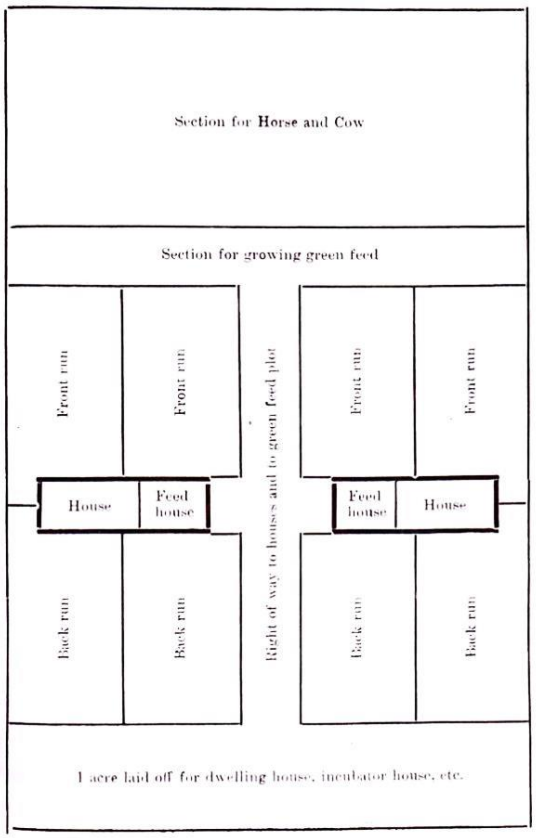

Figure 9. Plan for a commercial farm with 800 laying fowls in 1920.

One acre of range is advised per for 100 fowls.[209]

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[206] See for example, R. Falloon, "London News and Notes," *NZPJ*, 21 June 1926, 20.

[207] See for example, P.N. Lumsden, "Correspondence. Mr Woodward's Patent Scheme " *NZPJ*, 20 June 1908, 34; Brown, *Bulletin No. 13. Poultry and Eggs for Market and Export*: 12.

[208] See for example, S.H. Scott, "From the President's Pen," *NZPJ*, 20 August 1921, 13-14; J.B. Merrett, "Current Topics," *NZPJ*, 1 March 1928, 7.

[209] M. Graham, "How to Provide Accommodation for a Laying Flock," *NZPJ*, 20 July 1920, 7.

Housing systems were still far from being standardised at the end of WWII when returned servicemen were advised that: 'There are no hard and fast rules as to whether one should farm intensive, semi-intensive or free-range. One has an equal chance of success whichever method one uses.'[210]

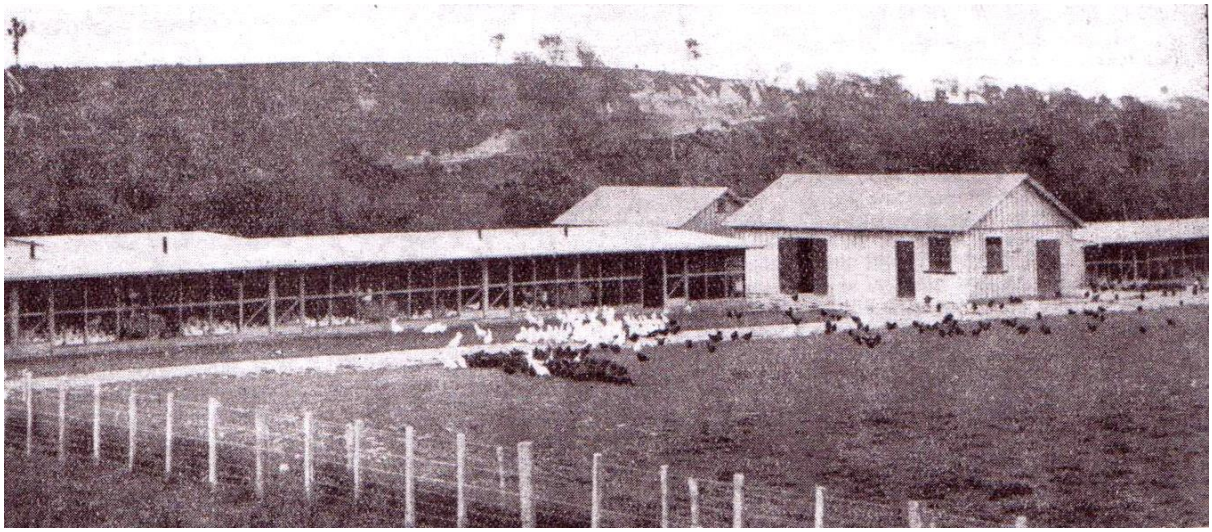

Figure 10. The Massey College Poultry Department, 1939.
An 'intensive' housing system for layers is shown in the open-sided shed.[211]

By the mid-1950s, commercial farmers began to adopt battery cages for egg-laying birds, though Stewart described cages as in the 'experimental stage' in 1958.[212] The poultry press had reported on Britain's 'extreme' experiments with cages in 1935 and at least one New Zealand farmer trialled them.[213] Their adoption was influenced by a variety of factors, including behavioural and disease problems in overcrowded flocks, commercial competition, American models, post-war European immigration and land cost.[214] The early cages were

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[210] "Making a Start. Advice for Ex-Servicemen," *NZPW* 8, no. 2, (1945): 6.

[211] "Well-Known Poultry Farms – No. 16," *NZPW* 2, no. 4, (1939): 8.

[212] Stewart, *Profitable Poultry Keeping*: 25.

[213] "The Intensive System," *EP*, 27 April 1935, 21; "Obituary - Mr. Harry Williams," *NZPW* 2, no. 1, (1938): 16.

[214] Ovid Bay, "Floors or Cages? Now You Can Decide," *NZPW* 21, no. 2, (1958): 29-30. Anecdotally, Dutch immigrants after WWII were advocates for cage systems (Noel Hudson,

designed to hold one or two birds.[215] Open-air sheds with cages were trialled in warmer regions (as below).[216] Around 1960, as pecking and cannibalism became a problem within battery cages, the practice of 'de-beaking' (the removal of the beak tip of chicks) was adopted.[217]

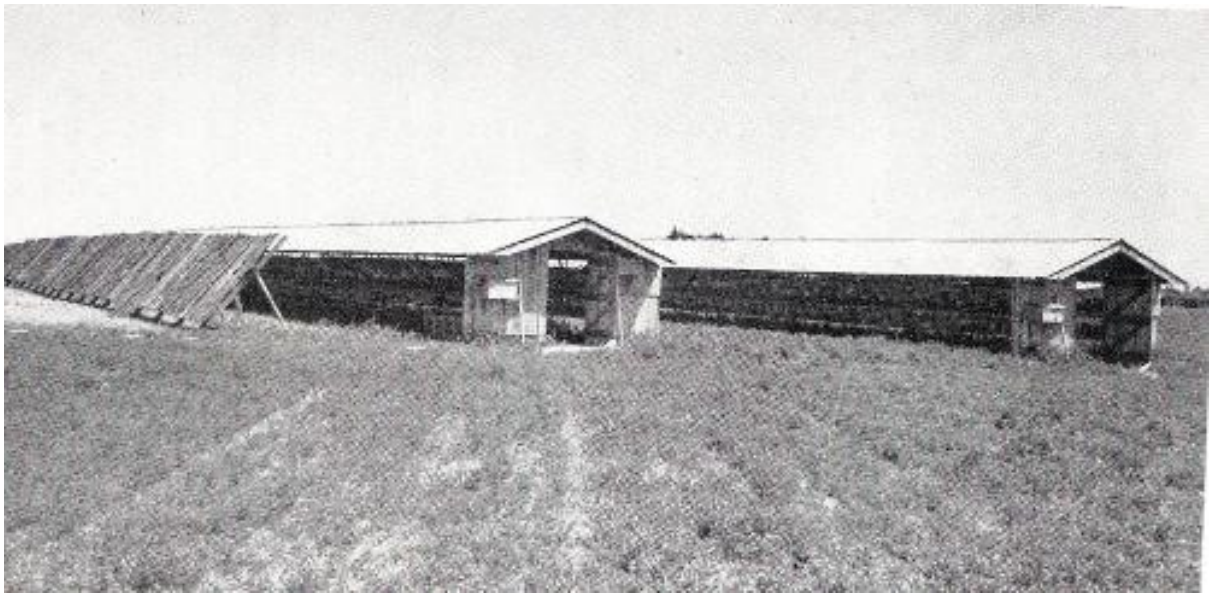

Figure 11. Open sheds with windbreaks and battery cages for laying birds, c. 1958.[218]

Artificial lighting to boost egg production also became more common in the 1950s, although the light-determined physiology of chicken egg-laying was first explained at the World's Poultry Congress in 1936.[219] Bobby had recommended

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interview by author, Shannon, 3 February 2012). See also consumer research on the taste of eggs in "Keeping Qualities of Eggs," *NZPW* 2, no. 1, (1938): 3.

[215] Turners & Growers (Wellington) Limited, "'Congress' Reinforced 'Glass Clean' Hen Battery," *NZPW* 18, no. 5, (1955): 210.

[216] On the variety of housing in the 1950s, including deep-litter systems which became popular around this time, see Stewart, *Profitable Poultry Keeping*: 13-31.

[217] De-beaking devices were commonly advertised in the NZPW around 1960. See for example, "De-beak Chickens? Saturn Limited, Auckland," *NZPW* 23, no. 7, (1960): 39. This practice is now referred to as 'beak-trimming'. See Dr Marjorie Orr, "Managing Poultry," Lifestyle Block, accessed 11 October 2014, http://tinyurl.com/n9t69mk.

[218] Stewart, *Profitable Poultry Keeping*: 26.

[219] Sayer, "Battery Birds, 'Stimulating' and 'Twilighting': The Ecology of Standardised Poultry Technology," 157.

artificial lighting for Otago farmers to aid winter production in 1941.[220] However the *NZPW* did not devote more space to this topic until around 1955, when uptake was aided by improving electricity supplies.[221]

Conclusion

Those leading and contributing to poultry press debate in the early twentieth century included farmer-breeders with various degrees of fancy and utility orientation, sideline farmers, and Government advisors. However, perspectives were also shaped by women, poultry club hobbyists, backyard poultry-keepers, and by advertisers appealing to these diverse groups. Full-time expert breeders and officials were predominantly writing for the broad audience of non-specialist, part-time egg farmers and backyard poultry-keepers.

Experienced breeders trained in fancy club traditions of the late nineteenth century were schooled to observe animals according to natural laws, a concept which blended Darwinian naturalist-biology and natural theology. They asserted attention to beauty and utility within industry as breed points retained distinctiveness, and it was considered a natural law that animals should be beautiful specimens of their breed (or 'race', as is discussed in chapter five). In upholding this, breeders considered that they were maintaining standards of bird husbandry and preventing the degeneration which inevitably occurred when utility was the sole consideration. Moral, humanitarian husbandry was a strong cultural value in this generation, based upon the understanding that chickens were sensitive creatures with drives, feelings and emotional bonds.

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[220] F.C. Bobby, "Artificial Lighting and Winter Egg Production," *NZPW* 4, no. 7, (1941): 6-7. An early adopter, using lighting for winter laying, was described in "Well-Known Poultry Farms – No. 13," *NZPW* 2, no. 1, (1938): 20-21.

[221] F.H. Leuschner, "What Lighting Will Do In Maturing Pullets," *NZPW* 17, no. 2, (1954): 57-59; W. O. Wilson, "How to Use Lights on Layers," *NZPW* 18, no. 3, (1955): 107. Power cuts remained an issue for farmers in this period. See Norman Smith, "Monthly Poultry Notes," *NZPW* 21, no. 6, (1958): 17.

Debate between those adhering to naturalist fancy tradition, and the more utilitarian-minded was sustained throughout the period but was particularly strong prior to WWI and up until 1930. From 1930, traditional stalwart fanciers were cast as a 'dying breed'. However, leaders continued to value the skills and perspectives of hobbyist fanciers, especially as problems with disease and decreased vigour became evident in the 1920s and 1930s. At this time, farmers and commercial breeders were particularly reliant on the advice of experienced hobbyists. Hobbyists worked with industry throughout the period, and were relied upon to sustain breeding stock, as Government services were stretched, and from the 1930s there were restraints on importing eggs and birds.

The 1950s was a period of change with increased interest in emerging specialist knowledge. This was evident in attendances at Massey and Lincoln courses and increasing WPSA membership. Bobby was appointed in 1941 as the first Government expert with specialist industry training. However, although the team of Government advisors was gradually enlarged from 1945, these men still tended to be informally and practically trained. The uptake of specialist poultry training at the tertiary level was limited during the 1940s and 1950s. Wallaceville diagnostic services were advising industry from 1928 but only gained a single specialist poultry pathologist in 1939.

Prior to the 1950s a small number of leaders were associated with the WPSA, keeping the industry attuned to international debate and research. Merrett was an important conduit and disseminator of this, and was more connected than Government officials who were not permitted to attend international congresses prior to WWII. Government experts in this period were 'practical men'. Brown at the helm until 1935 had served his apprenticeship with King, which he was evidently proud of, and his lack of specialist training was regarded as an asset rather than a problem. Subsequent experts, Cussen and Jarrett, were also 'practical' men. In the 1930s, Stewart, trained in Britain, commenced a writing career offering pragmatic advice well-known through the *NZF*.

A number of practical factors within industry affected empathetic connection and the ability to closely observe birds. Laying trials, the export trade and commercial competition reinforced a focus on output rather than sentiment. Requirements to maximise efficiency, especially during and after the world wars, demanded larger flock sizes, high levels of culling and stock replacement, specialisation (hatcheries in particular), the use of mass-producing technology such as incubators, and by the 1950s, cages, lighting and methods such as de-beaking. Biologised, evolutionary perspectives were evident in Merrett's discussions of progress, productivity and industry survival in the *NZPJ*.

However, factors mitigating the above included the predominance of lay, untrained experts and the hobbyist masses, women's moral, child-rearing perspectives and the blurring of boundaries between domestic and farm environments on small farms. Explicitly theologically-infused advice to women was particularly manifest within the pre-WWI transitioning period, reflecting orthodox maternalism and the correlation of family farms, where women were predominantly involved, with moral care. Stewart and other women with businesses adopted the approaches of male counterparts who were likewise encouraged to practice moral husbandry. Maternal images of women (and girls) as chick-rearers and Watt's accounts, indicate sustained sympathetic attitudes to the needs of chickens as living creatures.

New Zealand's relatively small flock sizes, the gradual progression from backyard to commercial ventures, and a climate which permitted 'natural' outdoor methods, facilitated observation of bird individuality and needs. Available space and housing affected perceptions of bird psychology and behaviour. Farms were kept small and business competition reduced through cooperatives, justified by biologically-based ideas of 'mutual aid' which was evident within poultry press commentary into the 1950s. A balance of hard-line and softer Social Darwinist perspectives was evident as even Merrett with his progressive urgency also preached cooperation to reduce competition and

ultimately spoke favourably of the industry's balance between fancy and commercial approaches.

Chapter Two

Science Education and General Biology

> In plants, just as in the case of animals, the inroads of disease are best prevented by keeping the organism well-nourished, vigorous, and healthy [...] The potato plants which suffer most from various blights are those that have the least vital energy and resistiveness […] Such laws and principles ought to be conveyed to the rising generation [and] could be easily illustrated to children in schools.
>
> Truby King, *The Feeding of Plants and Animals*, 1905.[1]

This chapter examines three factors related to science education that contributed to sustained attention to general biology within the broad-based poultry industry. It is argued first of all, that industry experts encouraged attention to common-sense, general knowledge and adherence to fundamental principles. Breeders and other industry leaders were expected to have a good grasp of this, as well as speciality knowledge. In the second section of this chapter, King's views on science education are introduced. He is discussed as an example of a particularly influential advocate of fundamental science education. Although he mentored Fred Brown and was an early industry leader, it is argued here, and in subsequent chapters, that his articulation of biological principles had a diffuse influence upon the poultry industry through agricultural science education and the widespread public dissemination of his ideas. The final segment of this chapter demonstrates the significance of nature study and elementary science in state schools. It is argued that school education played a particularly important role in instilling the principles and ethos of general biology in these generations who were for the most part without tertiary training.

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[1] F. Truby King, *The Feeding of Plants and Animals* (Wellington: Whitcombe & Tombs, 1905). 5.

Attitudes to Science

Poultry science in the pre-WWII period was also referred to as 'poultry culture'. It was conceived of as both an art and a science.[2] Nineteenth-century poultry breeders identified themselves as practical 'field scientists', and at least until the mid-1950s, most industry experts liked to think of themselves in this way.[3] As we saw in the previous chapter, experts promoted technical knowledge and the development of observation skills. Fred Brown in his role as the Government expert into the 1930s for example, emphasised the importance of maintaining humidity levels within artificial incubation, advising consideration of how hens' feathers, wet from morning dew, moistened eggs. As a general principle, he instructed farmers to be guided by nature in many instances: 'take a set of instructions from the old hen. She is past the experimental stage.'[4]

While leaders in the interwar period acknowledged that 'progressive' farmers knew there was 'much to be learned from the laboratory and lecture hall', practical learning was prioritised over scientific study.[5] Many breeders grumbled that scientists only revealed what farmers already knew through experience,[6] echoing the sentiments of early *NZPJ* contributors that poultry experts with a 'liberal education' were just as likely to make discoveries as scientists.[7] The view that specialist, laboratory-based scientists were narrow in outlook[8] persisted in the interwar period when pubic awareness of vivisection

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[2] As acknowledged throughout Derry, *Art and Science in Breeding: Creating Better Chickens*.

[3] Ibid., 78-79.

[4] Brown, *Bulletin No. 13. Poultry and Eggs for Market and Export*: 15, 63.

[5] See for example, Gordon Gray, "General Farm Poultry Notes. Progressive Methods " *NZPJ*, 20 September 1926, 4; J.B. Merrett, "Our Government Experts," *NZPJ*, 20 June 1925, 8.

[6] See for example, E. Bostock-Smith, "The Sun's Rays and Chick Rearing. Latest Discoveries in Research " *NZPJ*, 20 October 1926, 5.

[7] For example, "Sex of an Egg. Can it be Determined?," *NZPJ*, 20 May 1907, 34.

[8] Ford, "The Tyranny of the Microbe: Microbial Mentalities in New Zealand, c.1880–1915," 141, 165, 169.

was heightened.[9] In Merrett's account of an English poultry conference in the *NZPJ* in 1925, scientists were defensive of their role. One explained that 'if the public demanded knowledge there must be experimentation. There was great feeling against those who use the knife … but they must not be led away by the stories they were told about the horrors of vivisection.'[10]

Farmers were also cautious with new science as much scientific knowledge concerning areas such as genetics and nutrition was in a state of flux in the first half of the century.[11] Brown warned farmers in the *NZPJ* in 1911 that:

> The air is full of theories - patents and gimcrack ideas which, like the philosopher's stone, will enable the possessor to solve the secrets of nature […] I would appeal to every reader […] to analyse carefully […] any new theory or idea […] and weigh it in the scales of common-sense.[12]

It was an oft-expressed view that, as a breeder in the *NZPJ* in 1927 commented, although keeping up-to-date was necessary, adherence to modern developments could be overdone: 'Caution is, perhaps, the most necessary attitude towards all progress. This is the one justification for the conservative person, commonly called "stick-in-the-mud."'[13] Caution was also necessary because, as experts acknowledged, recommendations had to be adjusted to local environments and varied farm systems.[14] Common-sense, Merrett frequently reiterated in the 1920s (echoing the views of British poultry expert, Professor Punnett), was the layman's science. Science on the farm was nothing more

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[9] Swarbrick, *Creature Comforts: New Zealanders and their Pets: An Illustrated History*: 224-226.

[10] "The Monkey Gland in Poultrydom," *NZPJ*, 20 October 1925, 18.

[11] See for example, "Agriculture and Art," *AS*, 6 February 1926, 24.

[12] F.C. Brown, "Common-Sense Poultry Keeping " *NZPJ*, 20 September 1911, 3.

[13] G.C. Heseltine, "The Danger of Being Too Progressive " *NZPJ*, 21 February 1927, 4.

[14] See also L.M.R. [pseud.], "Feeding Confined Poultry," 6.

mysterious than experience guided by the maintained consideration of fundamental principles.[15]

Thus, the poultry press reflected a tension between an emphasis on practical common-sense, and on keeping an open mind to modern scientific perspectives. Brown sought to encourage the scientific method and the discarding of untested hearsay and 'superstition'.[16] The latter were persistent, especially prior to 1930. In the *NZPJ* in 1919 for example, one breeder asserted that: 'Amoung animals and plants, as well as in mankind, a favourable environment causes an excess of female births [Whereas where] the struggle is hardest and food scanty, males are more plentiful […] Therefore a plentiful supply of good food and good environment promotes the feminine.'[17] Although bookshop advertisements and *NZPJ* commentary suggests that many people read advice books,[18] in the late 1930s articles and reports by Government officials reveal frustration with farmers' maintained resistance to 'book learning'.[19] One advisor noted even in 1960 that poultry farmers 'run ingenious "experiments" at times, which for lack of training in methods are usually wide of the mark.'[20]

The suspicion of academic, institutional science hampered Government funding of farm animal research in New Zealand prior to WWII, as demonstrated in the

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[15] J.B. Merrett, "Science Talkers at the English Conference. Science and Common Sense," *NZPJ*, 20 October 1925; J.B. Merrett, "Poultry for Beginners. No. 5. Feeding Poultry," *NZPJ*, 21 December 1925, 15; "Seasonal Suggestions," *NZPJ*, 20 January 1927, 12.

[16] J.B. Merrett, "The Official Conference Report. Evening Session. A Lecture," *NZPJSup*, 20 April 1914, n.p.

[17] H. Leger, "Good Advice," *NZPJ*, 20 October 1919, 14. See the same idea in "Sex of an Egg. Can it be Determined?," 34. For other examples see "Poultry Lore," *NZPJ*, 20 April 1927, 9; H. S. Babcock, "Determining Sex in the Egg. Age-Old Theories Without Foundation," *NZPJ*, 20 October 1927, 10.

[18] "Booksellers. Upton & Co. New Books on Poultry," *AS*, 4 September 1902, 6; Merrett, "Beginner's Department."

[19] See for example, "Don't Jump at Conclusions," *NZPW* 1, no. 11, (1938): 20-21.

[20] Smith, "Monthly Notes," 39.

fluctuating fortunes of Government poultry farms and university poultry plants.[21] Ernest Marsden, as head of the Department of Industrial and Scientific Research from 1926, advocated for more of both 'applied' and 'pure' research. The latter, he explained to farming and science groups, concerned the fundamental principles of nature, or the study of plants and animals removed from the pressure of industry requirements. He was particularly keen for more research into animal disease and genetics.[22] However, the first Government report into animal research in 1938 noted that there were insufficient trained personnel to staff its recommended research institutes.[23]

Industry leaders, who tended to be active self-educators prior to WWII, regarded the articulation of fundamental scientific principles as central to their role. English expert, A.S. Galbraith in the *Auckland Star* in 1917 identified a difference between the abilities, inclinations and knowledge of breeders and everyday farmers, but stressed that the areas of science of most relevance to poultry-keepers were chemistry and physiology (in relation to understanding food requirements), and the 'laws' of heredity and hygiene. He also acknowledged that, unlike laboratory researchers, farmers had the additional

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[21] On this attitude within the farming sector generally see Lee and Brooking, "A Cautionary Tale: Rural Education in New Zealand, 1900-1940," 66.

[22] "'Research'. What It Means. Dr. Marsden Explains," *EP*, 19 May 1927, 12; "Vital Necessity," *EP*, 19 May 1927, 12; "Science in America," *AS*, 1 December 1928, 20; "Good Team Work. Research in the Dominion. Is it being Overdone? Science on the Farm," *EP*, 28 June 1935, 13. Marsden did not bring animal research under DSIR control. This remained within the Department of Agriculture. See Ross Galbreath, "Marsden, Ernest," DNZB: Te Ara - The Encyclopedia of New Zealand, accessed 5 January 2014, http://www.TeAra.govt.nz/en/biographies/4m41/marsden-ernest. On the formation of the DSIR in 1926 see Ross Galbreath, *DSIR: Making Science Work for New Zealand: Themes from the History of the Department of Scientific and Industrial Research, 1926-1992* (Wellington: Victoria University Press in association with the Historical Branch, Deptartment of Internal Affairs, 1998).

[23] J. Hammond, *Report on the Organisation of Animal Research in New Zealand* (Wellington: DSIR, 1938), 775-781.

challenge of understanding 'self-willed and complicated animals' within equally varied farm environments.[24] Other breeders similarly advised attention to broad areas of biological science. American Arthur Brigham, for example, in *Progressive Poultry Culture* (1913), a book described by Merrett as one that 'every farmer should have', explained that prior to learning specialist poultry science, the fundamental studies useful to the poultryman were 'biology …the science of life' which determined the management of chickens 'as living creatures', chemistry to understand nutrition, physics to comprehend 'the general properties of things and the influences such as heat, light, electricity, [and] gravitation [on] fowls and their surroundings' and mechanics 'to do with the laws of matter and of motion', especially for the construction of farm machines.[25]

Leaders in other areas of the applied life sciences in the same period evidently also read widely, encouraging what is nowadays termed 'interdisciplinarity'. A nurse writing on pre-natal health in the nursing journal *Kai Tiaki* in 1920 for example, educating mothers about the 'fundamental laws' of heredity and health cited, amongst others, a livestock breeder, spiritualists, the Bible and the internationally-renowned American plant hybridiser-entrepreneur, Luther Burbank (the latter a figure whom the editor of the *NZPW* in 1941 celebrated and assumed reader familiarity with in regard to the laws of breeding).[26] Throughout the period, specialist poultry scientists understood the degree to which general knowledge was valued within industry, as indicated for example when an Australian geneticist at a Massey refresher course in 1959 humoured his audience with the common quip: '[The 'specialist' is] a man who knows

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[24] A. S. Galbraith, "Science and the Poultry Keeper," *AS*, 26 January 1917, 9.

[25] Brigham, *Progressive Poultry Culture. A Text-Book of Study and Practice in the Keeping of Poultry for Profit and Pleasure*: 13; J.B. Merrett, "The Editor's Book Desk," *NZPJ* 20 November 1912, 28.

[26] Ada E. Chappell, "Pre-Natal Influence," *Kai Tiaki: The Journal of the Nurses of New Zealand* XIII, no. 1, (1920): 19; "Editorial. Notes on Breeding," *NZPW* 4, no. 8, (1941): 1.

more and more about less and less as opposed to the generalist who knows less and less about more and more.'[27]

Truby King

King was a leading articulator of general biology principles in the early twentieth century, informing New Zealanders' common-sense conceptions of the life sciences. Like other international evangelists for the new biology, he engaged modern media, and tended to refer to the 'natural' or 'fundamental laws' of the 'life sciences', rather than 'biology', as these were the more familiar, popular terms, especially prior to the 1930s. He achieved influence as a 'man of science' during a period when medical doctors, like agricultural experts, enjoyed more popular kudos than specialised scientists.[28]

King's medical training at Edinburgh University was undertaken during the heyday of emerging branches of experimental biology and comparative psychology in Britain. King's professor in Edinburgh, William Smith Greenfield, for example, had expertise in comparative pathology and bacteriology and King was taught physiology by William Rutherford, famous for conveying experimental physiology methods to Britain.[29] After graduating in 1886, King obtained a Bachelor of Science Degree in Public Health, when comparative pathology was a burgeoning field. He became the medical superintendent of the Seacliff asylum and a part-time lecturer in Mental Diseases at Otago University in 1889. At this time the university was commencing courses in General Biology, which was described in their calendar

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[27] "Poultry Farmers' Refresher Course," 97.

[28] On this view of medics see Mark Weatherall, "Bread and Newspapers: The Making of 'A Revolution in the Science of Food'," in *The Science and Culture of Nutrition*, ed. Harmke Kamminga and Andrew Cunningham (Amsterdam: Rodopi, 1995), 189.

[29] James Millarn, "Letter to University of Edinburgh. April 15 1937," in *Correspondence. King Family: Papers. MS-Papers-10004-6* (ATL); S. Richards, "Doyle, Conan Challenger Unchampioned - Rutherford, William (1839-99), and the Origins of Practical Physiology in Britain," *Notes and Records of the Royal Society of London* 40, no. 2, (1986): 193-217.

as: 'The Anatomy, Physiology and Life History of certain typical organisms, both animals and plants, which serve to illustrate the general principles of Biology'. It was prescribed for B.A. and B.Sc. Degrees, and for the Intermediate Examination in Medicine.[30]

King resigned from his Dunedin posts in 1921, and in his new Government role oversaw school medical services and health camps.[31] His widely-reported views did not go unchallenged by critics who were concerned with the breadth of his influence. One woman, for example, objecting to King's advocacy of Home Science training for women early in the century exclaimed: 'This year pigs, next year fowls, the third year after, babies. [Experts like King] talk about women as if they were some kind of chattels to be moved around and treated exactly in the experimental way cranks treat chickens.'[32]

Agricultural experiments on the Seacliff farm and lobbying for agricultural science education consumed King's spare time prior to his advocacy for infant health. Mary King, in her biography of her father acknowledged that despite his involvement with Plunket, he was 'first and foremost […] a scientific farmer' and that he had a reputation for this for many years prior to his work on infant care.[33] A tribute to King within Plunket's Golden Jubilee publication also

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[30] *The University of Otago, New Zealand. Calendar for the Year 1890* (Dunedin: The University, 1890), 70. General Biology courses commenced at other universities around the turn of the century. See for example, *Auckland University College, University of New Zealand. Calendar for the Year 1905*. (Auckland: The College, 1905), 41.

[31] Barbara Brookes, "King, Frederic Truby," DNZB: Te Ara - The Encyclopedia of New Zealand, accessed 20 October 2011, http://www.teara.govt.nz/en/biographies/2k8/1; D.W. Carmalt Jones, *Annals of the University of Otago Medical School* (Wellington; Dunedin: A.H. & A.W. Reed, 1945). 95-188.

[32] This unreferenced quote is from A.G. Strong, *History of the Development of University Education in Home Science in New Zealand 1911-1936* (Dunedin, 1937). 52, cited in Barbara Brookes, Charlotte Macdonald, and Margaret Tennant, eds., *Women in History: Essays on European Women in New Zealand* (Wellington: Allen & Unwin, 1986), 95.

[33] Mary King, *Truby King - The Man* (London: Geaorge Allen & Unwin Ltd, 1948). 85, 183.

acknowledged his work with agricultural research and animal husbandry.[34] In addition to his pioneering initiatives with poultry, over a fifteen year period at Seacliff King undertook a range of experiments into animal and plant health. He investigated diseases from potato blight to scouring in calves (comparable to human diarrhoea). The latter study, as scholars have noted, successfully helped to reduce the nation's cattle mortality.[35] King published *The Feeding of Plants and Animals* which he presented to the Farmers' Union congress in 1905 in a lecture titled *The Feeding and Upbringing of Humanity and the Lower Animals*.[36] This received considerable media attention and was published as a Farmers' Union bulletin.[37]

The Farmers' Union considered King's essay a model for elementary science education (which in 1905 was taught in the senior classes of primary schools, following on from nature study).[38] Congruent with comparative biology in its broadest sense, which extrapolated from plants to animals, this pamphlet detailed some of his experiments and emphasised to farmers, who King felt played a particularly pivotal role in determining the future of the race, that agricultural education should draw attention to 'the unity and simplicity of the laws of organic Nature'.[39] King later noted support for his principles in the

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[34] The Royal New Zealand Society for the Health of Women and Children (Incorporated), *Plunket News. Golden Jubilee Number* (Dunedin: Plunket Society, 1957). n.p.

[35] Linda Bryder, *A Voice for Mothers: The Plunket Society and Infant Welfare, 1907-2000* (Auckland: Auckland University Press, 2003). 11; Chapman, *In a Strange Garden: The Life and Times of Truby King*: 80-81. For potato blight see King, *The Feeding of Plants and Animals*: 2-5; "Modern Farming. Air and Light at Seacliff.," *OW*, 17 January 1906, 19.

[36] "Agricultural Conference," *OW*, 26 July 1905, 8.

[37] Attention was noted in Olssen, "Truby King and the Plunket Society: An Analysis of a Prescriptive Ideology," 5. Bulletin published: F. Truby King, *The Feeding of Children. Bulletin No. 1.*, ed. N.Z. Farmers' Union (Wellington: Whitcomb & Tombs Ltd., c.1905).

[38] N.Z. Farmers' Union, *Further Notes for Farmers*, (Wellington: NZFU, 1905). 12.

[39] King, *The Feeding of Plants and Animals*: 5,8.

views of Luther Burbank[40] who in *The Training of the Human Plant* (1907) similarly stressed the importance of environmental factors in determining the health of offspring.[41]

King was informed by trends in international agricultural education. He had visited Japan and observed their methods of agricultural education adapted from German and American systems.[42] King's approach mirrored that of international reformists who emphasised scientific principles rather than vocational skills alone.[43] King had attended the national agricultural conference in 1902, where the motion was carried to lobby the Government for 'simple practical teaching of the elements of natural science', and again in 1905 where recommendations were made to 'inculcate amongst the pupils of rural schools a knowledge of nature study, and the fundamental laws which underlie the practice of agriculture and the breeding and care of domestic animals.'[44] The *Taranaki Daily News*, one of many newspapers reporting on the 1905 conference noted that:

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[40] Chapman, *In a Strange Garden: The Life and Times of Truby King*: 100. On Burbank and his influence on animal breeding see Margaret Rossiter, "The Organization of the Agricultural Sciences," in *The Organization of Knowledge in Modern America*, ed. Alexandra Oleson and John Voss (Baltimore: John Hopkins University Press, 1976), 224-226; Barbara A. Kimmelman, "The American Breeders' Association: Genetics and Eugenics in an Agricultural Context, 1903-13," *Social Studies of Science* 13, no. 2, (1983): 185.

[41] Luther Burbank, *The Training of the Human Plant* (New York: The Century Co., 1907). For local responses to Burbank's book see for example, "Cultivating the Human Plant. Mr Luther Burbank's Theories," *TARH*, 10 August 1906, 3; "An Improved Variety of Man. Luther Burbank Again. To Produce the Best," *Dominion*, 5 November 1907, 9.

[42] "Agricultural Education," *EP*, 20 July 1905, 4.

[43] On debate about this balance in the US see Kohlstedt, *Teaching Children Science: Hands-On Nature Study in North America, 1890–1930*: 103-105.

[44] "Science in Schools," *OW*, 23 July 1902, 6; "Editorial. The Farmers and Education," *MEX*, July 25 1905, 2; "Rural Education. Discussion at the Agricultural Conference," *OW*, 26 July 1905, 10.

> According to Dr. King, the standard of agricultural knowledge in this colony is, in some respects, from a quarter to half a century behind the times, and he advocates a broad training that will be educational in its highest and most general sense, resulting in a direct personal knowledge of nature and her laws, applicable as far as possible in practical life.[45]

The eugenic objectives of the agrarian Country Life Movement were also evident in King's views. He suggested that emulating Japan's successful promotion of rural life would prevent the menace of physical deterioration evident within urban populations.[46]

The Department of Education head, George Hogben, who initiated changes to the nature study syllabus in schools in 1905, was aware of calls for reform upon joining the Department in 1899 and at the 1905 conference agreed with the objectives, but raised the issue of training teachers for the task. This was to be an ongoing problem.[47] However, the initial changes instigated in schools were made due to the collaborative efforts of farmers' groups, educationalists under the leadership of Hogben, and science advocates – especially King and the

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[45] "Nature Knowledge," *Taranaki Daily News*, 10 August 1905, 2.

[46] "Agricultural Education," *EP*, 20 July 1905, 4. On eugenics and the Country Life Movement see G.W. Rodwell, "The Country Life Movement and American Education," in *Essays in the History of Rural Education in Australia and New Zealand*, ed. R.C. Peterson and G.W. Rodwell (Darwin: William Michael Press, 1993), 1-17. On the Country Life Movement, its ideological complexity and the leadership of the Cornell University agricultural scientist, Liberty Hyde Bailey who primarily promoted nature study as a means of encouraging a scientific attitude and sympathetic, connected relationships with living things, see David Danbom, "Rural Education Reform and the Country Life Movement, 1900-1920," *Agricultural History* 53, no. 2, (1979): 462-474; Scott J. Peters, ""Every Farmer Should Be Awakened": Liberty Hyde Bailey's Vision of Agricultural Extension Work," *Agricultural History* 80, no. 2, (2006): 190-219.

[47] "Rural Education. Discussion at the Agricultural Conference," *OW*, 26 July 1905, 10. On the 1905 syllabus change, see Ross, *Going Bush: New Zealanders and Nature in the Twentieth Century*: 29-31.

Department of Agriculture's pathologist, John Anderson Gilruth (examined in chapter six).[48]

King's public lectures in the early twentieth century reveal that, like other life science educators at this time, he emphasised the fundamental concept of general physiology; that all living things were essentially made up of the same cellular protoplasm.[49] The notion that all animal life evolved from this and that the body was essentially a conglomeration of amoeba-like cells differentiated into parts of various complexity remained prevalent amongst biologists in the early decades of the century. [50] A New Zealand secondary school text, Professor Holmes' *The Elements of Animal Biology* (1919), after describing the shared protoplasmic basis of amoeba and humans, described cells as analogous to a 'society' of 'little organisms' that multiplied and specialised.[51] These ideas were sustained within popular general biology texts sold in New Zealand in the 1930s.[52]

Ideas about comparative embryology also informed conceptions of a shared, general physiology. Like many turn-of-the-century scientists internationally, King was interested in this and conducted experiments on chickens testing the

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[48] N.Z. Farmers' Union, *Further Notes for Farmers*: 9-13. Gilruth claimed that he and King were instrumental in presenting arguments for reform to teachers which spurred the initial changes. See "Taranaki Agricultural Society," *TARH*, 27 September 1907, 3.

[49] "Lecture by Truby King," *AG*, 20 October 1909, 4. See the same idea in Woods Hutchinson, *Studies in Human and Comparative Pathology* (London: Henry J. Glaisher, 1901). 1-9; J. Arthur Thomson, *The Study of Animal Life* (London: John Murray, 1917). 192-195.

[50] Andrew Reynolds, "The Theory of the Cell State and the Question of Cell Autonomy in Nineteenth and Early Twentieth-Century Biology," *Science in Context* 20, no. 1, (2007): 72; Andrew Reynolds, "Amoebae as Exemplary Cells: The Protean Nature of an Elementary Organism," *JHistBio* 41, no. 2, (2008): 307-337.

[51] S.J. Holmes, *The Elements of Animal Biology* (Philadelphia: P. Blakiston's Son & Co., 1919). 240-242.

[52] See for example, J. Arthur Thomson and Patrick Geddes, *Life: Outlines of General Biology* (London: Williams & Norgate Ltd., 1931). 6, 13-14, 406-408.

effect of alcohol on embryo growth.[53] The hen's egg was an early tool of reproductive physiology, and was commonly referred to by nineteenth and twentieth-century animal breeders to convey the notion of common origins. As Wright said in his *Book of Poultry*, 'all animals come from an egg'.[54] The embryonic chick was also associated with the recapitulation theory of the German biologist, Ernst Haeckel. Haeckel posited that stages of embryonic development (ontology) mirrored the evolutionary development of the species (phylogeny). His illustrations evoked notions of intelligent design and aided popular acceptance of evolutionary ideas.[55] Although Haeckel's theory was discredited within professional science by 1930, upon his death in 1919 the *Auckland Star* proclaimed him as 'one of the most famous and accurate students of biology the world ever knew'.[56] The evocative embryonic chick continued to feature within the poultry press until around 1930 as we shall see in chapter four.

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[53] "The Gospel of Health. Lecture by Dr. Truby King," *OW*, 1 September 1909; Philip J. Pauly, "How Did the Effects of Alcohol on Reproduction Become Scientifically Uninteresting?," *JHistBio* 29, (1996): 1-28. King's results, reported publicly in 1909, were used to support prohibition arguments.

[54] Lewis Wright, *The New Book of Poultry, with Forty-Five Plates in Colour and Black and White by J.W. Ludlow and the Poultry Club Standards of Perfection for the Various Breeds* (London: Cassell & Company, 1902). 41; William Fream, *Complete Grazier and Farmers' and Cattle-Breeders' Assistant: Forming a Compendium of Husbandry* (London: Crosby Lockwood, 1908). 617. On nineteenth century reproductive physiology encouraging popular concepts of interspecies kinship see Kete, "Introduction: Animals and Human Empire," 18-19.

[55] Haeckel initially articulated this theory in *The History of Creation*, published in numerous editions between 1876 and 1926. See Allen, *Life Science in the Twentieth Century*: 3-7; Nicolas Rasmussen, "The Decline of Recapitulationism in Early Twentieth-Century Biology: Disciplinary Conflict and Consensus on the Battleground of Theory," *JHistBiol* 24, no. 1, (1991): 51-89.

[56] For this and other slightly more subdued acknowledgements of his international fame, see "A Great German Scientist," *EP*, 11 August 1919, 8; "Ernst Haeckel Dead. A Great Biologist," *AS*, 12 August 1919, 5; "Death of Professor Haeckel," *NZH*, 12 August 1919, 7.

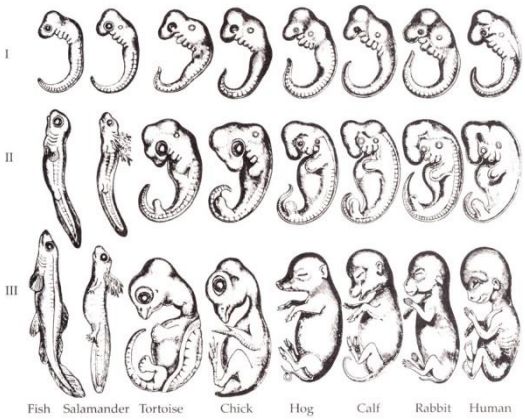

Figure 12. A copy of Haeckel's embryo drawings illustrating recapitulation theory, 1892.[57]

King echoed international educators in his emphasis on 'nature's book' and the imitation of nature wherever possible. This, he said, applied whether raising animals or human infants.[58] However, he acknowledged the 'artificiality' of modern human and livestock conditions, so urged rational compensatory measures such as the use of alternative milk formulas when natural suckling was impossible.[59] Fred Brown appears to have been influenced by these ideas, warning farmers for example, not to 'follow nature too closely in the matter of feeding the laying hen' as high egg production and winter production were 'artificial', so 'artificial methods' were necessary.[60]

In many of his lectures King utilised slides of animals to illustrate human health or behaviour and anecdotes from farming practice.[61] He kept attuned to agricultural research as he developed his approaches to infant nutrition. His ideas about cow's milk and 'protein poison' for example, were informed by the

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[57] Reprinted in G.J. Romanes, *Darwin and After Darwin* (Chicago: Open Court, 1892). Page number unidentified by digital source, Wikimedia Commons.

[58] See mention of this consistent advice in "British Tribute. Sir Truby King's Work," *EP*, 7 March 1938, 17. On the trend against book-learning, see Sally Gregory Kohlstedt, "Nature, Not Books," *ISIS: Journal of the History of Science in Society* 96, no. 3, (2005): 324-352.

[59] King, *The Feeding of Plants and Animals*: 6-7.

[60] F.C. Brown, "The Pullets and Winter Egg Production," *NZPJ*, 20 May 1924, 7.

[61] An early example is "Race Preservation, Infant Mortality and its Causes," *OW*, 20 December 1905, 31.

nutritional research at agricultural stations.[62] The early Plunket pamphlet, *Beautiful Babies*, highlighted King's respect for the perspectives of Herbert Spencer, in which he asserted that it was the responsibility of mothers to adhere to the 'laws of life' in order to produce 'a nation of good animals'.[63] However, it is overly simplistic to dismiss King's comments as eugenic rhetoric. Although he was engaged with the eugenics movement like many other leading scientists of his era, his unfailing assertion that heredity tendencies '[could] always be greatly modified by suitable conditions of life and training', emphasising environmental rather than genetic determinants of health, was grounded in agricultural and medical experiment and an awareness of contemporary research.[64] General biology, of which eugenics was a part, was central to King's worldview.

General Biology in Education

The majority of experienced poultry breeders in the period under study received their formal schooling prior to 1920, or at the latest 1940, and only to a primary school level. They also wrote for a poultry-keeping populace most of whom prior to WWII received this same level of education. By the beginning of WWII only 25 percent of 12-18 year olds engaged in post-primary education.[65] The new primary school syllabus was enacted in 1905, but although technical secondary schooling included agricultural courses from this time, agricultural courses were not popular in district (rural) high schools, despite official efforts,

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[62] F. Truby King, *The Application of Science, Simplicity and Ecenomy to the Everyday Practice of Artificial Feeding During Infancy* (Wellington, 1921). 2.

[63] F. Truby King, *The Beautiful Babies. What Becomes of Them? The Purpose of the Plunket Society* (The Society, n.d.). n.p. On differentiating Spencer from Social Darwinism see Versen, "What's Wrong with a Little Social Darwinism (In Our Historiography)?," 403-423.

[64] See King cited in "The Fit and Unfit," *EP*, 13 August 1906, 5, and further notes on King and eugenics education in chapter five.

[65] Erik Olssen, "Towards a New Society," in *The Oxford History of New Zealand*, ed. Geoffrey Rice (Oxford: Oxford University Press, 1992), 276-277.

in the interwar period prior to WWII.[66] The chairman of the NZPB expressed concern about this in 1938.[67] Farming sector leaders in the *NZFW* in 1943 also noted that less than seven percent of all boys leaving high school that year had taken agricultural courses, but that over 20 percent were leaving to go farming.[68] Following the election of the 1935 Labour Government, post-primary education was available and virtually free up to the age of nineteen, and from 1944, compulsory up to the age of fifteen.[69] By 1945, 72 percent of boys commencing their farming careers possessed some post-primary education. However, at this stage, post-war urbanisation pressures contributed to the declining popularity of agriculture as a subject.[70]

Vocational Training versus General Biology

There was scope for variable implementation of nature study and elementary science within the early public school syllabus guides prior to the end of WWI.[71] One early and relatively technically-orientated school nature study text written by Auckland school inspector E.K. Mulgan, *The New Zealand Nature Study Book* (1905), illustrates the desire to balance vocational and naturalist agendas. In

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[66] Lee and Brooking, "A Cautionary Tale: Rural Education in New Zealand, 1900-1940," 51-74.

[67] In regards to the poultry industry, see Knowles, "Problems of the Industry. No. 2 - Labour on a Poultry Farm," 12-13.

[68] Ronald Vine, "Learning About Farming on Farms," *NZFW*, 11 November 1948, 4-5.

[69] Michael King, "Between Two Worlds," in *The Oxford History Of New Zealand*, ed. Geoffrey Rice (Oxford: Oxford University Press, 1992), 289; Brooking, *The History of New Zealand*: 122.

[70] Robert Peden, "Agricultural Education - Primary and Secondary Education," Te Ara - The Encyclopedia of New Zealand, accessed 10 May 2014, http://www.teara.govt.nz/en/agricultural-education/page-2. On the abolition of compulsory agricultural education in district high schools in 1946 see Lee and Brooking, "A Cautionary Tale: Rural Education in New Zealand, 1900-1940," 64. District high schools were primary schools with small secondary school departments.

[71] See *The Education Act, 1908. Public Schools. Regulations for Inspection and Syllabus of Instruction* (Wellington: Government Printer, 1914). 13, 17.

this, as was not unusual, the fowl was selected as an easily-accessed model of birdlife.[72] After detailing the bird's anatomy its 'habits' were noted.

> The Common Fowl is a ground bird, [and] a social bird, preferring to live with a number of its own kind. It spends most of its time scratching up the ground in search of food … Its feet are specially adapted […] At night the bird roosts on a perch, which is firmly grasped by the toes. If not trained to go to the nest prepared for her, the hen lays in a nest of her own making in some sheltered spot. […] When she has a brood of chickens, the hen is particularly fearless, being ready to defend them with great courage. She is able to call them with a particular clucking cry, the sound being capable of much variation. The chickens readily understand the meaning of the different sounds. A note of invitation when she has found some dainty morsel is quickly responded to.[73]

Following this description, the 'uses' of the fowl were then explained, including the fact that the Government was endeavouring to 'encourage the rearing of fowls [the poultry and eggs from which promises to be] a large and important export.'[74] While this book taught the skills of detailed observation and highlighted economic interests, its primary purpose was to instil in children an appreciation of natural laws and an inquiring attitude towards 'the teachings of Nature'. As is evident, the comprehension of animal emotional experience and intelligence was important.[75]

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[72] See also for example, "Bird Life," *NEd*, 1 October 1930, 520. The study of birdlife was central to nature study and the chicken was recommended as a familiar model in later syllabus guides. See for example, *Public Schools: Organization, Examination, Inspection and Syllabus of Instruction (With Appendices)* (Wellington: Education Department, 1923). 58, 74.

[73] E.K. Mulgan, *The New Zealand Nature-Study Book* (Christchurch: Whitcombe & Tombs Ltd., 1905). 169-174.

[74] Ibid., 174. Numerous copies of this book are extant according to the NZLC.

[75] Ibid., iii-iv, 93-97.

As books were expensive for schools, newspaper nature study columns provided cheap, supplementary resources for teachers.[76] For example, 'Dinornis', the columnist for the *Otago Witness*, a weekly paper with wide circulation, articulated the latest trends in nature study education in 1909. This included advice against animal vivisection and other forms of 'necrology' in classrooms. Young people, Dinornis asserted, should study living animals to appreciate 'what is beautiful and wonderful in Nature' and develop the mental attitude of the artist prior to 'industry or scientific specialism'. The careful study of familiar animals was encouraged as, Dinornis explained, 'One of the greatest things that evolutionary science impresses upon us is [that to] know a dozen or so typical examples well is to have a sufficient foundation on which to superimpose details relating to the rest.' He concluded: 'A great deal can be learnt from books, but they should be supplemental to direct observation.' As we have seen, poultry experts and King echoed this latter idea.[77]

Following WWI there were calls for further state school syllabus reform, with debate centred on the priority given to vocational imperatives. A utilitarian trend was discernible within international education texts around this time, and the New Zealand teacher's journal published from 1919, *National Education,* itself displayed the business-like banner-line: 'School Efficiency. Civic Efficiency, National Efficiency'.[78] However, at the national agricultural training conference in 1919, teachers and educational leaders continued to oppose the

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[76] Ross, *Going Bush: New Zealanders and Nature in the Twentieth Century*: 35.

[77] Dinornis [pseud.], "Nature Study: Right and Wrong," *OW*, 5 May 1909, 86. The *OW* predominantly served the Otago and Southland regions until 1932, but was one of only four long-standing illustrated weeklies in the country (including the *AWN*, the Wellington's *New Zealand Free Lance*, and Christchurch's *Weekly Press*), so had wider circulation, particularly in the South Island. Dinornis's gentler approach to nature study and anti-vivisection stance riled an entomologist in the rival newspaper, whose views suggest that these new approaches were not without controversy. See Magister [pseud.], "Our Public Schools Column," *ODT*, 27 May 1909, 4.

[78] See for example, "Professor Alex. Darroch," *NZT*, 4 July 1914, 3; Champtaloup & Edmiston, "Thoughtful Books for the Teacher," *NEd*, 1 December 1929, 574.

teaching of 'agriculture' in primary and secondary schools. The Director of Education, W.J. Anderson, emphasised that teachers approached agriculture from the point of view of a 'nature study trainer', and that secondary school agriculture was designed to proceed from primary school nature study. The study of plants and animals, he said, was seen as a means of stimulating learning and intelligent thought.[79] However, teacher training in 'rural science', (elementary biology, chemistry and physics), was supported, and it was recommended that 'elementary science' (as it was also referred to) be compulsory within the senior classes of the primary syllabus and at secondary schools.[80]

Teachers' maintained resistance to vocational agriculture in schools was based on concern that students would be trained as 'rule-bound' technicians[81] and the interests of teachers themselves which did not generally include agriculture.[82] But the sectors' stance was also consistent with international nature study approaches. A 1925 Government review of agricultural education recommended student instruction in scientific observation and the scientific method, and that Department of Agriculture instructors assigned to assist teachers in schools worked under teacher supervision to ensure that the key objective – to stimulate interest in plant and animal life – was not lost sight of. It was recommended that provisions be made for vocational apprenticeships on approved farms and State farms subsequent to pupils leaving high school. Supplementary farming instruction such as clubs and farm camps were considered acceptable at the post-primary level, as were vocational elements to

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[79] "Agricultural Training," *NEd*, 1 July 1919, 123.

[80] "Agricultural Instruction," *Feilding Star*, 20 June 1919, 4.

[81] "The Growing Spirit of Enquiry. Quickened by the Stress of War," *NEd*, 15 March 1919, 23; "The Annual Conference," *NEd*, 1 February 1919, 3-4.

[82] "Notes of the Month. Mechanised Education," *NEd*, 1 May 1929, 147.

courses, but this was to be subordinate to the 'general cultural aspects' of education.[83]

Agricultural Clubs

Government and local efforts with agricultural education were concentrated on Young Farmers' Clubs, particularly from the 1920s and 1930s. Existing scholarship identifies the broader issue of 'generational resistance' within the farming community to scientific approaches leading to this focus of resources on the younger generation.[84] But teachers' resistance to agricultural training evidently also contributed to this.

Agricultural clubs did little to facilitate specialist poultry knowledge as they were mainly focused on the larger primary industries, especially dairying.[85] Occasionally, local poultry clubs or Government instructors worked with Education Boards to promote school poultry clubs. Students were taught skills such as trap-nesting and keeping a profit and loss account, but they were not totally utilitarian in focus. Emotional engagement was encouraged, especially as hens rather than incubators were used for hatching. One account reported that 'the broody hen and chicks were watched with keen interest.'[86]

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[83] "Agricultural Education in New Zealand," *Education Gazette*, 1 July 1925, 106-108. For an example of 'anti-specialism' articulated in New Zealand prior to WWI see Dinornis [pseud.], "Nature Study: Right and Wrong," *OW*, 5 May 1909, 86.

[84] Day, "Education, Generation, and Gender: The Rural Youth Movement in New Zealand, 1920-1973," 1-4; Swarbrick, *Creature Comforts: New Zealanders and their Pets: An Illustrated History*: 133-138.

[85] R.L. McNabb, "An Investigation into the Development and Value of the School Club Movement in Taranaki Primary Schools, with Special Reference to the School Agricultural Club," (Victoria University College, 1943); Wellington Education Board. "Agricultural and Science Instruction Section," *Your School Agricultural Club Bulletin*, no.1, (1952[?]).

[86] "Egg Laying Competitions," *NZPJ*, 20 October 1913, 16; "Poultry as a School Subject," *NZPJ*, 20 July 1914, 32; "School Poultry Clubs," *NZPW* 5, no. 12, (1942): 12; McNabb, "An Investigation into the Development and Value of the School Club Movement in Taranaki Primary Schools,

Prior to WWI, some schools became sites of tension as they negotiated agricultural and humanitarian agendas. In the farming region of Taranaki, for example, the *Hawera and Normanby Star* reported that members of the local SPCA in 1912 faced resistance when they requested permission to address school classrooms and were required to limit their discussions to after-school hours.[87] However, school agricultural clubs when they boomed from the 1920s explicitly aimed to foster 'a love of animals'. The expansion of SPCA education programmes in partnership with schools in the interwar period contributed to this focus.[88]

General Biology in the Interwar Syllabus

An examination of the 1928 and 1937 syllabuses and recommended reference texts for teachers reveals that concepts of general biology in this period were conveyed in four main ways: through general discussion of natural laws or general principles that were said to apply to all living things; through emphasis on observing similarities in the morphology, functioning and behaviour of living things (sometimes including humans); through direct discussion of Darwin's 'natural law of evolution'; and through emphasis on kindness to animals, which conveyed the idea that animals were at the very least, emotionally-conscious (or 'sentient' as we tend to say today). Texts thus modelled various means by which teachers could convey the principle of continuity, without *necessarily* discussing Darwin's theory of evolution.

Recommended reference texts for teachers within both syllabuses (from preparatory to Standard VII or Form III) reflect a sustained emphasis on fundamental, comparative principles and nature study rather than agricultural

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with Special Reference to the School Agricultural Club" 61; Ross, *Going Bush: New Zealanders and Nature in the Twentieth Century*: 39.

[87] "Local and General," *HNS*, 25 October 1912, 4.

[88] McNabb, "An Investigation into the Development and Value of the School Club Movement in Taranaki Primary Schools, with Special Reference to the School Agricultural Club" 29; Swarbrick, *Creature Comforts: New Zealanders and their Pets: An Illustrated History*: 136-146.

skills and specialist science (see Appendix C). Agricultural texts comprised only one quarter of the total. General biology texts included, for example, Hugh Robert Mill's *The Realm of Nature* (1913), John Arthur Thomson's *The Study of Animal Life* (1917) and Benjamin Moore's *The Origin of Nature and Life* (1913). These were published during the initial period of reform within professional biology when the 'new natural history' was being promoted. They emphasised the discovery of natural laws as the basis of science and interwove humanitarian, theological and scientific perspectives. All these authors explicitly discussed Darwin and evolution.[89]

The texts of Scottish zoologist, John Arthur Thomson (1861-1933) were particularly popular in New Zealand schools prior to WWII. Four of his texts, and one for which he wrote an introduction, were listed in the recommended texts in the two interwar syllabuses.[90] Thomson was an influential proponent of the 'new natural history' (as he referred to general biology for popular audiences prior to the 1930s). He was a well-respected scientific authority internationally, although criticised by professional scientists for expressing 'neo-vitalist' sentiment as he reconciled Christian and scientific perspectives.[91]

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[89] Hugh Robert Mill, *The Realm of Nature: An Outline of Physiography*, 2nd ed. (London: John Murray, 1913); Benjamin Moore, *The Origin and Nature of Life*, Home University Library of Modern Knowledge (London: Williams & Norgate, 1913); Thomson, *The Study of Animal Life*.

[90] *New Zealand Syllabus of Instruction for Public Schools*, (Wellington: Education Department, 1937). 222; John Rennie, *The Aims and Methods of Nature Study*. (London: W.B. Clive, 1911).

[91] On his book, *The New Natural History*, see "Literary Notes," *EP*, 14 November 1925, 17. The titles of his later publications, such as *Life: Outlines of General Biology* (1931), *Biology for Everyman* (1935), suggests more widespread familiarity with biology as a term. On maintained respect for Thomson as a scientist, see for example, Kotare, "Struggle For Existence," NZH, 24 July 1926, 1; W.H. Triggs, "The Mental Defectives Bill," Press, 14 August 1928, 10; "Biologist's Death," NZH, 14 February 1933, 9. On his theological views see David Kahan, "Authors: John Arthur Thomson " Gifford Lectures. Over 100 Years of Renowned Lectures on Natural Theology, accessed 30 July 2013, http://www.giffordlectures.org/Author.asp?AuthorID=166. On criticism of his neo-vitalist views see Believer [pseud.], "The Twilight of the Gods. Letter to the Editor," *AS*, 5 July 1923, 8; Joseph McCabe, "Darwin and McCabe. To the Editor," *AS*, 14 July 1923, 14.

Education journals indicate that teachers followed his ideas and the release of his many biology and general science texts were reported in the New Zealand press until his death.[92] *Study of Animal Life* for instance, published between 1892 and 1917, and praised by 'Dinornis' in his 1909 column for being 'scientific, artistic and evolutionary,' and for encapsulating the diverse ideas and sentiments of the age,[93] featured chapters entitled 'The Web of Life', 'The Struggle of Life', 'Social Life of Animals', 'The Domestic Life of Animals', and 'The Evolution of Evolutionary Theories'.[94] While Thomson acknowledged competition and aggression within nature, interdependence and cooperation was highlighted, as it was in most nature study guides. Thomson's discussion, for example, included Kropotkin, Darwin, Alfred Wallace and Herbert Spencer's theories on the 'fittest' animals being the most social. He aligned these theories with that of French philosophers, concluding:

> Man is the realisation of antecedent societies, and it is man's realisation of himself as a social person which makes human society what it is. […] As biologists and perhaps as philosophers, we are led to conclude that man is determined by that whole of which he is a part.[95]

Thomson's chapters were no mere reiteration of Darwinist natural history, as he incorporated up-to-date research. On the subject of heredity for example, Thomson cited various scientists, including German biologist August Weissmann, Gregor Mendel, American geneticist William Castle and contemporary poultry and eugenic-geneticists, detailing the work of the latter

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[92] See for example, Dinornis [pseud.], "Nature Study: Right and Wrong," *ODT*, 14 June 1909, 9; F.G.A. Stuckney, "The Spirit of the New Syllabus," *NEd*, 1 May 1929, 153. Numerous texts by Thomson are held in New Zealand library collections.

[93] Dinorni [pseud.], "Nature Study: Right and Wrong," *ODT*, 14 June 1909, 9.

[94] Thomson, *The Study of Animal Life*: vii-xi.

[95] Ibid., 99. See further examples of 'mutual aid' discourses within nature study in chapter four.

(with diagrams of chicken breeding) to convey the principles of genetic science.[96]

Evolutionary ideas were integral to both the 1928 and 1937 syllabuses, which introduced nature study and elementary science as the study of:

> […] the animate population of the world together with the physical setting into which the many organisms have been born and in which they have fought and are fighting their way upward to higher and yet higher stages of development. Ultimately Nature-study should aim at enabling Man to understand and appreciate some extent of the scale of the universe and his own place in it.[97]

The syllabus advised that the subject of science was to be conveyed as 'the basis of a new culture' and important in the 'evolution of mankind'. The emphasis on understanding the human-beings' 'place' in nature, was primarily intended to subtely convey the evolutionary notion of 'Man the animal', (while simultaneously implying a maintained sense of human exceptionalism).[98]

Historians have noted generally that Darwin's evolutionary ideas were taught without debate prior to WWI and that simultaneously, nature study with a theological bent was taught in junior classes. Creationist ideas remained strong around 1930 when public debate about the teaching of Darwinian evolutionary theory in schools briefly erupted. In the mid-to late 1940s books and school radio broadcasts discussed Darwin's theory of evolution by modification more explicitly. The Catholic Church fiercely opposed this and the word 'evolution'

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[96] Ibid., 362-382.

[97] *New Zealand Syllabus of Instruction for Public Schools*, (Wellington: Education Department, 1928). 42.

[98] Ibid., 173. See also Pauly, *Biologists and the Promise of American Life*: 171-103.

was absent from the 1950 nature study syllabus. However, concepts such as adaptation and 'the struggle to survive' remained.[99]

Instiling an awareness of 'general laws' was an explicitly-stated objective within the 1928 and 1937 elementary science syllabuses for Standards V and VI (Forms I and II). While students developed specific skills within agricultural subjects such as dairy science, mechanical and electrical studies and basic soil analysis, it was emphasised that:

> The methods of science are both inductive and deductive. In the inductive method […] the aim is to establish, from the consideration of individual cases, general laws. The aim of the deductive method is to "explain" occurrences by showing how they conform to general laws.[100]

In both syllabuses, elementary science teachers were encouraged to inspire students with the stories of the 'great nature-lovers of the past', the scientists who had established the laws of modern science. Charles Darwin was specifically mentioned, along with Antoine Lavoisier, who studied energy

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[99] Colin McGeorge, " Evolution and the Primary School Cuniculum 1900-1950," *History of Education* 21, no. 2, (1992): 205-218; William Stewart Peddie, "Alienated by Evolution: The Educational Implications of Creationist and Social Darwinist Reactions in New Zealand to the Darwinian Theory of Evolution" (PhD thesis, University of Auckland, 1995). Catholic schools expanded their religious studies programmes in response to the secularisation of State education from 1877. See Geoffrey Troughton, "Religion, Churches and Childhood in New Zealand, c.1900-1940," *NZJH* 40, no. 1, (2006): 40. As an example of earlier approaches, Mulgan's text was not ideologically-challenging. He evaded explicit discussion of evolutionary theory, or of humans as animals. The 1919 syllabus also did not mention 'evolution', but comparable human and animal life habits were to be instilled in nature study and the teaching of the 'simpler facts' of animal life in respect to 'Man, rabbit, sheep, cow …fowl…' was specified in elementary science. See *Public Schools: Organization, Examination, Inspection and Syllabus of Instruction (With Appendices)*: 56-60, 74.

[100] *New Zealand Syllabus of Instruction for Public Schools*: 174.

conversion in the animal body, Mendel whose research founded modern genetics and Louis Pasteur who established the 'germ theory' of disease.[101]

Although nature study encouraged young children to observe and enjoy nature, senior elementary science students were taught that measurement enhanced appreciation of nature and its laws and not to rely on their senses. Hugh Robert Mill in *Realm of Nature* emphasised the importance of accurate scientific observation, but like poultry leaders, upheld common sense as an approximate, lay persons' guide.[102]

Both syllabuses encouraged teachers to make interdisciplinary connections between biology, health, agriculture and geography.[103] This approach was evident within the Education Department's manual for physical education and hygiene, *Growing Body: Its Nature, Needs and Training* by James Renfrew White, which instructed in the natural laws of health for the human animal. White was a surgeon and the son of David Renfrew White, New Zealand's first Professor of Education in Dunedin and a contemporary of King's. This book, published in 1932, strongly echoed King's ideas.[104]

Agricultural texts also encouraged students to think broadly and comparatively. The use of botany to teach heredity (and tacitly eugenic) principles was common within Anglo-American education of this era and principles of artificial selection with corn crops were clear models for animal

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[101] *New Zealand Syllabus of Instruction for Public Schools*: 173. See p.175 in the 1937 syllabus.

[102] Mill, *The Realm of Nature: An Outline of Physiography*: 5-6.

[103] Ibid., 172-181.

[104] J. Renfrew White, *Growing Body: It's Nature, Needs and Training* (Dunedin: Coulls Somerville Wilkie, 1932); *New Zealand Syllabus of Instruction for Public Schools*: 62-63. On the author see "White, James Renfrew, 1888-1961," The Community Archive, accessed 24 December 2014, http://thecommunityarchive.org.nz/node/74615/description. The alignment of biology and physical education had been explicitly encourged within earlier syllabuses. See *The Education Act, 1908. Public Schools. Regulations for Inspection and Syllabus of Instruction* (Wellington: Government Printer, 1914). 17.

selection and breeding within texts used in New Zealand schools.[105] Preceding preparatory-level nature study trained children to extrapolate. Texts and syllabus guides instructed children to compare the hen's egg with the bean seed that nourishes the adult plant or to observe the needs of baby chicks compared with young seedlings.[106]

Religious values, including humanitarian kindness to animals, remained influential within the state schools syllabus, initially due to moral instruction sustained within Hogben's early changes. Nature study was regarded, according to the *New Zealand Journal of Education* in 1905, as a means of 'counteracting 'the mischievous materialism of our age.'[107] Hogben's *Moral Instruction in Schools* (1908) advised teachers to emphasise humankind's place in nature and kindness to animals, and the correlation of cultural subjects with nature study to achieve these goals.[108] In an international inquiry into moral instruction in 1910 Hogben stated that 'nature subjects' for older students such as physiology, botany, zoology, and physical geography could also indirectly teach responsibility for self and the natural world.[109]

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[105] Marouf A. Hasian, *The Rhetoric of Eugenics in Anglo-American Thought* (Athens: University of Georgia Press, 1996). 35; Chapter X in C.R. Jackson and L.S. Daugherty, *Agriculture Through the Laboratory and School Garden* (New York: Orange Judd Co., 1906). This text was recommended in Mr Davies and Mr Cummings, *Notes on Nature Study and Elementary Agriculture* (Wellington: Wellington Education Board, 1911). 15.

[106] See for example, Mulgan, *The New Zealand Nature-Study Book*: 209-213; J. McK. Miller, "School Gardening and Nature Study," *NEd*, 1 September 1930, 453.

[107] "The New Syllabus - Its History and Working," *New Zealand Journal of Education* VII, no. 73, (1905): 154.

[108] George. H. Hogben, "Moral Instruction and Training in the Schools of New Zealand," in *Moral Instruction and Training in the Schools: Report of an International Inquiry*, ed. M.E. Sadler (London: Longmans, Green & Co., 1908), 2-3; "Moral Education. Schools of the World. A British Empire Commission," *OW*, 4 November 1908, 18.

[109] M.E. Sadler, *Moral Instruction in Schools: Report of an International Inquiry*, vol. II (London: Longmans, Green & Co., 1910). 313.

The general educational goal of 'character training' as stated within the 1928 and 1937 syllabuses similarly specified indoctrination in kindness to animals, an appreciation of order and beauty, and the importance of a balance of spiritual, mental and physical development.[110] The teaching of nature study was structured to enable an integration of naturalist sympathy and scientific analysis. Thomson's *Study of Animal Life*, for example, carefully articulated the natural laws of animal emotion, sociability and vitality before entering into their morphological analysis in later chapters.

Teachers' instruction to incorporate nature-study into drawing, poetry, songs, and stories in the interwar syllabi was accompanied by the recommendation that 'over-sentimentality' and the implication of a 'too human psychology' be avoided. Although recommended stories for juniors such as the *Ugly Duckling* and Beatrix Potter's *Flopsy Bunnies* were replete with anthropomorphism,[111] education journals attempted to provide alternatives for older pupils. Stories based on real-life events, such as 'Doctoring a Sick Pig', suggested for Standard II English classes in *National Education* in 1935, modelled humanitarian empathy, with questions to encourage observation of animal pleasure ('What did the pig do when Philip scratched her back?') or, in the case of this story, unresponsiveness, implying illness.[112] The *NZSJ* provided various heroic adult role-models with animal-loving attitudes, from sympathetic military heroes to Saint Francis and his modern scientific equivalent, Doctor Doolittle. The SPCA promoted annual essay competitions within schools in the 1930s and a particularly sympathetic attitude to nature was discernible at this time within the English curricula. Sentimental poems, including many with bird themes, were especially popular.[113]

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[110] *New Zealand Syllabus of Instruction for Public Schools*: 6-7, 63-65.

[111] Ibid., 164-168.

[112] F.W. Moore, "Suggestions on English," *Supplement to NEd*, 1 November 1935, 1-2.

[113] "General Custer and the Bird's Nest," *NZSJ* III, no. 8, (1909): 126; "Saint Francis and the Birds," *NZSJ* XXXIII, no. 6, (1939): 80-84; "Doctor Doolittle," *NZSJ* XXXIII, no. 9, (1939): 135-138;

To maintain theological perspectives, Hogben in a 1908 lecture in Wellington had actively urged Sunday Schools to take up the important role of theological instruction through nature study, as in his view, nature study demonstrated 'the immanence of God in nature, as exemplified by the order and beauty of the universe and the interdependence of man and the lower forms of life.'[114] Nature study books were awarded as Sunday School prizes and songs reinforced 'good shepherd' empathy for 'all things bright and beautiful'.[115]

Sunday School and church attendance was a common experience up until the late 1960s, which, it has been argued convincingly, preserved Christian values.[116] The Bible in Schools campaign in some districts also provided religious instruction from early in the century. By the time legislation cemented this in 1962, the programme was already operating in 80 percent of state schools.[117] Although men were less frequent churchgoers, it has been argued that the 'diffusive Christianity' of New Zealand's men in the first half of the century derived in part from the moral messages of childhood religious instruction. Contemporary critics who complained about overly-feminised religious morality being detrimental for boys[118] observed conflicting messages,

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Swarbrick, *Creature Comforts: New Zealanders and their Pets: An Illustrated History*: 140. On poetry, see for example, "The Robin's Grave," *NZSJ* XII, no. 128, (1930): 435.

[114] "Teaching the Young. Methods of Sunday School Work. Lecture by Mr. G. Hogben," *EP*, 11 February 1908, 3.

[115] Troughton, "Religion, Churches and Childhood in New Zealand, c.1900-1940," 47. The DPL holds for example, Carey Bonner, *Child Songs. Volume II: For the Primary and Junior Departments of the Sunday School and Day School and for Home Singing* (London: Pilgrim Press, 1914). Songs include 'Behold the birds of the air' and 'Insects and animals'. The popular song 'All things bright and beautiful' was the first hymn in David Cook, *Children Sing: Christian Songs for Boys and Girls* (Elgin, 1962).

[116] Stenhouse, "God's Own Silence: Secular Nationalism, Christianity and the Writing of New Zealand History," 57.

[117] It commenced in Nelson prior to WWI. See Troughton, "Religion, Churches and Childhood in New Zealand, c.1900-1940," 43-44.

[118] Ibid., 49-51.

with adult roles discouraging emotional sentiment (as with commercial poultry farming), while religious and moral instruction drummed it home.

Post-WWII

Nature study was expanded and revitalised in New Zealand primary schools beyond WWII to 1960. Vitalist ideas were sustained in text books. For instance, the objective for twelve to thirteen year olds in one nature study guide used in New Zealand, was to focus student's attention on the phenomenon of 'aliveness' through analysis of 'plant from seed […] animals from egg', and to understand 'the principle life functions – viz, feeding, respiration, excretion, movement, reproduction, vital rhythm, [and] kinship of animals and plants with man.'[119]

Such texts also recommended that school classrooms facilitate the study of small animals in classrooms. This advice was evidently followed as the Wellington Education Board, for example, recommended in the 1950s that chicks be kept in an 'animal house' to facilitate learning about growth and care. However, while this method focussed on physical principles, unmothered chicks did not assist apprehension of maternal relationships.[120] Children's books maintained a focus on this, attempting to balance scientific objectivity, and subjective interpretation. Eileen Mayo's *Animals on the Farm* (1951), for instance, acknowledged the emotional experience of the doting hen.

> The 'broody' hen […] sits patiently on her eggs for three weeks …
> If the hen is put on the eggs of ducks or turkeys, she sits for
> twenty-eight days instead of twenty-one. Goose eggs take two or

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[119] C. Von Wyss, *Teaching of Nature Study* (London: A. & C. Black, 1951). 7, 44, 80. Australasian adherence to nature study programmes beyond WWII is noted in Kohlstedt, "Nature Study in North America and Australasia, 1890-1945: International Connections and Local Implementations," 449.

[120] K.S. Morgan, "Keeping Animals in the Classroom," *The Education Board of the District of Wellington Newsletter* 5, (1954): 10.

> three days longer. But the patient hen goes on sitting […] She does not seem surprised when goose and duck eggs hatch […] but tends to them as carefully as if they were her own. But she is worried when the ducklings take to the water, and stands clucking anxiously at the edge of the pond.[121]

However, post-primary schools in this period were more important for the new generation of poultry farmers. The 1949 post-primary syllabus was designed to dovetail with the reinvigorated nature study syllabus.[122] It included specific instruction in animal husbandry (for horses, pigs, cattle and sheep), but a substantial emphasis on general principles was sustained. Students had lessons in 'general agriculture' (learning for example, about the interdependence of animals and plants and the elementary principles of breeding, heredity and variation) and 'general biology' (which overlapped with general agriculture and included, for example, the basis of cellular or 'organic' energy, muscular movement and fatigue, heredity and 'adaptation' to the environment). Human biology was also studied, as both a separate subject and within general biology.[123]

Conclusion

This chapter has argued that science education supported concepts of general biology within the poultry industry. Poultry breeder experts in particular were expected to possess knowledge of the life sciences, and to take an interest in professional research. However, leading farmer-breeders primarily regarded themselves as field scientists. Practical, common-sense knowledge and adherence to natural laws was emphasised. This assisted the negotiation of new

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[121] Eileen Mayo, *Animals on the Farm* (Harmondsworth, Middlesex: Penguin Books, 1951). n.p.

[122] *Nature Study in the Primary School. Report of the Revision Committee*, Primary Education – Syllabus – Science and Nature Study, 1942-1963. BCDQ1050 A739 1698a (ANZ, Auckland).

[123] *Education (Post-Primary Instruction) Regulations: Syllabuses of Instruction and Prescriptions for the School Certificate Examination*, (Wellington: Education Department, 1949). 47-61.

knowledge and affirmed the wisdom of traditional adherence to natural laws, but fuelled a resistance to book-learning.

Greater attention to the latter was urged by leaders in the late 1930s, but as discussed in the previous chapter, government poultry experts were not tertiary-trained until Bobby took the helm in WWII. Throughout this period, pure and applied research at government farms and universities was not well-supported in New Zealand. As general knowledge was valued, those within industry attended to varied sources of information, as did others in applied fields.

Generalists such as King played an important role in heightening public awareness of life science principles in the first half of the century. King's views were conveyed through agricultural education, Plunket, school medical services and health camps, and general media, and this had a diffuse influence within the broadly-based lay poultry industry. His approach had a direct influence upon Brown who was the longest-serving Government expert within our period. King's agricultural and medical opinion was informed by comparative, experimental research, and general biology was central to his educational approaches and worldview.

Most breeders, farmers, poultry-keepers and Department advisors prior to 1950 received only primary-level education. Poultry experts who emphasised attention to natural laws and the validity of common-sense to assess new science, prioritisation of careful observation over rule-bound book-learning, and sustained attention to kind but not overly-sentimental husbandry, echoed the naturalist, elementary science education received within schools. Nature study and elementary science emphasised natural laws related to topics such as nutrition, energy, fatigue, and heredity (the topics of later chapters) and conceptualisation of a plant-animal-human continuum. Ideas about selective breeding were applied to plants, but presented as general principles.

Evolutionary theory, or at least notions of biological continuity and adaptation, was conveyed within school biology throughout the period.

It was generally acknowledged that science and industry narrowed perspectives on animals. This was an important factor in educationalists' insistence upon the preservation of general nature study and elementary science, rather than agriculture, within schools. Although, as Kohlstedt's studies highlight, nature study could be variably implemented, texts and syllabus guides encouraged an ethos of moral and sympathetic connectedness with animals. This was reinforced within cultural subjects and through programmes of religious instruction. Elementary science and farmers clubs throughout the period also encouraged a conception of animals as emotionally-sensitive creatures through an emphasis on kindness. A process of negotiation between utilitarian and moral views was evident in efforts to avoid overly-sentimental stories, and resistance to feminised morality and early SPCA education within schools. An over-emphasis on psychological kinship was antagonistic to modern farming.

Both change and continuity were discernible within 1950s education. Although junior level children's books of this period portrayed chickens and other farm animals as sentient creatures, classroom animal houses where chicks were observed without the broody mother hen, taught children about nutrition and physical care rather than psychological and social needs. Up until 1960, post-primary instruction reflected a continued emphasis on fundamental principles in general biology and animal husbandry courses.

Chapter Three

Chicken Mind

> The first bond between the animal and the human being, mentally speaking, which arrests our attention is the possession by every animal, as by every human being, of a separate personality […] All animals, however lowly in organisation, possess consciousness [which is] the essential distinction between an animal and a plant.
>
> Charles W. Purnell, 'A Comparison between the Animal Mind and the Human Mind,' read at the Philosophical Institute of Canterbury, 1896.[1]

The topic of animal consciousness and the 'evolution of mind' was vigorously debated around the turn of the century within lay and professional scientific spheres internationally. The associated field of research, comparative psychology, which examined intelligence, emotions and behaviour in human and non-human animals, was articulated most forcefully within New Zealand's scientific community by the amateur naturalist, lawyer and New Zealand Institute member, Charles William Purnell (1842-1926).[2] Purnell presented three papers on the animal mind to the Institute in the 1890s[3] and published a book, *The Intelligence of Animals* (1893). The book's release coincided with the rising animal rights movement, but also with a boom period for livestock farming, and had a limited circulation.[4]

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[1] Charles W. Purnell, "A Comparison Between the Animal Mind and the Human Mind," *TPRSNZ* 29 (1896): 74.

[2] "Ashburton Election. To the Editor," *AG*, 25 November 1893; Allana Inglis and Norman Inglis, "Notes for Charles Purnell," RootsWeb, accessed 20 December 2012, http://archiver.rootsweb.ancestry.com/th/read/ENG-SURREY/2007-01/1169621032.

[3] Charles W. Purnell, "True Instincts of Animals," *TPRSNZ* 28 (1895): 27-36; Charles W. Purnell, "The Animal Mind as a Factor in Organic Evolution," *TPRSNZ* 32 (1899): 243-252.

[4] Purnell, *The Intelligence of Animals*; "Local and General," *AG*, 18 January 1893, 2. The release of this publication was noted in Ashburton, Wanganui and Otago. See for example, "New Book. The Intelligence of Animals," *AG*, 4 February 1893, 2; "Books. The Intelligence of Animals,"

Nevertheless, in considering New Zealand poultry breeder opinion, it is noteworthy that this debate was being held amongst scientists. Other New Zealand Institute members, including its head, Sir James Hector and the geologist and zoologist, Frederick Hutton, accepted the notion of evolution of mind and that this had implications for animal welfare.[5] William Carlile, another member who spoke on this topic at the Wellington Philosophical Society in 1891 commented that 'the attention paid of late to comparative psychology has already revolutionised much of human psychology'.[6] Carlile was likely to have been referring here to the work of William James, whose theories of human psychology were influenced, as Sigmund Freud's emerging work also was, by Darwin and subsequent investigation into instincts.[7]

In the previous chapters we encountered a number of observations of chicken psychology – from reflections upon the bird's spirit and instincts to observations of emotion and intelligence – influenced by the traditional naturalist perspectives of older breeders and the popular, evolutionary-based

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ODT, 18 March 1893, 2. Distribution beyond these areas has not been established. Asserting animal intelligence rather than 'sagacity' signaled closer alignment with human cognition. See Ritvo, *Noble Cows and Hybrid Zebras: Essays on Animals and History*: 67-69.

[5] Stenhouse has described the Institute leaders as open to Darwinian ideas and comparatively young and 'progressive'. See Stenhouse, "Darwinism in New Zealand, 1859 -1900," 72. On Hector and Hutton's views see "The Otago Institute," *ODT*, 23 August 1876, 3; "'Animal Intelligence' by W.W. Carlile, M.A.," *TPRSNZ* 24, (1891): 691-692. Interestingly, an honorary NZPS member, the Scottish medic, William Lauder Lindsay (d.1880), who published two volumes on comparative psychology, was not referred to by Purnell or others when discussing this topic. See William L. Lindsay, *Mind in the Lower Animals in Health and Disease*, vol. 1 (London: Kegan Paul & C., 1879); ibid., 2.

[6] Carlile, "Animal Intelligence," 349.

[7] David M. Buss, *Evolutionary Psychology. The New Science of the Mind* (Boston, Mass.: Allyn & Bacon, 1999). 22-23. Buss notes that James's Principles of Psychology (1890) asserted that humans had more instincts than other animals, and that Sigmund Freud's theories of life-preserving and sexual instincts also drew upon Darwin's theories. Freud published shortly after Carlile's talk in the 1890s.

biology of school texts. We have seen that poultry-keepers' experience with birds in free-range and barn systems and in domestic and small farm environments encouraged attention to chickens as intelligent and social creatures, and that ideas about chicken psychology were integral to sustained humanitarian concerns.

The objective of this chapter is to more closely examine how description of chicken psychology (personality, emotion, cognition and social behaviour) was informed by psychology theory as ideas about the animal mind relative to human experience were articulated publicly and within the poultry press in the nineteenth and twentieth centuries. The first part of this chapter explains Darwinian notions of evolutionary psychology which informed nineteenth-century natural history and traditional naturalist views of poultry-keepers and breeders. Ideas about bird behaviour and interiority are then examined with respect to trends in twentieth-century ethology and behavioural psychology.[8] This includes reflection on innate qualities and learnt behaviour (the 'nature-nurture' debate) and, from the late 1940s, behaviourist theories of group psychology.

[8] Ethology is a term for the field-based study of animal behaviour. See Paul Griffiths, "Ethology, Sociobiology and Evolutionary Psychology," in *A Companion to the Philosophy of Biology*, ed. Sahotra Sarkar and Anya Plutynski (Victoria, Australia: Blackwell, 2008), 393-414.

Chickens and the Evolution of Mind

The evolution of morphology or physical traits was the primary focus of Darwin's *Origin of Species By Means of Natural Selection* (1859) and *The Variation of Animals and Plants Under Domestication* (1868). Darwin had consulted with the world-renowned poultry expert, William Tegetmeier and the study of poultry and pigeon breeding played a significant role in the formulation of his ideas.[9] Darwin's theories about the evolution of mind were initially articulated in his later publication, *The Descent of Man and Selection in Relation to Sex* (1871). In this he drew upon the observations of a range of naturalists and breeders, including Tegetmeier and other bird experts. His central assertion was that:

> The difference in mind between man and the higher animals, great as it is, is certainly one of degree and not of kind. We have seen that the senses and intuitions, the various emotions and faculties, such as love, memory, attention, curiosity, imitation, reason, &c., of which man boasts, may be found in an incipient, or even sometimes in a well-developed condition, in the lower animals. They are also capable of some inherited improvement, as we see in the domestic dog compared with the wolf or jackal. [10]

Darwin also hypothesised, for example, that animals possess inherited personality traits and that they dream and imagine: 'As dogs, cats, horses, and probably all the higher animals, even birds, as is stated on good authority, have vivid dreams, and this is shewn by their movements and voice'. He also postulated aesthetic appreciation: 'when we behold male birds elaborately

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[9] Squier, *Poultry Science, Chicken Culture: A Partial Alphabet*: 168-171. On pigeons see James Secord, "Nature's Fancy: Charles Darwin and the Breeding of Pigeons," *Isis* 72, no. 2, (1981): 162-186.

[10] Charles Darwin, *The Descent of Man and Selection in Relation to Sex*, vol. 1 (London: John Murray, 1871). 105. For reference to Tegetmeier, see Vol. 2. p. 193.

displaying their plumes and splendid colours […] it is impossible to doubt that the females admire the beauty of their male partners.'[11]

Building upon the Paleyian notion of moral sensibilities, Darwin devoted an entire chapter to the sociability of animals, citing many examples, including accounts of birds, roosters and hens.

> […] the social instincts lead an animal to take pleasure in the society of its fellows, to feel a certain amount of sympathy with them, and to perform various services for them. The services may be of a definite and evidently instinctive nature; or there may be only a wish and readiness, as with most of the higher social animals.[12]

He observed that animal morality could, as with humans, be lacking within individuals and families, but that it could also be 'improved' – as evident in his comment above concerning dogs, wolves and jackals. These ideas about animal sociability underpinned Kropotkin's notion of mutual aid.

Darwin's final work, *The Expression of the Emotions in Man and Animals* (1872), extended his argument for the common evolutionary basis of emotional experience and behaviour. In this, Darwin compared non-human animals, human infants, older people, the mentally unwell and 'uncivilised races' in order to discern fundamental emotional expressions prior to cultural learning (or by 'generation by convention' as Darwin phrased it).[13] Included in this text was an examination of the fear response in hens and cockerels, which drew upon Tegetmeier's observation that cockerels' hackles become erect in much the same way that human hair raises on the back of the neck. This physiological

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[11] Ibid., 40, 46, 63. His bird authority cited on p.46 was Dr. Jerdon in *Birds of India* (1862).

[12] Ibid., 72.

[13] Charles Darwin, *The Expression of the Emotions in Man and Animals* (New York: Appleton, 1873). 1-17.

reaction, Darwin observed, occurred in most animals in response to the often concurrent emotions of anger and fear.[14]

Darwin's theories of evolutionary intelligence challenged notions of human exceptionalism, and in New Zealand, *Descent* received strong reactions from sections of the community. In 1873 the *West Coast Times* reported on a lecture by Archdeacon Harper, for example, who proclaimed that language was uniquely human: 'The neighing of a horse, the lowing of a cow, the barking of a dog, are in no true sense words of language. They are mere signs and ejaculations'.[15] *Expression of the Emotions* was also greeted sceptically at the time of its release,[16] but was sold widely between 1873 and 1905 and cited within naturalist newspaper columns.[17]

Poultry expert views on chicken intelligence and personality mirrored Darwinian description at this time. In an agricultural column of *The Weekly News* in 1871, for instance, a contributor observed that although profit may be a motive for treating them well, chickens should also be appreciated because 'hens, like other highly civilised races, manifest endless diversities of character'. Various hen personalities analogous to human 'types' were detailed.[18] Descriptions of personalities were common in accounts of backyard flocks, as in the following extract from a naturalist column in the *Auckland Star* in 1890:

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[14] Ibid., 97-102.

[15] "Modern Theories on the Nature of Man," *WCT*, 10 November 1873, 2. The lecture addresses many aspects of Darwin's work and is continued in the 11 November issue. See also "The Origin of Man and the Unity of the Human Species," *New Zealand Tablet*, 13 October 1882, 19.

[16] "Emotional Expression," *WI*, 3 April 1873, 3. This is the first review of Darwin's book in New Zealand newspapers according to my PP search, 5 January 2013.

[17] On sales see for example, "Advertisements. C. Bonnington & Co," *Press*, 7 March 1873, 1; "Advertisements. H.I. Jones and Son Limited, Booksellers," *WH*, 24 January 1905, 3. For naturalist columns see for example, "The Naturalist. Animals that Laugh and Cry," *OW*, 13 September 1884, 28; Colonus [pseud.], "The Contributor," *OW*, 9 September 1887, 37.

[18] "Agricultural," *WN*, 18 February 1871, 20.

> Mrs Jellaby […] was a long-necked and scraggy person, always untidy, always in a hurry, generally in the clouds, so that unless she was especially looked after and roused from her dreams she would come off badly when the daily scrimmage for worms was going on. […] Miss Miggs was remarkable for one thing – a great partiality for boots […] Whether it was that she liked the taste of blacking, or that she could see herself reflected in the boots, I do not know. One of these two reasons must have had something to do with it, I think, for canvas shoes had no charm for her.[19]

Such descriptions were influenced by the personification of animals in modern folk fables such as *The Story of Chicken-Licken*, which as a genre engaged the moral object lesson conventions of natural history.[20] However, Saunders, who advanced evolutionary perspectives, also incorporated observations of personality, describing the Langshan breed for example, as intelligent and sociable:

> […] langshans are not mischievous [...] and naturally roam [...] but they are of a contented, sociable disposition, and seldom use their wings or scratch much with their feet. They are the most intelligent of fowls, attach themselves to the feeder, and will follow him to a great distance, or sit down by him for hours together.[21]

In the *Bay of Plenty Times* in 1894 another breeder likewise recommended the Brown Leghorn as being particularly good at foraging and adapting to

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[19] Julia Huxley, "Humours of a Henhouse," *AS*, 8 March 1890, 3.

[20] Versions of this story, alternatively titled *Chicken-Little* or *Henny-Penny, are* in the NZLC date from 1895. Variations of this tale in Europe and England existed in the nineteenth century. See James Orchard Halliwell-Phillipps, *The Story of Chicken-Licken*, Popular Rhymes and Nursery Tales: A Sequel to the Nursery Rhymes of England (London: J. R. Smith, 1849). On nature as parable within the history of biology see Alexander and Numbers, *Biology and Ideology from Descartes to Dawkins*: 17-23.

[21] Saunders, *Our Domestic Birds: A Practical Poultry Book for England and New Zealand*: 55.

environments, and urged more attention to the intelligence of breeds for economic reasons.[22]

The notion of birds possessing, or lacking, a sense of morality and duty was also discernible. Saunders stated, for example, that:

> […] excessively large fowls of any breed are almost invariably bad layers, sitters and nurses. The very habits that have caused them to grow so large are antagonistic to all domestic virtues. They must have been greedy feeders, late layers, and little prone to sacrifice themselves in any way for the good of those around them.[23]

Like humans, chickens were judged to have negative personality traits, to be 'greedy' or 'lazy' according to their ability to serve the utilitarian purposes for which God (or nature) had designed them. The notion of animals inheriting bad behaviour was also found within naturalist discourse. For example, an *Otago Witness* column in 1898 titled 'Animals as Liars' discussed the 'lying' and 'thieving' of geese as inherited habits.[24]

Around the turn of the century it was thought that thieves and other criminals passed their dishonest dispositions to their offspring, an idea informed by theories of personality inheritance and French naturalist, Jean-Baptiste Lamarck's pre-Darwinian theory of 'acquired characteristics'. As Carlile discussed in his exploration of animal personality, ideas about inherited personality circulated in the second half of the nineteenth century within the work of Francis Galton (1822-1911), Darwin's cousin and, in 1883, the originator of the term eugenics.[25] Galton was inspired by Darwin's livestock studies and

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[22] "Brown Leghorns," *BOPT*, 23 February 1894, 2.

[23] Saunders, *Our Domestic Birds: A Practical Poultry Book for England and New Zealand*: 56.

[24] "The Naturalist. Animals as Liars," *OW*, 30 June 1898, 43.

[25] Carlile, "Animal Intelligence," 349-354. Galton's key works related to inherited personality were: Francis Galton, "Hereditary Talent and Character," *Macmillan's Magazine* 12, (1865); Francis Galton, *Hereditary Genius. An Inquiry into its Laws and Consequences* (London: Macmillan,

had published on the social, mental (and physical) traits in domesticated horses and cattle.[26] Debate about the 'inheritance of acquired characteristics', a term which encompassed both psychological and physical traits, continued within New Zealand newspapers into the 1940s as the mechanisms of heredity were explored by scientists.[27]

Darwin's work on comparative psychology was most famously continued by his younger colleague Georges Romanes, whose publications throughout the 1880s and 1890s included *Animal Intelligence* (1882), *Mental Evolution in Animals, with a Posthumous Essay on Instinct by Charles Darwin* (1883) and *Mental Evolution in Man* (1888).[28] Romanes' work was influential and accessible.[29] Publications and lectures were reported frequently and in detail within New Zealand newspapers in the late nineteenth century.[30]

1869). On this and Lamarck, see also Diane B. Paul and James Moore, "The Darwinian Context: Evolution and Inheritance," in *The Oxford Handbook of the History of Eugenics*, ed. Alison Bashford and Philippa Levine (Oxford: Oxford University Press, 2010), 28-29.

[26] M. G. Bulmer, *Francis Galton: Pioneer of Heredity and Biometry* (Baltimore: Johns Hopkins University Press, 2003). 147-153.

[27] On inherited personality theory, see C. W. Saleeby, *Heredity*, Jack's Scientific Series (London: T.C. & E.C. Jack, 1905). 115. On the inheritance of criminal dispositions see Hasian, *The Rhetoric of Eugenics in Anglo-American Thought*: 5. For public refutation of the theory of inherited acquired characteristics in the 1940s, see for example, "Heredity's Mysteries," *NZH*, 19 April 1941, 2; S. Coombes, "Shyness and Environment," *AS*, 23 March 1944, 4.

[28] G.J. Romanes, *Animal Intelligence* (London: Kegan Paul, Trench & Co., 1882); G.J. Romanes, *Mental Evolution in Man: Origin of Human Faculty* (London: Kegan Paul, Trench & Co., 1888); George John Romanes and Charles Darwin, *Mental Evolution in Animals. With a Posthumous Essay on Instinct by Charles Darwin* (London: Kegan Paul, Trench & Co., 1883).

[29] Carlile, "Animal Intelligence," 349.

[30] See for example, "Literature, Music and the Drama," *NZH*, 15 November 1884, 4; "Obituary," *Press*, 26 May 1894, 7.

Romanes acknowledged that animals possessed language in terms of tones and gestures that suggested intentional communication of feelings and ideas.[31] But he also promoted the idea, which Purnell and others in the international scientific community debated, that many animal habitual actions, such as bird nest-building, incubation and scratching, were instinctive.[32] Within an Institute lecture Purnell highlighted a number of researchers working with chickens, hens and other birds who supported the view that many apparent 'instincts' can be understood as learnt behaviour or inter-generational habits and cultural traditions, similar to those of human society.[33]

Debate about language and reasoning, instincts and learning were central to turn-of-the-century discussion of animal intelligence, and was evident within poultry-keeping discourse. As a newspaper columnist in 1884 maintained, chicken vocalisations were undeniable evidence of emotional experience: 'It may not be interesting to the utilitarian to notice the habits of a hen. [But their cries and noises] if they have no other meaning […] certainly express the feelings of the animals at the time'.[34] Considering hen language, a commercial breeder in 1901 noted: 'Every sound we hear among poultry seems appropriate, and there is, probably, no redundancy of speech'.[35] Saunders attended to instinct and learning, noting for example that: 'At first the chickens' food must be placed within reach of the hen, so that she can call them to it, as instinct teaches them to look to her for directions as to what they should eat' and that

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[31] "Science. The Genesis of the Human Mind," *WT*, 15 August 1885, 6; "Science. Darwin on Instinct," *WT*, 24 May 1884, 2.

[32] "Animal Intelligence," *ODT*, 19 November 1878, 5. Purnell acknowledged for example, Douglas Spalding's research into young chicks scratching and pecking for food that demonstrated that it occurred instinctively without instruction, but also other studies demonstrating that chickens gain 'wisdom' through being taught. See Purnell, "True Instincts of Animals," 28-36. See also Purnell, *The Intelligence of Animals*: 49-101.

[33] Purnell, "True Instincts of Animals," 27-36.

[34] "Habits of Poultry," *AWN*, 14 June 1884, 5.

[35] "Poultry Notes," *AWN*, 17 May 1901, 42.

'you can teach a hen to be tame and docile, but you cannot teach her to be courageous and vigilant, and therefore it is best to rely on these breeds that possess the qualities you cannot give by education, and then to educate them carefully'.[36]

Debate about instincts challenged the subjective interpretation of behaviour of Darwinian approaches. Purnell defended subjectivity in his talks and publication on the basis that:

> All our ideas about the animal mind and the animal's actions are anthropomorphic, for the simple reason that it is beyond our power in the present state of our knowledge to summon up ideas of any other nature. We even clothe our fellow-men with our own individuality. None of us knows any other human being exactly as that human being is.[37]

However, the new demands for objectivity contributed to tentative interpretations by some poultry experts and qualification of subjective statements, as in this columnist's observations in 1887:

> Our domestic fowls go to their dust bath with eagerness, and it makes them *"feel good"* or prevents them from feeling bad, *for to all appearances* they enjoy it exceedingly […] They *seem* also to take a positive pleasure while wallowing among clean dirt.[38][italics added]

Despite the qualifications here, the notion of inner emotional experience was not dismissed. Dust-baths were judged to be good for the birds, both physically

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[36] Saunders, *Our Domestic Birds: A Practical Poultry Book for England and New Zealand*: 126-127, 133.

[37] Purnell, "A Comparison Between the Animal Mind and the Human Mind," 73. See also Purnell, *The Intelligence of Animals*: 11-12.

[38] "Poultry. That Important Dust Bath," *WT (Supplement)*, 15 October 1887, n.p.

(to rid them of lice), and psychologically. Similarly, nature study accounts of hens in newspapers, reflected sensitivity to accusations of anthropomorphism, but an insistent, and at times defiant, defence of the emotional lives of their backyard birds.[39]

Twentieth-Century Chicken Psychology

As discussed in the introduction to this thesis, efforts to convey naturalist-orientated, general biology perspectives around the turn of the century (as we have seen in school and popular biology), emerged in response to reductionist, mechanistic approaches to biology between 1890 and 1915.[40] Comparative psychology at this stage was dominated by the study of physiological automatism with reflexes and instincts due to this latter dominant trend. However, while poultry experts evidently attended to debates, a sustained rejection of the notion of chickens as reflexive machines in twentieth century poultry press discourse was aided by the fact that breeder tradition was founded within the context of nineteenth-century evolutionary psychology. Attention to individual bird personalities was a mark of good husbandry. Assessment of a bird's 'bearing, attitude or style' was incorporated in Wright's turn-of-the-century breeding guide, which remained within the 1953 New Zealand Standards for utility breeders.[41]

Significant within turn-of-the-century comparative psychology was the work of British psychologist Lloyd Morgan, who conducted experiments with chicks, ducklings and moorhens raised in incubators. From this research he established what became known as 'Morgan's Law', which asserted that higher processes of

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[39] See for example, "The Nature Fakirs Again. The Emotions of Animals," *Star*, 23 October 1907, 3.

[40] Allen, *Life Science in the Twentieth Century*: xiv-xxii, 8-9.

[41] Wright, *The New Book of Poultry, with Forty-Five Plates in Colour and Black and White by J.W. Ludlow and the Poultry Club Standards of Perfection for the Various Breeds*: 239; Utility Poultry Standards Revision Committee, *New Zealand Utility Poultry Standards of Perfection and Breeding of Poultry* (Wellington: Department of Agriculture, 1953). 64.

human-like cognition or emotional experience should not be inferred in animals if lower processes (such as reflexes, instincts or trial-and-error learning), could account for behaviour.[42] This underpinned emerging behaviourist psychology with its emphasis on observable behaviour: Ivan Pavlov publicly released his research into the stimulus-response mechanisms of classical conditioning in 1903. [43]

Morgan's law fuelled the argument that instincts were the predominant mode of functioning in non-human animals and that assumed similarities to human experience were anthropomorphic. In an article entitled 'Study of Domestic Animals' in the *Otago Witness* in 1906, displays of affection shown by animals towards their human owners were described as the working of the animal's unconscious 'natural instinct to do the best for itself, because this will work through its descendants for the good of the race.' It also noted that 'it is only because we insist upon looking at the actions of animals from the human point of view that such conduct appears to transcend the limits of mere animal instincts.'[44]

Battling perspectives on instinct as the dividing line between 'man and beast' were evident in the turn-of-the-century poultry press, as the following extract from the *Auckland Weekly News* in 1901 illustrates:

> Who has seen a dozen hens at large in garden time, with freshly-raked garden beds nearby, and not learned what the

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[42] C. L. Morgan, *An Introduction to Comparative Psychology*, 2nd ed. (London: W. Scott, 1903). 59; S. Allen-Hermanson, "Morgan's Canon Revisited," *Philosophy of Science* 72, no. 4, (2005): 608-631.

[43] Daniel Philip Todes, *Pavlov's Physiology Factory* (Baltimore: John Hopkins University Press, 2002). 232. Purnell was fired up about these ideas. See Charles W. Purnell, "Animal Rights," *Press*, 22 February 1904, 7.

[44] E. Kay Robinson, "Study of Domestic Animals," *OW*, 24 January 1906, 76. For similar commentary, see American naturalist John Burrough's argument against the idea that animals teach their young and the unscientific 'sentimentality' of nature study being taught in schools cited in "Topics of the Day. Animals at School," *Press*, 9 May 1904, 6.

> predominating instinct of the animal is? Philosophers have tried to define man as a cooking animal, a tool-making or a laughing animal – there need be no doubt whatever that a hen is a scratching animal. We believe that a scratching place should be provided winter and summer for fowls. It not only keeps them in good condition, but the fun of seeing them work at it is worth more than all it costs.[45]

Scientific debate on instinct versus learning – nature versus nurture – was ongoing in the twentieth century, and poultry experts were attuned to this. Behaviourist Edward Thorndike, in *Animal Intelligence: An Experimental Study of the Associative Processes in Animals* (1911) argued that all animals learn in the same incremental manner. The poultry columns of the *Star* and the *Otago Witness* reported prior to this in 1903 that Thorndike's experiments with baby chicks had found there was no set instinctive response to a range of strange objects and sounds, which supported farmers' observations that hens teach their chicks.[46]

Poultry columnists also responded to stories of headless roosters during this period which appealed to the popular fascination with mechanistic notions that the 'lower animals' functioned by instinct and reflex. *The Northern Luminary*, for example, reported in 1907 on an American headless rooster, decapitated and no longer crowing, but still alive and being fed, though 'foolish' due to its inability to see. It explained that birds' movements 'are largely controlled by nerve centres in other parts of the body beside the brain […] Experiments made in the medical schools […] show that birds can fly and live without a brain.' Such reports did not convey any sense of reduced bird experience or disability, but

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[45] "Poultry Notes," *AWN*, 17 May 1901, 42.

[46] Terror [pseud.], "Poultry Notes," *OW*, 16 December 1903, 49; "The Poultry Yard," *Star*, 22 October 1903, 1.

reinforced notions of reflexive 'bird-brains'.[47] In an attempt to nuance such interpretations, the poultry column of the *Taranaki Herald* that year reported a veterinary surgeon's view that the 'finer senses' (implying sensory and perhaps emotional processing), would be impaired in a decapitated chicken.[48] School pupils learnt through John Arthur Thomson's *Study of Animal Life* that only insects were truly instinctual, and that larger-brained animals, including birds, were more complex and learnt by experience.[49] However, contradictory scientific reports on the intelligence of animals being determined by brain size, which reinforced notions of human exceptionalism, did not assist the chicken's cause.[50]

Within this early mechanistic period, when ideas about bird intelligence and sensitivity were vigorously debated, ideas about animal cruelty were also in a state of flux. King became embroiled in debate about this at the turn of the century when his machine-cramming methods for fattening table birds, which involved tube-feeding roosters a milky porridge through a pedal-operated mechanism, were criticised in local newspapers. In 1902 he admitted to previous experimentation with this, but denied that it was cruel.[51] It was

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[47] "The Headless Rooster," *NL*, 2 February 1907, 2. See also "The Duck's Brain," *AS*, 23 May 1891, 3.

[48] Brooder [pseud.], "Poultry Notes. Headless Rooster Lives," *TARH*, 3 April 1907, 8.

[49] Thomson, *The Study of Animal Life*: 170-171.

[50] Sir Ray Lankester, "Science From an Easy Chair," *Press*, 5 April 1913, 9. For recent research into chicken intelligence see Giorgio Vallortigara, "The Cognitive Chicken: Visual and Spacial Cognition in the Non-Mammalian," in *The Oxford Handbook of Comparative Cognition*, ed. Thomas R. Zentall and Edward A. Wasserman, *Oxford Library of Psychology* (Oxford: Oxford University Press, 2012), 48-66.

[51] Terror [pseud.], "Poultry Farming at Seacliff Asylum," *OW*, 25 August 1898, 43; F. Truby King, "Poultry Feeding at Seacliff," *OW*, 22 December 1898, 15; Terror [pseud.], "Poultry Notes," *OW*, 23 February 1899, 39; "Poultry Breeding," *TT*, 26 April 1902, 4. On the changing ethical environment for medical researchers during King's medical training, see Stewart Richards, "Conan Doyle's 'Challenger' Unchampioned: William Rutherford, F.R.S. (1839-99), and the

certainly less cruel than darkened coop fattening, or non-anaesthetised surgical caponising which some were practising prior to WWI despite views that this was inhumane.[52] Neither Hyde nor Brown recommended caponising in their official booklets,[53] but Brown was an enthusiastic advocate for cramming in this period as he had prepared the country's first export of 300 table birds from Seacliff.[54]

Figure 13. Brown demonstrating 'forced feeding' at the NZPA conference, 1910.[55]

King's treatment of lower animals may be considered in light of approaches to 'lower humans' at this time. Contemporaneously, King's inmates at Seacliff

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Origins of Practical Physiology in Britain," *Notes and Records of the Royal Society of London* 40, no. 2, (1986): 199-205.

[52] Henderson, *Poultry and Eggs for Market and Export*: 17; "Advertisement. Caponizing Instruments from America," *NZPJ*, 20 October 1913, 9. On the inhumanity of surgical methods see Saunders, *Our Domestic Birds: A Practical Poultry Book for England and New Zealand*: 155-156.

[53] Hyde and McNab, *Poultry and Eggs for Market and Export* 40; Brown, *Bulletin No. 13. Poultry and Eggs for Market and Export*: 19; Brown, *Bulletin No. 066. Utility Poultry-Keeping*: 33.

[54] Merrett, "Leaders in Colonial Poultry Culture. No. 3. Mr Fred. C. Brown, The N.Z. Government Assistant Chief Poultry Expert," 27.

[55] J.B. Merrett, "Visit of the Conference Delegates to Mr.W. Knight's Poultry Farm, Lower Hutt," *NZPJ*, 20 November 1910, 14.

hospital were force-fed through tubes when unwell and rejecting food.[56] King was attuned to comparative psychology. He owned the well-known psychiatry text, *Clinical Lectures on Mental Diseases* (1892) by his Edinburgh mentor, Thomas Clouston, which referred to Romanes. King's underlined passages included reference to the physiological and evolutionary basis of psychological functioning.[57] His views on psychology however were often focussed on instincts: he lectured on the self-sacrificing parental and clan instincts of all animals.[58] We know that he paid attention to the psychological effects of diet on his patients,[59] and would have considered, as most other animal breeders of this period did, that this applied equally to non-human animals.[60]

Ideas about maternal instincts, reinforced in the New Zealand context by educators such as King, contributed to a preserved role for the broody hen on family farms and resistance to the use of artificial mothers. As noted in chapter one, broodiness was recognised as a natural desire and turn-of-the-century

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[56] Charles Stuart Moore, Typescript Chapters and Notes Relating to the History of Seacliff and Cherry Farm Hospitals, December 1895. MS-3181/001, (Hocken).

[57] F. Truby King, Annotated copy of *Clinical Lectures on Mental Diseases* (Clouston, 3rd ed., 1892), MSX-5242, (ATL); Allan Beveridge, "Clouston, Sir Thomas Smith, 1840–1915," *Oxford Dictionary of National Biography* (Oxford University Press, 2004), http://www.oxforddnb.com/templates/article.jsp?articleid=38634&back=. On Clouston's influence on King see W. Brunton, "The Scottish Influence on New Zealand Psychiatry before World War II," *Immigrants & Minorities* 29, (2011): 308-342.

[58] See for example, "The Gift of Life. An Interesting Discourse. Lecture by Sir Truby King," *AS*, 2 October 1926.

[59] Stock and Brickell, "Nature's Good for You: Sir Truby King, Seacliff Asylum, and the Greening of Healthcare in New Zealand, 1889–1922," 107-114.

[60] This was less-often articulated in the twentieth century but in a health column in 1890 for instance, it had been observed that food influenced the temperament, moods, and dispositions of animals.' It noted that horse and greyhound owners understood how food could influence not only performance, but animal character, and that ancient medics knew that 'diet alone make a man mild or vicious, calm or irritable'. See "Health Column. Nurture," *OW*, 30 January 1890, 43.

advice books encouraged poultry-keepers to permit hens to raise at least one brood a year as it was thought to be good for the hen.[61] An account of an American poultry-woman in the *NZPJ* in 1913 debating the merits of mechanical brooders reflected the belief that it was unfair to deprive the hen of her motherly role and the chicks from being parented.[62]

Similarly, ideas about the male aggressive instincts informed the selection of roosters. The editorial of the *NZPJ* in 1924 for example, advising on the selection of breeding roosters based on male behavioural traits, proclaimed: 'The "fighting instinct" does the work among wild creatures which the eye and experience of the breeder does among domestic animals. So if you have not the experience, you can safely let Nature's fighting method cull out the weaklings from among your male birds.'[63] Cockfighting had established a tradition of male identification with roosters within breeder lore, and the notion of the fighting instinct had been reinforced by Darwin's account of Tegetmeier's observations of roosters.[64] Game roosters were described within nineteenth-century breed guides as the 'undisputed king of all poultry', whose tail should be 'carried erect to show good spirit', for it was the 'fighting qualities', the indications of a 'bold and fearless spirit', that were judged, and these descriptions were retained in turn-of-the-century guides.[65] Projections of masculine ideals, combined with evolutionary ideas about 'fighting animals'

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[61] See for example, Murphy, *Gardening for New Zealand with Chapters on Poultry and Bee-Keeping*: 234.

[62] P.J. Inland, "A Visit to a Room Brooder. An American View," *NZPJ*, 20 November 1913, 17-19.

[63] W. Hicks, "Choice of the Breeding Male," *NZPJ*, 20 May 1924, 1.

[64] The projection of male qualities onto roosters has been sustained historically and cross-culturally. See Fred Hawley, "The Moral and Conceptual Universe of Cockfighters: Symbolism and Rationalization," *Society & Animals* 1, no. 2, (1993): 161-165. On Darwin see Charles Darwin, *The Descent of Man and Selection in Relation to Sex*, vol. 2 (London: John Murray, 1871). 192-193.

[65] Breed descriptions in New Zealand books were often drawn from Wright's *Book of Poultry*. For this particular description, see Allen, "Poultry," 410-425.

preserved the tendency to describe Game, and rooster psychology generally, in gladiatorial terms.[66]

Whereas some turn-of-the-century description reflected the debate and doubt thrown on chicken consciousness, by the 1920s both fancy and utility breeders frequently emphasised the importance of psychological health to overall bird health, downplaying mechanistic approaches. Merrett asserted for instance in 1925 that: 'You cannot keep poultry by pulling strings and automatic devices. There must be an affinity between the keeper and his birds.'[67] Similarly, in an advice column on rearing chicks in the *NZPJ* in 1920, farmers were reminded that chicks, like 'other frisky young creatures', like to play. Farmers were therefore advised to keep the brooder warm enough so that chicks can warm up quickly, because if this is done:

> […] you will seldom find them under the hover in the day time. They run in out of the cold to warm up a bit, and then run out again to scratch in the litter or play with their mates. Like all young things, healthy chicks are playful […] if you doubt this, watch a flock of brooder chicks running with a bit of wood or other non-edible substance, watch them jump about and flap their tiny wings, and race in and out of the brooder in the sheer joy of a happy existence.[68]

In the *NZPJ* in 1926, Australian expert Bert Mitchell advocated close observation and flexibility to the birds' feeding patterns rather than standardised feeding because:

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[66] On tough and militant ideals of masculinity see Jock Phillips, *A Man's Country? The Image of the Pakeha Male - A History* (Auckland: Penguin Books, 1987). 99-101,134-158. On 'fighting animals' see also Paul Crook, *Darwinism, War and History* (Cambridge: Cambridge University Press, 1994). 130-152.

[67] J.B. Merrett, "How to Keep Poultry for Profit. Suggestions for Beginners: How to Avoid the Pitfalls. The Way to Success," *NZPJ*, 20 October 1925, 19.

[68] "Successful Chick Growing," *NZPJ*, 20 September 1920, 18.

> The bird that is fed by the daily pint measure will never be the good layer because, like humans, the layer has her likes and dislikes […] The layer should be fed liberally and at all times fed a variety [and if] it is noticed that the birds go three or so days without relishing their food, then give them greater variety [a healthy bird should show] the activeness that denotes contentment.[69]

Mitchell did not explain the chickens' likes and dislikes in terms of possible imbalances in nutrient intake but observed his birds 'relishing' their food and exhibiting 'contentment'.[70] Contemporary ideas about satiety as a basic instinctive pleasure, about instincts for what the body needs, and research into nutritious food influencing brain physiology and enjoyment affirmed this approach.[71]

Assumptions of interiority were a persistent element of advice. On the issue of dust-baths again in the *NZPJ* in 1942 it was stressed that these were required, regardless of the use of insect powders that removed the physical need.

> No one who has seen a batch of them wallowing in some hollow of dry earth, throwing up clouds of dust in obvious enjoyment, can doubt that this is so […] the exercise and "something to do" must be all to the good, while you may be sure that any birds indulging in this pastime are contented and healthy.[72]

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[69] Bert Mitchell, "Good Feeding," *NZPJ*, 20 July 1926, 4.

[70] See also Orpington [pseud.], "Poultry Keeping," *AS*, 6 October 1933, 12.

[71] "Medicine as Practised by Animals," *OW*, 19 May 1883, 27; Aaron Gillette, *Eugenics and the Nature-Nurture Debate in the Twentieth Century* (New York: Palgrave Macmillan, 2007). 42-45; Kete, "Introduction: Animals and Human Empire," 9. See also ideas about races being effected by food in King, "Annotated copy of 'Clinical Lectures on Mental Diseases' (Clouston, 3rd ed., 1892), MSX-5242," 3.

[72] "Backyard Dust Baths," *NZPW* 5, no. 11, (1942): 5.

Likewise, British breeder Tom Knowles emphasised in 1956 that the '[o]ne great drawback to any kind of mechanical routine management is that the hen herself is not mechanical and is subject to moods and temperamental changes like other living creatures.'[73]

School and popular biology texts throughout the period affirmed attention to chickens as emotional creatures. Thomson's *Study of Animal Life* acknowledged debates about animal intelligence and, while hesitant in ascribing advanced cognition to birds, Thomson asserted that they 'feel more if they think less.' Before illustrating his point with accounts of ducks, geese, pheasants and pigeons, he added: 'They love much and joyously' and their 'spirit is more full than in any other creature', appealing to sustained notions of the animal soul. Thomson's later international best-seller, *The Outline of Biology* (1922) and its subsequent editions were also popular.[74] His theory of consciousness in simple life forms ('psychobiology') was discussed by teachers when the incorporation of evolutionary biology in the syllabus was being debated around 1930.[75]

Similar views were propounded by the British evolutionary biologist-ethologist Julian Huxley, who was known through WWI-era nature study texts and

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[73] Tom Knowles, "You Can't Treat Your Birds Like Laying Machines," *NZPW* 21, no. 5, (1956): 199.

[74] "When a Month was a Day," *EP*, 8 April 1922, 16; "Y.M.C.A. Notes," *Hutt News*, 11 March 1942, 5.

[75] Thomson, *The Study of Animal Life*: 179, 287-289; Thomson and Geddes, *Life: Outlines of General Biology*: 406-408. On psychobiology see Stuckney, "The Spirit of the New Syllabus," 153. On these ideas within contemporary comparative psychology see Margaret Floy Washburn, *The Animal Mind: A Textbook of Comparative Psychology* (New York: MacMillan Co., 1923). 38-52. On turn of the century cellular consciousness theory see Michael Foster, "Physiology," in *Encyclopaedia Britannica* (New York: Scribner's & Sons, 1885), 20; Reynolds, "Amoebae as Exemplary Cells: The Protean Nature of an Elementary Organism," 323-324.

particularly popular between the 1920s and 1950s.[76] In his *Essays of a Biologist* (1923) he rejected Morgan's Law, asserting that 'It is the foolish biologist who denies emotion and confines analysis to behaviour alone.'[77] Omitting categories of perceived phenomena from consideration was, he argued, unscientific. He also asserted that while birds have less reasoning ability, they exhibit greater emotional expression than mammals. He observed human-like behaviours such as jealousy and play, and held that even inherited instinctual behaviours were accompanied by emotion.[78] However, he distinguished between observing comparative psychological states and misinformed anthropomorphic projection. In naturalist Frances Pitt's popular study, *The Intelligence of Animals* (1931), Huxley's warning to school educators was cited:

> It seems to me that there is, perhaps, more popular misapprehension on the subject of animal behaviour than on any other biological subject. You usually either find the idea that animals are a simple type of reflex machine, or more usually the idea that they are little human beings with just the same thoughts and emotions as ourselves, which they are, for some reason, unable to express. Both these attitudes are completely wrong, and lead into serious error.[79]

The assertions of ethologists such as Huxley that animal behaviour was determined by naturally-selected inherited traits reinforced ideas about

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[76] Huxley's research into grebes is discussed in Thomson, *The Study of Animal Life*: 111. On Huxley's later research, books and films see for example, "Politeness in Flies," *EG*, 5 June 1925, 5; "Books Received," *AS*, 15 November 1930, 2; "Film on Nutrition," *NZH*, 11 November 1937, 19.

[77] Julian Huxley, *Essays of a Biologist* (London: Chatto & Windus, 1923). 107.

[78] Ibid., 103-128. On Huxley's ideas about inherited behavior see Erika Lorraine Milam, "Beauty and the Beast? Conceptualizing Sex in Evolutionary Narratives," in *Biology and Ideology from Descartes to Dawkins*, ed. Denis Alexander and Ronald Numbers (Chicago: University of Chicago Press, 2010), 290-291.

[79] Professor Julian Huxley in an address to Britain's School Nature Union, 1930, cited in Frances Pitt, *The Intelligence of Animals* (London: George Allen & Unwin Ltd., 1931). 5.

innately good and bad personality, echoing the older notion of animal morality and eugenic ideas about 'born criminals'. In a New Zealand naturalist column entitled 'Animal Criminals' in 1926, for example, readers were reminded that:

> […] numerous naturalists, from Linnaeus down, have left on record the effects of various emotions as seen in the actions of animals. Hate, fear, rage, and jealousy play a major part in the animal society, just as they do among humans.[80]

Despite the focus on animal emotion within popular discourse, there was an overall decline in apprehension of animal emotional and cognitive intelligence in the 1930s according to commentators in the mainstream press. A contributor to the *Evening Post* in 1932 observed the sustained interest in Darwin's theories of evolution and heredity, but commented that: 'we have fallen for the time being rather below Darwin's insight in our relative failure to appreciate the psychical factor in animal evolution, the degree of mental awareness shown in animals'.[81] Likewise, the *Auckland Star* in 1935 observed that in regard to humans and other animals 'the mind is hardly mentioned in new scientific manuals.'[82] Discussing the issue of reduced appreciation for animal intelligence generally, and citing the German educational psychologist Dr David Katz who reported a chicken 'language of nine words', the *NZPP* acknowledged in 1936 that industry had contributed to reduced appreciation of the hen's intellectual

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[80] "Animal Criminals," *EP*, 19 November 1926, 4. On evolutionary biologists see Gillette, *Eugenics and the Nature-Nurture Debate in the Twentieth Century*: 44. On inherited personality traits in animals see also for example, "Brains and Breeding," *EP*, 4 May 1923, 6.

[81] "Darwin To-Day," *EP*, 9 July 1932, 5.

[82] ACE [pseud.], "Materialism and Mind," *AS*, 8 October 1935, 14. As an example, Canterbury University's former Professor of Biology's textbook eschewed the topic. See Arthur Dendy, *Outlines of Evolutionary Biology* (London: Constable & Co. Ltd, 1938). 19.

capacity because she was now observed only in 'the mechanical job of laying eggs.'[83]

From the late 1930s and into the post-war decades comparative psychology was dominated by radical behaviourism, led by its chief proponent B.F. Skinner, whose professionally-influential early work was *The Behavior of Organisms* (1938).[84] Skinner sought to restore a balance to what he regarded as an overemphasis on 'mentalism' (the 'philosophical' tradition of investigating thought and emotions). He denied the existence of autonomous thought or emotion, asserting that all animal behaviour is environmentally-determined through operant conditioning. Within this framework, animal models were key – experiments with pigeons underpinned Skinner's human behavioural theories.[85] Due to this resurgent reductionist ethos, accounts of headless roosters again caught the popular imagination. The most famous internationally, during the post-war era when home-kills were still common, was Miracle Mike, decapitated in 1947.[86]

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[83] "Animal Intelligence," *NZPP* 2, no. 1, (1936): 17. Katz was drawing upon the research of Norwegian scientist, Schjelderup-Ebbe. See David Katz, "Animal Intelligence," *Journal of the Royal Society of Arts* 84, no. 4341, (1936): 300-301.

[84] B. F. Skinner, *The Behavior of Organisms: An Experimental Analysis* (New York: D. Appleton-Century Company Inc., 1938).

[85] The initial definition of behaviourist psychology included 'attention to a unitary scheme of animal response … [recognising] no dividing line between man and brute', see J. B. Watson, "Psychology as the Behaviorist Views It," *Psychological Review* 20 (1913): 158. On Skinner see Sohan Modgill and Celia Modgil, eds., *B.F Skinner. Consensus and Controversy* (New York: Falmer Press, 1987), 48-59.

[86] "Mike the Headless Chicken," Wikipedia, accessed 17 July 2013, http://en.wikipedia.org/wiki/Mike_the_Headless_Chicken.

Figure 14. Miracle Mike, the Wyandotte chicken
who lived for 18 months after having his head axed (with the brain stem left intact) on a Colorado farm in 1947.[87]

Behavioural chicken research was reported in the *NZPW* more frequently from this time, and parallels were made to human experience. The apparent novelty of this as a subject of serious scientific investigation for readers was evident when in 1948, the research of Texan-based behavioural psychologist, Dr A.M. Guhl, was introduced with a tone of amusement:

> Chicken characters, says Dr. Guhl, of Kansas state College, are "about like humans" and just as varied although simpler and more mechanical […] He isn't sure if chickens have emotions, but he won't say they don't […] I asked if chickens can talk […] being a conscientious scientist he wouldn't go so far as to give a flat "yes". But he has identified seven distinct sounds.[88]

The article then discussed hen 'pecking', which by this time was a significant issue within intensifying systems. Guhl identified the main reasons for pecking as competition, lack of space, and the introduction of new birds into the flock, observing that, like humans: 'The organized flock […] eats more, pecks less, and produces more. It establishes a balance between co-operation and competition.

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[87] Image courtesy of Wikimedia Commons.

[88] "Pecking," *NZPW* 11, no. 1, (1948): 4.

If we can learn anything from chickens, it may be that […] if you want production, you must have peace.'[89]

Another of Guhl's projects, reported in 1955, involved disguising chickens to test individual recognition. The reporter commented that, in respect to chicken intellect, 'we should not expect much'. However, Guhl's research concluded that: 'The frequency of contacts between individuals reinforced memory. Human memory and recognition follow the same laws.' In small flocks of eight to thirty pullets and hens, Guhl noted, habits of interaction were established between individuals, fighting ('bossism') became unnecessary, and they formed contented, and more productive, flocks. He found that abrupt changes in appearance, especially around the face and comb, resulted in recognition problems and 'social stress'.[90]

Another 1955 *NZPW* article entitled 'Some Vices of Poultry', again examined the issue of bullying and cannibalism. Although the article identified environmental causes and the problem of 'idleness' when birds had nowhere to scratch, the focus was on the 'bad habits' of problematic individuals:

> […] there are cases where an outbreak [of cannibalism] is started by a "killer" bird, and in consequence no remedy has the slightest effect, except that of searching out the ring-leader and removing the bird to a cage or the cooking pot.[91]

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[89] Ibid. See also A.M. Guhl, "The Development of Social Organization in the Domestic Fowl," *Animal Behaviour* 6, (1958): 92-111. On A.M. Guhl's contribution to 'understanding and controlling' the social behavior of chickens, see T. C. Byerly, "Changes in Animal Science," *Agricultural History* 50, no. 1, (1976): 272.

[90] "How Do Fowls Recognise Each Other?," *NZPW* 18, no. 3, (1955): 111, 113. See also A.M. Guhl and L.L. Ortman, "Visual Patterns in the Recognition of Individuals Among Chickens," *Condor* 55, (1953): 287-298.

[91] "Some Vices of Poultry," *NZPW* 18, no. 9, (1955): 390.

This returned to the notion of innately bad animals. Sustained popular ideas about innate personalities and debate over nature and nurture were evident in New Zealand media commentary related to the infamous Parker-Hulme murder of 1954, which was attributed to both 'bad stock', and bad parenting. Like the country's unfathomable murderous teenagers, the farmers' killer birds were considered beyond cure.[92]

Guhl acknowledged that his research aligned with sociobiological studies of human pecking orders and renewed behavioural studies of chickens and other animals commencing in the 1940s.[93] The horrors of WWII sparked this renewed interest in comparative psychology, which also manifest within post-war popular psychology and literature.[94] Discussion of pecking orders within the poultry press thus reflected contemporary sociobiological views. In the *NZPW* in 1949, young pullets and hens were compared with school children in an effort to discourage poultry-keepers from running birds of different ages together:

> […] running pullets and hens together is on a par with making infants in the primers and children from the senior standards play

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[92] On the murder and its sensationalist coverage at the time see Julie Glamuzina and Alison J. Laurie, *Parker & Hulme: A Lesbian View* (Auckland: New Women's Press, 1991). 38, 57-60. On eugenic ideas about the nature-nurture debate in the 1950s explored with animal experiments see for example, John L. Fuller, "Heredity and Learning Ability in Infrahuman Mammals," *Eugenics Quarterly* 1, no. 1, (1954): 28-43.

[93] A.M. Guhl, "Reflections by an Animal Behaviorist," *Transactions of the Kansas Academy of Science* 66, no. 2, (1963): 174-175. Sociobiology is the study of animal and human social behavior, considered in evolutionary, biological terms. The first recorded use of the term was in 1946. See "Sociobiology," Oxford English Dictionary, accessed 12 August 2014, http://tinyurl.com/qhr6maa.

[94] Milam, "Beauty and the Beast? Conceptualizing Sex in Evolutionary Narratives," 287-288. In popular psychology see for example, Wilfred Trotter, *Instincts of the Herd in Peace and War*, 3rd ed. (London: Ernest Benn, 1947). In popular fiction: William Golding, *Lord of the Flies* (New York: Perigee, 1954).

> together in the same school ground. Hens are like children in that some feel they must exercise their superior size and strength; others will even come to knocks and blows, and a few will behave like outlaws and savages. The weaker and timid birds are bullied by all. Only the strongest – not necessarily the largest – are free from bullying.[95]

While group behaviour was a focus for scientists like Guhl, the effects of psychological isolation were also studied as comparative behavioural psychologists from the 1940s working with caged laboratory animals observed psychological effects and related this to human urban experience.[96] However, when the SPCA mounted a campaign in 1954, opposing the confinement of birds, which at the time were caged singly for one to two years in 2 x 1 foot cages,[97] the *NZPW* conveyed the opinion that: 'Objections […] come from well-meaning but inexperienced people who […]have no knowledge of poultry. Their criticism is based on standards of comfort required for other animals, and, perhaps, their own feelings as to what constitutes a comfortable environment.' The official noted that 'well-fed layers in cages are obviously contented and quiet' because – again employing analogies with the schoolyard and wild tribes – 'there is no bullying or cannibalism.'[98] This statement exemplifies the cognitive dissonance remarked on by Ritvo in respect to nineteenth-century farming perspectives. The positive attitude to silence in the chicken workplace

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[95] W. L. McIver, "Household Poultry," *NZPW* 12, no. 3, (1949): 86. On continued comparisons between human and chicken pecking orders in the 1950s, see for example, L.G. Bedford, "Securing Maximum Efficiency from Shed Space," *NZPW* 21, no. 1, (1958): 12.

[96] E. Ramsden, "Model Organisms and Model Environments: A Rodent Laboratory in Science, Medicine and Society," *Medical History* 55, no. 3, (2011): 366.

[97] On the SPCA campaign see Thornburrow, *An Introduction to the History of the Royal New Zealand Society for the Prevention of Cruelty to Animals*: 51; "Hen Battery System Opposed," *EP*, 25 November 1954, 7.

[98] "Battery Laying Cages. S.P.C.A. Members Active in Opposing Method," *NZPW* 17, no. 4, (1954): 111.

also marked a shift from earlier breeder advice which equated chicken chirps, clucks and 'singing', usually accompanied by active scratching, with health and contentment.[99]

Conclusion

This chapter, along with the discussion of previous chapters, illustrates that daily interactions with birds influenced views on the chicken mind, as did theological and humanitarian ideas that were entwined with evolutionary psychology. It is evident that views varied between breeders, and, as chapter one's accounts of SPCA records reveal, between farmers. However, it is also evident that general trends in psychology were important. From the late nineteenth century, evolutionary psychology moulded the traditional views of fanciers and everyday poultry-keepers. In the twentieth century, a continual negotiation between new scientific perspectives, and the affirmation of bird interiority within traditional and popular viewpoints, was evident. Overall, the poultry press did not reflect experts' adherence to the notion of chickens as reflexive machines, but a sustained rejection of this idea. Even in the 1950s, while some influential industry leaders were reflecting reductionist behaviourist perspectives, leaders had mixed views. Reports of the research of professional psychologists throughout the period affirmed the comparison of chickens and humans, even if only on a fundamental or instinctual level.

The poultry industry was established within the context of a trend towards mechanistic, physiologically-based psychology and the assertion within professional science of Morgan's Law, which reinforced a conception of chickens as creatures of neuronal reflex and instinct. However, it also coincided with the resurgence of naturalist-orientated general biology within schools and popular biology. Industry commentary of the pre-WWI period was

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[99] See for example, "Visits to Poultry Farms," *NZPJ*, 20 October 1919, 24; The Wanderer [pseud.], "Show News and Notes," *NZPW*, (1941): 14.

characterised by a focus on instinct and cautious but sustained assertions of bird emotion, reinforced by breeder emphasis on the care of feathered friends.

Evolutionary biologists such as Thomson, who was influential in schools, and Huxley, who was also popularly known, did acknowledge bird emotion, if not advanced intelligence. During the interwar period farmer description more confidently aligned with the views of these field biologists who legitimated attention to chicken interiority and the refutation of extreme mechanistic perspectives. Evolutionary perspectives on emotion sustained ideas about innate bird personalities.

Experimental behaviourist psychology reinforced the comparison of human and bird behaviour. Edward Thorndike's general learning theory was an early example noted within poultry columns. However, in terms of the *degree* of similarity implied within comparison, the ascendency of behavioural science generally contributed to a conception of chickens as cognitively simpler machines. During the heyday of behaviourism in the 1940s and 1950s poultry experts continued to urge attention to psychological needs, although social behaviour became the primary focus. According to Guhl, who was attuned to sociobiology and emphasised common chicken-human experience, behaviourist studies of human and chicken pecking orders coincided from the 1940s. His reports in the *NZPW* compared the social behaviour of humans and birds as they attempted to address the problems of flock aggression within intensive systems. Guhl's studies of chicken memory in respect to social behaviour in the 1950s noted that human cognition observed the same laws.

Popularly-prevalent sociobiology ideas were appealed to in journal advice on how to prevent bullying. Echoes of traditional notions of innately and morally bad animals resurfaced in discussions of problematic killer birds, reflecting sustained eugenic ideas and nature-nurture debates. As noted in chapter one, intensification and the use of cages altered perceptions of chicken psychology. Critics of caged systems compared the fundamental needs of chickens and

human animals, but were dismissed by industry defenders who were focussed on problem behaviour that they themselves described anthropomorphically as bullying and cannibalism. Their response to criticism reflects an adoption of behaviourist ideas about chickens as simpler creatures, and a sustained tendency to compare chicken and human psychology at a fundamental level, but only in regard to negative behaviour.

Chapter Four

Chicken-Workers

> The business world of today is kept going by workers […] and the same may be said of poultry. It is the bird that works and produces that will pay the feed bills. The person who considers fine clothes and fancy dresses the main things to live for is useless in this world of ours, and the birds bred for fine feathers and to be shown only at the poultry shows will never […] be made to pay.
>
> *NZPJ*, 1921.[1]

A wide range of references to chicken-workers pervaded the poultry press throughout the period under study. These sometimes whimsical descriptions and images assisted the rationalisation of industry but were reinforced by general biology. The first part of this chapter examines how notions of evolved workers and cooperation within nature's economy related to the burgeoning field of ecology, and to ideas from comparative psychology, and utilitarian, theological and humanitarian concepts. In the second part of this chapter, chicken-worker analogy is considered in respect to general physiology, ideas about the animal-machine and the science of work. The final section examining the chicken-worker in the factory farm reflects concern with maximising hen efficiency and debate about care and abuse.

Evolved and Useful Chicken-Worker Friends

Comparative psychology, as we have seen, supported the perception that fowls, like all animals, required occupation; that they had an instinct for work and became bored in confinement. Scratching for food was often discussed as the fowl's employment.[2] Theological perspectives had also traditionally encouraged the observation of animal industriousness as a model for human

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[1] "Visit to Auckland Egg-Laying Competition," *NZPJ*, 21 March 1921, 6.

[2] For an early example, see "Employment for Fowls," *WN*, 3 July 1875, 18.

productiveness.[3] In the twentieth century, school nature study reinforced these ideas about animal industry as a natural law. After examining the social life of animals, Thomson's *Study of Animal Life* outlined animal hunting, shepherding, storing, home-making and other examples of 'constructive skill'.[4] Likewise, in *Professor Hollinrake's Dominion Song Book for Children* (1935), birds were 'carpenters' and 'house-builders'.[5] Farmers would frame comments about this in respect to their own Protestant work ethic. Exploring the various causes of cannibalism, the *NZPW* noted in 1938, that: '"Satan makes mischief for idle beaks" sums up the cause of most outbreaks', and that inactivity could be prevented by hanging green feed and scattering grain in the litter to encourage scratching.[6] However, observations of busy hens differed to the anthropomorphic justification of laying hens as workers which commenced as the chicken was brought into industrialised, scientifically-managed regimes.

From the outset, the notion of the utility hen was conceptually aligned with ideas about improved human workers. Calls for the reform of fancy breeding in the nineteenth century were framed in relation to social reform, as illustrated in an 1883 report of a poultry show in the *Auckland Weekly News*:

> All the malice of civilization has been expended upon fowls. Legs so heavily feathered that the wretched birds only walk by a series of fortunate accidents; heads decorated with tufts so enormous that the creature's circle of vision is limited to the ground it stands upon; combs of so wonderful a kind that each cock appears to

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[3] Peter Harrison, "The Cultural Authority of Natural History in Early Modern Europe," in *Biology and Ideology from Descartes to Dawkins*, ed. Denis R. Alexander and Ronald L. Numbers (Chicago: University of Chicago Press, 2010), 17.

[4] Thomson, *The Study of Animal Life*: 125-137.

[5] Professor H. Hollinrake, *The Dominion Song Book Number 3: Forty-four Songs for Little Children* (Auckland: Whitcombe & Tombs, 1935).

[6] "Cannibalism. How to Deal with It," *NZPW* 1, no. 6, (1938): 5.

> carry a beefsteak and two mutton chops above his startled visage: these are the results of centuries of scientific breeding. […]
>
> [But] the evils of high-pressure competition are equally obvious among bipeds of the 'featherless class'. In our modern schools have we not results that are as lamentable in the large-headed, weak-eyed boys […] trained like Cochin China cockerels […] into one stiff type of conventional excellence? [...] Education and poultry-breeding alike have their origin in the employment of the leisure of the rich [… and] old-world culture.[7]

The fancy bird was considered degenerate; a consequence of civilised excess and, like school boys weakened by competition and hours of Latin, unfit for purpose.

With the advent of the 'utility bird' or 'business hen' as they were commonly advertised, breeds became defined according to their work roles: broiler, egg-producer or breeder.[8] Darwin's concept of living things fulfilling a function in the 'economy of nature', which informed emerging turn-of-the-century ecological ideas about the natural world, were enmeshed with the Victorian philosophy of utilitarianism, in which human or non-human animals were valued according to their contribution to the greater [human] good.[9] Utilitarianism was central to New Zealand's egalitarian aspirations and

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[7] "Poultry Progress," *AWN*, 17 March 1883, 23.

[8] See for example, "Irvine Strain," *NZPJ*, 20 November 1912, 26; "Brown Leghorns," *BOPT*, 23 February 1894, 2.

[9] Mark Rowlands, "Philosophy and Animals in the Age of Empire," in *A Cultural History of Animals in the Age of Empire*, ed. Kathleen Kete (Oxford: Berg, 2007), 135-152. On ecological ideas see Nyhart, *Modern Nature: The Rise of the Biological Perspective in Germany*: 1-34.

continued as an ideological thread within twentieth-century society and education as we have seen.[10]

Darwin had conceptualised evolved animals as divergent in particular traits as well as in the specialised worker roles they occupied. In addition to this idea, which underpinned his concept of ecological competition, Darwin's notion of the cooperative division of labour within natural systems, as Kropotkin's *Mutual Aid* explained, was also understood as a natural law which applied to all animal communities, including human systems such as families or modern industry.[11]

The idea that domestic livestock existed within a cooperative relationship with humankind was instilled within school nature study which, as noted in chapter two, emphasised cooperative, rather than competitive, concepts. Discussing mutual aid as a law of nature, Thomson noted that evolved animals possessed a sense of the social group. Farmed animals were considered to be in this category as sociable, tame (or as Darwin phrased it 'civilised') versions of their wild relatives, living in protected 'partnership' with humans.[12] This idea underpinned *National Education* nature study lesson plans in 1935, which included studies of birds as 'friends' or 'enemies' of man, with poultry in the

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[10] On colonial efforts to create an egalitarian society 'free of the dead weight of the Old World's omnipresent pasts' see Erik Olssen, Clyde Griffen, and Frank Jones, *An Accidental Utopia? Social Mobility and the Foundations of an Egalitarian Society, 1880-1940* (Dunedin: Otago University Press, 2011). 244-257.

[11] William Tammone, "Competition, the Division of Labor, and Darwin's Principle of Divergence," *Journal of the History of Biology* 28, (1995): 109-131.

[12] Thomson, *The Study of Animal Life*: 18-29, 97-99. Frequent accounts in newspaper nature study columns of mother hens adopting young animals served as object lessons in mutual aid. See for example, "Nature Notes. Hen as Foster Mother," *Fielding Star*, 7 December 1912, 7. For another example of cooperative division of labour, see "Birds of New Zealand," *NZSJ* III, no. 10, (1909): 158-163.

former category as suppliers of food.[13] Anthropocentric ideas about chickens as willing and natural helpers of humanity were also entwined with the theological concept of human dominion.[14] Animal workers were considered the natural order of things.

Assisting the rationalisation of industry, these ideas were evident within the poultry press when, for example, hens during WWII were portrayed as dutifully fulfilling their contract as helpers of humanity. The campaign by the American poultry industry to provide eggs for Britain was noted in the *Auckland Star* in 1941 under the headline 'Victory Hens'. American hens, it reported, would help win the war.[15] Playing to these same ideas, advertisements for local suppliers of Karswood Poultry Spice (a British product consisting of 'ground insect protein') depicted hens as glorified worker-soldiers.

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[13] W.M. Martin, "Nature Study and Elementary Science," *Supplement to NEd* XVII, no. 184, (1935): 19-20.

[14] Natural theology notions of the 'economy of nature' had influenced Darwin's *Origin of Species*, which, as Karl Marx observed, underpinned justification for the capitalist division of labour. See Trevor Pearce, ""A Great Complication of Circumstances" – Darwin and the Economy of Nature," *JHistBio* 43, (2010): 493-528.

[15] Thomas R. Henry, "Victory Hens," *AS*, 12 June 1941, 6. This act of salvation was also an opportunity for the aggressive marketing of eggs as the 'Near Perfect Diet' for wartime rations.

Figure 15. 'Victory hens' in Karswood advertisement, 1940.

This advertisement appeals to notions of cooperative mutual aid, the division of labour, and useful citizenry: hens, like farmers, should produce their 'quota' for the greater good. The enlisted hen is both a 'food factory', and a soldier within the army flock.[16]

Hens, like humans, were understood to have a social contract of duty: hens had to work and face the ultimate sacrifice in order to get fed, just as humans

[16] E. Griffiths Hughes Ltd., "Every Hen in Your Flock is a Potential 'Food Factory' of National Im[p]ortance," *NZPW* 3, no. 9, (1940): 25.

understood that they must work (and die) if necessary for the greater good. From early in the century, the message that hens had to 'earn their keep' was conveyed through books which served to articulate modern poultry (and human) regimes to children.[17] Whereas the nineteenth-century hen was an icon of maternal duty, in the twentieth century she was the symbol of industriousness, as in the story of *The Little Red Hen*, popularised from the late 1930s and 1940s. Roosters, increasingly redundant on egg farms, were characterised as useless and 'lazy'.[18]

Evolutionary ideas about evolved animals supported the portrayal of purebred utility birds as the 'elite' workers of industry. In the *NZPJ* in 1907 Julia Flewellyn described purebred fowl as fulfilling their duty to the nation as cream-of-the-crop, industrious citizens:

> […] for a day of recreation visit a big poultry plant, where the "blue-blooded" fellows are strutting around in their magnificent quarters and the hens have the honour of laying eggs worth twenty-five cents apiece, then we will realise that we are in truth a part of the greatest money producing scheme in the country.[19]

Commercial fowl embodied the goals of the 'industrious' modern woman to whom Flewellyn's article was addressed. Although the implication of chicken complicity and gratefulness for the privilege was recognised as a device, it appealed to evolutionary notions of natural partnership.[20]

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[17] E. Boyd Smith, *Chicken World* (New York: G.P. Putnam's Sons, 1910). n.p.

[18] Squier, *Poultry Science, Chicken Culture: A Partial Alphabet*: 140.

[19] Flewellyn, "What Women Can Do. Work that is a Pleasure and Not a Task. An Excellent Employment for the Home-Loving Woman," 10.

[20] On the anthropomorphic attribution of status to improved livestock within nineteenth-century farming discourse. See Ritvo, *The Animal Estate: The English and Other Creatures in the Victorian Age*: 45-81.

Not all worker hens were attributed high status. The evolutionary division of labour implied evolved hierarchies, with the masses comprised of less improved specimens. The following image from a 1937 poultry food advertisement alluded to the alignment of labourers and livestock, as the phrase 'strong as a horse' was often employed to describe fit young men.[21]

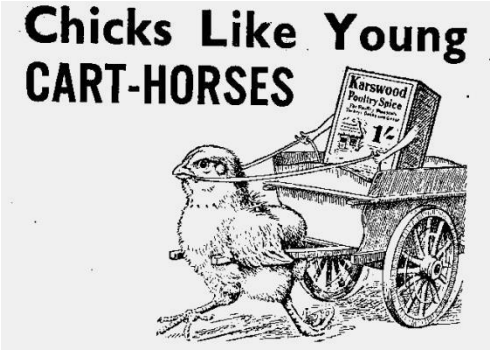

Figure 16. Image from a Karswood Poultry Spice advertisement, 1937.[22]

Laying hens were also described as 'grafters'.[23] In a similar vein, the *NZF* in 1903 featured an article comparing cows to 'improved workers' and 'drone bees', positioning them as the basis of the farming industry along with bachelor men.[24]

Domestic livestock were believed to be prone to degeneration, which informed ideas about less intelligent worker-drones. As a scientist and animal-rights advocate, Purnell for instance, had pondered why New Zealand livestock

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[21] See for example, "Local and General," *Dominion*, 15 February 1916, 4; "The Hardening Theory," *WDT*, 8 October 1904, 2.

[22] E. Griffiths Hughes Ltd., "Chicks Like Young Cart-Horses," *NZPP* 2, no. 17, (1937): 6.

[23] See for example, "A Breeder of Stud Stock," *NZPJSup*, 20 May 1912, 17.

[24] A.J. Cook, "Evolution in Bees, Nature and Nurture," *NZF*, January 1903, 34. The image of the strong rural male within New Zealand society at the turn of the century conveyed both nobility and subservience, as society remained stratified. See Miles Fairburn, *The Ideal Society and its Enemies: The Foundations of Modern New Zealand Society 1850-1900* (Auckland: Auckland University Press, 1989). 103, 126-127. On reduced stratification during the twentieth century, see Margaret Nell Galt, "Wealth and Income in New Zealand: c. 1870 to c. 1939" (PhD thesis, Victoria University of Wellington, 1985).

seemed apathetic about their confinement in his 1893 book. He hypothesised that they were like dull-witted farm labourers or industry workers whose actions become stereotyped, and that perhaps with their basic needs attended to, he considered, 'they succumb to circumstances.' He also mused about racial characteristics, wondering if they were stoic and group-led like 'Eastern races'.[25] Human workers in the same era were believed to be degraded by their circumstances to 'bestial' behaviour within British slums.[26]

Experts also aligned animals with lower human types to remind farmers that dominion implied a duty of care; that human and animal workers had psychological and physical needs and gave better service if looked after.[27] Agricultural columns and general farming texts reflected this view. A.H. Baker's *Livestock Cyclopedia* (1920) illustrates the associated moral judgement of bad farm managers: 'A master so unthrifty or penurious as to begrudge the proper care and feeding of his animals, is also apt to over-work and under-feed his labourers, and an employer who does this never has efficient help'.[28] The *NZPJ* in 1928 warned against treating birds as 'slaves'.[29]

Thus far then, it is evident that chicken-worker analogy within twentieth-century industry was informed by evolutionary and ecological ideas about evolved or improved animals being adapted to specialised roles, the cooperative division of labour, and animal industry. This chimed with existing idealogies, including utilitarianism, the Protestant work ethic and the theological notion of human dominion. Apart from providing humour, chicken-worker analogy served to both rationalise industry and deflect concerns, and

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[25] Purnell, *The Intelligence of Animals*: 160-163.

[26] Kete, "Introduction: Animals and Human Empire," 9-12.

[27] Thomas, *Man and the Natural World: A History of the Modern Sensibility*: 99.

[28] Baker, *Live Stock. A Cyclopedia for the Farmer and Stock Owner including The Breeding, Care, Feeding and Management of Horses, cattle, Swine, Sheep and Poultry with A Special Department on Dairying being also A Complete Stock Doctor*: 240.

[29] "Tasmania and Its Poultry Potentialities," *NZPJ*, 1 March 1928, 31.

express humanitarian concerns. While it was understood as an anthropomorphic construct, it was sustained due to engrained cultural beliefs reinforced within evolutionary-based general biology. The concept of the chicken-worker and animal-workers generally, and the notion that all these principles applied to human animals also, was instilled early in life through children's literature and nature study.

The Animal-Machine in General Physiology

The correlation of animal and human workers was inherent to turn-of-the-century research into the 'science of work' as it was referred to in Europe, or 'scientific management', as promoted by the American Frederick Taylor. This science aimed to maximise the efficiency of the working body and was underpinned by general physiology and the study of the animal-machine. Taylor's language and writings were famously replete with analogies between human and animal labourers.[30] European and Taylorist theories were discussed within New Zealand's mainstream press prior to WWI,[31] and, as mentioned in the introduction to this thesis, farmers were absorbing ideas about efficiency.[32] Factory efficiency, including the concept of the assembly-line in abattoirs and Henry Ford's production-line, were familiar concepts to early twentieth-century farmers in New Zealand as in other Western countries even though the specific theories of scientific management were not widely discussed in respect to farming until the 1920s and 1930s.[33]

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[30] Tim Cresswell, *On the Move: Mobility in the Modern Western World* (New York and London: Routledge, 2006). 85-95.

[31] See for example, "The Science of Work," *Wanganui Chronicle*, 3 October 1911, 4; "The Science of Work," *NZH*, 20 March 1914, 6.

[32] On the 'efficiency movement' see Samuel Haber, *Efficiency and Uplift: Scientific Management in the Progressive Era, 1890-1920* (Chicago: University of Chicago Press, 1964).

[33] See for example, T.H. Hunter, "To the Editor. Industrial Psychology," *EP*, 25 October 1926, 6; "Exchange of Ideas. Scientific Management. Farm, Home, and Factory," *EP*, 19 February 1935, 12; "Farmers and the State," *EG*, 3 September 1935, 4; "Currency Values. Scientific Management," *AS*, 29 November 1935, 15.

However, before considering farmers' discussion of the hen worker-machine, some clarification of mechanistic description is necessary. General physiology was defined by Professor Benham in a public lecture in 1899 as the study of the chemistry, physics and mechanics of plants and animals, including 'human animals'.[34] The particularly reductionist, mechanistic physiology prior to WWI affected the way people studied and thought about living creatures, contributing to the focus on reflexive instincts in psychology around the turn of the century as we have seen. Experimental physiologist Jacques Loeb's *The Mechanistic Conception of Life* was an internationally-influential book,[35] informing the scientific view, as reported in the *Wairarapa Daily Times* in 1913, that 'the dividing line between animate and inanimate matter is less sharp than it has hitherto been regarded' and that the expression 'vital force,' in regards to living beings, was 'merely an expression of ignorance.'[36] Encouraged by discoveries in many fields, biologists from this time presented themselves as nature's bio-engineers (a term that was in use by the 1930s).[37]

Mechanistic description of machine-bodies however, did not necessarily imply reductionist conceptions of living beings. After describing the mechanics of bodies in his popular texts, Thomson for example, promoted the view that animals were more than the sum of their parts. He encouraged the integration of scientific and religious perspectives, reminding readers of Paley's conception of the universe as a mechanical clock.[38] In the interwar period, general

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[34] Professor Benham, "Physics in Biology," *Press*, 25 September 1899, 5.

[35] "Among the Announcements," *ODT*, 25 January 1913, 14.

[36] "The Nature of Life," *WDT*, 29 March 1913, 4.

[37] Wilmot, "Between the Farm and the Clinic: Agriculture and Reproductive Technology in the Twentieth Century," 305.

[38] See for example, Patrick Geddes and J. Arthur Thomson, *Evolution*, Home University Library of Modern Knowledge (London: Williams & Norgate, 1912). xii-xiii; Thomson, *The Study of Animal Life*: 185-186. On Paley and Descartian physiology, see Alexander and Numbers, *Biology and Ideology from Descartes to Dawkins*: 23-24. On progressive-era concern about 'machine culture' see Seltzer, *Bodies and Machines*: 3.

agricultural and biology literature often acknowledged the mechanist-vitalist debate.[39] Within the *NZPJ* prior to 1930, recurrent accounts of chick embryonic development were intended to reflect a synthesis, and are illustrative of changing perspectives. In the *NZPJ* in 1913 around the time of Loeb's experiments, a reprinted excerpt from a popular science book pondered the 'miracle' of the hen's egg, preceded by a chemical analysis of the 'egg atoms'. The writer wondered at the 'kinetic potentiality', generated by the 'heat from a hen's bosom' which arranged atoms of carbon, nitrogen, iron, calcium and so forth in the hen's ovary 'like a disciplined army'.[40] In the *NZPJ* in 1927 however, an excerpt from *Reflections on the Words of God in Nature and Providence*, a nineteenth-century text, was reprinted, absorbing two page-length columns. It noted that 'each of the members [of the embryo's body] becomes visible in that moment which is the most proper', and that this 'animated body' was 'manifestly the work of a Superior Intelligence'. It concluded: 'The microscope and the scrutinizing spirit of man have discovered only those which fall more immediately under the observation of our senses. But the discovery of many things may be reserved for those who shall follow us, or be perfectly known only to the world to come.'[41]

New Zealand school children were inculcated with mechanistic biological models within elementary science education. They learnt of the eighteenth century French chemist, Antoine Lavoisier, who studied food conversion in the animal-machine, comparing it to a steam engine. This illustrated the first law of thermodynamics – the conservation of energy – in the animal body. They also

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[39] Henry Prentiss Armsby, *The Nutrition of Farm Animals* (New York: MacMillan Company, 1930). xvi, 544-559; Dendy, *Outlines of Evolutionary Biology*: 19, chapter 1. On changing trends in the 1920s biology see Allen, *Life Science in the Twentieth Century*: xv-xix.

[40] Ronald Campbell Macfie, "Popular Science" cited in "A Hen's Egg," *NZPJ*, 20 November 1913, 21.

[41] "Development of the Chick," *NZPJ*, 20 September 1927, 18. Reprinted from Christopher Christian Sturm, *Reflections on the Words of God in Nature and Providence* (London: Richard Edwards, 1810).

learnt about energy conversion and loss – the second law of thermodynamics – in respect to work power and fatigue.[42]

Advanced agricultural texts throughout the period also conveyed general 'bioenergy' principles.[43] The American animal nutrition expert, Henry Armsby, in *The Nutrition of Farm Animals* (1930) for example, asserted that as a starting point, emphasis upon the general laws rather than the specifics of animal feeding was necessary for the student of agriculture, and principles of stock feeding were illustrated with tables comparing the energy efficiency of human and farm animals.[44] Armsby introduced the animal body as:

> […] a transformer of energy – a mechanism for the conversion of the chemical energy of its feed into motion energy while more or less incidentally a reserve of energy-containing material may be stored up which can be utilised for human food [...] Its value […] depends upon […] the balance between the income and outgo of matter and energy.[45]

Scientists researching animal nutrition in the nineteenth and early twentieth century investigated the energy (calorific) intake and respiratory and heat output of animals of different species, ages and activity levels using calorimeters.[46] Initial and ongoing animal calorimetry experiments in the 1920s

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[42] See for example, Mill, *The Realm of Nature: An Outline of Physiography*: 16-48. The first and second laws of thermodynamics were articulated by Hermann Hermholtz in 1847 and Radolph Clausius in 1865 respectively. See Rabinbach, *The Human Motor: Energy, Fatigue, and the Origins of Modernity*: 47, 61-68.

[43] As an example for the later period see Samuel Brody and The Herman Frasch Foundation, *Bioenergetics and Growth. With Special Reference to the Efficiency Complex in Domestic Animals* (New York: Hafner Publishing Company, 1964). 307, 971-972.

[44] Armsby, *The Nutrition of Farm Animals*.

[45] Ibid., xvi.

[46] Weatherall, "Bread and Newspapers: The Making of 'A Revolution in the Science of Food'," 189-190; Kenneth Carpenter, "A Short History of Nutritional Science: Part 2 (1885-1912)," *Journal*

were explained in New Zealand school texts and newspapers.[47] This led to an emphasis on calorific requirements within both animal and human nutrition in this period. Scientific support for minimum calorific requirements was employed by New Zealand unions battling for improved wages in 1918.[48]

In addition to explaining energy within the living body, popular and elementary science texts emphasised that energy principles applied to the larger macro-systems of society and industry. In combination with evolutionary theory, these physical laws were said to determine 'the fate of the species'.[49] Mill's *Realm of Nature* discussed 'man's degradation of energy', emphasising that human modification of the natural world was harmful when it did not work in harmony with its laws.[50] National progress through the 'labour power' of man and beast was equated with spiritual progress, whereas loss of resources, including inefficiency within living bodies, signalled entropy, fatigue and moral and racial degeneration.[51] Thus, when Merrett in 1910 urged that in poultry farming, as in every department of business, there needed to be 'harmony of the whole [...] design [...] efficiency' he evoked these ideas.[52]

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of Nutrition 113, (2003): 977. For example, the American nutrition scientist, Wilber Atwater was commonly cited in general farming texts. See Fream, *Complete Grazier and Farmers' and Cattle-Breeders' Assistant: Forming a Compendium of Husbandry*: 634.

[47] "Wonders of the Respirator-Calorimeter," *NOT*, 8 November 1906, 2; "Value of Breakfast," *King Country Chronicle*, 17 August 1920, 6; A.T. Simmons and E. Stenhouse, *Science of Common Life* (London: Macmillan & Co., 1928). 325.

[48] "Man's Energy," *NZH*, 4 January 1913, 2; "The Human Machine. More Food, More Production," *EP*, 3 August 1920, 8.

[49] Frederick Soddy, *Matter and Energy* (London: Williams & Norgate, 1912). 9-15. See for example, Naturalist [pseud.], "Energy," *NZH*, 2 August 1919, 1.

[50] Mill, *The Realm of Nature: An Outline of Physiography*: 48, 369-374.

[51] Wendling, *Karl Marx on Technology and Alienation*: 61-92.

[52] J.B. Merrett, "Economy of Labour. How Forethought and Knowledge of Mechanics Saves Labour," *NZPJ*, 20 October 1910, 5.

The Chicken Bio-Machine

Poultry experts' discussion of nutrition mirrored general discourse on the body as a transformer of fuel. As one breeder commented in the *NZPJ* in 1926, '[t]he hen is a machine that transforms wholesome food into a highly nutritious product, and for that reason it is imperative that the hen should get the best.'[53] The importance of a 'balanced ration' to keep the hen 'working at high pressure', as it was phrased in the *NZPJ* that same year, was a particular focus in this period after WWI.[54] In 1918, the principal of Britain's centre for poultry training, Hawkesbury College, had explained at the international poultry conference, that whether producing 'meat, milk, wool, eggs, feathers [or] labour', the body required fuel for work, 'a reserve store' and an adapted ration according to work requirements. He emphasised the importance of appetising food to aid palatability and digestibility through reference to the human mouth and the stimulation of salivary glands, and defined the balanced ration as:

> [The] protein, carbohydrates, fat and mineral ash in such proportions and amount as will properly and without waste […] nourish a given animal or bird for twenty-four hours and provide the maximum amount of commercial product.[55]

These basic food groups had been identified by Justus Leibig in the mid-nineteenth century,[56] and nutritional advice (for humans and hens) barely

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[53] Mitchell, "Good Feeding," 4. See also "Bran as Food," *NZPJ*, 20 September 1927, 3.

[54] "Hens and their Eggs," *NZPJ*, 20 April 1926, 16. Research into the 'dry mash' system of providing a standardised balanced ration, touted as more time-efficient, though not as much liked by hens, was presented prior to WWI. See Dr. Kemp and M.A. Jull, "The Dry Mash System," *NZPJ*, 20 March 1914, 19-22.

[55] H.W. Potts, "A Balanced Ration," *NZPJ*, 20 August 1918, 7-8.

[56] Arthur Bower Griffiths, *Biographies of Scientific Men* (London: Robert Sutton, 1912). 91-103; Justus Liebig, William Gregory, and John Webster, *Animal Chemistry: Or Organic Chemistry in Its Application to Physiology and Pathology* (Cambridge: John Owen, 1843). *Animal Chemistry* and another of Liebig's books, *Modern Agriculture* were advertised in William Lyon, "Just Received," *WI*, 31 July 1850, 2.

altered from this prior to the mid-1920s.[57] Until this time, poultry feeding was mainly described by international and New Zealand experts in term of 'heat units' and 'fuel value,' generally with more emphasis on food quantity than nutrient analysis.[58] The calorific focus and the narrow nutrient range of some 'balanced' rations came to be blamed for mortality rates in the 1930s.[59]

Machine analogy was also employed in discussion of the hen's ovary function. Merrett, in his poultry conference address in 1914, cited the American poultry geneticist, Raymond Pearl:

> Chickens are not machines. They are living creatures. A poultry plant is not a factory. It partakes much more of the nature of a girls' boarding school, with a strong leaning on the part of the inhabitants towards suffragette doctrines. Poultry management is a biological problem, and to be successful must have due regard to fundamental biological principles.[60]

This acknowledged the complexity of chickens' reproductive cycles, and their wilfulness. However, for Merrett their biology was also an engineering problem to be overcome. While admitting to 'revolts against nature' under existing

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[57] See for example, "Definition of Protein, Carbohydrates and Fat," *NOT*, 27 July 1912, 3; J.B. Merrett, *Poultry for Profit in New Zealand: A Practical Guide to Poultry Keeping in New Zealand and Australia for Use and Profit*, 2nd ed. (Christchurch: Simpson & Williams Ltd., 1926). 29-30.

[58] See for example, Brigham, *Progressive Poultry Culture. A Text-Book of Study and Practice in the Keeping of Poultry for Profit and Pleasure*: 121-125; Terry, "Poultry Keeping," *AS*, 24 July 1926, 24. The energy values of poultry feeds were studied by the US agricultural experiment station scientist George Fraps during WWI. See Byerly, "Changes in Animal Science," 265-266.

[59] "High Mortality Rate," *NZPW* 2, no. 4, (1939): 26.

[60] Merrett, "The Official Conference Report. Secretary's Annual Report," 2. This quote was repeated in newspaper reports of the conference. See for example, "Poultry Industry," *NEM*, 16 April 1914, 2.

methods, he added: 'who knows how soon we may be able to use our little machine without injury?'[61]

Merrett's comments were congruent with general attitudes to the modern body at this time. Progressives, including capitalists and physical culturists, promoted the view that the body could be engineered or improved.[62] The 'mechanism' of discharged ova in the human female and other animals was both differentiated and conflated in the classic text for biologists, veterinarians and medics, Marshall's *Physiology of Reproduction*, which was well-known internationally amongst biologists in 1910 and into its third edition in 1952.[63] The New Zealand school physical education text of the interwar period, *Growing Body* advised that although strenuous military training was unsuitable for girls, physical education was based on 'an understanding of the mechanical nature of the body' which was able to be trained 'into an instrument of the highest skill.' A 'new path of evolution' – improved bodies with better fertility, was similarly hoped for.[64]

Respect for the hen's 'masterpiece of Nature' was expressed in the *NZPW* in 1945, in an article detailing the hen's 'egg factory',[65] but by the 1950s pragmatic mechanical analogy was overt, appealing to a farming generation in awe of the scientist-engineer. In the *NZPW* in 1957, for instance, prolapsed ovaries in

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[61] J.B. Merrett, "The Question of Poultry Disease," *NZPJSup*, 20 April 1914, 17.

[62] Rabinbach, *The Human Motor: Energy, Fatigue, and the Origins of Modernity*: 120-124, 224-225. On the manifestation of physical culture in New Zealand to improve citizen worker bodies and as a fitness pursuit promoted within the eugenic era see Caroline Daley, *Leisure and Pleasure: Reshaping & Revealing the New Zealand Body 1900-1960* (Auckland: Auckland University Press, 2003); Charlotte Macdonald, *Strong, Beautiful, and Modern: National Fitness in Britain, New Zealand, Australia, and Canada, 1935-1960* (Wellington: Bridget Williams Books, 2011). 70-98.

[63] Francis Marshall, *The Physiology of Reproduction* (London: Longmans, Green & Co., 1910). 140-141.T See also Jean-Paul Gaudillière, "The Farm and the Clinic: An Inquiry Into the Making of Our Biotechnological Modernity," *SHPBBS* 38, no. 2, (2007): 521.

[64] White, *Growing Body: It's Nature, Needs and Training*: v, 10.

[65] J Birtwhistle, "The Egg "Factory" in Operation," *NZPW* 8, no. 11, (1945): 17.

pullets were described as being due to the direct fault of the 'operator' not having exercised enough care. Better husbandry, sensitivity to the nervous state of the point-of-lay pullet whose system is rapidly changing, was urged.

> If you realise that the ovaries, and the long and complex "conveyor belt" which carries the yolk from the ovary through the various processes of adding the white, the skins, the shell and the colour is a very delicate piece of machinery, then it is not too difficult to appreciate how it is that this organism, having never before been in use, and having … been quite underdeveloped, can, in the process of becoming geared up, break down under judicious overloading.[66]

The writer proceeded to give instruction on how to 'avoid breakdown,' stressing that birds should be put into production only when mature. Mechanist analogy here promoted care and attention to nervous vulnerability, echoing health advice for young women approaching menarche.[67]

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[66] Murray Hale, "Pullets are at Difficult Stage," *NZPW* 20, no. 3, (1957): 143.

[67] Barbara Brookes, "Hygiene, Health and Bodily Knowledge, 1880-1940: A New Zealand Case Study," *Journal of Family History* 28, (2003): 303-305.

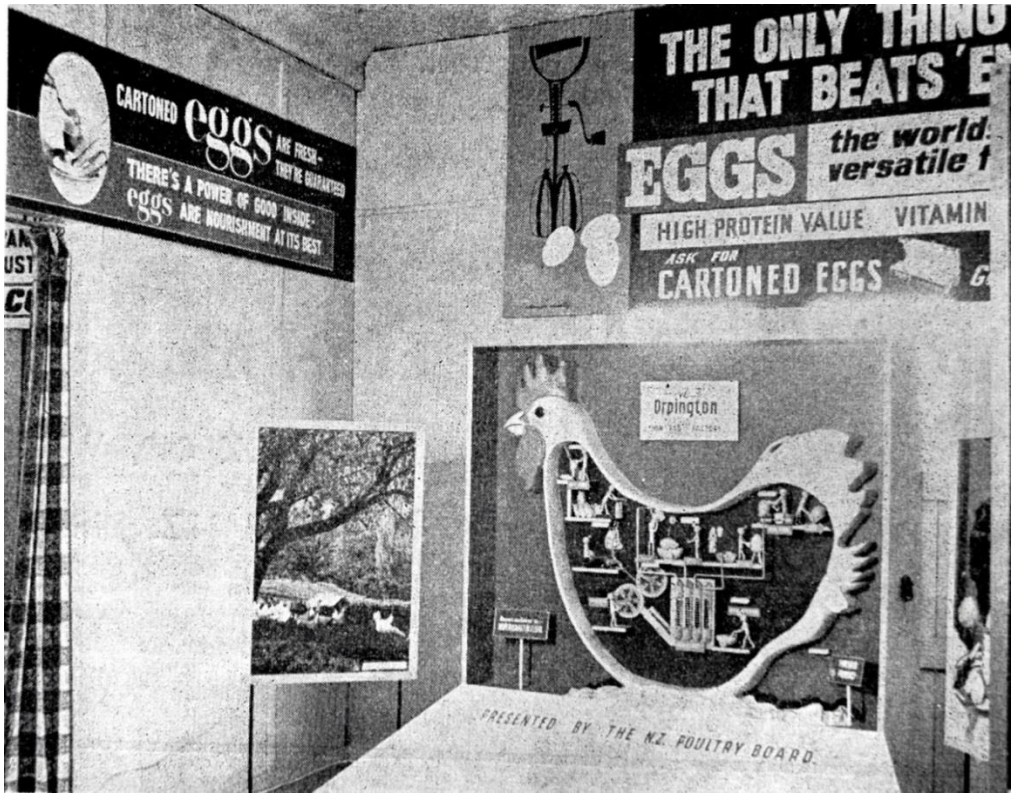

Figure 17. "Amelia Orpington."

The poultry industry's mechanical hen on display at the Christchurch conference of the N.Z. Master Grocer's Federation, February 1960.[68]

The Factory Chicken

Farmer reflections on the chicken-worker reveal alternate discourses on the science of work in this period. Taylorist approaches emphasised 'overwork', whereas European perspectives placed greater emphasis on fatigue in the worker body.[69] The latter was especially prominent within poultry industry discourse of the interwar period. However, all systems of management aimed for efficiency, minimal waste, uninterrupted production, the enforcement of

[68] Cover image, *NZPW* 23, no. 4, (1960).

[69] Rabinbach, *The Human Motor: Energy, Fatigue, and the Origins of Modernity*: 238-288.

time schedules, and the replacement of lazy, inefficient workers with standardised, efficient technology.[70]

From the turn of the century, aspirations for hyper-efficient poultry farms in New Zealand were fuelled by US reports. One such account of a 'Fowl Factory' in the *Star* in 1902 noted with awe that great 'plants' were managed 'in so systematic […] a manner that a poultry farm is really not a farm at all – it ought, instead, to be classed with the factories.'[71] Factory-farm parallels were being made prior to WWI in regard to New Zealand farms, if only humorously. Possibly in response to controversy over the Factories Act, a tongue-in-cheek letter to the *NZPJ* in 1912 reported that a district factory inspector had requested factory registration of a farm due to the large number of worker-fowls and considerable use of labour-saving appliances. The farmer mused that he would have difficulty unionising his male and female workers and negotiating half-holidays and working hours as they spoke no English and already took long periods of leave.[72]

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[70] E.J. Yanarella and H.G. Reid, "From 'Trained Gorilla' to 'Humanware': Repolitisizing the Body-Machine Complex Between Fordism and Post-Fordism," in *The Social and Political Body*, ed. Theodore Schatzki and Wolfgang Natter (New York: The Guilford Press, 1996), 181-199.

[71] Pearson's Weekly article reprinted in "In a Fowl Factory," *Star* 1902, 2. See also "Chicken Factories," *North Otago Times*, 2 August 1913, 3.

[72] "The Factory Act," *NZPJ*, 20 November 1912, 6. The Factories Act had resulted in confusion over the definition of a factory. See for example, "Picture Shows and the Factory Act," *HNS*, 16 August 1911, 7. On the Act's definition see Olssen, Griffen, and Jones, *An Accidental Utopia? Social Mobility and the Foundations of an Egalitarian Society, 1880-1940*: 251; Noel Spencer Woods, "'Control of Working Conditions' from An Encyclopaedia of New Zealand, edited by A. H. McLintock, originally published in 1966," accessed 16 August 2013, http://www.TeAra.govt.nz/en/1966/labour-department-of/page-7; " The Factory Act (1894)," New Zealand Legal Information Institute, accessed 16 August 2013, http://www.nzlii.org/nz/legis/hist_act/fa189458v1894n31185/.

Culling, trap-nesting and laying competitions were designed to identify star workers and non-producers.[73] The latter were described as 'wasters' or 'loafers' like unemployable human workers.[74] A report of the methods of one of the biggest poultry farms in Taranaki in 1927 with 1500 layers reflected an emerging rhetoric of waste in regard to unproductive life: 'At about five weeks the cockerels were killed and buried as Mr. Scott contends they are of no commercial value and were therefore a waste.'[75]

The 'wasteful habit' of broodiness was minimised and the hen gradually standardised through selective breeding and the favouring of White Leghorns.[76] Dual-purpose birds, like other generalist workers, became less common as industry specialised.[77] As the use of incubators gradually increased, redundant broody hens were described as outmoded machines. In the *NZPJ* in 1927, a correspondent expressed the opinion that the incubator and the motor-car are considered indispensable by people 'in the smart world […] who wish to be up-to-date.' In comparison, this writer commented, the broody hen was 'like the stagecoach […] a "back number" still tolerated and employed but no longer indispensable.'[78]

Star workers, in contrast, were closely identified with, embodying their breeders' own work efforts. In 1914, Mr Jack Nixon, an Auckland breeder, regularly advertised his winning Leghorns. He was especially proud of his world record-breaking 'Lady Alma', who laid 353 eggs in 52 weeks at the

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[73] See for example, Merrett, "The Value of Trap Nests," 25.

[74] See for example, "A Breeder of Stud Stock," n.p; Jarrett, "Benefits of the Trap Nest," 11.

[75] "Taranaki Notes," *NZPJ*, 20 September 1927, 10.

[76] "The Egg Laying Competition," *NZPJ*, 20 May 1912, 12; J.B. Merrett, "Mating up the Pens," *NZPJ*, 20 July 1927, 1.

[77] J.B. Merrett, "Annual Catalogue of the New Zealand Poultry Institute, Christchurch," *NZPJSup*, 20 March 1914, n.p.

[78] "The Economy and Advantage of Incubators," *NZPJ*, 21 February 1927, 12.

Auckland Poultry-keepers' Association egg-laying contest the previous year.[79] Portraits of good worker types – either breeders or their breeder birds – on the cover of the journals attested to the ability of both to give 'a good account of themselves'.[80] In the *NZPW* in 1940, it was lamented that most commercial birds were never tested by trap-nesting procedures or egg-laying contests, implying wasted potential: '[I]n New Zealand, many hens […] are never discovered [...] They go through life as individual non-entities – just one of the mob – and in due course are passed out 'unwept, unhonoured and unsung.'[81]

Technological efficiency was a focus in the post-WWI era as the gradual adoption of incubator technology facilitated continuous mass production. An account of incubator hatching in the *NZPJ* in 1918 suggested breeders were cognisant of the 'little lives' in their production lines, but celebrated the merging of animal and machine, likening chicks to fighting troops:

> Chirp! Chirp!! This is the song of the incubator at the close of the twentieth day […] The music increases in a babel of voices as the great day of liberation dawns. At times a lusty voice stands out above the rest, as if in a desperate desire to make its presence known to all the world [...] Then the chorus is renewed with fresh vigour. The voices gain in power till it would almost seem that a battle is going on for supremacy.[82]

The incubator army was imagined as a heightened image of nature's battle and a revolutionary force. Leaders like Merrett who considered themselves progressive specimens of the poultry world were proud of their technologically-driven poultry operations.

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[79] W.A. Nixon, "Nixon's White Leghorns," *NZPJ*, 20 April 1914, 10.

[80] See this phrase employed in "What Others Are Doing. Feilding Notes," *NZPJ*, 20 May 1907, 19. For covers, see for example, "The Late Mr. W. Hodgson, Cheviot. An Enthusiastic and Well-known Poultryman," *NZPJ*, 20 January 1914; "A Utility White Leghorn Cockerel, property of Green Bros.," *NZPJ*, 20 July 1926.

[81] Merrett, "The 300-Egg Hen," 2.

[82] E.E. Marsden, "Hatching and Rearing Hundred Per Cent," *NZPJ*, 20 September 1918, 1.

From the 1930s the terms 'farm management' and 'flock management' were employed synonymously with 'farm husbandry' while 'egg producers' came to refer not to the hens, but to the farmer-managers who oversaw 'production'. Two articles in the *NZPJ* in 1938 reminded readers of Henry Ford's factory systems and urged consideration of egg and poultry production as 'a manufacturing industry'.[83] Within the mainstream press, reports of factory farms overseas continued to be cited, though now in a dystopian tone, as with this *Metropolis*-like account in the *Auckland Star* in 1931:

> The mass production methods in the poultry industry abandon all idea of the green field and sunlight; the mother is employed solely as a layer […] She lays the egg in the trap nest just as the workman fits a number two bolt in an automobile frame.

The chick was then described as a 'livestock unit' and as 'raw material,' followed by a lengthy description of its 'modern home':

> The new home of the chick is of the most modern kind—a structure of a single low story, the walls replaced by wire rods, the floor of metal wire. The cellar is only an inch or so deep, with a solid metal floor, which can be removed; this floor is for the removal of the factory waste. […]
>
> The whole factory is made up of these interchangeable unit homes; they are piled on top of each other like sectional book-cases. Each home has an outside dining-room in the form of a metal trough, and the food can only be obtained by reaching out through the wire walls […] The units are fitted with electrically heated

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[83] "Little Things," *NZPW* 2, no. 1, (1938): 27; "Poultry Farming as a Business," *NZPW* 2, no. 4, (1939): 25.

> mothers, called hovers […] The ration is prepared on as accurate specifications as those for an automobile cylinder.[84]

Factories in general by the 1930s were associated with some of the negative outcomes of American capitalism, and mass-production in farming was debated as a general trend.[85] Marsden in 1930 noted that the idea of large scale mass-production on New Zealand farms was 'abhorrent' to many and that the Government was encouraging farmer cooperatives in order to preserve the family farm.[86] Public concerns were expressed about the 'inhuman' experience for workers on larger farms and 'the horrors of mass-produced crammed birds and cows in sunless sheds'.[87]

This public mood was mirrored by an emphasis on the care of worker-hens in the poultry press, and a tempering of leader's militant rhetoric. A contributor in the *NZPW* in 1938, for instance, noted that hen productivity improved with incentives and a pleasant working environment.

> If a moist mash is fed for two days, the flock will expect it the following day at the same time and will be waiting at the door. If they are disappointed, a let-down in egg production is not unlikely […] Hens also react favourable [*sic*] to clean surroundings. When clean litter is substituted for dirty litter there is much singing and scratching, which helps increase egg production.[88]

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[84] The "Industrial Bulletin," Massachusetts, cited in "Chicken Factories," *AS*, 5 June 1931, 14.

[85] For example, "Enough for Two Worlds," *EP*, 13 August 1931, 24; "The United States," *EP*, 20 December 1937, 4.

[86]"Mass Production Ideas," *EP*, 9 July 1930, 10.

[87] Black Watch [pseud.], "Land and Production," *Maoriland Worker*, 31 March 1920, 6; "Double Escape Dive to Earth," *EP*, 24 November 1934, 10.

[88] "Whims of Hens," *NZPW* 2, no. 1, (1938): 28. In the 1950s, a brand of automatic feeding devices was advertised as the 'Chicken Canteen', appealing to the notion of chickens as

A series of Shell Company kerosene advertisements in the *NZPW* in 1938 appealed to concerns with mother-hen redundancy and inattention to bird individuality and care within technologically-driven systems. Under the heading: 'Putting Her Best Foot Forward,' a single baby chick was shown within a large brooder shed, caringly warmed, it was suggested, by its product.[89] Another advertisement portrayed a stork carrying a bundle of baby chicks, encouraging farmer preparation for the 'coming hatchlings',[90] while another proclaimed: 'What is Home Without a Mother, or a Brooder Without Pennant Kerosene?' (below). Like the earlier Pennant Kerosene advertisements, these targeted farmers' wives and daughters who were responsible for chick-raising.

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nurtured employees. See Bradley's Electrical Co. Ltd., "Something to Crow About," *NZPW* 17, no. 9, (1954): 300.

[89] The Shell Company of NZ Ltd., "Putting Her Best Foot Forward," *NZPW* 1, no. 11, (1938): rear cover.

[90] The Shell Company of NZ Ltd., "Coming Events," *NZPW* 1, no. 12, (1938): iv.

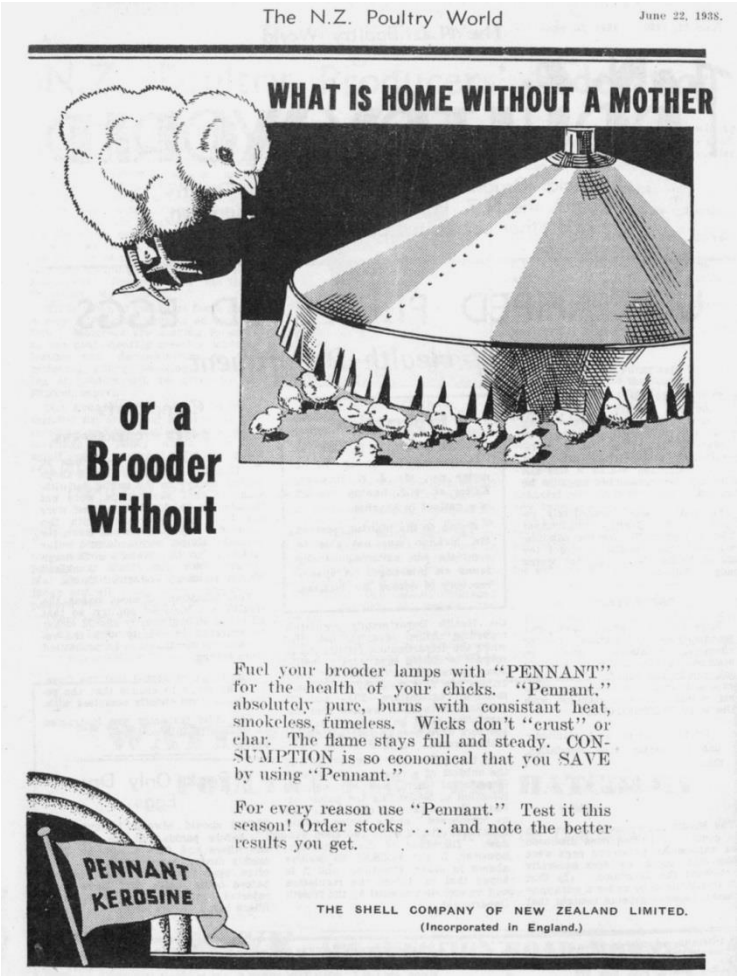

Figure 18. Shell Company advertisement aligning their product with infant care.[91]

The disrespect for life emerging within modern commercial industry disturbed many breeders. A contributor to the *NZPJ* in 1927, for example, had commented:

> […] it is clear [from the example of Leghorn producers who dispose of cockerels and old hens of this breed] that modern poultry farm methods are influenced to a large extent by labour-saving considerations, and that the mass-production policy is based on the assumption that low working cost is the main factor in commercial practice [… With] mammoth incubators and large brooder houses, a wide margin appears to be allowed for failures and mortality. [...] Practice of this kind lays itself

[91] Shell Company of New Zealand Ltd., *NZPW* 2, no.1 (1938), rear cover.

> open to criticism as misguided commercialism and with better opportunities for organized research on scientific lines there is scope for real economy by the avoidance of such serious wastage.[92]

Although this writer appealed in the last phrase to concern with financial waste, the term 'wastage' in respect to the bodies of living creatures had broader moral resonance.[93]

Problems with disease caused experts in the 1930s to rally against the 'evils of mass production'.[94] It was noted that breeders with small flocks, including women, often won egg-laying contests as the birds were healthier.[95] In the *NZPP* in 1936 one breeder questioned modern methods at length, lamenting upon the artificiality of the hen's modern working conditions:

> The present day utility hen has been turned into a laying machine. Instead of carrying out her normal function in a state of nature by laying not more than two sittings of eggs each year and rearing a couple of broods of chicks in the open air, scratching for a living for herself and her chicks, living under conditions where only the fit could survive, she has been transformed by the wisdom of man […] to keep on laying eggs in season and out of season – as a result of the abnormal development of her reproductive organs brought about by selective breeding […] and stimulated by concentrated foods. Instead of still being hale and hearty

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[92] "Poultry Rearing. Wasteful Methods," *NZPJ*, 21 February 1927, 2. For another critique of commercialism, see Ambler, "Fancy Classes at Shows. To the Editor," 16.

[93] Cresswell, *On the Move: Mobility in the Modern Western World*: 82. See also a comparable reference to the moral shame of wasting human lives and economic wastefulness in Charles Bell, "Thrift. To the Editor," *EP*, 4 April 1935, 8.

[94] Poultry Conference remit discussed in Orpington [pseud.], "Poultry Keeping. Mass Production," *AS*, 13 September 1935, 14.

[95] See for example, "Breeding Problems," *EP*, 1 February 1936, 14.

> when six or seven years old […] she is generally regarded as a worn-out wreck at the end of her second laying season.[96]

Overwork

Research into fatigue after WWI in human workers moderated the Taylorist emphasis on overwork, as did socialist sympathy for workers.[97] Concern about overwork in regards to the commercial hen was expressed from the commencement of industry. A breeder in the *NZPJ* in 1914 had commented: 'Nature never intended that any hen lay 200 or 300 eggs in a year […] Modern methods […] are forcing the over-worked hen to deliver her 15 or 20 years' supply in two or three years'.[98] However, by the 1920s, this topic was a recurrent theme. In the *NZPJ* in 1922 a comparison with human overwork was explicit:

> We often hear pioneers say that the present-day generation cannot do the work or enjoy the health of their parents. A woman complained to a doctor that her children were weak and sickly. He replied: "The trouble is, you are overworked yourself, and now your children are paying for it." […] It is certain that we cannot expect the hen to keep up the pace and at the same time be a mother to strong chickens.[99]

Hen health was conceived in terms of energy conservation principles. In a poultry club meeting in 1927 a farmer discussed the care and feeding of laying pullets, who he described as 'next year's mothers':

> I take no more than I give, and I am therefore not drawing anything away from her nor sapping her strength. Accordingly, when I ask her to

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[96] "Breeding, Mortality, Disease," *NZPP* 2, no. 5, (1936): 10.

[97] Rabinbach, *The Human Motor: Energy, Fatigue, and the Origins of Modernity*: 206-224.

[98] "The Missouri Test. Hen with 1000 Eggs to Her Credit," *NZPJ*, 20 May 1914, 16. See also "Editorial. The 1943 Chick Season. Quality versus Quantity," *NZPW* 6, no. 4, (1943): 1-2.

[99] "A Great Problem," *NZPJ*, 20 May 1922, 2.

> become a breeder she doesn't have to put a spurt on to produce the best eggs.[100]

The same ideas were expressed in a British article reprinted in the *NZPW* in 1947 which urged greater attention to hens as 'highly developed living creatures obeying natural laws' as the sustained emphasis on high annual production and annual replacement indicated a 'speed[ing] up of the natural order of things too much'.[101]

Research into worker fatigue was a prominent component of early twentieth-century physiology, of which New Zealanders were well-informed.[102] King as a public educator commented on the dangers of forcing animals into production too early, the reduced vitality of dairy cattle which were being bred for increased lactation, and similarly, 'the evils of cram' – especially in regard to girls whom King believed should not 'waste their energy' prior to motherhood.[103] King conceived of this literally as his physiology training included a through grounding in the electrodynamics and thermodynamics of nerves and muscles.[104] The farming press featured public education about school physical education and the 'evils of cram' into the post-WWII period.[105]

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[100] "Poultry Raising by the Incubator Method," 2.

[101] Charles G. Stacey, "Broody Breaking Can be Overdone," *NZPW* 10, no. 6, (1947): 245-246.

[102] Rabinbach, *The Human Motor: Energy, Fatigue, and the Origins of Modernity*: 38-40. An example of animal experiment within fatigue research reported locally is "Inoculation for Energy," *HNS*, 22 November 1924, 13.

[103] "Tuberculosis in Cattle. Interview with Dr. Truby King," *OW*, 16 September 1897, 7; "The Evils of Cram," *Press*, 6 August 1906, 6. See also Chapman, *In a Strange Garden: The Life and Times of Truby King*: 86-90.

[104] Millarn, "Letter to University of Edinburgh. April 15 1937."; Richards, "Doyle, Conan Challenger Unchampioned - Rutherford, William (1839-99), and the Origins of Practical Physiology in Britain," 193-217.

[105] See for example, "Sound Bodies for Sound Minds," *NZFW*, 9 January 1947, 58.

School pupils were instructed that fatigue produced waste-product toxins. In the school physical education text *Growing Body*, which mirrored King's ideas, toxins poisoned the organism, weakening the entire system. *Growing Body* explained that rhythm was important within daily activity and work to avoid fatigue, and that this principle was observed by factory workers and the military.[106] Similarly, in a nature study text, *The Origin and Nature of Life,* chapters on 'The Living Organism at Work' and 'Cyclic Activities of Life' discussed fatigue and the importance of recuperation. Body cells were described as 'energy transformers', always 'alternating periods of activity and repose' as seen with the beating heart and nerve impulses and in the ordered sequence developing embryos and seasonal cycles.[107] These ideas within modern physiology were easily absorbed by the older generation as they chimed with traditional concepts in which healthy vitality echoed nature's rhythms.[108]

Industry debate about 'forcing' birds through various techniques to increase egg-production related to these ideas about natural cycles and rest. Forcing chiefly referred to the feeding of excessive protein or spices to promote early laying or to speed the recuperative moulting period.[109] One breeder remarked in the *NZPJ* in 1927: 'You may have heard that the moult can be forced. Yes it can, but it's not good to do it. There is a natural time table for this business, and when the man tinkers with it the result is always bad.' He noted: 'the moult is

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[106] "Health and Sanity. Lecture by Dr. Truby King," *Press*, 19 October 1909, 8; White, *Growing Body: It's Nature, Needs and Training*: 32-33.

[107] Moore, *The Origin and Nature of Life*: 197-253.

[108] James C. Whorton, *Inner Hygiene: Constipation and the Pursuit of Health in Modern Society* (Oxford: Oxford University Press, 2000); Brookes, "Hygiene, Health and Bodily Knowledge, 1880-1940: A New Zealand Case Study," 297-313.

[109] 60-70 days was noted as the natural moulting period in "Prepare for Moulting Time," *NL*, 9 February 1907, 3. 56 days was the norm noted in L. Robinson, "The Moult," *NZPW* 3, no. 5, (1940): 8. Variability depending on age, health and genetic factors is noted in Amateur [pseud.], "Questions and Answers. The Moult " *NZPW* 4, no. 1, (1940): 32.

the natural rest for the fowl, just as the man who has worked hard for 12 months takes a holiday'. [110] No doubt influenced by King, Brown strongly adhered to this view.[111]

Advertisements for Karswood Poultry Spice in the *NZPJ* employed anthropomorphic analogy in order to counter these arguments. One advertisement in 1914, the year after farmers had been recruited as special constables to control protesting dock workers, likened moulting hens to strikers.[112] Another advertisement in 1949 presented moulting hens as workplace 'shirkers', who would 'get away with' a longer 'holiday' if permitted. The notion of performance being determined by different character 'types' rather than physical constraints is implicit within this analogy. The ethos of industrial psychology was familiar to this generation of men who had encountered it within military recruitment.[113]

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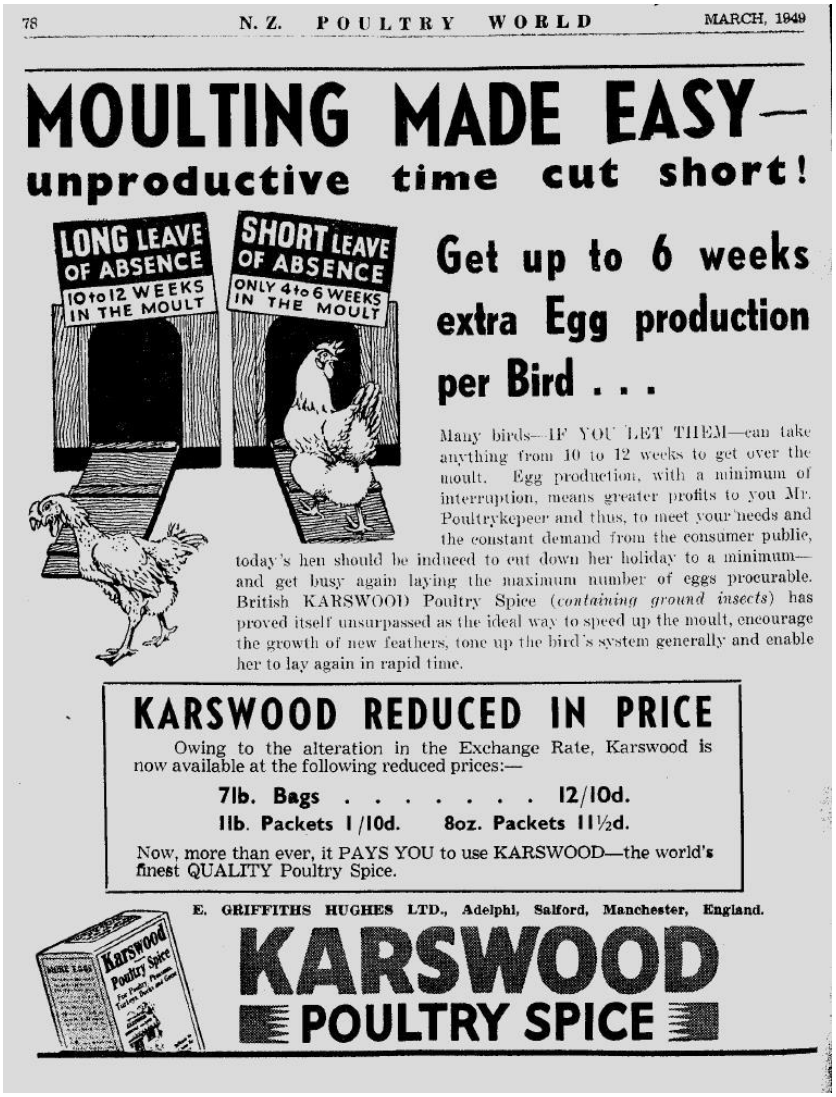
[110] '"Notes for the Novice," *NZPJ*, 20 January 1927, 13.

[111] Brown, "Common-Sense Poultry Keeping " 2.

[112] "The Strike Breaker. Or the Great Egg Food," *NZPJ*, 20 March 1914, 16. On farmer-union animosity during the 1913 strike see Belich, *Paradise Reforged: A History of the New Zealanders From the 1880s to the Year 2000*: 91-95.

[113] Rabinbach, *The Human Motor: Energy, Fatigue, and the Origins of Modernity*: 280-282. On ideas about chicken psychology, see under 'culling' in chapter four.


78 N. Z. POULTRY WORLD MARCH, 1949

MOULTING MADE EASY—
unproductive time cut short!

LONG LEAVE OF ABSENCE
10 to 12 WEEKS IN THE MOULT

SHORT LEAVE OF ABSENCE
ONLY 4 to 6 WEEKS IN THE MOULT

Get up to 6 weeks extra Egg production per Bird . . .

Many birds—IF YOU LET THEM—can take anything from 10 to 12 weeks to get over the moult. Egg production, with a minimum of interruption, means greater profits to you Mr. Poultrykeeper and thus, to meet your needs and the constant demand from the consumer public, today's hen should be induced to cut down her holiday to a minimum—and get busy again laying the maximum number of eggs procurable. British KARSWOOD Poultry Spice (*containing ground insects*) has proved itself unsurpassed as the ideal way to speed up the moult, encourage the growth of new feathers, tone up the bird's system generally and enable her to lay again in rapid time.

KARSWOOD REDUCED IN PRICE

Owing to the alteration in the Exchange Rate, Karswood is now available at the following reduced prices:—

7lb. Bags . . . . . 12/10d.
1lb. Packets 1/10d. 8oz. Packets 11½d.

Now, more than ever, it PAYS YOU to use KARSWOOD—the world's finest QUALITY Poultry Spice.

E. GRIFFITHS HUGHES LTD., Adelphi, Salford, Manchester, England.

KARSWOOD
POULTRY SPICE

Figure 19. Karswood Poultry Spice advertisement with shirking worker hens, 1949.[114]

WWII Karswood advertisements such as that noted earlier in which hens were likened to land army workers also posed winter rest as a problem to be remedied. Hens were required to 'speed up' and double their output for the nation and empire, while pullets were to be 'brought into service' at a younger age and older birds forced to overcome moulting or ill-health. The normal rules

[114] E. Griffiths Hughes Ltd., "Karswood Poultry Spice," *NZPW* 12, no. 3, (1949): 78.

of animal husbandry were to be discarded in this time of human crisis.[115] An *Otago Daily Times* report in 1943 militantly described birds as being 'hardened' in the brooders, with a 'finishing off' process in the paddocks making them 'ready for dispatch'.[116] This conflation of farming, industry and war was popularly acknowledged, and had been noted by social commentators and authors since the nineteenth century.[117]

Overwork through the use of artificial lighting within poultry farming was initially moderated by traditional ideas about treating chicken-workers well. A 1940 *NZPW* report advising on the use of artificial lighting to stimulate laying advised that this technology be used sparingly: 'Good horsemen hold a whip in reserve, using it only when good judgement indicates its need. Many pullet flocks are forced to lay beyond their physical capacity … Flocks that are properly bred should not have to go over the 12-hour day.' A good 'hen-man', like a 'fair employer', would go easy on youngsters, keep hours reasonable and strike a balance between maintaining hen health and profit concerns.[118]

However, as in any unregulated workplace, standards of fairness were subjective and prone to erosion. Bobby, a year later in the *NZPW* in an article promoting use of the technique, advised a maximum of 13 hours of daylight and artificial light combined. He reassured readers that it was 'not a dangerous

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[115] E. Griffiths Hughes Ltd., "Every Hen in Your Flock is a Potential 'Food Factory' of National Im[p]ortance," 25; E. Griffiths Hughes Ltd., "Speed-Up Your Wartime Production of Eggs," *NZPW* 3, no. 11, (1940): 3.

[116] "Mass Production. Modern Poultry Raising. Large-Scale Incubator," *ODT*, 12 October 1943, 6. Newspaper reports of expeditionary forces in WWI and II employed the same phrasing. See, for example, Rifleman [pseud.], "Territorial Notes," *AS*, 29 June 1916, 8.

[117] See for example, Ivy Saunders in the *Daily Mail*, reprinted in "Pigs and T.N.T," *Dominion*, 11 July 1918, 8. On writers such as Marx and Upton Sinclair see Daniel Pick, *War Machine: The Rationalisation of Slaughter in the Modern Age* (New Haven, Connecticut: Yale University Press, 1993). 182-185.

[118] "Artificial Lighting," *NZPW* 3, no. 4, (1940): 16.

method of forcing birds for eggs', but a 'sane method of inducing better production at a time when eggs are scarce'.

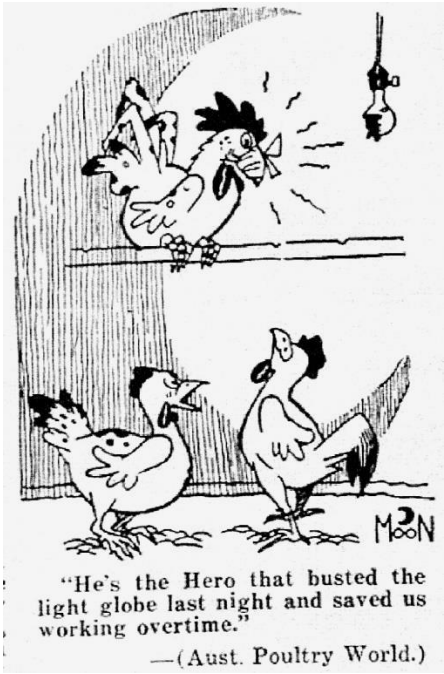

Figure 20. *Australian Poultry World* cartoon in the *NZPW*, 1941.[119]

The accompanying cartoon featuring hens as unionised employees poked fun at the fact that if chickens had a voice they might protest.[120] In this case, anthropomorphic humour deflects and minimises farmer concerns. But it also hints at the fact that, particularly in the absence of cages, farmers were aware that they still had to weigh management efficiencies against worker-hen compliance. In the *NZPW* in 1955 for example, the labour efficiency of large sheds was promoted, including advice about locating waterers, nests and feeders for ease of clearing and filling. However it was advised that:

> […] the heavy breed birds don't like to walk very far to get a drink or lay an egg – the maximum distance is around 20 feet. The hen's retaliation to an arrangement which does not suit her is to lay

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[119] Reprinted in *NZPW* 4, no.7 (1941): 7.

[120] Bobby, "Artificial Lighting and Winter Egg Production," 7.

> fewer eggs – or drop them on the floor when the urge overtakes her. In either case, the hen has won the argument. You Can't Argue with a Hen![121]

Nevertheless, such stances were small victories for the hen. By 1957, the maximum lit hours for the working hen had crept to 14 per day.[122] In addition, forcing birds by a technique known as 'forced moulting,' which involved intentionally stressing birds by withholding food, water and moving them to new quarters, was also introduced.[123] Maximising factory-efficiency was the vision for the future. As was reported in the *NZPW* in 1958, international experts envisaged that by 1978 layers would be kept in fully-automated, multi-storey houses, resembling a modern factory.[124]

Conclusion

The use of chicken worker analogies within the poultry press was supported by a mix of ideological factors, including biological ideas. The notion that chickens required occupation existed prior to industrialised farming, and its adaptation was evident within twentieth-century laying hen-worker analogy. This chapter initially outlined how the latter may be understood as a rationalisation integrated into cognitive schemas from childhood which were congruent with a biological worldview. Evolutionary and early ecological ideas about improved animals and the division of labour and cooperation within communities, entwined with utilitarian ideas about all beings productively contributing to the greater good and theological ideas about human dominion, informed chicken-worker description. The chicken-worker was a common trope in twentieth-century children's literature, instilling the modern work ethic and justifying the toughness of industrialised systems believed to apply to co-existing human and non-human animals. Notions of livestock-worker subservience were reinforced

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[121] "You Can't Argue With a Hen!," *NZPW* 18, no. 9, (1955): 398.

[122] Hale, "Pullets are at Difficult Stage," 144.

[123] "Natural and Man-Made Moulting," *NZPW* 20, no. 3, (1957): 135.

[124] "A Twenty-Year Forecast," *NZPW* 21, no. 2, (1958): 7.

by theories of civilised docility from evolutionary psychology. Chicken-worker analogies continued established traditions within animal husbandry and animal rights discourse.

Twentieth-century chicken-worker description was also sustained by physiological research into the animal-machine – the latter a concept applied to human and non-human workers alike. Chicken-machine descriptions served two purposes: as educational models (especially for discussing nutrition or ovarian function) or to convey reductionist conceptions of the chicken within the factory-farm. Its use, in the former mode in particular, did not preclude apprehension of bird psychology. Vitalist notions of physiological order and ideas from comparative psychology modified literal conceptions of the chicken-as-machine. The care of the hen's reproductive mechanism was discussed with reference to fundamental biological principles as it was understood within the context of general physiology and ideas about improving fertility in the human female. Poultry nutrition education utilised the common mechanistic analogy of the body as a transformer of fuel and general ideas about the palatability of food aiding digestion and the balanced ration.

From the commencement of industry, poultry farms were discussed as factories, and New Zealand famers were attuned to this analogy. Processes such as year-round hatching, the focus on quantity of output, and the disposal of inefficient wasters, reflected the application of scientific management. Changing descriptions of factory farms and chicken-workers were evident. Both were initially aligned with progressive turn-of-the-century rhetoric, but by the 1930s debates about chicken-worker fatigue, 'forcing' and 'waste' were informed by general physiology and degeneration theory, and reflected moral concerns. These concerns, especially in the interwar period, were also reinfoced by wider societal debate about mass-production and worker treatment as the humanitarian conflation of worker and animal rights persisted. Advertisements depicting chicks reminded farmers of their parental duty of care within industrialising systems.

Chicken-worker analogies commonly employed within Karswood Poultry Spice advertisements countered concerns about overwork, appealing to ideas about cooperative relationships, animal duty and worker 'type'. During war, images of the complicit and heroic worker hen, aligned with heroic human efforts, served to remind farmers of their vital home-front role and the need to suppress ethical concerns. An example of a humorous analogy of worker-hens in the 1950s as artificial lighting commenced, alluded to farmer cognizance of bird agency and concern about the degree to which hens could be forced. Images of worker-hens were recognised as analogies but played to sustained conceptions of their fundamental connection with human counterparts.

Chapter Five

Chicken Eugenics

> The hen incapable of discharging the high duty for which she is designed is a subject to command sympathy. She lingers around, discarded by her mates, as if dissatisfied that she is unable to do the work expected of her. Later her blackening comb and dull eye betoken her unfitness for profit, and while one could give directions for her possible recovery and restoration to usefulness, the beginner is advised to kill the bird. To save her means she may reproduce her kind, and, if in human progress, we are slow to adopt eugenics, the poultryman must have no sentiment, but adhere strictly to eugenic principles, and eliminate all birds that show signs of constitutional weakness, lest his whole flock be ultimately affected by the fertility of the unfit.
>
> Merrett, *Poultry for Profit*, 1926.[1]

Describing livestock selection and disposal as eugenics did not seem bizarre to readers when the above was published in 1926. In the first half century, eugenics – defined by Galton as the science of human stock improvement[2] – was an international movement associated, particularly prior to 1930, with progressive reform. The New Zealand Eugenics Education Society (NZEES) was formed in Dunedin in 1910, with branches in Wellington, Christchurch and Timaru by 1912. NZEES members included esteemed politicians and scientists such as Benham who founded the society and King. This group successfully strengthened legislation for the incarceration of 'mental defectives' and sterilisation measures were being actively debated when Merrett wrote his book

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[1] Merrett, *Poultry for Profit in New Zealand: A Practical Guide to Poultry Keeping in New Zealand and Australia for Use and Profit*: 32.

[2] Francis Galton, *Inquiries Into Human Faculty and Its Development* (London: Macmillan & Co., 1883). 30.

in the 1920s. However, as several historians have noted, the eugenic focus of much of New Zealand's reforming classes echoed King's 'Lamarckian', environmental views, and were concerned with improving the moral, intellectual and physical health and virility of the 'fit', particularly through health, education and child welfare measures.[3]

This chapter argues that sustained attention to the poultry breeder's traditional art of selection was supported by prevailing eugenic ideas which infiltrated the national psyche as a system of evaluating the fitness of living beings in the first half of the century.[4] The conflation of genetics and eugenics within lay conception is firstly outlined. This includes an examination of the use of livestock breeding analogy within eugenic education, farming sector awareness of natural laws pertaining to the science of heredity, and the historic interplay between international poultry genetic and eugenic research and local awareness of this. I next explore ideas about races of poultry, including debates about hybridity, fears of racial degeneration, and hopes for a New Zealand type. This is followed by an examination of eugenic ideals of beauty with respect to the utility hen, and efforts to engineer the ideal layer through systems of body measurement. I then detail eugenic ideas in respect to selection and culling through observation of behavioural and physical traits. The final section of this chapter examines the persistent eugenicised poultry culture within WWII and the post-war period.

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[3] Fleming, "Eugenics in New Zealand, 1900-1940."; Stephen Garton, "Eugenics in Australia and New Zealand: Laboratories of Racial Science," in *The Oxford Handbook of the History of Eugenics*, ed. Alison Bashford and Philippa Levine (Oxford: Oxford University Press, 2010), 243-257. On King's eugenic views see "The Fit and Unfit," *EP*, 13 August 1906, 5. Fleming (p.10), states that King was a member of the Wellington Council of the NZEES. On the terms 'Lamarckian' and 'environmental' see Hawkins, *Social Darwinism in European and American Thought, 1860-1945: Nature as Model and Nature as Threat*: 40-44.

[4] On this latter point within Anglo-American nations see Hasian, *The Rhetoric of Eugenics in Anglo-American Thought*: 30.

When eugenic principles for poultry were outlined in the English *Poultry Farmer* and the Australian *Farmer and Settler* in 1944 they were described in terms of the selection of breeding stock and the culling of defective birds, as well as preventative, environmental principles.[5] The same broad conception was evident amongst New Zealand breeders, but when Merrett and others explicitly referred to poultry eugenics they were discussing breed improvement, particularly by selection and culling, which is the central concern of this chapter. Preventative health principles are the subject of chapter six.

The General Science of Heredity

Eugenics Education and the Livestock Model

As historian Angela Wanhalla observed, New Zealand eugenicists, and women's groups in particular, frequently promoted eugenics through livestock analogy.[6] The Woman's Division of the Farmer's Union (WDFU) was active in supporting eugenic reform, and Nina Barrer, vice-president of WDFU from 1925-1947 and editor of the *NZCW* from 1933 to 1935, employed livestock analogies in her campaign in support of sterilisation laws. In an article in 1933 she began:

> What would be thought of the farmer who drained and topdressed his land, sowed with the best pasture or crops, provided the best stock his purse could afford, and then, while continuing to keep up the environmental standard, neglected to cull out inferior stock …?[7]

Barrer discussed these principles as natural laws and her belief that while New Zealand settlers were 'the finest stock to be found in the world', this was being

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[5] An article from the *Poultry Farmer* reprinted in "Eugenics - Art of Breeding Well," *Farmer and Settler*, 26 May 1944, 6.

[6] Wanhalla, "Gender, Race and Colonial Identity: Women and Eugenics in New Zealand, 1918-1939," 73.

[7] Nina A.R. Barrer, "The Problem of the Mentally Defective," *NZCW*, 20 May 1933, 6.

eroded by immigration and the 'biological menace' of prolific mental defectives.[8]

The Plunket Society also overtly employed livestock analogy. They proposed their own 'standards of bodily perfection for human specimens' in their early information booklet for mothers, prioritising five bodily points,[9] and the Society's regular education columns, *Our Babies*, which circulated in the nation's newspapers into the 1930s, frequently highlighted livestock husbandry principles.[10] Baby competitions organised by Plunket, but also though local produce and agricultural fairs, mimicked an American and international trend for 'Better Baby' competitions in eugenic education.[11] A New York better babies competition directly inspired by rural shows that proved that 'the blue-ribboned animals entered by farmers at cattle shows are far more physically fit than the babies,' was reported in the New Zealand press in 1913. The judges' score card (below) inspired local discussion on the ideal baby.

> Height … 8 points
> Weight … 8
> Circumference of chest … 6
> Circumference of abdomen … 6
> Shape of forehead … 5
> Shape of ears … 5

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[8] Wanhalla, "Gender, Race and Colonial Identity: Women and Eugenics in New Zealand, 1918-1939," 82-83.

[9] King, *The Beautiful Babies. What Becomes of Them? The Purpose of the Plunket Society*: n.p. This was reprinted in 1926.

[10] See for example, Hygeia [pseud.], "Our Babies," *ODT*, 6 January 1910, 3; Hygeia [pseud.], "Our Babies," *NA*, 20 January 1923, 10.

[11] D.S. [pseud.], "Improving the Race," *The Horsham Times*, 6 April 1928, 12; Alexandra Stern, "Making Better Babies: Public Health and Race Betterment in Indiana, 1920-1935," *American Journal of Public Health.* 92, no. 5, (2002): 742-752; Leland L. Glenna, Margaret A. Gollnick, and Stephen S. Jones, "Eugenic Opportunity Structures: Teaching Genetic Engineering at US Land-Grant Universities Since 1911," *Social Studies of Science* 37, no. 2, (2007): 3-6.

Bones of chest and skull, spine, limbs and feet … 10

Number of teeth … 7

Tonsils … 10

Quality of skin … 6

Quality of muscles … 5

Disposition … 6

Energy … 6

Facial expression … 10

Attention … 3 [12]

Livestock comparison was less overtly stated but implicit within reports of New Zealand competitions. For example, a Dunedin fete in 1908 reportedly attracted a large crowd to the Gardens 'to participate in the pleasure to be derived from bands, babies, and botany … A very critical examination was made of nine girls and 37 boys, and the samples may, on the whole, be pronounced a very fine lot that would do credit to any community'. Such displays were said to be in the general spirit of improvement.[13]

The common-sense of eugenic agricultural analogies was also reinforced within school science education which utilised maize experiments as generalisable studies. It also appealed in an era when at the very least, 25 to 50 percent of people had knowledge of animal breeding through observation of backyard fowls. Engagement with the eugenics debate on this basis is evident, for example, in a letter to the *Otago Daily Times* in 1911 highlighting the hypocrisy of sterilisation advocates emphasising natural laws. It was argued that if they were familiar with poultry flocks they would know that:

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[12] "Better Babies," *Clutha Leader*, 27 May 1913, 8; "Better Babies. Education of American Mothers," *PBH*, 14 June 1913, 9.

[13] "Bands' Fete and Baby Show," *OW*, 11 November 1908, 66. See also for example, "The Winter Show," *AS*, 24 July 1923, 3.

> […] weeds could be the progeny of even a most, robust, pair of birds, such as he would never have dreamed of sterilising; and the progeny of the most miserable pair of fowls could be, in the course of two or three generations, built up to splendid stock by good housing, feeding, etc.[14]

Heredity c. 1900

Interest in eugenics and the initially-entwined field of genetics, as it was referred to by scientists from 1906, was boosted by the rediscovery within the scientific community of Gregor Mendel's law of heredity in 1900.[15] Galton's 'ancestral law of heredity' which emphasised attention to pedigree to 'avoid the production of undesirable types' was commonly referred to in agricultural literature around the turn of the century and in popular biology texts such as Thomson's, into the 1930s, along with Mendel's law and the insights of other contemporary scientists. The many popular books on the general science of heredity, like Thomson's own book on the topic, were intended for all students of biology, including farmers and breeders.[16]

Mendel's sweetpea studies, which mathematically deciphered observations of variation in offspring, explaining how living things could 'breed true' by the possession of homozygous or dominant traits, or not due to heterozygous or recessive traits, were also informed by livestock breeding.[17] Chickens were the first animal in which Mendel's laws were found to hold true. British geneticist

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[14] Opoho [pseud.], "Sterilisation of the Unfit," *ODT*, 27 May 1911, 9.

[15] Möller-Wille and Rheinberger, *A Cultural History of Heredity*: 128.

[16] On Galton's 'ancestral law of heredity' in agricultural and animal breeding columns see for example, T.G. Palgrave, "Breeding Dairy Cows," *NZH*, 24 November 1913, 9; H.B.T. [pseud.], "Types of Animals," *NZH*, 11 October 1932, 15. See also Nicholas W. Gillham, *A Life of Sir Francis Galton: From African Exploration to the Birth of Eugenics* (New York: Oxford University Press, 2001). 303-305. On Thomson's text, see Dinornis [pseud.], "Heredity," *ODT*, 20 June 1908, 7.

[17] Vitezslav Orel and R.J. Wood, "The Sheep Breeders' Legacy to Gregor Mendel," in *Gregor Mendel and the Foundation of Genetics*, ed. Vitezslav Orel and Anna Matalova (Brno: Mendelianum of the Moravian Museum, 1983), 57-75.

William Bateson published these results in 1902. The *NZPJ* published his research into dominant and recessive poultry characters over the subsequent two decades.[18] 'Terror' in the *Otago Witness* introduced Mendel's principles in his poultry columns in 1907, explaining them at length and concluding hopefully: 'there can be no doubt that utility points, such as persistent laying, size, and colour of egg, etc., are to be modified or strengthened by a study of this law.'[19] The Milton poultry station tested Mendel's laws in one experiment in 1909 as Government officials were also hopeful for gains in respect to plants and livestock.[20]

Terror in his column had admitted that Mendel's principles were debated amongst breeders. Scepticism was also revealed in bemused public reactions, as in a report in the *Dominion* in 1913:

> [On an experimental farm near Leicester] are rows of peas which were the first plants to disclose Mendel's strange law of inheritance. In another a variety of rodents and rabbits [… Because these laws also apply to human beings,] while the botanists and farmers are inspecting the generations of tall peas and short peas or rust-proof wheats and sparrow-proof barleys, the zoologists will be able to examine family groups of villagers and to mark

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[18] R.C. Punnett, *Heredity in Poultry* (London: MacMillan & Co., Ltd., 1923). 2. For published research see for example, H.A. Woolnough, "Some Breeding Hints," *NZPJ*, 20 September 1922, 32. See also R. Pearl and F. M. Surface, *Studies in Hybrid Poultry, Bulletin No. 179* (Maine Agricultural Experiment Station, 1910) in Bugos, "Intellectual Property Protection in the American Chicken-Breeding Industry," 141.

[19] Terror [pseud.], "Poultry Notes. Mendel's Law of Heredity," *OW*, 11 September 1907, 35.

[20] "Plant-Breeding," *MEX*, 8 May 1908, 5; "State Poultry," *EP*, 14 April 1909, 3. See also the report by R.C. Punnett and Arthur Belfour from the *Bulletin of Agricultural Intelligence and Plant Diseases of the Institute of Agriculture* reprinted in "The Progress of Mendelian Studies in Great Britain," *NZJA*, 15 August 1913, 182-184.

> whether tallness, as in sweet peas, or "brownness" in eyes are "dominant" over shortness or "blueness."[21]

This echoed the sentiments of popular books such as H.G. Wells' *The Food of the Gods* (1904), a satire in which two bumbling scientists created a substance to enhance growth. Their initial trials on chickens on an experimental farm went disastrously wrong.[22]

Genetics was 'in the too hard basket' for everyday poultry-keepers and the general comprehension of heredity in the early twentieth century was, as noted in the *Otago Daily Times* in 1906: 'as thoroughly misunderstood as any subject well could be.'[23] This situation was not aided by research, as scientists were aware by the end of WWI that most economically-valuable traits were attributable to multiple gene combinations and environmental factors, rather than simple Mendelian inheritance. This stymied the hopes of breeders and eugenicists for immediate access to formulaic breeding plans.[24]

International Eugenic Poultry Research

Poultry geneticists on experimental farms in Britain and North America from 1900 to 1930 investigated the fundamental principles of evolution, heredity and constitutional health. Genetic-eugenic research was a primary focus, and specialist industry needs secondary. Although as historian Margaret Derry confirmed, poultry breeders essentially continued their traditional practices as genetics was of limited assistance, it is evident within New Zealand sources that they maintained attention to ongoing research.[25]

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[21] "Heredity Farm," *Dominion*, 9 October 1913, 11.

[22] H. G. Wells, *The Food of the Gods and How It Came to Earth* (Leipzig: B. Tauchnitz, 1904).

[23] Dinornis [pseud.], "Heredity," *ODT*, 18 August 1906, 6.

[24] Kenneth M. Ludmerer, "American Geneticists and the Eugenics Movement: 1905-1935," *JHistBio* 2, no. 2, (1969): 337-362; Boyd, "Making Meat: Science, Technology, and American Poultry Production," 655-656.

[25] Derry, *Art and Science in Breeding: Creating Better Chickens*: 85-87.

British geneticists worked closely with fancy breeders and some had backgrounds as breeders themselves. The British Genetical Society planned conferences to coincide with International Poultry Congresses, and the British Research Council included poultry breeders and genetic scientists.[26] Reginald Punnett, after whom geneticists' 'punnett square' tools are named, worked closely with Bateson with whom he co-founded the *Journal of Genetics* (published 1910-1926). Punnett published the first textbook on Mendelism, *Mendelism* (first edition, 1905) and published on eugenics during WWI. He also wrote *Heredity in Poultry* (1923) and established the phenomenon of sex-linked plumage, subsequently developing 'auto-sexing' breeds with his colleague, Michael Pease. These breeds were promoted commercially from the 1930s, enabling the easy identification of male chicks for disposal.[27] Punnett's books on this were advertised in New Zealand industry journals and auto-sexing breeds were bred at Massey College.[28]

Heredity in Poultry remained recommended reading for poultry-breeders into the 1990s, as did Morley Allan Jull's *Poultry Breeding* (1932), to which Punnett contributed, commenting: 'what is written here is only part of some great scheme into which all of us living creatures must willy-nilly fit. … There is little doubt that much of what is here recorded concerning the nature of the hen

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[26] Marie, "For Science, Love and Money: The Social Worlds of Poultry and Rabbit Breeding in Britain, 1900-1940," 922, 928-930.

[27] R.C. Punnett, *Mendelism*, 1st ed. (Cambridge: Macmillan & Bowes, 1905); R.C. Punnett, "Eliminating Feeblmindedness," *Journal of Heredity* 8 no. 10, (1917): 464-465; Punnett, *Heredity in Poultry*; Morley A. Jull, *Poultry Breeding* (New York: John Wiley & Sons, 1932). xi-xiii; "Wonderbar," *NZPW* 2, no. 4, (1939): 28.

[28] R.C. Punnett, *Sex-Linkage for Egg Production and Table Poultry* (London: Daily Mail, 1925); R.C. Punnett, *The Sex-Linked Method in Poultry Breeding* (London: H.M.S.O., 1932). For advertisements and Massey experiments see for example, J.B. Merrett, "Sex-Linked Inheritance," *NZPJ*, 20 November 1925, 19; "The Auto-Sexing Breeds," *NZPW* 4, no. 10, (1941): 4.

offers the clue to much that is puzzling in ourselves.'[29] *Mendelism* was also widely accessed within New Zealand universities and government departments. An *Auckland Star* review in 1911 commented that the book would be of great interest to both commercial animal breeders and eugenicists. It was suggested that 'ambitious women' concerned about their own offspring should heed Punnett's examples of sex-linked trait transmission within Brown Leghorn hens. Punnett had suggested that sex-linked traits might explain 'deficit' qualities in girls, including intelligence.[30] Although pre-WWII New Zealand school syllabuses focussed on plant breeding, Thomson's *Study of Animal Life* detailed Punnett and Bateson's poultry research in his chapter on heredity, noting implications for human stock.[31]

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[29] Jull, *Poultry Breeding*: xiv. *Heredity in Poultry* was first mentioned in "New Publications," *NZPJ*, 20 June 1923, 29. For ongoing attention to these books see Utility Poultry Standards Revision Committee, *New Zealand Utility Poultry Standards of Perfection and Breeding of Poultry*: 72; Ian Selby, *New Zealand Poultry Standards* (New Plymouth: I. & G. Selby Ltd., 1992). 5.

[30] The Bookfellow [pseud.], *AS*, 4 November 1911, 13; R.C. Punnett, *Mendelism*, 3rd ed., (1911), Project Gutenberg, accessed 24 September 2013, http://www.gutenberg.org/files/28775/28775-h/28775-h.htm#page107. In this see pp.113-114.

[31] Thomson, *The Study of Animal Life*: 378-382.

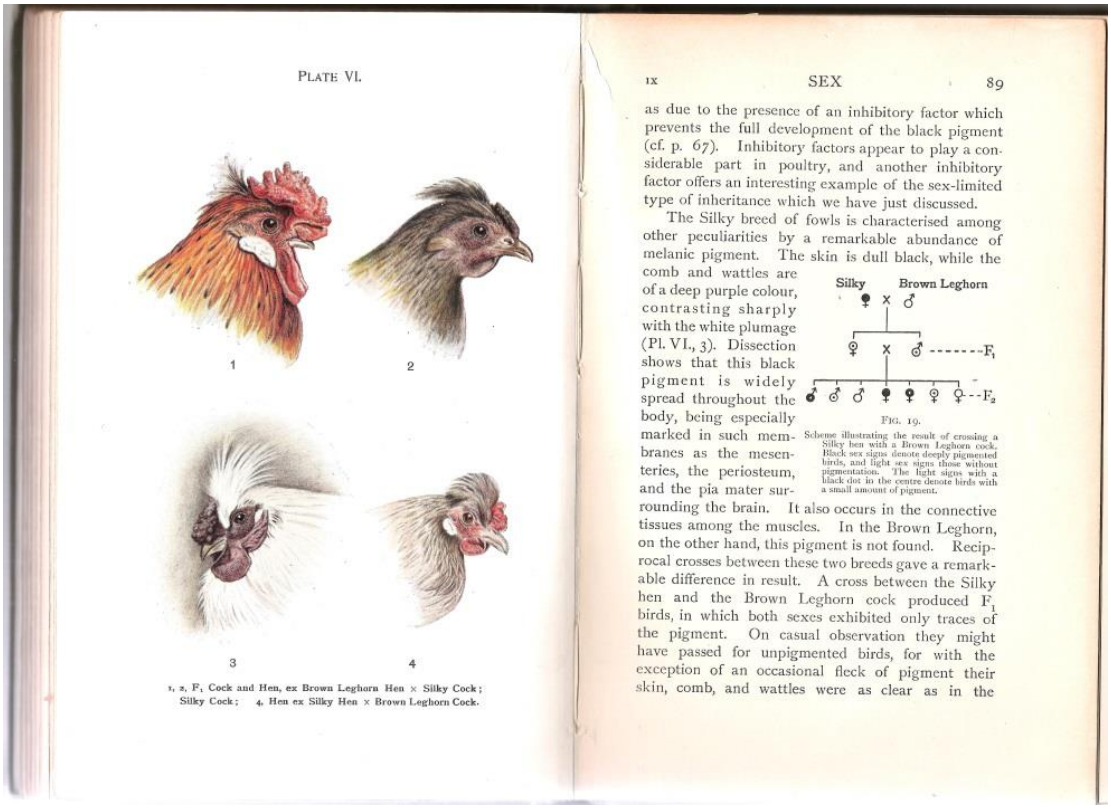

PLATE VI.

1 2 3 4

1, 2, F_1 Cock and Hen, ex Brown Leghorn Hen × Silky Cock; Silky Cock; 4, Hen ex Silky Hen × Brown Leghorn Cock.

IX SEX 89

as due to the presence of an inhibitory factor which prevents the full development of the black pigment (cf. p. 67). Inhibitory factors appear to play a considerable part in poultry, and another inhibitory factor offers an interesting example of the sex-limited type of inheritance which we have just discussed.

The Silky breed of fowls is characterised among other peculiarities by a remarkable abundance of melanic pigment. The skin is dull black, while the comb and wattles are of a deep purple colour, contrasting sharply with the white plumage (Pl. VI., 3). Dissection shows that this black pigment is widely spread throughout the body, being especially marked in such membranes as the mesenteries, the periosteum, and the pia mater surrounding the brain. It also occurs in the connective tissues among the muscles. In the Brown Leghorn, on the other hand, this pigment is not found. Reciprocal crosses between these two breeds gave a remarkable difference in result. A cross between the Silky hen and the Brown Leghorn cock produced F_1 birds, in which both sexes exhibited only traces of the pigment. On casual observation they might have passed for unpigmented birds, for with the exception of an occasional fleck of pigment their skin, comb, and wattles were as clear as in the

Silky Brown Leghorn

F_1

F_2

FIG. 19.

Scheme illustrating the result of crossing a Silky hen with a Brown Leghorn cock. Black sex signs denote deeply pigmented birds, and light sex signs those without pigmentation. The light signs with a black dot in the centre denote birds with a small amount of pigment.

Figure 21. Pages illustrating sex-linked inheritance in Punnett's *Mendelism*.[32]

Charles Davenport, who became an international leader in the eugenics movement, headed the American Breeders Association (ABA). This was founded in 1903 to support genetic research.[33] Its stated objectives were:

> [T]he advancement of the discovery of the basic facts concerning heredity, the devising of new plans for creative breeding, and the organisation of those projects which lead toward improved plants, animals and men.[34]

Davenport was involved with the ABA poultry committee and researched poultry during his tenure as Director of the Carnegie Station for Experimental

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[32] R.C. Punnett, *Mendelism*, 6th ed. (London: MacMillan & Co., Ltd., 1922). 88-89.

[33] Kimmelman, "The American Breeders' Association: Genetics and Eugenics in an Agricultural Context, 1903-13," 163-204.

[34] From the ABA Magazine (1910), cited in Pauline M.H. Mazumdar, *The Eugenics Movement. An International Perspective, vol. II* (London and New York: Routledge, 2007). xviii.

Evolution, a farm which adjoined the Eugenics Records Office at Cold Spring Harbor.[35] He toured New Zealand in 1914, lecturing on his well-known publication, *Heredity in Relation to Eugenics* (1911), reportedly receiving large audiences. Lecture notices trumpeted his animal breeding experience. A report of his Canterbury lecture noted that he utilised poultry breeding to illustrate eugenics principles, reminding the audience that interest in the scientific breeding of humans had arisen as: 'the law of inheritance applied to men as it did to animals, for man was only an animal.'[36]

Raymond Pearl, secretary of the WPSA from 1912 to 1921 and known to Merrett, was another poultry breeder-eugenicist associated with the ABA. Pearl researched poultry at the Maine Agricultural Experiment Station as head of its biology department from 1907 to 1918.[37] Trained as a biologist, Pearl's well-documented career exemplifies the interdisciplinary general biology of this era. He initially specialised in heredity science, biometrical methods and embryology. While at Maine he was president of the American Society of Naturalists, advocating for behaviourist psychology. In 1918 he became Professor of Biometry and Statistics at John Hopkins University, and established the field of human biology. He became president of the American Association of Physical Anthropologists in 1934 and wrote *Man the Animal*, which was published posthumously in 1946. Although he publically rejected the extreme hereditarian views of eugenic zealots in 1927, Pearl throughout his career promoted 'integrative' approaches to biology, and with this objective in

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[35] Boyd, "Making Meat: Science, Technology, and American Poultry Production," 655; "Topic: Agricultural Genetics," Eugenics Archive, accessed 9 June 2013, http://eugenicsarchive.org/eugenics/topics_fs.pl?theme=28&search=&matches=.

[36] "Need for Racial Purity," *AS*, 1 September 1914, 7; "Heredity in Relation to Eugenics," *EP*, 4 September 1914, 8; "Heredity and Eugenics," *Press*, 10 September 1914, 10.

[37] Ludmerer, "American Geneticists and the Eugenics Movement: 1905-1935," 341-342; "Officers of the Association," World's Poultry Science Association, accessed 6 May 2013, http://www.wpsa.com/organization/officers.html.

view established the *Quarterly Review of Biology*.[38] This journal was subscribed to by many New Zealand universities and scientific institutions from its commencement in 1926.[39] Reports of Pearl's studies on topics ranging from cow lactation to lemming suicides and human mortality were often cited in the nation's newspapers between 1910 and 1945.[40]

Pearl's poultry research, including the presentation of his work into Mendelian inheritance at the first International Eugenics Congress in 1912, was cited in New Zealand newspapers and in the *NZPJ*. The *North Otago Times* reported in 1914 that a certain poultry breeder by the name of 'Mr Pearl' was 'testing eugenics (i.e., the science of race breeding) upon chickens, with the special object of ascertaining what effect heredity may have upon their laying.' This project was also published in the *Reliable Poultry Journal*, an American journal familiar to New Zealand breeders. Pearl established that there was no necessary correlation between the egg production of mother and daughter hens, and recommended progeny-testing: breeding from roosters which were themselves the progeny of high-producing hens and whose progeny were proven to be high layers. However, he realised that the control of mating was impractical in these years prior to artificial insemination, so advised continuing attention to health and egg records, and precise record-keeping with breeding pens. In New Zealand his research findings were reduced to the headline: 'Chickens take after their Fathers,' which was said to confirm what farmers already knew about the

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[38] Little and Garruto, "Raymond Pearl and the Shaping of Human Biology," 77-102; Elazar Barkan, *The Retreat of Scientific Racism: Changing Concepts of Race in Britain and the United States Between the World Wars* (Cambridge and New York: Cambridge University Press, 1992). 210-220.

[39] See NZLC for holdings. AgResearch holdings, originally from the Ruakura Station library, are more recent, dating from 1947 according to library e-mail to author, 8 April 2014.

[40] See for example, "Study and Analysis of Milk Records," *Wanganui Chronicle*, 9 February 1918, 7; "A Green Old Age," *EP*, 12 May 1923, 14; "Will Man's Intelligence Destroy Him?," *EP*, 21 August 1937, 25.

importance of sires, and truths known about humans, such as the fact that 'the daughter of a heavily bearded man is likely to bear hairy sons.'[41]

Races and Mongrels

In 1903, Dr. William Chapple published the influential text of the New Zealand eugenics movement, *Fertility of the Unfit*, introducing this with the familiar trope of the 'wondrous mechanism' of the chicken embryo, the development of which he said, represented 'the history of the race to which the chick belongs'.[42] Races of human and non-human animals were identified from the nineteenth century,[43] and within professional science up until 1950, race as a term was used loosely and applied to various typological groupings. Despite ambiguity, it was believed to represent a naturally-existing average type that could be identified and measured.[44]

Books on races of people and animals were a common genre within the conceptually-intertwined fields of natural history, agriculture and anthropology in the late nineteenth and early twentieth centuries.[45] In 1906, Edward Brown (not to be confused with New Zealand's official, Fred Brown), a well-known British industry advocate and the president of the WPSA while Pearl was

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[41] Dr Raymond Pearl, "Breeding for Heavy Egg Production," *Reliable Poultry Journal* 20, (1913): 812-813, 860-862. For reports of Pearl's work see for example: "The Eugenics Congress," *AS*, 13 September 1912, 6; "Poultry Notes," *NZH*, 5 February 1913, 13; "Chickens Take After Their Fathers," *NOT*, 31 January 1914, 3; Merrett, "The Official Conference Report. Secretary's Annual Report," n.p.

[42] William A. Chapple, *Fertility of the Unfit* (Wellington: Whitcombe & Tombs Ltd., 1903). ix-x. The text's influence is noted in Garton, "Eugenics in Australia and New Zealand: Laboratories of Racial Science," 245.

[43] Ritvo, *The Platypus and the Mermaid, and Other Figments of the Classifying Imagination*: 75-81.

[44] Nancy Stepan, *The Idea of Race in Science: Great Britain 1800-1960* (London: MacMillian Press Ltd., 1982). xviii, xx.

[45] Kete, "Introduction: Animals and Human Empire," 16-23.

secretary from 1912 to 1927, published *Races of Domestic Poultry*.[46] He observed that by 1853 attention to races of poultry within poultry texts was flourishing, and 34 distinguishable races were identified. Brown identified 71 races, all with potential utility value, which was the focus of his book. The preservation of these races, he believed, would prove vital due to their various commercial qualities and suitability to different conditions.[47] Brown employed the terms race and breed interchangeably, and continued to do so in his 1930 publication, *British Poultry Husbandry*.[48] These terms, as well as 'strain', 'variety', and 'species', were also used interchangeably by other experts.[49] The *New Zealand Utility Poultry Standards* in 1954 continued to define breed as 'a race of fowls'.[50]

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[46] "A Charming New Book," *AS*, 19 October 1934, 17; Sayer, "Animal Machines: The Public Response to Intensification in Great Britain, c. 1960-c. 1973," 476-477; "Officers of the Association", accessed 6 May 2013, http://www.wpsa.com/organization/officers.html.

[47] Edward Brown, *Races of Domestic Poultry* (London: Edward Arnold, 1906). v, 14, 16-17. Example of published excerpt: "Breeding of Poultry," *MEX*, 4 February 1907, 4.

[48] Edward Brown, *British Poultry Husbandry* (London: Chapman & Hall, 1930).

[49] See for example, Wright, *The New Book of Poultry, with Forty-Five Plates in Colour and Black and White by J.W. Ludlow and the Poultry Club Standards of Perfection for the Various Breeds*: 176, 186, 239, 241.

[50] Utility Poultry Standards Revision Committee, *New Zealand Utility Poultry Standards of Perfection and Breeding of Poultry*: 64.

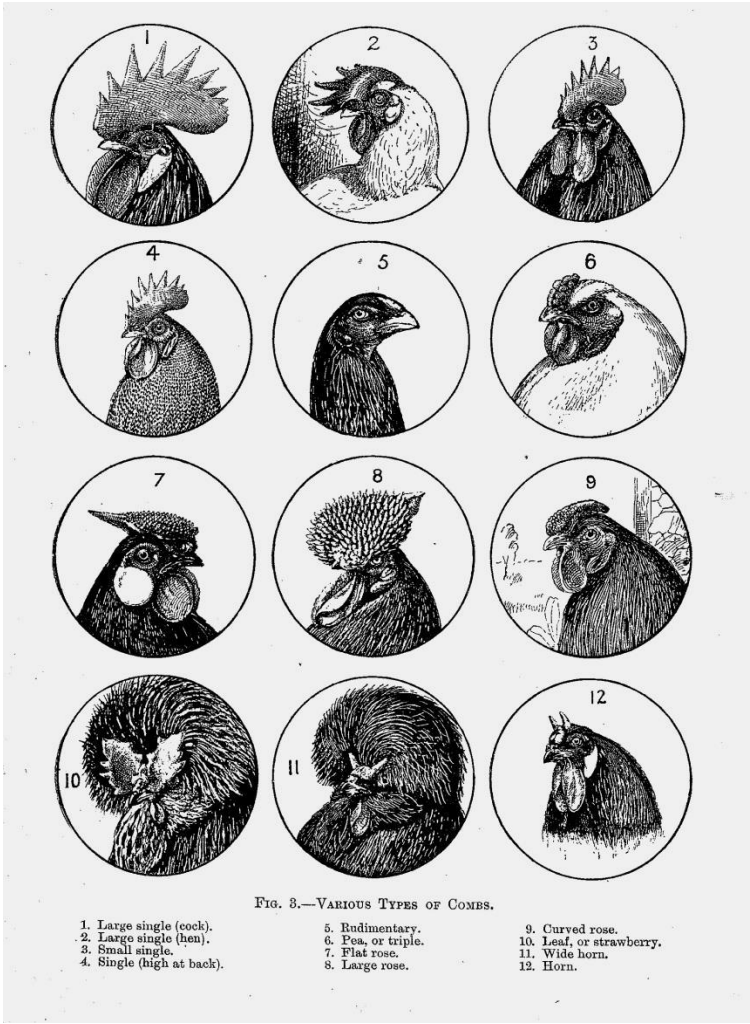

Figure 22. Edward Brown, 'Various Types of Comb' in *Races of Domestic Poultry* (1906).[51]

Brown defined poultry races by their 'blood purity', asserting that race cross-breeding, or 'mongrelism' spelt degeneracy.[52] This traditional language of 'bloods' used by livestock breeders conveyed an older notion of inheritance as the dilution or blending of traits, and continued within eugenic and farming discourse into the twentieth century.[53] The notion of purity around the turn of

[51] Brown, *Races of Domestic Poultry*: 21. Comb size was thought to correlate with fertility.

[52] See a review of *Races* in "Breeding of Poultry," *MEX*, 4 February 1907, 4. Davenport was also of the opinion that poultry breeding efforts should focus on racial 'purification'. See Boyd, "Making Meat: Science, Technology, and American Poultry Production," 655.

[53] Möller-Wille and Rheinberger, *A Cultural History of Heredity*: 64, 119-122. See also the use of this throughout Galton, *Inquiries Into Human Faculty and Its Development*.

the century was associated with scientific mastery and was a marketable quality in humans and animals alike.[54]

This was evident from the 1890s when New Zealand breeders promoted the superiority of their artificially-selected purebreds over mongrel 'barndoor' flocks, which were often inter-racial and too closely inbred. One breeder commented in the *Otago Witness* in 1897:

> [Most people are] content to allow their flocks of hens to breed in a miscellaneous fashion […] The feathers on these degenerate fowls [revert] to the hair-like down of some primitive ante-type, and for laying purposes they [are] practically worthless. It is a universal law of nature that in-breeding means decay and final extinction.[55]

Breeders associated the naturally-selected hen with unscientific, 'backward' poultry-keeping. A turn-of-the-century cartoon from the *Otago Witness* in 1905, picturing a Māori girl frightened by a hatching chick from a dinner-table egg (below), reflected these ideas. Accidental fertile eggs were only possible with unfenced fowl. In this image, the chick, a product of backyard chaos, is associated with the girl, who retains her 'primitive' head feathers. The implication was that this girl, although being dressed in European clothes, was living with only the pretence of civilisation. The colour of the bird may also have signalled backwardness to the reader, as egg-laying birds on modern farms were already by this time predominantly White Leghorns, which hatched as light-coloured chicks.

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[54] Möller-Wille and Rheinberger, *A Cultural History of Heredity*: 136-137.

[55] "Notes on Rural Topics," *OW*, 18 November 1897, 5.

Figure 23. Trevor Lloyd, "An Easter Tragedy", 1905.[56]

The cartoonist for this image, Trevor Lloyd, had grown up on a farm and was, judging by his postcard of around 1905 (below), familiar with chickens. Māori farms were represented as the antithesis to modern, improved farms in the mainstream press[57] and few Maori were involved in poultry farming.[58] Thus,

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[56] Trevor Lloyd, "An Easter Tragedy," *OW*, 20 April 1905, 7.

[57] On turn of the century beliefs about Maori as a degenerating race, without scientific skill or drive, see Margaret McClure, "On Work: Perceptions of Work in Late Nineteenth Century New Zealand 1870-1900" (M.A. thesis, University of Auckland, 1993), 13-14. See also Colin McGeorge, "Race, Empire and the Maori in the New Zealand Primary School Curriculum 1880-1940 " in *The Imperial Curriculum*, ed. J.A. Mangan (London: Routledge, 1993), 66-67. For more positive views based on beliefs about Aryan roots, improvement, and the effect of miscegenation, see ibid., 77; McClure, "On Work: Perceptions of Work in Late Nineteenth Century New Zealand 1870-1900," 81-82; Angela Wanhalla, *Matters of the Heart: A History of Interracial Marriage in New Zealand* (Auckland: Auckland University Press, 2013). 125.

[58] The 1936 census statistics recorded poultry-keeping among Māori for the first time: the average number of fowls or ducks kept by Māori this year was 13.9 compared with 23.7 for

one of Lloyd's Māori coon images of this era depicted efforts with farming penned-in moa-chickens sabotaged in a scene of moa-chicken-theft (lower image below).

Figure 24. Lloyd postcards c.1905.

Top: 'MADAM You have deceived me.' The precise reading of this is ambiguous. It either refers to the chicks being white, and as this is a recessive gene colouring to black, this makes the rooster an unlikely father, OR, the chicks may be meant to be ducks as their beaks are long. Lower image: 'Stealing Xmas Chickens': The scene portrays primitive and chaotic farming efforts and a problem with stolen 'chickens'.[59]

Europeans. Recorded flocks kept by Māori did not exceed 200 birds, and 88 percent were comprised of less than 25 birds. See *Dominion of New Zealand Population Census, 1936*, p.vi.

[59] "Postcards: Trevor Lloyd (1863-1937)," New Zealand Antique Prints and Rare Books. The On-line Gallery, accessed 26 November 2013, http://tinyurl.com/k7fygcf; John F. Perry, "Lloyd,

Amongst early twentieth-century breeders, the need for purebred standards was agreed, but the degree of family inbreeding was debated. Animal breeders from the second half of the nineteenth century had attended closely to ongoing debate about inbreeding in the human species. Human inbreeding in the form of cousin marriages was fashionable in the nineteenth century. Queen Victoria and Darwin had both married first cousins, and Galton affirmed the benefits of family inbreeding with superior specimens.[60] Purebred livestock were commonly compared with inbred royal families in particular, reflecting views about the close inbreeding of superior specimens. A science columnist in the *Evening Post* in 1902 for instance noted that:

> The aristocracy of the Continent, and especially of Germany [… has become …] excessively Inbred. With the lower animals the same result of artificial selection, when pushed to excess, frequently appears. [… While] 'high bred' that is, carefully-selected animals are generally excessively stupid, the most intelligent and easily-taught horses, dogs, and cats are of mongrel breed.[61]

Early poultry eugenic-geneticists encouraged closer inbreeding than was previously recommended. Raymond Pearl in the *Reliable Poultry Journal* in 1913 acknowledged poultry farmer resistance to inbreeding but dismissed it as ideological.[62] Echoing this, Fred Brown advised in 1919 that crossing races was a greater danger to the purity of the nation's stock, and assured readers that

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Trevor," DNZB: Te Ara - The Encyclopedia of New Zealand, accessed 26 November 2013, http://www.TeAra.govt.nz/en/biographies/3l9/lloyd-trevor. Source for 'Stealing Xmas Chickens': Gary Davies, "Trevor Lloyd Postcards," E-Library New Zealand, accessed 26 November 2013, http://tinyurl.com/nacpcme.

[60] Möller-Wille and Rheinberger, *A Cultural History of Heredity*: 135.

[61] Sagittarius [pseud.], "Artificial Breeding and Degeneracy," *EP*, 13 September 1902, 4. See also Spectator [pseud.], "Our Animal Aristocracy," *EP*, 28 January 1899, 4.

[62] Cooke, "Science and Art Among the Chickens: Practical Breeding in the Work of Raymond Pearl," 16. On this line-breeding debate see also F. Roger, "Line Breeding and Inbreeding," *NZPJ*, 20 November 1924, 18-19.

with inbreeding, nature would ensure 'the elimination of the unfit'.[63] However, an Australian expert in the *NZPJ* in 1924 reminded readers of the 'fundamental truth' that 'if [inbreeding] were continued long throughout the realm of creation the cumulative effects would in time sweep the whole race of living things off the face of the earth'. He then recounted a story of an American lawyer who committed suicide after his father married his step-daughter.[64]

Concepts of racial hierarchy were evident in Brown's discussion of the 'primitive' origins of the domestic chicken: 'In endeavouring to trace the origin of our domesticated breeds of poultry, it is essential from the outset to remember that the first civilisation of man was Asiatic […] When man lived in a primitive state, and was a savage […] animals and birds were wild also.'[65] He noted the 'extreme stupidity' of the ancient Shanghai breed and the natural sense of aversion demonstrated towards it by the 'mighty' British Game Cock.[66]

In New Zealand, British Game, also associated with British gentleman-farmers and skilled husbandry, retained a status amongst breeders,[67] but the primary concern was that all birds were bred for utility.[68] The ultimate effect of this utility race policy was a rapid decline in breed variety. 'Goldfinch' for example in the *NZPJ* in 1911 commented remorsefully that 'Minorcas, I am sorry to say, are falling off in quality. They are in great need of some fresh blood 'and:

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[63] F.C. Brown, "Poultry-Keeping," *NZJA*, 21 April 1919, 230.

[64] Roger, "Line Breeding and Inbreeding," 18.

[65] Brown, *Races of Domestic Poultry*: 1. See Benham's use of the ancestry of the barnyard fowl to explain evolutionary theory in "Facts of Evolution," *OW*, 29 November 1905, 62.

[66] Brown, *Races of Domestic Poultry*: 3, 33-41. On the psychological element to racial antipathy within species recognized by breeders and scientists see W.E. Castle, "Biological and Social Consequences of Race-Crossing," *American Journal of Physical Anthropology* IX, no. 2, (1926): 146; Ritvo, *The Platypus and the Mermaid, and Other Figments of the Classifying Imagination*: 88-91.

[67] Hudson, interview. See also for example, "Old English Game," *Press*, 2 December 1897, 2; J.W.W., "Poaching as a Fine Art," *AS*, 30 July 1938, 3.

[68] "Utility Poultry Standards," *NZPJ*, 20 August 1920, 1.

> […] the Langshan is dying out fast; it is a pity, for what is more handsome than a Black Langshan with beautiful beetle-green sheen glimmering in the sunshine, and his proud head erect as he struts round a nice green pen […] Let the Utility man say what he will, the Modern Langshan, as an all round fowl, is hard to beat.[69]

Edward Brown noted that 'distinctive races' of birds had evolved in various geographic areas, as had races of people, and urged breeders to select races adapted to local conditions.[70] The notion that a distinctive New Zealand, or at least Australasian, race of poultry would emerge was a reiterated theme within the *NZPJ* prior to WWII. Breeder, George Willis, at the NZPA conference in 1914 stated:

> Our country being insular and separated by long stretches of water from other countries, it is not unnatural to expect that the effect of such isolation will be seen in the character of the people, and reflected in our livestock. […] [Poultrymen desire to] control the destiny of their own poultry […] that we may give expression to that nationality which is beginning to assert itself.[Our stock is from] mostly Australian […] English and American stocks. Clearly then our poultry is of a cosmopolitan character and can be said to neither conform to English or American ideals.[71]

New Zealand breeders did not develop any distinct breeds as such, but the Australian-bred variety of Black Orpington, the 'Australorp' and the New

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[69] Goldfinch [pseud.], "The Fancier's Department," *NZPJ*, 20 September 1911, 21. See also Merrett, "The Journal's Show Report," 18.

[70] Brown, *Races of Domestic Poultry*: v-vi, 12. On origin theories, see Nicolaas Rupke, "Darwin's Choice," in *Biology and Ideology from Descartes to Dawkins*, ed. Denis Alexander and Ronald Numbers (Chicago: University of Chiacago Press, 2010), 139-164.

[71] Geo Willis, "Report of the Fourth Annual Poultry Conference. Evening Session. Second Day. A New Zealand Utility Poultry Standard," *NZPJSup*, 20 April 1914, n.p.

Zealand variety of White Leghorn were heralded in this vein.[72] These sentiments echoed public, medical and official rhetoric from the late nineteenth century into the 1930s which conveyed the notion of New Zealanders as a superior type – as 'Better Britons'.[73] Eugenic ideas about the selected stock of new colonies had their origins in Galton's *Inquiries* in which he had stated that: 'Exiles are […] on the whole men of exceptional and energetic natures, and it is especially from such men as these that new strains of race are likely to proceed.'[74]

Notions of climatic determinism were entwined with these ideas, as evident for example, in the *Evening Post* editorial in 1909, which linked climate with physical, mental and facial characteristics:

> [Those who observe British immigrants] are realising that the offspring of the transplanted stock is changing perceptibly in type, physical and mental. When men change their skies, the skies change them. […] The life here develops an alertness, a quickness of the eye [It is thought too that] the southerners […] will be more sturdy than the northerners of the milder areas.[75]

In this vein the NZPA president in 1921 observed that Southland, with its 'invigorating' climate, was the locality with the 'most vigorous stock in the Dominion.'[76] Regional climatic variations were also considered useful for

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[72] "Confusing Names," *EP*, 29 May 1937, 25; Goldsmith, "Developing Trends in Specialisation in the Poultry Industry," 318.

[73] Keith Sinclair, *A Destiny Apart: New Zealand's Search for National Identity* (Wellington: Allen & Unwin, 1986). 79-83.

[74] Galton, *Inquiries Into Human Faculty and Its Development*: 200.

[75] "Macaulay's New Zealander," *EP*, 4 August 1909, 6. School texts also instructed that human and animal races arose within geographic and climactic zones. See for example, "Where Animals Are Found," *NZSJ* III, no. 5, (1909): 79-80; Mill, *The Realm of Nature: An Outline of Physiography*: 359-368.

[76] Scott, "From the President's Pen," 13.

inducing racial variability. In *The New Zealand Smallholder* in 1936, it was advised that the dangers of inbreeding were mitigated by this:

> There is little doubt that eggs for hatching might be sent to the South Island breeder from the North and the resultant chicks reared on different soil and under different climatic conditions would be hardier than those of the same birds reared on the [North Island] farm […] The idea then would be for these breeders to exchange stock [as it] had the effect of introducing new blood.[77]

Just as Galton had envisaged the athletic, record-breaking potential of well-bred human stock given the right food and living conditions,[78] poultry breeders frequently observed that New Zealand's mild climate was 'a poultry keeper's paradise',[79] and prior to WWI sent birds 'Home' for show or breeding and to Australian and other international egg-laying competitions to test their mettle.[80]

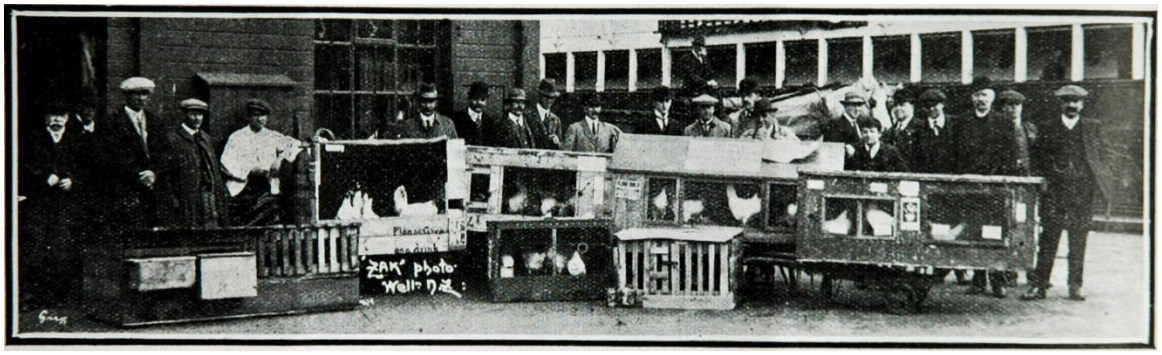

Figure 25. The 'All Whites' leaving for the Missouri Egg-Laying Competition, 1913.[81]

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[77] Utility Standard [pseud.], *New Zealand Smallholder*, 16 September 1936, 565.

[78] Galton, *Inquiries Into Human Faculty and Its Development*: 15-19.

[79] See for example, "Poultry Farming in New Zealand," *NZPJ*, 20 August 1921, 2; Scott, "From the President's Pen," 13.

[80] See for example, "Mr Rogan's Langshans," *OW*, 19 June 1901, 35; Irvine, "Irvine Strain," n.p.

[81] Zac Studios [photographer], "Off to Missouri," *NZPJ*, 20 December 1913, 8.

In 1913 the NZUPC sent a team of White Leghorns to Missouri. In reference to the recently triumphant 'All Blacks' rugby team, they named this team of birds the 'All Whites'.[82] According to Merrett, who provided accounts of their progress in the *NZPJ* and in the *Press*, the journey was arduous for the All Whites. He proclaimed: 'Three weeks on the water, 3000 miles by rail and a few days' rest, then they will enter the most historic event connected with the poultry industry in New Zealand.' Seeming to collapse the male owners and the birds' performance, Merrett reported on the initial positive start to the competition: 'Perhaps our boys, like ourselves, got their blood up at the incredulous Yankees and were determined to show of what material they are made […] It will be a long twelve months to watch their records'. Final results were not as positive as hoped, although there was one celebrated tale of heroic effort. After the boat trip, one poor hen went blind, but 'stoically' kept laying. She was nick-named after the disability advocate, Helen Keller.[83] Success was soon to come however with birds performing on their home turf. In 1914, and again in 1922, world egg-laying records were proudly held by New Zealand-bred White Leghorns.[84]

Record-breaking wonder birds were commonly described as athletes into the 1940s.[85] In a letter to the *NZPJ* in 1913, one breeder advised:

> They are like an athlete exhausted in a strenuous effort. Rest, care and a green paddock will bring back their strength. [But] what

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[82] On the All Blacks' tour of Britain from 1905 to 1906, see Kate Pickles, "Colonisation, Empire and Gender," in *The New Oxford History of New Zealand*, ed. Giselle Byrnes (Auckland and Melbourne: Oxford University Press, 2009), 234.

[83] J.B. Merrett, "Off to Missouri " *NZPJ*, 20 October 1913, 5; J.B. Merrett, "International Egg Laying Competitions," *NZPJ*, 20 February 1914, 13; J.B. Merrett, "Missouri Egg-Laying Competition," *Press*, 15 May 1914, 10; "The Missouri Test. Hen with 1000 Eggs to Her Credit," 16.

[84]"Nixon's Winning Leghorns," *NZPJ*, 20 April 1914, 10; A.F. Martin, "Egg Records," *NZPJ*, 20 May 1922, 5.

[85] See for example, "Notes for the Poultry Farmer," *NZPW* 3, no. 5, (1940): 12.

> may be called forcing for European hens would be loafing for Australasian hens. The latter will lay one hundred more eggs in a year and be fitter physically than the former.[86]

Commentary on national egg-laying competitions in the *NZPJ* in 1921 likened the trials to 'the Grand National Steeplechase,' the 'National Hurdles' and to 'a sport [in which the audience expects to see] the animal or bird accomplish something above the ordinary.' Eliminations through injuries and fatalities were seen as par for the course.[87]

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[86] "Is Laying Overdone? To the Editor," *NZPJ*, 20 November 1913, 15.

[87] See for example, "Dialogue," *NZPJ*, 20 August 1921, 12.

Figure 26. Stewart Reid, "Another Tall Yarn," in the *Otago Witness*, 1905.[88]

The duckling greets the Leghorn as a worn-out athlete, which is ambiguous but suggests public scepticism about the treatment of birds. The title hints to the common claim that breeders exaggerated their breeder bird records. Blenheim is mentioned as a competition site as this was the initial site for the early contests before it was moved to Lincoln.

Egg-laying competitions were an Australian initiative,[89] and conformed to a colonial penchant for competitive physical display. New Zealand celebrated

[88] Stewart Reid, "Another Tall Yarn," *OW*, 3 July 1905, 41.

[89] They were viewed skeptically by European and American poultry breeders before 1913 when Pearl validated them. See Pearl, "Breeding for Heavy Egg Production," 812.

record-breaking shearers and wood-choppers, to say nothing of its speedy chick-sexers.[90] As Ritvo noted, while livestock shows had long been a means of displaying breeder status and success, improved records also became a means of demonstrating local and national productivity and strength.[91] Merrett's enthusiasm for the All Whites and national records suggest this applied in New Zealand. At the 1913 poultry conference Merrett puffed: 'we have fowls in our dominion that lead the world in records, and in public test have laid in the year 280 eggs per hen. This shows what can be done'.[92] Of the farmer's themselves, Merrett reflected: 'Among poultrymen we find a lot of narrow-minded chaps, unprogressive, relentless and slow to appreciate the advance movement; but we also find a number of fellows who possess the very highest qualities'.[93]

Degenerationist fears accompanied progressive rhetoric. Despite record-breaking successes, Merrett commented in 1914 for example, that these were no better than nineteenth-century records from Australia and the US[94] and in 1924 exclaimed: 'The development and progress of the fit are as certain as the retrogression and deterioration of the unfit. […] We must go back to a better class of bird.'[95] Ambler in 1922 similarly warned of 'the small egg menace' resulting from 'the glorification of the individual superlayer'.[96]

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[90] Mrs Daisy Carter set a New Zealand record sexing 200 chicks in 22 minutes in WWII. See "Chick Sexing. Mrs D. Carter's Success," 12. See also for example, "Dunedin Caledonian Sports," *WH*, 5 January 1909, 6; "Taihape News," *AS*, 23 December 1919, 3.

[91] Ritvo, *The Animal Estate: The English and Other Creatures in the Victorian Age*: 80-81.

[92] Merrett, "The Conference," 2. On statistics as a tool of racial science see Wanhalla, *Matters of the Heart: A History of Interracial Marriage in New Zealand*: 123, 129-134.

[93] Merrett, "Off to Missouri " 5. Non-conforming, failing farmers in America at this time were considered 'culls'. See Charles E. Rosenberg, "Rationalization and Reality in the Shaping of American Agricultural Research, 1875-1914," *Social Studies of Science* 7, no. 4, (1977): 405.

[94] "Do You Believe It?," *NZPJ*, 20 May 1914, 22.

[95] J.B. Merrett, "Nature's Penalty," *NZPJ*, 20 November 1924, 5. See also Brown on this in "Poultrymen Confer," *Dominion*, 26 April 1916, 8.

[96] Geo Ambler, "The Two-Ounce Egg," *NZPJSup*, 20 February 1922, n.p.

An article in the *NZPJ* in 1919 citing the *Reliable Poultry Journal* acknowledged the validity of deterioration concerns, noting that during times of war 'vigor and stamina are words fraught with intense meaning, and […] akin to the world-old battle slogan of "survival of the fittest," which […] the present generation accept as "Nature's decree"'. It was recommended that more attention be given to breeding for health by observing the outward signs of vigour in a hen, expressed in 'a well-rounded body [a] beautiful coat of feathers,[…] the alertness and activity which express the joy of being alive, [and] in the full, bright eyes and the unquenchable energy which shows in every move.'[97] This echoed eugenicist emphasis upon health in the beautiful, well-proportioned body and the happy, energetic animal.[98]

Beauty

As genetic science offered little in the way of immediate practical assistance, emphasis upon visual selection prevailed as an artful science within poultry breeding as in human eugenics.[99] As mentioned in the thesis introduction, historians have observed this retained emphasis on the poultry breeder's 'art', and that in general beautiful and symmetrical animals were associated with health and moral husbandry prior to 1950.[100] Artfulness was itself informed by various biologically-based theories on the science of aesthetics in this era.[101] Aesthetic sensibilities were posited as an indicator of racial advancement – or as was stated in the *Evening Post* in 1910, as one of the qualities that 'sets us aside from savages and beasts'.[102] Industry leaders' continued insistence upon

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[97] W.H. Card, "The Outcross for Vigor and Stamina," *NZPJ*, 20 January 1919, 8.

[98] Eugenette, the world's bonny 'first eugenic baby' in 1913, was reportedly 'born laughing'. See "First Eugenic Baby," *NZH*, 13 October 1913, 8.

[99] Sarah Efstathiou, "The Nazi Cosmetic: Medicine in the Service of Beauty," *SHPBBS* 43, (2012): 634-642.

[100] Theunissen, "Breeding without Mendelism: Theory and Practice of Dairy Cattle Breeding in the Netherlands 1900-1950," 637-676; Derry, *Art and Science in Breeding: Creating Better Chickens*.

[101] *Encyclopaedia Britannica*, 15th edition, s.v. "Scientific systemization of aesthetics."

[102] H.M. [pseud.], "The Gospel According to Dr. Newman," *EP*, 10 January 1910, 8.

beautiful utility birds prior to 1950s was partly due to moral beliefs. Fancy columnist George Ambler still claimed in the *NZPJ* in 1940 that fanciers had a morally-elevating influence on industry.[103]

Eugenics affirmed the traditional naturalist belief that the contemplation of perfection, of balance and 'pure form' fostered health and a sense of positive well-being and connection.[104] Religious associations with the contemplation of beauty were explicit in the rural women's magazine, the *NZCW*, which in 1933 for example cited both Thomson's belief that observation of wild animals was pleasurable as their movement echoed human rhythms, and Jesus' instruction to observe the birds in the sky and fields.[105] An article in another 1934 issue echoed Paley, saying that the study of beauty in nature through science, as in art, revealed the 'hand of God'.[106]

Poultry journals reflected some moral and theological sentiment in this regard. For example, breeder allusions to the instinct for workmanship as in the saying: 'When a man makes a useful thing, and a beautiful thing as well, he has performed for the world a doubly practical service', printed as a reflective thought in the *NZPJ* in 1922,[107] suggested that the crafting of beautiful birds was understood as a moral and social good. And in the *NZPW* in 1941, 'The

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[103] Ambler, "Fancy Classes at Shows. To the Editor," 16.

[104] Nadia Gush, "Beauty of Health: Cora Wilding and the Sunlight League" (M.A. thesis, University of Canterbury, 2003), 28-43.

[105] "The Place of Beauty," *NZCW*, (1933): III.

[106] Nota Bene, "Science and Humanity," *NZCW*, 20 September 1934, 11.

[107] "'When a man ...'," *NZPJ*, 20 October 1922, 14. American economist, Thorstein Veblen's 'instinct of workmanship' is discussed in William E. Akin, *Technocracy and the American Dream: The Technocrat Movement 1900-1941* (Berkley: University of California Press, 1977). 14-16. Veblen's ideas were influenced by Professor Jacques Loeb's tropism theories. For an example of a local reference to this, see "Human happiness…," *Maoriland Worker*, 7 November 1923, 10.

Wanderer' urged breeders to continue to breed for beauty and utility as a balance of these in nature adhered to the plan of the 'Great Designer'.[108]

King in his 1920s public health lectures instructed that the 'finer instincts' to discern beauty emerged as a natural evolutionary mechanism to favour health and reproductive capacity.[109] Acknowledging this idea, an article from the Australian *Poultry* journal, reprinted in the *NZPJ* in 1922, encouraged utility breeders to appeal to the instinct for beauty, if for no other reason than to influence customers and sales. Reversing early eugenic education, it also advised attention to bird breeding through human analogy.

> [As I write this] a beauty competition is in progress, the object of which is to prove that the lasses of Australasia are more beautiful than the girls of America. […] I conclude that the Australians pride themselves on their love of beauty. This leads me to put the question – "Why do they not cultivate it more among their laying hens?" […] Why should not beauty and usefulness go hand in hand?[110]

New ideals of beauty were promoted in the eugenic era in regard to the human body. The *New Zealand Herald* in 1923 noted that: 'Perfect beauty nowadays is perfect health, like the beauty which the ancient Greeks loved and immortalised in their statues.' Citing a London doctor, it continued:

> Our great-grandfathers admired women with sloping shoulders, swan necks and narrow faces. We admire braced-up shoulders, upright necks, and faces with the eyes wide apart. […] Sloping

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[108] The Wanderer [pseud.], "Beauty and Utility,"*NZPW* 4, no. 3, (1941): 6.

[109] "The Gift of Life. An Interesting Discourse. Lecture by Sir Truby King," *AS*, 2 October 1926.

[110] C.A. House, "Combine the Beautiful and the Useful," *NZPJ*, 20 May 1922, 9.

> shoulders and swan necks are both signs of early consumption, and narrow faces mean lack of brain power.[111]

New Zealand beauty competitions of this era promoted ideals for breeding types, and winners were always of British stock.[112] However, Galton in *Inquiries* had said, 'there is variety in the human race, and improvement should not aim to a common type.' He understood that workers were needed to perform different tasks.[113] Thus, the school text, *Growing Body*, determined three phenotypical body types for girls: the stocky 'pyknic type', 'fitted for slow, heavy, laborious work […] for endurance rather than for speed', the slender 'asthenic type', built for speed, not endurance, and the 'athletic type': the well-proportioned, Greek ideal.[114]

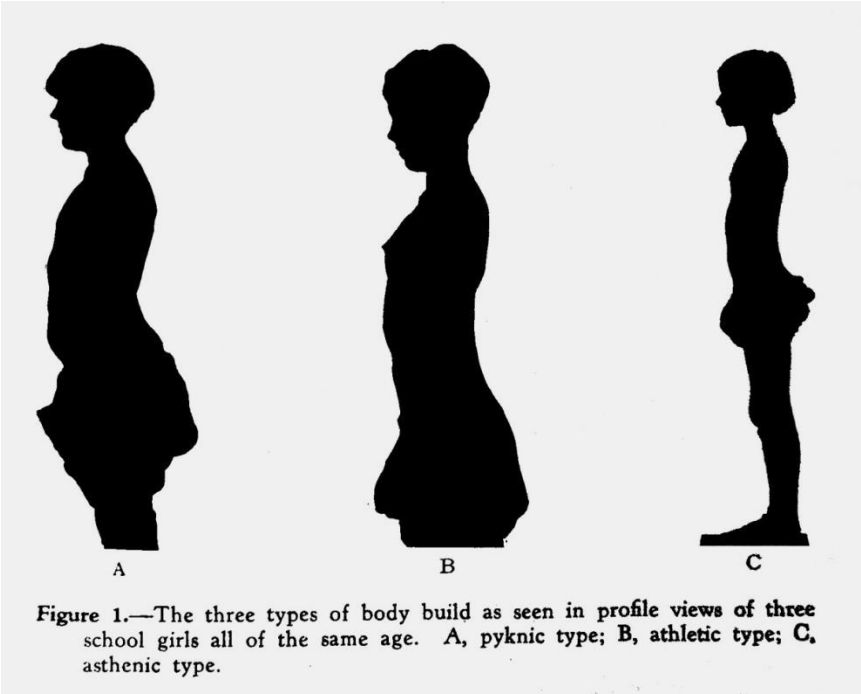

Figure 27. Figure 1 from *Growing Body* (1932).[115]

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[111] "Beautiful Modern Girl," *NZH*, 28 November 1923, 11.

[112] Daley, *Leisure and Pleasure: Reshaping & Revealing the New Zealand Body 1900-1960*: 100-115.

[113] Galton, *Inquiries Into Human Faculty and Its Development*: 2.

[114] White, *Growing Body: It's Nature, Needs and Training*: 18-21.

[115] Ibid., 19.

Healthy reproductive form was also the new beauty ideal in poultry breeding. While traditional fanciers had adhered to Paleyian ideas about hen feathers being nature's art, these ideals were explicitly rejected in the era of poultry eugenics. In 1928 an agricultural columnist of the *Auckland Star* discussed the farmer's responsibility for stewardship in this way:

> Whether or not we accept the Biblical statement that, at the Creation, man was given "dominion" over the fish of the sea, and over the fowl of the air […] "dominion" implicitly implies a [responsibility] for the physical well-being and evolution of the beasts […] The breeder of all animals must […] refuse to be led astray by qualities which are of the "fancy" type. […] Ignorance of the laws of health amongst animals cannot be accepted as an excuse for wrong treatment.[116]

Likewise, Thomson's *Study of Animal Life* observed that all healthy animals were 'harmonious in form' and that 'the only ugly animals are the products of domestication and human interference'. These were, he said, the 'excretions of civilisation.'[117] Responsible husbandry through avoiding fancy breeding was thus a core value espoused by agricultural leaders and retained its theological resonance.[118] In addition, Terror's early articulation of the new ideal in the *Otago Witness* in 1908, that it was neither the 'showman's ideal' of 'a hand-fed monstrosity' nor 'the utility man's ideal' of 'a weed […] running to infertile seed', reflected the view that moral husbandry preserved a *balance* of beauty and utility.[119] After a world tour in 1920, Merrett expressed pride in New Zealand's healthy avoidance of extremes. His perception was that America was

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[116] Sundowner [pseud.], "The Farmer's Stewardship. Obligations of "Dominion"," *AS*, 22 February 1928, 21.

[117] Thomson, *The Study of Animal Life*: 16.

[118] The origins of such ideas in late 19th health discourse are discussed in Whorton, *Inner Hygiene: Constipation and the Pursuit of Health in Modern Society*: 20-21.

[119] Terror [pseud.], "Poultry Notes," *OW*, 28 October 1908, 35.

entirely 'for the commercial man,' while Britain was 'for the fancy', which both led to unhealthy flocks.[120]

The Ideal Bird

Precise measurement was the rage within turn-of-the-century elementary science education. Children were taught that mere observation of beauty was unacceptable: it had to be described accurately in measurements in order to 'fully appreciate […] the wonder […] of the Universe and its deepest meaning'.[121] Anthropometry, the precise measurement of the human body, was considered a significant science around 1900, associated with areas of applied eugenics such as school health checks and military recruitment. Breeders on agricultural stations in Europe and North America interacted with university-based biologists and took note of developments in the human sciences. Their methods prior to WWII reflected an inter-borrowing of techniques and concepts that intensified within this time.[122] Morphological measurement with callipers, long a tool of anthropologists, began to be employed for determining high-producing dairy cows in Holland just prior to WWI. This practice was observed by George Willis and presented at the 1914 poultry conference.[123]

In the six months prior to this Willis wrote a series of articles for the *NZPJ* in order to stimulate discussion on the new Utility Standards for New Zealand, with the objective of determining and standardising a 'universal laying type':

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[120] Merrett, "Advance New Zealand," 1.

[121] See for example the school syllabus text, Mill, *The Realm of Nature: An Outline of Physiography*: 2-5.

[122] Möller-Wille and Rheinberger, *A Cultural History of Heredity*: 106-107, 133-135. On anthropometry in the New Zealand school medical service see Daley, *Leisure and Pleasure: Reshaping & Revealing the New Zealand Body 1900-1960*: 204-209.

[123] "Local and General," *WDT*, 16 April 1914, 4. Möller-Wille and Rheinberger (above) explain anthropometry in the nineteenth century. However, no research exists to date tracing farmer uptake of calipers. This was confirmed by Bert Theunissen, e-mail to author, 14 November 2014.

the hen figure best suited to sustained egg-production.[124] Willis regarded this venture in revolutionary terms, as a timely symbol of an emerging national identity and as a national 'duty' in order that New Zealand breeds were created 'worthy of being handed on to posterity and also for the immediate needs of society.' He acknowledged the varying opinions as to what constituted 'an ideal', but all breeds, he felt, needed to be brought 'into line with the trend of modern thought.'[125]

Willis's first analysis utilised sketches of four breeds: the Leghorn, Wyandotte, Orpington and Plymouth Rock, which he attempted to decipher mathematically.

> It is the angle F G H, formed by the abdominal and keel lines, together with length of body, which determine much of the value of a bird as an egg producer. If the "keel line" is flattened, that is, if the angle F G H is increased, it will be readily seen that the bird either has not got the abdominal development, or else it has too great a depth of breast.[126]

In attempting to establish one composite ideal, Willis pondered if this might result in extreme standardisation: 'There is a possibility in developing the different breeds with the sole object of egg-production, that we shall have them all so much alike that it will only be possible to distinguish each breed by its colour and furnishings.' Perhaps, he suggested, one dual-purpose, or one light and one heavy composite bird was all that was required.

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[124] Geo Willis, "A N.Z. Utility Poultry Standard," *NZPJ*, 20 December 1913, 10-13; Geo Willis, "A N.Z. Utility Poultry Standard. Article II.," *NZPJ*, 20 January 1914, 9-12; Geo Willis, "A N.Z. Utility Poultry Standard. Article III.," *NZPJ*, 20 February 1914, 15-16.

[125] Willis, "Report of the Fourth Annual Poultry Conference. Evening Session. Second Day. A New Zealand Utility Poultry Standard," n.p.

[126] Willis, "A N.Z. Utility Poultry Standard," 12.

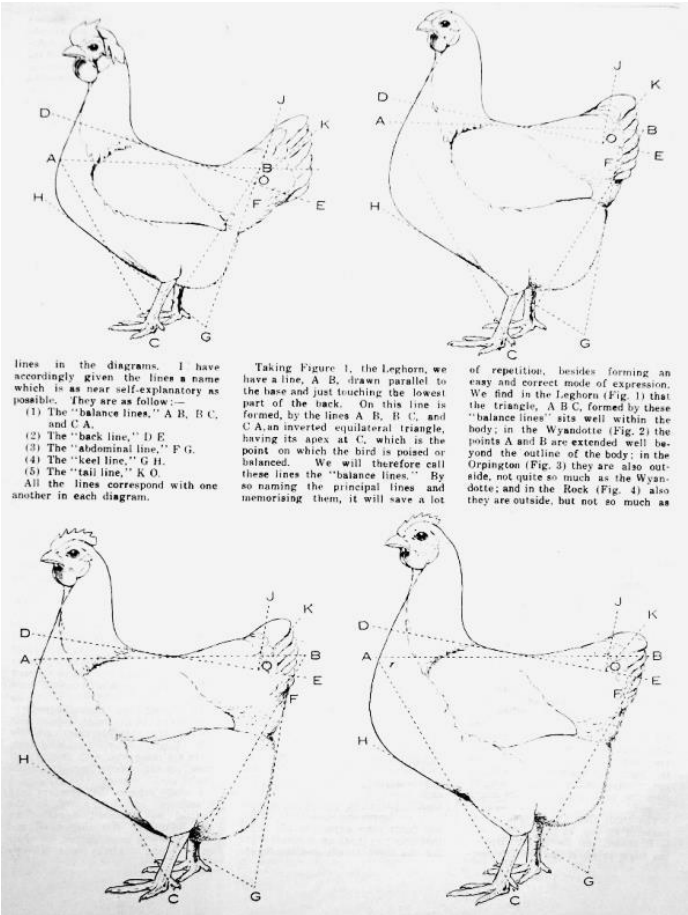

Figure 28. Willis's drawings of four breeds conforming to an ideal type in the *NZPJ*, 1913.[127]

In 1914 Willis urged breeders to forward measurements of their top layers. A good layer of any breed, he asserted, having drawn new images (below) from photographs, possessed a body angle close to 70 degrees. They also possessed '[s]hort legs, set wide apart, with plenty of stern, and tail carried high,' and were 'symmetrical, wedge-shaped' and light in frame for the breed.[128] He surmised that 'the erect carriage of the tail in females might be attributable to prolonged laying, as it is noticed that pullets […] after laying […] carry [their tails] at an alarming angle.'[129]

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[127] Ibid., 11.

[128] Willis, "A N.Z. Utility Poultry Standard. Article III.," 15-16.

[129] Willis, "A N.Z. Utility Poultry Standard," 13.

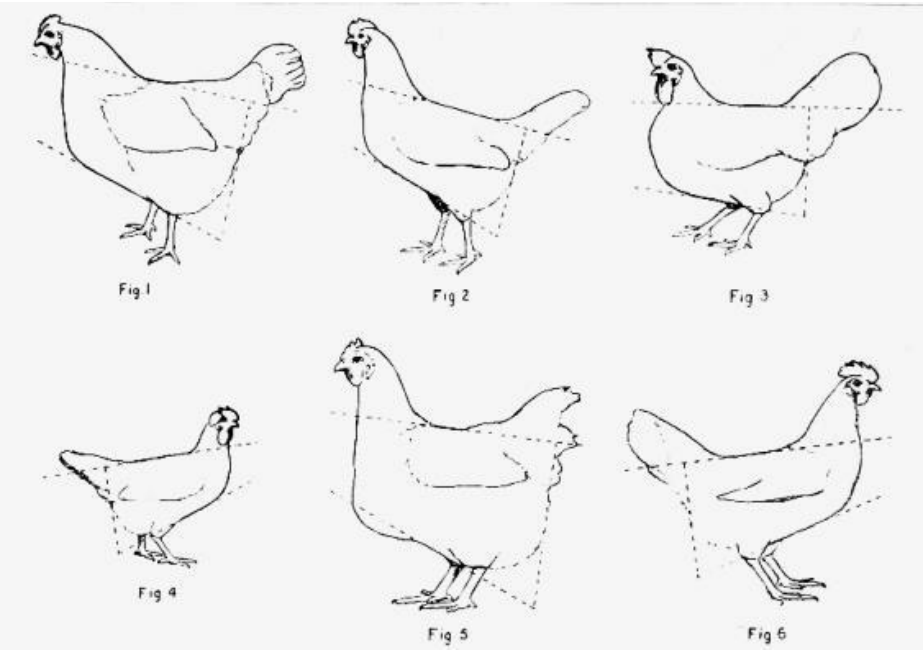

Figure 29. Willis's drawings of layers and a 'masculine' non-layer (fig. 3, top right) in the *NZPJ*, 1914.[130]

These proposed Standards were controversial. Traditionally, experts promoted a variety of breeds. Edward Brown, for example in *Races*, had expressed the view that fixed standards for utility hens were 'wrong in principle and against Nature'.[131] At the 1914 NZPA conference, one breeder forcefully opposed 'the application of fixed measures' and the concept of one layer type, arguing that he kept a number of successful laying breeds.[132] Ongoing international debate within poultry circles reflected the opinion that although 'Nature has provided a standard size and form for everything that lives', race variation was natural.[133]

Ultimately, no consensus could be reached and the *New Zealand Utility Standards* were published in 1917, without diagrams or pictures, and only

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[130] Willis, "A N.Z. Utility Poultry Standard. Article III.," 16.

[131] Brown, *Races of Domestic Poultry*: vi.

[132] "Report of the Fourth Annual Poultry Conference. Answers and Questions," *NZPJ*, 20 April 1914, n.p.

[133] "Is There An Egg Type?," *NZPJ*, 20 April 1927, 9.

slightly modified from the existing English Standards.[134] These Standards were reviewed and republished in 1920, featuring seven illustrated breeds.[135] Leaders continued to advise adherence to a general laying type, while preserving distinct breed characteristics. The body of the 'strong athlete' hen was to be well-developed in chest capacity, as a healthy heart and lungs were important for maximum performance.[136] Wide hips were also desirable in the super-layer, as indicated in the illustrations below from Brown's 1916 Government guidebook.

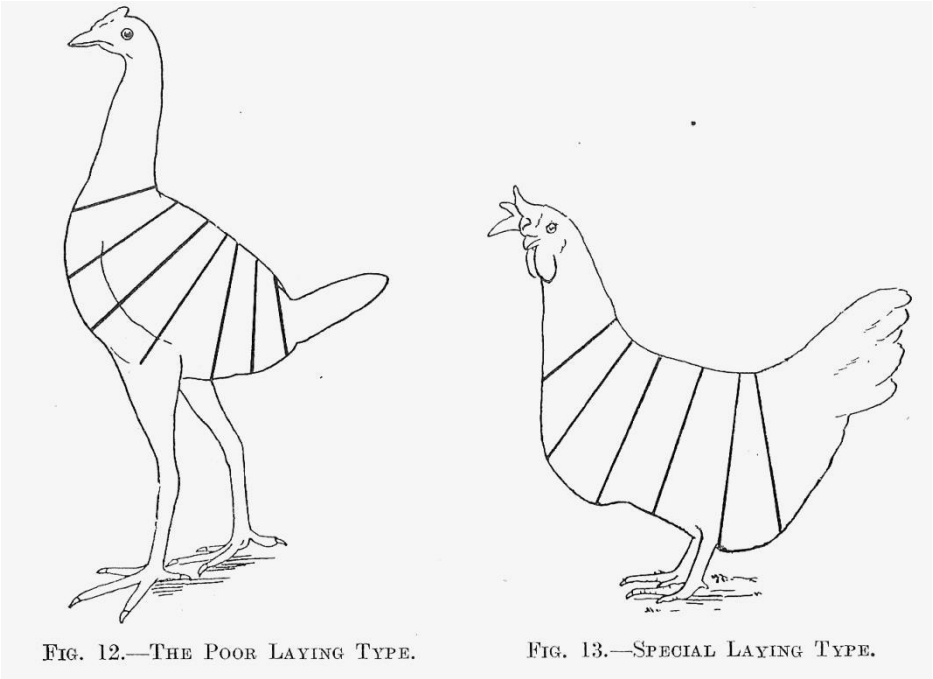

FIG. 12.—THE POOR LAYING TYPE. FIG. 13.—SPECIAL LAYING TYPE.

[134] Merrett, *The Sun Poultry Book. A Practical Guide to Poultry Keeping in Australasia for Use and Profit, Together with an Appendix Containing the Utility Poultry Standards, Adopted by the New Zealand Utility Poultry Club*.

[135] "The New Utility Standards," *NZPJ*, 20 July 1920, 13; "Utility Poultry Standards," 1; *The Dominion of New Zealand Utility-Poultry Standards*, 1st ed. (Wellington: Department of Agriculture, 1920).

[136] "Notes for the Poultry Farmer," 12.

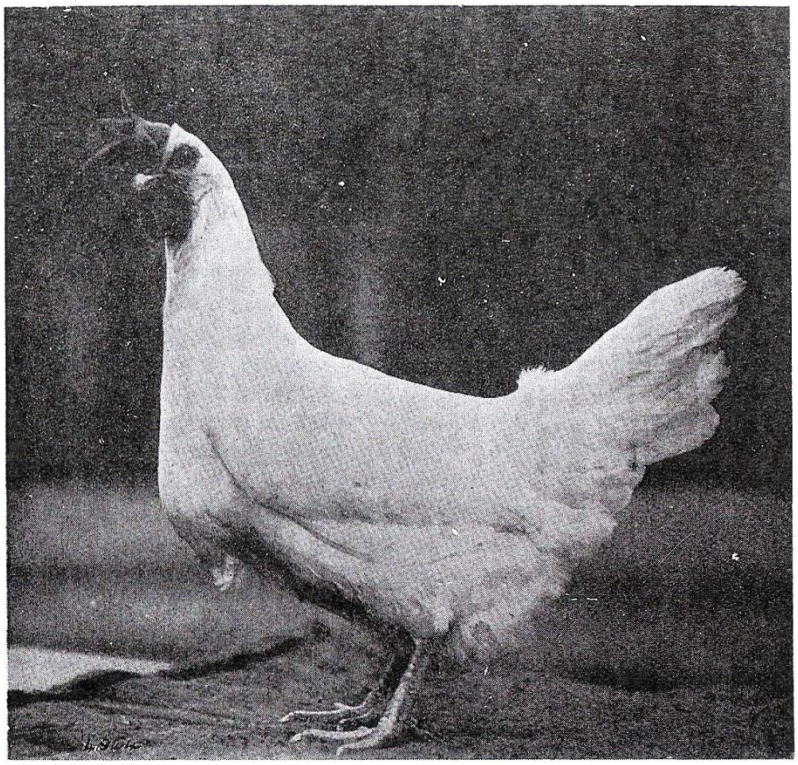

FIG. 14.—THE WHITE LEGHORN.

Showing the spare breast and the chief development at the business end. [Note.—The bird being in a somewhat squatting posture her type is not done full justice to in this photo.]

Figure 30. Two images from Brown's, *Utility Poultry-Keeping* (1916).[137]

A reflective article in the *NZPW* in 1954 noted that the emphasis on type and beauty that the Standards sought to preserve was ultimately lost due to the focus on mass production from the 1930s.[138] However, leading utility breeders persevered with their ideals, revising the Standards in 1936 and in 1953.[139] Variety was also preserved to some degree, although ten breeds included in the 1953 Standards had fallen somewhat from the 71 utility breeds identified in *Races of Domestic Poultry*.[140]

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[137] Brown, *Bulletin No. 66 (New Series). Utility Poultry-Keeping*: 28-29.

[138] Goldsmith, "Developing Trends in Specialisation in the Poultry Industry," 318-319.

[139] North Island Poultry Pigeon and Canary Association, *The New Zealand Utility Standards* (Palmerston North: NIPPCA, 1936); Utility Poultry Standards Revision Committee, *New Zealand Utility Poultry Standards of Perfection and Breeding of Poultry*.

[140] Brown, *Races of Domestic Poultry*: 16-17.

Culling

Education on strict culling was deemed necessary within poultry journals up until the 1950s. Poultry farmers, like other applied scientists in the modern age, were expected to be rationally objective,[141] but, as noted in the previous chapter, strict adherence to the 'art of culling' conflicted with moral ideas about care and waste.[142] Merrett noted in the early decades that farmers who 'knew what the runt of the litter meant' were reluctant to be as ruthless with their birds. Appealing to ideas about inefficient entropy, he explained for instance that '[h]ens laying eggs unfit for incubation are wasting the energy of the male bird and should be discarded', as should their 'crippled chicks'.[143]

Experts and officials employed eugenic language throughout this period, stressing that efficiency in the 'elimination of the unfit' was the key to success.[144] Sentimentality was framed as 'coddling' and a 'habit' of fanciers that should not be imitated, and was blamed for disease outbreaks, breed degeneration and economic failure. The *NZPJ* in 1927 for example stated:

> These tender, weak fowls that otherwise would have succumbed, but because of some desirable shade of plumage, colour or other fancy points, are kept for future use, coddled and nursed and all the time the breeder knows that he is doing what is not for his best good and future interest, but he hopes against hope, and by so doing year after year the percentage of weaklings grows larger […]

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[141] Lorraine Daston and Peter Galison, *Objectivity* (New York: Zone Books, 2007), Distributed by the MIT Press.

[142] On the 'art of culling', see for example, C. J. Cussen, "Notes on Poultry-Keeping," *NZPW* 1, no. 5, (1938): 16.

[143] J.B. Merrett, "Beware of the Runt. A Careful Article Baring the Root and Vital Fundamental of Healthy Poultry Flocks," *NZPJ*, 20 November 1913, 7.

[144] In addition to earlier examples, see Merrett, "Poultry Culture in New Zealand," 2.

> and all because nature takes her revenge every time on the person who trespasses on her laws.[145]

Defective birds were deemed 'contagion', literally due to susceptibility to disease if sickly, and metaphorically as carriers and transmitters of 'bad blood'. Birds were commonly referred to as inanimate 'weeds', with culling simplified to an act of weeding. In the same example, the breeder stated: 'There is only one way to produce a hardy race of fowls, and that is by mercilessly weeding out every weak constituted fowl in the flock. This takes courage, but it is the only means of achieving strength and vitality and hardiness of the future flock or strain'.[146] 'Continual weeding' was advised to 'select the drones.'[147] Early maturing birds were described by another breeder in 1927 as: 'precocious youngsters […] the worst wasters we have and should be the first ear-marked for the pot.'[148]

Description of roosters judged to be 'effeminate' reflected societal abhorrence of this unnatural deviance,[149] as indicated in one breeder's vehement aversion to 'chicken' roosters:

> […] dislike the bird that gives one the impression of his being an overgrown baby. Have no liking for the male that is readily bullied and a funk seeking to isolate himself and to dodge all other male birds. Differentiate between the sporting fellow who runs away because he admits t'other is his master [and the] undesirable [who]

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[145] "Producing the Hardy Fowl," *NZPJ*, 20 August 1927, 7.

[146] *Ibid.*

[147] Chanticleer [pseud.], "Hand Grading or Anatomical Selection," *NZPJ*, 20 July 1927, 24.

[148] W. Powell-Owen, "Utility Doings," *NZPJ*, 20 July 1927, 6.

[149] Galton, *Inquiries Into Human Faculty and Its Development*: 43; Wanhalla, "Gender, Race and Colonial Identity: Women and Eugenics in New Zealand, 1918-1939," 69.

> hides himself in the nestbox or corner of house, ruffles his hackle in fear and squeals.[150]

Similarly, in the *NZPJ* in 1921, Merrett advised beginners that their male bird should crow with strong masculine notes, and scrap well: 'If he will not fight for supremacy, send him to the saleyards.' In 1939, Cussen continued to advise farmers to avoid the 'nervous, highly strung, effeminate bird' in their selection of roosters.[151] Sexual behaviour was thought to indicate virility, and lists to aid selection favoured 'gallant' roosters and 'coquettish' hens.[152]

As we saw in chapter three, ideas about animal character were persistent. The assumption that physical types had psychological correlates was common within biological theory of the interwar period.[153] Eugenicist Caleeb Saleeby, in his popular handbook, *Heredit*y (1905), stated that 'we recognise the unquestionable inheritance, in all animals that possess a nervous system, of a nervous organisation which is intimately correlated with the facts of mind and consciousness',[154] and in the 1920s the British poultry geneticist, Professor Reginald Punnett, supported the general principle in animals and human animals that certain psychological traits might be linked to physical traits.[155]

General endocrinology research also supported ideas about gender psychology. The *NZPJ* explained in 1924 that the fighting nature of males was underpinned by the 'instinct for "pursuit" in the male and that of enticement in the female – which is universally true whether in human beings, animals or birds [the objective of which is] to stimulate the excretions (hormones) from certain glands'. After explaining the views of a well-known authority, Dr. Louis

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150 W. Powell-Owen, "Character in the Stock Sire," *NZPJ*, 20 September 1927, 2.

151 C. J. Cussen, "Notes on Poultry-Keeping," *NZPW* 2, no. 11, (1939): 17.

152 See for example, A.R. Winter and E.M. Funk, *Poultry Science and Practice*, 4th ed. (Chicago: J.B. Lippincott Company, 1956). 91.

153 Castle, "Biological and Social Consequences of Race-Crossing," 147-148.

154 Saleeby, *Heredity*: 115.

155 Punnett, *Mendelism*: 208.

Berman, on the functioning of adrenal, pituitary and thyroid glands which reportedly determined behaviour, emotion, activity and instincts in animals, this breeder added that the excitement of the glands were especially important during mating as: 'the progeny of a cold-blooded union is very liable to be a phlegmatic product, as proven in human experience'.[156]

In assessing breeding birds, as in eugenics, great emphasis was placed on symmetry as an indicator of inner health and breeding potential.[157] However, much guesswork remained about the significance of other physical features. At the NZPA conference in 1914, Brown emphasised that breeders should 'Beware of the hen with knock-knees'[158] while Merrett asserted: 'I am partial to a scrutiny of the shanks and the feel of the thighs. […] One can soon breed weedy chicks with dry matchstick legs if the stock sire is defective in a like way.'[159] Following the publication of the *Utility Standards* in 1920, which instructed judges to 'pass' (that is, fail), birds with 'any bodily deformity', Brown was required to clarify that the angle at which the hen carried the tail was not indicative of laying capacity. He explained that high-laying birds tended to spend a lot of time in laying boxes, so their tails could become pushed forward or rubbed away, and that short toe nails were a characteristic of the good layer only because she liked to scratch.[160]

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[156] Hicks, "Choice of the Breeding Male," 1-2. On Berman and his views on hormonally-determined personality in humans see Bernice Hausman, *Changing Sex: Transsexualism, Technology, and the Idea of Gender* (Durham, North Carolina: Duke University Press, 1995). 27.

[157] See for example, W. Powell-Owen, "Stict Culling of Growing Cockerels," *NZPJ*, 20 August 1927, 6. On ideas about symmetry in human health see Daley, *Leisure and Pleasure: Reshaping & Revealing the New Zealand Body 1900-1960*.

[158] Merrett, "The Official Conference Report. Evening Session. A Lecture," n.p.

[159] Powell-Owen, "Stict Culling of Growing Cockerels," 6-7.

[160] F.C. Brown, "General Poultry Keeping," *NZPJ*, 20 October 1922, 6-7.

Facial Features

Galton recommended the study of human facial physiognomy for revealing human types,[162] and the measurement of the cephalic index (skull or head length to width) was a fixation of eugenic researchers by the turn of the century.[163] Although skull size and other aspects of brain anatomy as indicators of mental capacity were questioned by scientists around the turn of the century, the degree to which small skull size could be taken as an indicator of limited intelligence remained a popular subject of debate.[164] Nina Barrer's 1934 *NZCW* article featured photographs of 'mental defectives' accompanied by measurements of head circumference and predictions of work ability.

Figure 31.
Woman with measured head circumference in Barrer's article in 1934.[161]

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[161] Image from *Everyman, the World News Weekly* in Nina A.R. Barrer, "Heredity and the Social Problem Group," *NZCW*, 20 February 1934, 6.

[162] Galton, *Inquiries Into Human Faculty and Its Development*: 10. He established 'composite portraiture' to aid analysis and acknowledged a New Zealander who had similarly considered the use of superimposed photographs of human and non-human animals to aid the study of racial blends. See Francis Galton, "Composite Portraits," *Journal of the Anthropological Institute of Great Britain and Ireland* 8, (1878): 132-142.

[163] Möller-Wille and Rheinberger, *A Cultural History of Heredity*: 106-107.

[164] See for example, "Mind and Brain," *AS*, 23 November 1929, 13; "Heads and Brains," *AS*, 9 February 1939, 10.

This science affirmed breeders' detailed analysis of birds' head and facial features. In 1921, a well-known breeder advised selecting roosters with a 'good head piece, full of fire […] free of wrinkles […] with a fine, bold eye [and powerful] beak, [and a] neck […] broadening out to a good broad back and shoulders.'[165] A breeder in the *NZPJ* in 1927 similarly advised: 'When a cockerel has a long, lean head, with pinched or sunken face, I suspect general weakness and a bad doer. Too close breeding, weak parent stock, poor bringing up [*sic*], or weak digestion will all show up in the lean and sunken face'.[166] Excessive coarseness, or very delicate faces in hens also signalled weakness and deterioration.[167] Research into the 'sex reversal' effect of the thyroid gland in chickens by the British biologist and poultry club member, Dr F.A.E. Crew, reported in the *NZPJ* in 1925 (and the initial discoveries reported in less detail in many newspapers prior to this), also affirmed attention to masculine and feminine facial types.[168]

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[165] "Poultry Breeding," *NZPJ*, 20 August 1921, 19.

[166] Powell-Owen, "Stict Culling of Growing Cockerels," 6. See also Powell-Owen, "Character in the Stock Sire," 2.

[167] "Head Points," *NZPW* 2, no. 4, (1939): 30.

[168] In newspapers see for example, "Sex Reversal," *EP*, 20 September 1923, 7; "Unsexed Hens," *Mount Ida Chronicle*, 4 January 1924, 1. For the NZPJ see "The Monkey Gland in Poultrydom," 18.

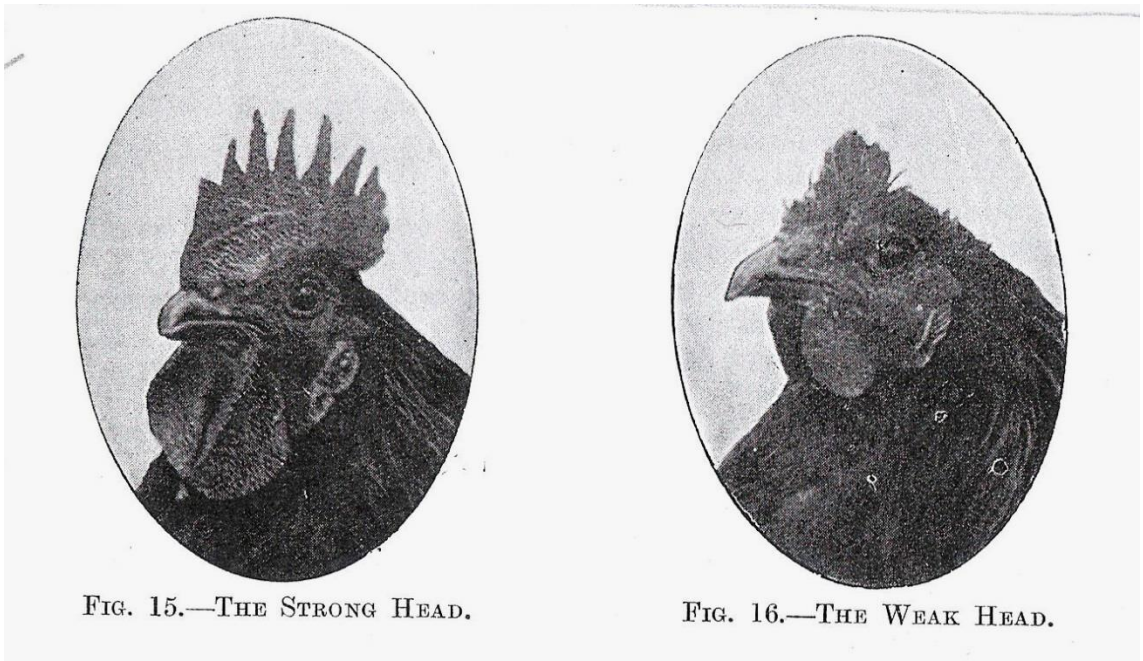

Figure 32. Cockerel head types in Brown, *Utility Poultry-Keeping* (1916)
Masculine (left) and feminine (right).[169]

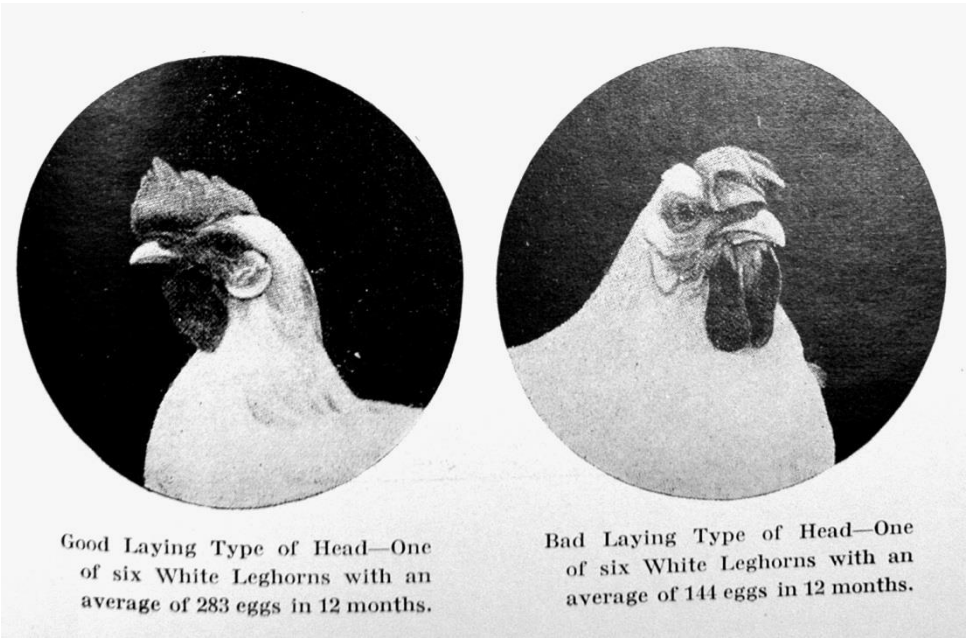

Figure 33. Heads of 'good' and 'bad' laying-types
in Merrett's *Sun Poultry Book* (1917).[170]

[169] Brown, *Bulletin No. 66 (New Series). Utility Poultry-Keeping*: 30.

The study of eyes was another aspect of popularly-discussed eugenic anthropometry. For example, the *Hawera & Normanby Star* in 1913 reported on the science of 'psychotechnics' which involved photographing and classifying eyes as an indicator of character type and health.[171] The *NZPJ* and *NZPW* repeatedly noted the protruding eye of good layers and the dull eye of drones and, commonly, advice books such as the example below provided photograph guides.

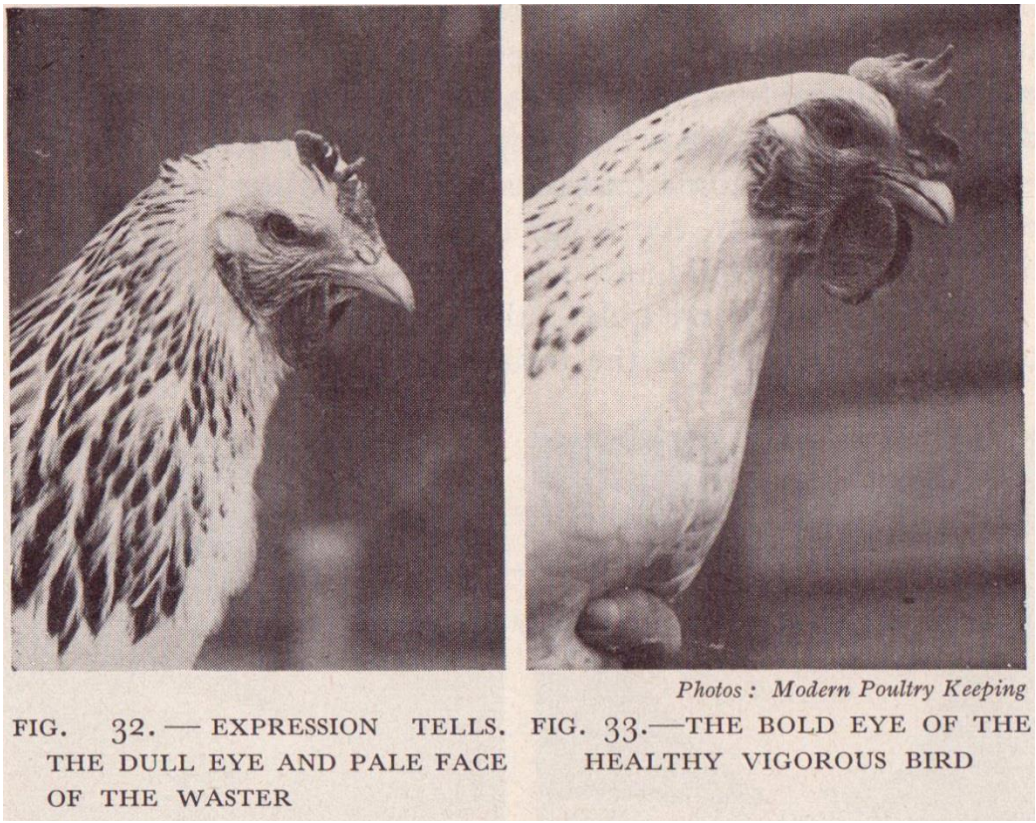

Figure 34.

The 'waster' and the vigorous bird in *Modern Poultry Husbandry* (1961).[172]

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[170] Merrett, *The Sun Poultry Book. A Practical Guide to Poultry Keeping in Australasia for Use and Profit, Together with an Appendix Containing the Utility Poultry Standards, Adopted by the New Zealand Utility Poultry Club*: n.p.

[171] "The Eye as Man's Index," *HNS*, 9 August 1913, 10. See also "The Eyes. What They Indicate," *Star*, 14 July 1906, 2.

[172] Leonard Robinson, *Modern Poultry Husbandry* (London: Crosby Lockwood & Son, Ltd., 1961). 128. This text was loaned to me from Shannon breeder Noel Hudson, and is

Culling and degenerationist fears remained a preoccupation through WWII. The editorial of the *NZPW* in 1941 continued to assert the importance of selecting from tested, record-breaking birds: 'Average production cannot be increased by breeding from the average. The pull of the race is downward. Promiscuous breeding is the sure road to deterioration'.[173] In promoting culling an editorial the following year explained that a sickly commercial hen had an easy existence compared with her wild ancestors, and that: 'Nature's method of eliminating the unfit is hard, it is unmerciful, it is the law of the jungle, but it is effective.'[174] Another 1942 article entitled 'Kill the Weaklings' reminded readers that 'a good rearer is a good killer', that weakling chicks 'are bullied and knocked about by their stronger companions [and] you will never […] make strong birds out of them.' Beginners who found killing chicks distasteful were advised to 'hold them up by the legs with the breast towards you and knock the back of the head sharply against any hard surface. You can do the job with your eyes closed if you wish!'[175] This language and culture of ruthless efficiency, which had developed through the pre-WWII era of overt eugenic debate within New Zealand society, persisted in the post-war period.[176]

Corn Birds and Hybrid Vigour

Prior to WWII, geneticists working for international corn companies, many of whom had commenced careers in eugenic biometric programmes, transferred their breeding methodologies from corn to poultry. They were now realising

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acknowledged by Sayer as a seminal British text. See Sayer, "'His footmarks on her shoulders': The Place of Women Within Poultry Keeping in the British Countryside, c.1880 to c.1980," 305.

[173] Progeny-testing was now recommended. See "Editorial. Notes on Breeding," 2.

[174] "The Importance of Culling," *NZPW* 5, no. 12, (1942): 1.

[175] S.P.B.A. [pseud.], "Kill the Weaklings" *NZPW* 5, no. 11, 28 October 1942: 19.

[176] Pride in the ability to efficiently and emotionlessly cull was evident within interview discussions of breeders who commenced their careers in the 1960s (names withheld).

the generalisation from maize to animals encouraged within school biology.[177] Their techniques involved 'incrossbreeding': the hybrid crossing of two severely inbred family lines within en-masse programmes to maximise genetic purity and create standardised birds, and involved the culling of millions of weak, malformed and imperfect chicks and birds.[178] Though presented positively by a researcher in the *NZPW* in 1939, this process, he admitted, was 'the grimmest test to which a living organism can be put.'[179]

New Zealand breeders were initially resistant after decades of being advised against close inbreeding on the basis of natural laws.[180] In 1953 a breeder argued for instance in the *NZPW* that these practices set humankind 'in opposition to nature' by enabling the emergence of recessive traits, which was 'antagonistic to the best interests of the species'.[181] The hybrid crossing of breeds within these programmes was less of an issue by this time. Breeders had been forced to reassess their bias against hybridity following the degeneration of flocks in the interwar period. The *NZPW* in 1939 had observed: '[C]ultivation and selective breeding have an invariable tendency to sap stamina and disease-resisting powers. In the animal and vegetable world it seems always to be the mongrel which is hardiest.'[182] New Zealand breeders had also received reports of the popularity of hardier crossbred birds in Australia[183] and eugenic bias against hybridity was challenged by scientists around 1930, who, like livestock breeders, had long-acknowledged the phenomena of hybrid vigour.[184]

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[177] Derry, *Bred for Perfection: Shorthorn Cattle, Collies and Arabian Horses Since 1800*: 14-15; Derry, *Art and Science in Breeding: Creating Better Chickens*: 91-96. On maize genetics see Möller-Wille and Rheinberger, *A Cultural History of Heredity*: 148.

[178] H.R. Bird, "Chicken a la Laboratory," *The Scientific Monthly* 75, no. 4, (1952): 241.

[179] Michael Pease, "Can Inbreeding Restore Stamina," *NZPW* 2, no. 5, (1939): 8.

[180] F.C. Bobby, "Poultry Husbandry in Britain," *NZJA* 90, no. 2, (1955): 156.

[181] "The Fundamentals of Inbreeding," *NZPW* 16, no. 12, (1953): 387.

[182] "It's the Detail that Counts," *NZPW* 2, no. 4, (1939): 24.

[183] "The Value of Crossbreeds," *NZPW* 2, no. 2, (1938): 13.

[184] See for example, Castle, "Biological and Social Consequences of Race-Crossing," 145-156.

Despite concerns about the new programmes, by 1960, artificial insemination was in use on New Zealand poultry stations,[185] which enabled breeders to produce their own incrossbred strains. Breeders also purchased incrossbred stock from international companies from the 1960s and 1970s.[186] These new hybrids were unable to be successfully bred from, providing an in-built means of commercial property protection.[187] Incrossbred birds were, like the modern monocrop species or human contract worker, designed for short-term high production, yearly disposal and hassle-free substitution.

Conclusion

This chapter has argued that traditional selection and breeding practices adhered to in this period were affirmed and extended by modern eugenic perspectives. The general applicability of race, heredity theory and genetic research was acknowledged by early poultry experts. As Mendelian genetics did not provide immediate solutions for breeders, existing selection methods were retained, affirmed by eugenic science as it was popularly understood. Bird selection by health, productivity and vigour, and by the visual assessment of well-proportioned form and masculine and feminine characteristics in this era, had common-sense validity due to the cultural prominence of eugenic perspectives as a means of assessing living beings in the first half century. Detailed behavioural assessment reflected the absorption of interwoven eugenic, physiology, endocrinology, and psychology theory. The tough eugenic language of selection and culling drummed home fundamental principles and the importance of culling within this era of non-standardised breeds and problems with diseased birds on intensifying farms. This eugenic culture

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[185] AI was first demonstrated in New Zealand in 1956. See "Poultry Farmers' Refresher Course," 97. On the interwoven history of AI in agricultural and human reproductive science see Wilmot, "Between the Farm and the Clinic: Agriculture and Reproductive Technology in the Twentieth Century," 310-311.

[186] "Can We Safeguard the Future of Our Pure-breds?," *NZPW* 34, no. 5, (1970): 1.

[187] Bugos, "Intellectual Property Protection in the American Chicken-Breeding Industry," 127-168.

established within poultry farming prior to WWII remained, evident within post-war language. Utilising the comparative principles of corn hybridisation, mid-century geneticists finally achieved the standardised worker-birds that had evaded earlier breeders, and this encouraged the comparison of chickens and plant crops in the post-war period. Moral concern about the scale and degree of inbreeding in these new hybridisation programmes was reflected in poultry press commentary about geneticists working against the principles of nature in the 1950s.

Chapter Six

Chicken Health and Hygiene

> Recent developments […] in biology and comparative pathology [can now be applied to] the disease problems which affect poultry-farming. […] The permanent value of the consistent application of hygienic principles in poultry husbandry [is that] the healthiest (and therefore most contented) hen lays the best and finest eggs. [M]odern commercial […] productive stress can be counteracted […] by a reasoned application of sound and practical rules of health.
>
> Henry P. Bayon, *Diseases of Poultry: Their Prevention and Treatment*, 1934.[1]

The book cited above, by British poultry pathologist Henry Bayon, circulated in New Zealand through the Government Country Library Service in the 1930s. It exemplifies the heightened attention to environmental factors within the interwar period coinciding with this focus in human medicine. Bayon was careful to articulate the *distinguishing* characteristics of chicken physiology which required consideration,[2] but his overall message was that factors such as hygiene, sunshine and green feed were essential for chickens as with humankind. Such views were supported by expert breeders who understood that environmental conditions and feeding were crucial to birds and to any animal achieving its hereditary potential. Conceptions of chicken race hygiene and physical hygiene (health) were intertwined.[3]

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[1] Henry Peter George Bayon, *Diseases of Poultry: Their Prevention and Treatment: A Practical Guide to Good Health in Fowls*, 2nd ed. (London: The Feathered World, 1934). 15.

[2] Ibid., 36.

[3] J.B. Merrett, "How To Avoid Poultry Diseases," *NZPJ*, 20 February 1914, 12; Cooke, "Science and Art Among the Chickens: Practical Breeding in the Work of Raymond Pearl," 14. See also for example ideas about inherited deficiency due to innate or environmental factors in "Producing the Hardy Fowl," 7. Around the turn of the century, 'hygiene' largely inferred sanitary cleanliness due to the emphasis on germ theory. See Whorton, *Inner Hygiene:*

These ideas were not new. Seventy-two years earlier, a discussion of comparative preventative health in respect to the then emerging field of comparative pathology, featured in New Zealand's *Daily Southern Cross* newspaper.[4] Professor Gangee at the Edinburgh Veterinary College, one of two centres for veterinary training in Britain at the time,[5] explained that comparative research would improve veterinary, human and sanitary medicine (the latter referring to public health), and that: 'medicine human and medicine veterinarian is as distinctly *one* as the animal creation is one'. Gangee's conception of comparative pathology also encompassed comparative psychology and drew upon existing humoural health traditions.[6] However, the study of bacteriology, epizootics (epidemics of animal disease) and zoonosis (the transmission of infectious disease between species) became the focus for comparative pathologists and the associated hygiene movement following the pioneering work of Pasteur and Robert Koch into germ theory from the 1860s to 1880s.[7]

A return to preventative or constitutional health perspectives occurred within the first decade of the twentieth century within British, European and US universities, medical schools and agricultural research stations.[8] This aligned with renewed interest in holism within Western biology and biomedicine

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Constipation and the Pursuit of Health in Modern Society: 19-20. The term hygiene gradually broadened again to imply practices related to the preservation of health, which was its original Greek usage. On the latter see Henry George Liddell and Robert Scott, *A Greek-English Lexicon* (Oxford: Clarendon Press, 1940), cited in "ὑ γιεινός," Perseus, accessed 22 August 2014, http://tinyurl.com/nwtvoqh.

[4] "Diseases of Men and Animals," *DSC*, 26 February 1861, 4.

[5] Wilkinson, *Animals & Disease: An Introduction to the History of Comparative Medicine*: 106-109.

[6] Ibid., ix, 1-33, 65, 87-113; Louise Hill Curth, *The Care of Brute Beasts: A Social and Cultural Study of Veterinary Medicine in Early Modern England* (Leiden: Brill, 2010). 7, 34-40.

[7] Wilkinson, *Animals & Disease: An Introduction to the History of Comparative Medicine*: 115-166.

[8] Ibid., 166-221.

generally in the first half of the century.[9] Preventative health ideas coexisted with the focus on inherited body types and disease predisposition (constitutional pathology), and pathogens as disease determinants, which were relatively new concepts within public consciousness around the turn of the century.[10] The ongoing heredity-environment debate within science prior to WWII was due to the fact that many illnesses such as gout, heart disease, epilepsy, mental illness, diabetes and cancer could not be explained by germ theory, nor were they confirmed as hereditary in origin, despite promising research into genetic causation around the turn of the century.[11]

This chapter examines comparative concepts about chicken health, charting the changing trends in comparative pathology. The turn-of-the-century emphasis on hygiene and zoonotic infection within New Zealand and the poultry press is firstly examined, including medical treatments for poultry that were similar to basic human treatments and curatives prior to 1920. The relationship between preventative health ideas in the poultry press and those of public educationalists such as King and others on the topics of nutrition, fresh air, sunshine and exercise is then examined. Lastly, part three briefly details the application of chemicals and pharmaceuticals within post-WWII society and poultry farming. In this era, dual approaches to human and poultry medicine were still explicitly discussed but this signalled the end of the preventative health era as reliance on medication was the antithesis of the hygienic ideal.

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[9] Christopher Weisz George Lawrence, *Greater Than The Parts: Holism in Biomedicine, 1920-1950* (New York: Oxford University Press, 1998); Allen, "Mechanism, Vitalism and Organicism in Late Nineteenth and Twentieth-Century Biology: The Importance of Historical Context," 261-283.

[10] J. Andrew Mendelsohn, "Medicine and the Making of Bodily Inequality in Twentieth Century Europe," in *Heredity and Infection: The History of Disease Transmission*, ed. Jean-Paul Gaudillière and Ilana Löwry (London and New York: Routledge, 2001), 21-79. See also Brookes, "Hygiene, Health and Bodily Knowledge, 1880-1940: A New Zealand Case Study," 293.

[11] Rosenberg, *No Other Gods: On Science and American Social Thought*: 35.

Comparative Pathology and Hygiene

In 1893 the Division of Veterinary Science in New Zealand's Department of Agriculture commenced operations, with infectious zoonotic diseases a primary focus. John Gilruth, the Division's chief veterinarian, had trained in comparative pathology at the Pasteur Institute in Paris. From 1898 he extended his work to the human animal in his role as the Government bacteriologist, and from 1900 and 1901 respectively he also served as a Government advisor on public health and as the Health Department pathologist. Prior to his departure to Australia in 1907, Gilruth was actively engaged in public and agricultural sector education, attending farmer's conferences with King to lobby for basic agricultural science in schools and promoting awareness of zoonotic disease.[12] He published numerous leaflets for farmers[13] which informed, not only the agricultural sector, but public hygiene discourse prior to WWI.[14]

New Zealand scientists, medics (including King) and veterinarians were kept informed of comparative pathology through national and international medical and veterinary conferences prior to WWII. During WWI, correspondence courses were also an option.[15] Three significant publications in the field of

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[12] J.A. Gilruth, "Bacteriology and Its Benefits," *Press*, 9 July 1900, 3; Alan Powell, "Gilruth, John Anderson (1871–1937)," National Centre of Biography, Australian National University, accessed 17 January 2014, http://adb.anu.edu.au/biography/gilruth-john-anderson-6393/text10927; Ford, "The Tyranny of the Microbe: Microbial Mentalities in New Zealand, c.1880–1915," 51, 121-170.

[13] See for example: J.A. Gilruth, *Leaflets for Farmers. No. 40. Tuberculosis* (Wellington: New Zealand Department of Agriculture, 1900).

[14] Ford, "The Tyranny of the Microbe: Microbial Mentalities in New Zealand, c.1880–1915," 14, 296-307.

[15] "Intercolonial Medical Congress," *OW*, 13 February 1896, 22. Truby King attended this. Newspapers reported on this Australasian conference between 1888 and 1905. For other conferences, see for example, "Animal Diseases," *EP*, 21 May 1928, 11; C.B. Bledisloe, "The Relation Between Human and Animal Disease," in *Annual Conference of the New Zealand Veterinary Association* (Wellington: NZVA, 1934), 1-11. On correspondence courses, see for example, "Imperial College," *NZH*, 22 September 1915, 12.

comparative pathology subscribed to by the Department of Agriculture and New Zealand university colleges were the *Veterinary Journal and Annals of Comparative Pathology*, published in London from 1875 to 1899; the *Journal of Comparative Pathology and Therapeutics*, published from 1888;[16] and *The Journal of Experimental Medicine*, published by the Rockefeller Institute in the US from 1896.[17] Some New Zealanders may have read Henry Bayon's 1934 article, 'The Study of Avian Biology in Relation to Scientific Progress' in the *Journal of Comparative Pathology and Therapeutics.* Bayon noted that research into chicken disorders had contributed to greater knowledge in a number of fields with which he actively engaged, including virology, bacteriology, oncology and haematology.[18]

Comparative pathology was also discussed in medical texts such as Woods Hutchinson's *Studies in Human and Comparative Pathology* (1901). Hutchinson was an American professor of comparative pathology and clinical medicine who toured New Zealand in 1928 to assess Karitane maternity hospitals and other Health Department initiatives while King was working for the Department. Hutchinson's opinions and publications were frequently cited in New Zealand's mainstream press prior to this.[19]

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[16] Copies of these, including early issues, are held in Ruakura, Otago University and Massey University libraries. AgResearch (which absorbed Ruakura's collection) has holdings of the latter journal from 1888-1969.

[17] The main holdings of this are from 1896 at AgResearch and Otago University Libraries and from 1929 at Massey University.

[18] Henry Peter George Bayon, "The Study of Avian Biology in Relation to Scientific Progress," *Journal of Comparative Pathology and Therapeutics* 47, (1934): 302-319.

[19] Hutchinson, *Studies in Human and Comparative Pathology*; "Our Public Health," *AS*, 3 July 1928, 3; "An American Eulogy," *AS*, 25 June 1928, 6. On Hutchinson's books see for example, "Books and Writers," *TIMH*, 20 June 1914, 3. King had connections with American medics. See F. Truby King, *Feeding and Care of Baby* (Auckland: Whitcombe & Tombs, 1940). title page; Chapman, *In a Strange Garden: The Life and Times of Truby King*: 16-17.

Tuberculosis

The poultry disease most discussed in terms of zoonotic transmission in the first half of the century was tuberculosis (TB), also referred to in the poultry press as 'consumption' or 'spotty liver'. TB was described by Brown in 1916 as one of the most serious poultry diseases in terms of mortality and ease of transmission and it remained a significant concern during WWII.[20] Gilruth in 1900 advised farmers that: 'The bacillus of fowl tuberculosis is slightly different from that of mammalian [but] they are only varieties of this same organism.'[21] He advocated for pasteurisation of milk for humans and warned against the use of skim milk and whey for animal feed as it was one of the main avenues for transmission.[22] Although the *NZJA* in 1936 stated that fowls were rarely infected by human or bovine strains of the disease, inter-species immunity was not guaranteed, and it advised against keeping pigs and fowls together.[23] Poultry produce was suspected as a source of transmission according to press reports of international scientific opinion prior to WWI, and public concerns about this were still evident in the *NZFW* in 1946, although at this stage there was only one reported incident of TB transmission from poultry to pigs in New Zealand. Transmission was rare as infected hens suffered wasting and usually ceased to lay.[24]

Although the tubercle bacillus had been identified by Koch in 1882, questions about hereditary transmission were debated internationally into the 1920s and

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[20] Brown, *Bulletin No. 66 (New Series). Utility Poultry-Keeping*: 75-76; Livestock Division, *Utility Poultry Keeping by the Chief Poultry Instructor* (Wellington: Department of Agriculture, 1939). 103.

[21] Gilruth, *Leaflets for Farmers. No. 40. Tuberculosis*: 8.

[22] Ford, "The Tyranny of the Microbe: Microbial Mentalities in New Zealand, c.1880–1915," 127-168.

[23] T.A. Blake, "Tuberculosis in Farm Animals," *NZJA* 52, no. 4, (1936): 227-228.

[24] For pre-WWI example, see syndicated article in "Tuberculosis," *EP*, 3 October 1913, 7. On symptoms and transmission to pigs see C.S.M. Hopkirk, "Department of Agriculture Annual Report for 1936-37. Veterinary Laboratory, Wallaceville," in *AJHR, 1937, Session I. H-29,* 18; "Tuberculosis in Poultry," *NZPP* 2, no. 14, (1937): 8-10; M.W. Stewart, "T.B. in Hens," *NZFW*, 14 November 1946, 46.

beyond. Human TB was discussed, as many illnesses were in this era, as a 'disease of civilisation', frequently accompanied by the observation that wild animals in their natural state did not acquire it. Beliefs about the inheritance of acquired characteristics contributed to this preventative health focus.[25]

Debate about avian TB mirrored trends in understanding the human strain. As with most other poultry diseases, infection from overcrowding and 'tainted ground' was considered a key cause, as were 'badly constructed and ill-ventilated quarters', and 'the heavy demands made on industry birds', who in their second laying year became nutritionally-depleted.[26] The English poultry expert William Tegetmeier, still being cited prior to WWI by poultry experts, regarded TB as a heredity disease, and warned against breeding from tubercular birds.[27] Ideas about the heredity transmission of TB in animals, as with humans, were evidently persistent, as an article for farmers in the *NZJA* in 1936 continued to counter this belief.[28]

Cleanliness

Although sanitary hygiene was being enforced within many areas of agriculture, including dairying, prior to WWI,[29] cleanliness on the poultry farm was also understood within the general framework of modern hygiene. Merrett reminded farmers that 'filth is against nature and thus against health' and

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[25] "White Scourge," *EP*, 27 October 1932, 22; Linda Bryder, "'If preventable, why not prevented?': The New Zealand Response to Tuberculosis 1901-1940," in *A Healthy Country: Essays on the Social History of Medicine in New Zealand*, ed. Linda Bryder (Wellington: Bridget Williams Books, 1991); Bernd Gausemeier, "Borderlands of Heredity: The Debate about Hereditary Susceptibility to Tuberculosis, 1882-1945," in *Human Heredity in the Twentieth Century*, ed. Bernd Gausemeier, Staffan Muller-Wille, and Edmund Ramsden (London: Pickering & Chatto, 2013), 13-26.

[26] Brown, *Bulletin No. 13. Poultry and Eggs for Market and Export*: 59; "Medical Notes," *EP*, 4 May 1925, 4; "Liver Disease in Fowls. Its Cause, Prevention and Cure," *NZPJ*, 20 October 1926, 5.

[27] Terror [pseud.], "Poultry Notes," *OW*, 15 April 1903, 54.

[28] Blake, "Tuberculosis in Farm Animals," 227.

[29] Katrina Ford, "'The Very Life Blood of the Country': Germs, Dairying and Public Health in New Zealand, c.1890-1910," *NZJH* 47, no. 2, (2013): 157-184.

recommended the white-washing of all poultry houses with a disinfectant spray to prevent disease through mite infestations.[30] Insects as vectors of disease for poultry were identified in 1895 by Theobald Smith, a professor of comparative pathology in the US.[31] Parasitical insects such as gapes in poultry that 'destroyed life' also had broader connotations. School nature study texts aligned dependent, parasitical people, animals and insects as indicators of evolutionary retrogression.[32]

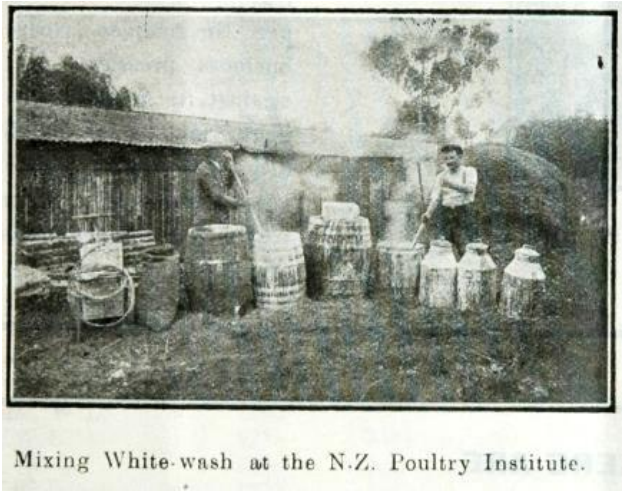

Figure 35. White-washing at Merrett's farm, pictured in the *NZPJ*, 1914.[33]

Disease outbreaks in the 1930s fuelled a demand for disinfectants. Chemicals now known to be highly toxic and carcinogenic, such as formaldehyde, were commonly used to disinfect both poultry and human habitations in this era. Formaldehyde was used as a domestic disinfectant following serious illness early in the century and its use for general disinfection within hospitals persisted in the interwar period.[34]Formaldehyde gas, formed by mixing Condy's Crystals (potassium permanganate), and Formalin solution, was

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[30] Merrett, "Beginner's Department," 24.

[31] Wilkinson, *Animals & Disease: An Introduction to the History of Comparative Medicine*: 210.

[32] Geddes and Thomson, *Evolution*: 105.

[33] J.B. Merrett, "The Value of Whitewashing," *NZPJ*, 20 March 1914, 9.

[34] "To Keep A Home Healthy," *Rodney and Otamatea Times, Waitemata and Kaipara Gazette*, 25 September 1912, 7; "That Hospital Block," *AS*, 19 September 1929, 8.

commonly used for fumigating hatching eggs and poultry sheds into the latter decades of the twentieth century.[35] The use of kerosene as an insecticide was affirmed by the widespread use of coal and oil derivatives in industry and medicine earlier in the century. Noting examples such as anthracene, naphthalene, creosote, disinfectants, dyes, anaesthetics and aspirin, the *NZPP* commented in 1935: 'No community of people can dispense with the use of these tar oil products and this certainly applies to the poultry farmers'.[36]

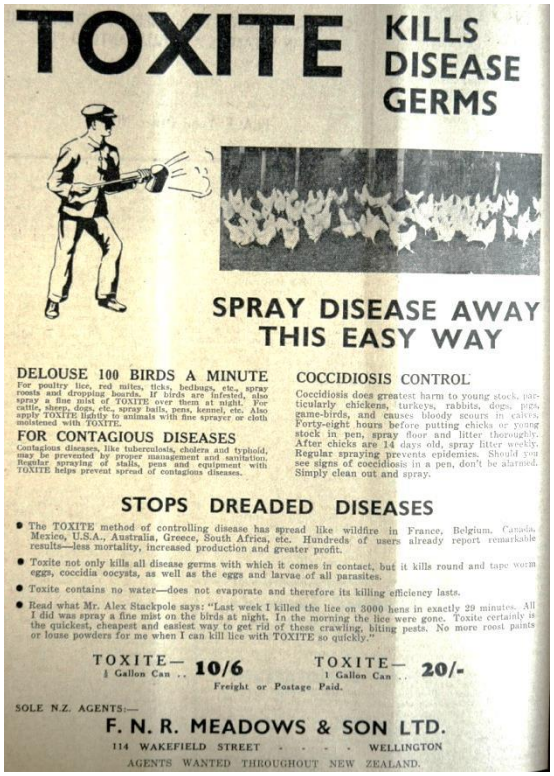

Figure 36. Insecticide advertisement in the *NZPP*, 1937 [37]

This militancy within marketing, evoking the triumph of science over nature, had its origins in the nineteenth century when Paul Ehrlich, a colleague of Koch's, in searching for the ultimate antiseptic drug, coined the term 'magic bullet'.[38]

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[35] Clarke, interview. See also J.D.W.A. Coles, "101 Hints for the Poultryman," *NZPW* 1, no. 5, (1938): 14.

[36] "Tar Oils. Their Use in Industry," *NZPP* 1, no. 7, (1935): 7.

[37] F.N.R. Meadows & Son Ltd., "Toxite," *NZPP* 2, no. 10, (1937): 6.

[38] "Paul Ehrlich," Chemical Heritage Foundation, accessed 22 July 2014, http://tinyurl.com/k4r5xwu.

Comparative Medicine

Treating animals through nursing and home remedies was the norm when preventative measures failed in the first half of the century. Correlated medicines for humans and farm animals were especially common prior to 1920 in scenarios where similar causes and symptoms were recognised (or assumed). *Brett's Colonists' Guide*, for example, recommended opium mixed with chalk for treating diarrhoea in fowls, and humans were prescribed the same, with additional castor oil and diluted sulphuric acid. It referred to sick animals as 'patients' and provided homeopathic, herbal and general pharmacological remedies.[39] Herbal remedies were advertised in New Zealand newspapers for 'man and beast' or 'Feathered and Brute Creation'.[40] Wright in 1902 recommended that large fowls be given one third of the dosage of medicines given to adult humans and *The New Zealand Family Herb Doctor* noted that its medicines for animals were 'about the same as for man', although 'the differences in the size of the animal must not be lost sight of.'[41] Various commercial embrocations sold through chemists and stores were advertised for interspecies use for the treatment of pain, rheumatism and infections.[42]

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[39] Thomson W. Leys, ed. *Brett's Colonists' Guide and Cyclopaedia of Useful Knowledge* (Auckland: Brett Printing & Publishing Co., 1902), 408-413, 658-675, 691-725.

[40] See for example, "Wood's Peppermint Cure," *Colonist*, 14 April 1908, 2; "Plantekoa," *EP*, 21 July 1911, 4.

[41] James Neil, *New Zealand Family Herb Doctor and Medical Recipe Book* (Dunedin: Mills, Dick & Co., 1891). 482-491; Wright, *The New Book of Poultry, with Forty-Five Plates in Colour and Black and White by J.W. Ludlow and the Poultry Club Standards of Perfection for the Various Breeds*: 573. On the common use of herbal medicine and other forms of alternative, 'natural' healing prior to WWI in Western countries see Deborah Brunton, ed. *Medicine Transformed: Health, Disease and Society in Europe 1800-1930* (Milton Keynes and Manchester: The Open University, 2004), 383.

[42] For example, Elliman's first aid book published in numerous editions prior to 1910, recommended their embrocation for rheumatism, cramp, injury dressings, gout and a range of other poultry disorders, while advertising a product of the same name for the treatment of human aches and pains. See *Elliman's First Aid. Horses, Dogs, Birds, Cattle. Accidents and Ailments*,

Colds and bronchial conditions causing runny noses, coughing, sneezing and wheezing were frequently discussed in the poultry press prior to the use of antibiotics,[43] and general remedies such as powdered aspirin and Friars Balsam (also commonly inhaled for human colds) were prescribed.[44] Roup, a vague term used to describe a chronic respiratory infection like catarrh or a sudden, severe influenza-like condition, was only in 1958 identified in the *NZPW* as a collection of diseases.[45] Prior to this it was discussed as a primary disease of concern.[46] As the *NZPW* in 1941 stated: 'If we can, for a moment think of all the things that cause a human being to go down with colds and influenza, we shall not be very far from knowing what conditions give fertile ground for an outbreak of roup'.[47] Although in severe cases, or in large commercial operations, birds would be killed or bathed in kerosene, poultry-keepers were generally advised to treat birds as they would human influenza patients.[48] In

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3rd ed. (Slough, England: Elliman, Sons & Co., 1902). 123-138; "The Empire's Embrocation," *EP*, 21 July 1926, 7; "Rub In Elliman's," *NZT*, 10 July 1930, 8.

[43] What we now know as avian influenza was referred to prior to 1981 as 'fowl plague' and was not identified within New Zealand flocks within the period under study. See Wlodzimierz Leonard Stanislawek, "Avian Influenza and Avian Paramyxoviruses in the New Zealand Bird Population," (PhD thesis, Massey University, 2002), iii; Blanca Lupiani and Sanjay M. Reddy, "The History of Avian Influenza," *Comparative Immunology, Microbiology and Infectious Diseases* 32, (2009): 313-314.

[44] W.W. McKinney, "Prevention of Disease," *NZPJ*, 20 July 1909, 24; Dr. F.N. Marcellus, "Disease Prevention on the Poultry Plant," *NZPW* 1, no. 12, (1938): 21; Bayon, *Diseases of Poultry: Their Prevention and Treatment: A Practical Guide to Good Health in Fowls*: 216. Friars Balsam for poultry and humans was used for cuts and colds. See "Health Hints," *AS*, 19 February 1910, 15; "Home Topics," *NZH*, 9 January 1912, 4.

[45] "Fifty Years Review of Poultry Disease Control," *NZPW* 21, no. 7, (1958): 7.

[46] Hyde and McNab, *Poultry and Eggs for Market and Export* 42. See also Brown, *Bulletin No. 13. Poultry and Eggs for Market and Export*: 59.

[47] "Prevention of Roup ", *NZPW* 4, no. 3, (1941): 14.

[48] J.B. Merrett, "A Common Poultry Disease. Dangers of Neglected Colds – How to Avoid and Arrest Complaints," *NZPJ*, 20 October 1913, 12; Brown, *Bulletin No. 13. Poultry and Eggs for Market and Export*: 77; Cussen, "Notes on Poultry-Keeping," 17.

addition to isolation, keeping the bird warm and out of drafts, an ample supply of green feed, and the use of a disinfectant, experts recommended treatments such as castor oil and a quinine pill twice daily and the application of eucalyptus oil or menthol to the nostrils.[49]

Proprietary commercial poultry medicines advertised in journals in the 1930s were largely ineffective.[50] Disease outbreaks in the 1930s continued to be treated with home remedies. When an outbreak of fowl pox arose in Auckland in 1935 prior to the use of vaccines, the poultry instructor advised good feeding and the isolation of infected birds. In addition he requested that farmers burn litter, paint perches with Creosote, paint the birds' sores with carbolised Vaseline and pure Campfosa twice daily for several days, put Condy's crystals and copper sulphate in the drinking water for several months, Epsom salts and sulphur in the mash in order to 'regulate the blood stream' to help the birds resist infection, and the use of a tonic.[51] Poultry vaccines for fowl pox and TB were in restricted use in New Zealand from 1938. However, routine vaccination of chicks was not the norm until the 1970s.[52]

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[49] Hyde and McNab, *Poultry and Eggs for Market and Export* 42-45; Brown, *Bulletin No. 66 (New Series). Utility Poultry-Keeping*: 74-77; "Control of Diseases and Pests in Household Poultry," *NZJA* 86, no. 1, (1953): 75.

[50] See for example, Norman Ross, "Disease Control," *NZPP* 2, no. 13, (1937): 10-11. A general trend for ineffective proprietary products was noted in C. J. Reakes, "Department of Agriculture Annual Report for 1931-32. Report of the Director-General," in *AJHR, 1932, Session I, H-29*, 4-5.

[51] E.C. Jarrett to C.J. Cussen, 4 July 1935, Poultry Diseases - Chicken Pox 1935-1948, AAFZ 412 W5704/292 87/13/4 Part 1 (ANZ); Chicken pox in humans is not the same virus. See E.M. Dickinson, "Fowl-Pox in Domestic Poultry. Agricultural Experiment Station Bulletin 411," Oregon State College, accessed 14 January 2014, http://ir.library.oregonstate.edu/xmlui/bitstream/handle/1957/15182/StationBulletin411.pdf

[52] E.C. Jarrett to C.J. Cussen, 4 July 1935, Poultry Diseases - Chicken Pox 1935-1948, AAFZ 412 W5704/292 87/13/4 Part 1 (ANZ); C.S.M. Hopkirk, "Department of Agriculture Annual Report for 1938-39. Veterinary Laboratory, Wallaceville," in *AJHR, 1939, Session I, H-29*; Poultry and Birds Disease. Marek's Disease, 1975-1983, ABMF 515 W4882/62 6/7/2/3 (ANZ).

Preventative Health

King's ideas about nutrition and fatigue discussed in previous chapters epitomised the constitutional comparative pathology perspectives which came to the fore in the first half of the century.[53] School health education mirrored these trends. The *NZSJ* in 1909 instructed that germs were 'seldom able to get a footing unless the body has been previously weakened and its natural resisting power […] lowered.' [54] The 'seed' of contagion required the right 'soil' for ill-health.[55] An environmental focus and refutation of genetic determinism was evident in texts such as Thomson's *Study of Animal Life* and the physical education text *Growing Body*.[56]

In line with this, by the 1920s poultry industry leaders emphasised that disinfectants were not a cure-all, but part of an overall approach. The *NZPJ* in 1925 reminded readers that:

> […] the rearer of chickens should [not] be always deluging his equipment with disinfectants. […] One does not deluge one's own home with disinfectant to ensure the health and well-being of the inmates. Such a procedure might have been excusable in the early days of our knowledge of micro-organisms as causative agents of disease, but science in these times directs its attention to more natural conditions of life – fresh air, sunlight, roomy dwellings, etc.[57]

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[53] King discouraged an over-reliance on antiseptics and other 'artificial' aids, but in acknowledgement of artificial conditions, allowed compensatory use. On disinfectants see "To Save the Race. The Struggle for Health and Sanity. Lecture by Dr.Truby King," *EP*, 15 October 1909, 9; Chapman, *In a Strange Garden: The Life and Times of Truby King*: 71.

[54] "Our Invisible Friends and Foes," *NZSJ* III, no. 7, (1909): 199-203.

[55] Mendelsohn, "Medicine and the Making of Bodily Inequality in Twentieth Century Europe," 28.

[56] Thomson, *The Study of Animal Life*: 383-410; White, *Growing Body: It's Nature, Needs and Training*: 9-10.

[57] James Hadlington, "Poultry Notes," *NZPJ*, 20 November 1925, 2.

The disease outbreaks of the 1930s also engendered a greater focus on constitutional health. Mass-production methods as a contributing factor to increased disease was highlighted in Cussen's 1938 official report, which explained that the best way to fight disease was to 'guard against it in the natural way' by better breeding, feeding and management.[58] In 1939 the poultry columnist for the *Auckland Star* reiterated the notion of fertile soil: 'Birds, like ourselves, are continually surrounded by disease-producing organisms, which, in, normal circumstances, do no harm'.[59] Another expert suggested in the *NZPW* that year that unless the focus shifted to constitutional resistance, 'it might be necessary to dispense with modern farming and let the fowls run free'.[60]

Nutrition

Comparative nutritional research was a prominent topic of discussion within New Zealand's scientific community during the 1930s. A key proponent was King's colleague at Otago University, and their first nutritional physiologist, Professor John Malcolm, known for his research into iron deficiency in New Zealanders and the equivalent in livestock, known as 'bush sickness'.[61] Malcolm used chickens and rats to demonstrate nutritional principles in his public and university lectures. Rural families were the target of Malcolm and his protégé Muriel Bell, in the Otago Home Science Extension Service and its successors in

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[58] W.C. Barry, "Department of Agriculture Annual Report for 1937-38. Livestock Division," in *AJHR, 1938, Session I, H-29*, 18. See for also example, E. Hadlington, "The Trend Towards Intensivism," *NZPP* 1, no. 9, (1935): 4-5.

[59] Orpington [pseud.], "Poultry Notes," *AS*, 6 January 1939, 15.

[60] "It's the Detail that Counts," 24.

[61] Professor J. Malcolm, "Some Present-Day Views on the Metabolism of Iron, with Remarks on "Bush Sickness"," *NZ Journal of Science and Technology* 13, no. 12, (1931): 181-188; James R. Robinson, "Malcolm, John (1873–1954)," DNZB: Te Ara - The Encyclopedia of New Zealand, accessed 30 January 2014, http://www.TeAra.govt.nz/en/biographies/4m33/malcolm-john.

liaison with the WDFU and other farming groups during the 1930s.[62] Malcolm's research and the need for closer liaison between 'the two branches of the healing profession' within the Departments of Health and Agriculture was noted by agricultural science advocate and New Zealand's governor general from 1930-1935, Lord Bledisloe in his opening address at the annual conference for veterinary surgeons in 1934. He urged interdisciplinary collaboration between nutritionists, soil chemists and veterinarians, noting that research had revealed common disease aetiology despite differing symptoms in people and farm animals.[63] During the 1930s an animal nutrition division of the Wallaceville laboratory was led by a couple (Drs Marion and Ira James Cunningham) with expertise in comparative nutrition and preventative medicine. They investigated for example, the vitamin D content of New Zealand fish oils, magnesium metabolism in the 'animal organism' and the effect of protein on animal sterility.[64]

As the chicken was a favoured experimental animal within nutrition research internationally, generic and specialist poultry nutritional researchers, the latter of which were emerging in the 1920s, shared a common pool of knowledge.[65] A British publication summarising the latest international research into poultry nutrition to assist industry in 1934, for instance, cited generic publications such

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[62] "Proper Food," *EP*, 8 September 1927, 13; Courtney Elizabeth Harper, "'The Art of Eating, has in fact, become a science': Dietary Advice from the Interwar Period to 1960" (M.A. thesis, University of Auckland, 2008), 9-14.

[63] Russell Marshall, "Bledisloe, Charles Bathurst," DNZB: Te Ara - The Encyclopedia of New Zealand, accessed 20 April 2014, http://www.teara.govt.nz/en/biographies/4b39/bledisloe-charles-bathurst; Bledisloe, "The Relation Between Human and Animal Disease," 1-11; "Health of Stock," *AS*, 4 July 1934, 3.

[64] The division submitted Department of Agriculture annual reports from 1933, but for a list see V.J. Wilson and Loris H. Webley, *The New Zealand Journal of Science and Technology Index to Volumes 1 to 25* (Wellington: Council of Scientific and Industrial Research, 1948). 22; Tenquist, *Wallaceville Veterinary Laboratory: An Anecdotal History*: 46.

[65] Jacob Biely, "The Chick in Nutritional Research," *World's Poultry Science Journal* 16, no. 2, (1960): 110-112.

as the *Journal of Biological Chemistry*, the *Journal of Experimental Physiology*, the *Journal of Nutrition*, the *British Medical Journal*, and the *American Journal of Pathology*, as well as the more agriculturally-specific *Veterinary Journal* and *Poultry Science*.[66]

General ideas about nutrition contributed to industry resistance to specialised poultry feeds. In 1935, the poultry column in the *Hutt News* articulated the prevalent view that no book could possibly provide all the required information about poultry nutrition as 'methods change so quickly in this age of progress.' This columnist added: 'human races of the world have vastly different diets but they all live and yet they would not if they changed their diets from one to another.'[67] This latter comment may be understood in relation to racial ideas about national diets,[68] and to related ideas about eating according to local climates and seasons, a fact which was conveyed to New Zealand school children early in the century.[69] It was understood that cold conditions withdrew energy.[70] The poultry press continually emphasised these same considerations.[71]

The opinion was expressed in the *NZPJ* in 1945 that standardisation of poultry food was unnecessary, provided birds were given plenty of range, and that: 'When anyone tells you that there is only one way to feed chickens for profit,

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[66] "Rowett Centenary. History," University of Aberdeen, accessed 8 January 2014, http://www.abdn.ac.uk/rowett-centenary/history/index.php; A.R.G. Emslie, *Recent Research in Poultry Nutrition* (Aberdeen: Imperial Bureau of Animal Nutrition, The Reid Library, Rowett Institute, 1934). 5, 55-58.

[67] "Poultry Notes," *Hutt News*, 18 September 1935, 5.

[68] E.V. McCollum and N. Simmonds, *The Newer Knowledge of Nutrition: The Use of Foods for the Preservation of Vitality and Health*, 4th ed. (New York: MacMillan, 1929). 433-468.

[69] See for example, "Living Stoves," *NZSJ* III, no. 10, (1909): 150-152.

[70] Henry Prentiss Armsby, *The Principles of Animal Nutrition* (New York and London: John Wiley & Sons, 1906). 471; H.B.T. [pseud.], "Stock Raising," *NZH*, 1 March 1930, 20.

[71] See for example, *Practical Poultry Keeping: A Guide to the Breeding and Upkeep of Poultry in New Zealand*, (Wellington: Reed, 1950). 30.

just tell them to go and jump in the lake. It would be just as reasonable to say there is only one ration right for human beings.'[72] The economic necessity of utilising varied feeds was heightened during wartime with the rationing of grain,[73] but was congruent with debates about the human diet. One *Auckland Star* contributor in 1931 for instance, while acknowledging that the army and other institutions attempted to develop 'standard' diets, cited Wood Hutchison's advice on a 'mixed diet' for humans, and differing individual requirements.[74]

Farmers' insistence about 'wholesome foods' for chickens and 'an absence of any made-up stimulants', as mentioned in the chapter three example with Bert Mitchell, also related to broader public discourses.[75] Alfred W. McCann, known in 1920s New Zealand as the American author of *The Science of Eating* (1919),[76] echoed the sentiments of King and others concerning the eugenic threat of malnutrition:

> […] many of the […] ills directly traceable to inadequate food, […] could be Vanished […] if the human race would only apply to its dietary the fixed laws which control the resistance of the sheep and the horse to the same disease, and the disregard of which makes the hog and the cow a constant prey to it.[77]

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[72] "Reflect on Rations," *NZPW* 8, no. 12, (1945): 13.

[73] C.J. Goldsmith to F.C. Bobby re: W.N. Peters, 16 December 1947, Rehabilitation of Returned Soldiers in the Poultry Industry 1945-1952, AAFZ 412 W5704/346 67/9/211 Part 2 (ANZ).

[74] H.A.Y. [pseud.], "Vitamins and Health," *AS*, 17 November 1931, 6.

[75] Mitchell, "Good Feeding," 4. On wholefoods see also the discussion of New Zealand's Sanitarium health food company in Amey, *The Compassionate Contrarians: A History of Vegetarians in Aotearoa New Zealand*: 44-47.

[76] "Whitcombe & Tombs Ltd," *Press*, 6 October 1920, 1; "Sun-Maid Raisins ", *EP*, 5 April 1923, 11. On McCann see Whorton, *Inner Hygiene: Constipation and the Pursuit of Health in Modern Society*: 211, 219.

[77] "Science of Eating. Remarkable Health Book," *NA*, 17 October 1922, 5.

In this book, McCann recommended an experiment for the school classroom in which three cages of chickens were fed graded amounts of processed grains or whole grains, greens and water to teach children about nutritional laws. Thankfully McCann instructed restoration of the poorly-fed chickens through a reverse dietary plan.[78]

Feeding Babies

Discussion of chick nutrition by New Zealand poultry experts was often framed in explicitly comparative terms, appealing to women, who as scientific baby-raisers and as guardians of family hygiene, inculcated in the natural laws of health, were well-equipped for modern poultry-raising.[79] For example, Merrett advised in his guidebook in 1926:

> In every section of reproduction there is a growing attention to feeding. Among humans the hygienic system for infant life has become a science. No breeder of purebred stock can establish himself unless he studies the most approved system of feeding and has a practical knowledge of the foods most suited for the development of the young. There is a very close relationship between the production of an egg and the growth of flesh and blood.[80]

Marie Stewart appears likely to have recognised some transferable scientific skills when in her mid-life she became an active member of the Plunket Society at a local and national level.[81] Discussing chick-rearing in her 1938 and 1956

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[78] Alfred W. McCann, *The Science of Eating. How to Insure Stamina, Endurance, Vigor, Strength and Health in Infancy, Youth and Age* (New York: George H. Doran Company, 1919). 243-245.

[79] Besides Plunket and other child health initiatives, popular health publications for women emphasised this, comparing animal and human needs. See Brookes, "Hygiene, Health and Bodily Knowledge, 1880-1940: A New Zealand Case Study," 301.

[80] Merrett, *Poultry for Profit in New Zealand: A Practical Guide to Poultry Keeping in New Zealand and Australia for Use and Profit*: 26. See also "Seasonal Suggestions," 12.

[81] Cox, "Stewart, Marion Watson" accessed 18 January 2014, http://www.teara.govt.nz/en/biographies/5s46/stewart-marion-watson.

advice books, she commented: 'The aim must be to keep the youngsters growing and healthy without a check to their chickenhood', and that '[b]onny chicks cannot be reared successfully on poor foodstuffs.' Her recommended regime for feeding chicks, from the first meal given at midday on the first day after hatching, followed a prescriptive three-meals-a-day routine with specific changes in content as the chick grew, much like King's Plunket regimen.[82]

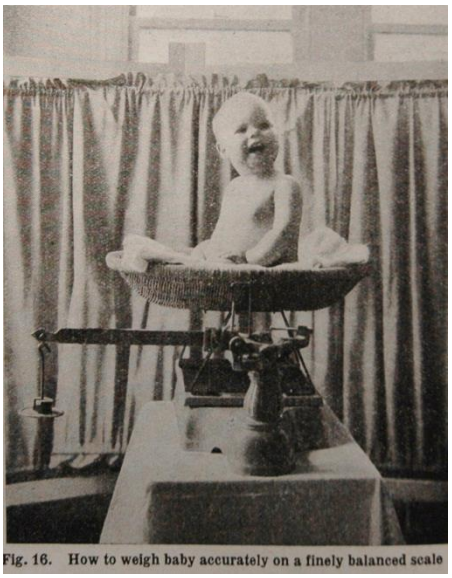

Figure 37. Image from King's *Feeding and Care of Baby* (1940).[83]

The systemisation of care within both spheres aimed to raise standards and guide those with limited skills. The *NZPJ* in 1925 recommended Plunket-style charts which provided the average weights by age of common breeds to assist the objective monitoring of chick growth. The weights for White Leghorns for instance were given as follows:

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[82] Stewart, *Profitable Poultry Keeping*: 76-77; M.W. Stewart, "Modern Poultry Keeping," *NZFW*, 27 October 1938, 41; "Lecture by Truby King," *AG*, 20 October 1909, 4.

[83] Fig. 16 from King, *Feeding and Care of Baby*: 48.

Age (days)	Weight in ounces (av.per chicken)
28	6-6 1/2
42	12-13
84	32-36
100	48-56

As this article explained, chick formulas were in an experimental stage during the interwar period.[84] An article drawn from the *South African Poultry, Pigeon and Bird Magazine* reprinted in the *NZPW* in 1958, at the dawn of 'modern chick starters', explained that scientists who initially composed chick formulas 'got the idea from the fact that young of humans and all other mammals […] require a special food', which was milk. However, chicks, it was noted, eat what their parents do. Chicks, this breeder argued, needed lower protein mashes than mammals. Levels and sources of protein for poultry feed in the late 1950s remained a contentious issue.[85]

Protein

At the turn of the century it was popularly understood that protein or 'albuminoids' helped build bodies.[86] Hyde and Brown's Government booklets both explained the bird's need for protein in the diet in comparative terms:

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[84] Hadlington, "Poultry Notes," 2. For comparable Plunket charts see Helen Deem and Nora P. Fitzgibbon, *Modern Mothercraft: A Guide to Parents*, 2nd ed. (Dunedin: Plunket Society, 1953). 97.

[85] L.M.[pseud.], "Hens and Chicks Need Same Feed," *NZPW* 21, no. 10, (1958): 45-46. See also W. Dixon, "Protein Sources in Feeding Stuffs," *NZPW* 19, no. 2, (1956): 70-74.

[86] In the mainstream press prior to WWI Leibig's name was associated with protein. See for example, M.P.S. J. Wrigley, "Central Pharmacy," *BOPT*, 12 January 1912, 4. Commercial poultry meat meal was available prior to WWI. See "The Southland Frozen Meat and Produce Export Company, Limited. Producers of New Zealand Poultrymen's Meat Meal," *NZPJ*, 20 May 1912, 3-6.

'Consider – firstly, exercise: cattle lead a very indolent life, as do the majority of men. Fowls live a decidedly active life, and it is universally agreed that an active life requires a greater proportion of albuminoids.[87] Within the interwar mainstream press animal protein was discussed as providing productive energy or 'pep', and more was recommended for labourers and any growing or pregnant animal, including egg-producing hens.[88] Buttermilk and skim milk powders were heavily marketed to poultry-keepers in the 1930s, claiming to build the body frame of chicks and improve vitality and egg yields.[89] Experts approved of skim milk for chicks by this time, but noted that in attempting to build the 'super physique', farmers were tending to feed too much protein to growing pullets. Brown warned poultry-keepers in 1932 not to overdo it with milk as it promoted premature egg-laying.[90]

Prescriptive guides for human milk consumption were printed in New Zealand newspapers in the late 1930s[91] and milk was supplied to New Zealand State schools from 1937.[92] This parallel timing with the poultry industry was not coincidental. While TB concerns initially limited the promotion of milk products for animal feed,[93] this situation changed with improved hygiene standards by 1930 and after Sir John Boyd Orr, the principal of the Rowett

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[87] Hyde and McNab, *Poultry and Eggs for Market and Export* 40; Brown, *Bulletin No. 13. Poultry and Eggs for Market and Export*: 69.

[88] See for example, "Vegetarianism and Physique," *NOT*, 5 June 1909, 1; "How We Get PEP," *NZH*, 11 January 1923, 8; "What is Protein?," *EG*, 13 May 1922, 3; "Science of Feeding," *NZH*, 26 June 1924, 18.

[89] New Zealand Co-operative Dairy Co. Ltd., "Food for Thought," *NZPJ* 1, no. 8, (1934).

[90] T.G. Hungerford, "Nutrition and Disease," *NZPW* 2, no. 6, (1939): 16; Brown, *Bulletin No. 066. Utility Poultry-Keeping*: 32.

[91] See for example, "Milk Requirements," *EP*, 2 April 1937, 9.

[92] Mein Smith, *A Concise History of New Zealand*: 162.

[93] Pasteurisation increased the safety of milk powder. This was boosted by local borough support and the Milk Act (1944). By 1950 the manufacturing of buttermilk powder had boomed. See Soraiya Gilmour, *History of the New Zealand Milk Board: A Study of the Corporatist Alliance Between the State and the Domestic Milk Sector* (Research Report, Lincoln University, 1992), 30-34.

Institute in Aberdeen, presented his research on the protein requirements of chicks at the World Poultry Congress that year.[94] The Institute, nowadays a key centre in the UK for nutritional science, was initially established in 1922 as an agricultural research centre, which incorporated poultry research. Prior to 1930 researchers also began investigating the effect of a daily ration of milk on 'the general health, growth and mentality of school children' and found some improvement within those from large cities.[95] Subsequently, Orr was involved in the British Government's Advisory Committee on Nutrition which promoted the value of milk as a 'complete food'. This was accepted by Government and industry in New Zealand, as besides relieving human and poultry food shortages it also dealt with the issue of market gluts.[96]

Vitamins, Cod Liver Oil and Greens

The tradition of utilising chickens as experimental animals for nutritional research had been established around the turn of the century when comparisons of chickens and humans on diets of polished or brown rice revealed that a lack of dietary thiamin (vitamin B1) caused beriberi, (or 'polyneuritis' in birds). The Polish biochemist Casimir Funk established the action of thiamin and coined the term 'vitamine' or 'vital amine' in 1912.[97] The American nutritional biochemist Elmer McCollum, was also researching vitamins from this time, investigating vitamin A deficiency, which caused chronic malnutrition in chickens, and vitamin D deficiency, which caused rickets in chicks as in human children, and reduced egg production in hens. He established that vitamin D was found in cod liver oil and other foods and

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[94] "Poultry Congress," *EP*, 29 May 1930, 7.

[95] "The Royal Family," *EP*, 22 November 1922, 12; "The Value of Milk," *EG* 26 April 1930, 8; "Rowett Centenary. History", accessed 8 January 2014, http://www.abdn.ac.uk/rowett-centenary/history/index.php.

[96] "Milk Consumption," *EP*, 19 March 1936, 9; British Official Wireless, "Better Diet," *EP*, 2 April 1937, 9; "More Milk Drunk," *EP*, 17 August 1937, 9.

[97] Sigfrido Burgos and Sergio A. Burgos, "The Role of Chickens in Vitamin Discoveries," *International Journal of Poultry Science* 5, no. 8, (2006): 704-707.

produced by the body when exposed to sunlight, and that cod liver oil also contained vitamin A. McCollum authored *The Newer Knowledge of Nutrition*, published in numerous editions from 1918, which detailed research into chickens and other farm animals to illustrate general nutritional principles. It was widely read internationally and informed New Zealand experts during the interwar period.[98]

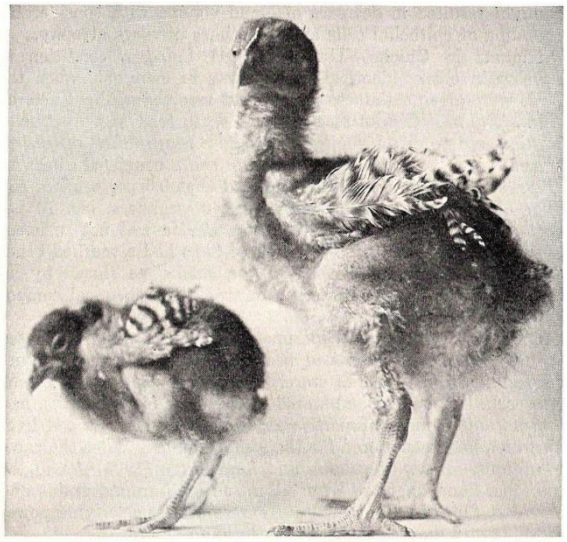

FIG. 26.—A contrast between the effect of green plant tissue and radiant energy. Both chicks received a synthetic ration composed of alcohol-extracted casein 18, dextrin 60, salt mixture 5, agar-agar 1, yeast 15, and 5 per cent of fresh green clover calculated on the basis of the dry weight of the clover.

Figure 38. Image showing the effect of a chick diet with greens but limited sunshine in McCollum's Newer Knowledge of Nutrition (1929).[99]

The general public and farming community were confused by initial reports about vitamins.[100] By the late 1920s New Zealand's Plunket nurses were educated about vitamins, but general nurses were only beginning to receive

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[98] McCollum and Simmonds, *The Newer Knowledge of Nutrition: The Use of Foods for the Preservation of Vitality and Health*: 189-190, 359-365; Georgian Adams and E.V. McCollum, "A Method for the Biological Assay of Cod Liver Oil," *J. Biol. Chem.* 78, (1928): 495-524; Harper, "'The Art of Eating, has in fact, become a science': Dietary Advice from the Interwar Period to 1960," 5.

[99] Fig. 26 in McCollum and Simmonds, *The Newer Knowledge of Nutrition: The Use of Foods for the Preservation of Vitality and Health*: 362.

[100] See for example, "The Elusive Vitamine," *AS*, 30 June 1923.

nutrition education during the interwar period and the nation's first trained dietician did not graduate until 1942.[101] Bayon in 1934 acknowledged that to most poultry farmers vitamins remained 'mysterious'. New Zealand experts had the task of 'digesting' and articulating this research as it continued over the decades.[102]

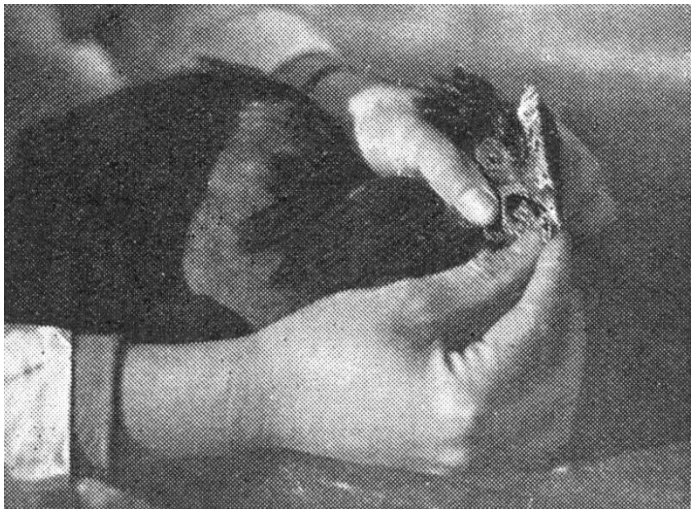

Figure 39. A paralysed hen being forcibly fed lettuce to counteract vitamin deficiency in Bayon (1934).[103]

New Zealand's poultry press in the 1920s tended to discuss the importance of greens rather than vitamins. Merrett referred to greens as 'the great health protector'[104] explaining in the *NZPJ* in 1925 that 'We humans know that in lettuce, onions and other vegetables and fruits the health is not only maintained but is immune to disease. It is just as important to give poultry the same

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[101] "The Plunket Nursing Service," *Kai Tiaki: The Journal of the Nurses of New Zealand* XXII, no. 1, (1929): 18; Dion Crooks, *History of the Dietetic Association (Inc.) and Dietetics in New Zealand* (Wellington: The Association, 1993). 2-6.

[102] Bayon, *Diseases of Poultry: Their Prevention and Treatment: A Practical Guide to Good Health in Fowls*: 17, 87-88; W.A. McGillivray, "More About Vitamins," *NZPW* 21, no. 6, (1958): 23-26.

[103] Bayon, *Diseases of Poultry: Their Prevention and Treatment: A Practical Guide to Good Health in Fowls*: 180.

[104] Merrett, *Poultry for Profit in New Zealand: A Practical Guide to Poultry Keeping in New Zealand and Australia for Use and Profit*: 28.

insurance.'[105] Leaders into the mid-1930s continued to emphasise the importance of a liberal variety of greens and other vegetables, including lucerne (alfalfa), Italian rye, silverbeet, rape, chou mollier, green oats, cape barley, kale, carrots, swedes and mangels.[106] Watercress was recommended by experts as 'a valuable tonic',[107] while onions were continually discussed as a great 'pick-me-up' for chickens.[108]

Cod liver oil supplementation made confined and winter egg and chick production feasible in the absence of green feed and sunshine. The New Zealand poultry press observed that the use of cod liver oil was largely responsible for the factory hen phenomena emerging internationally,[109] and initially dismissed the implication that greens were no longer necessary. In 1935, the *Evening Post* cited Tom Newman, nutrition expert and editor of the English journal *Eggs*:

> Green feed is to the hen what fruit and vegetables are to the human being. We can eat rich food, concentrated food, and badly-cooked food, and then by dosing up with health salts carry on with the job of living, but doctors tells us we are wrong, and it only needs a little thought to reason out that the hen is in much the same state.[110]

Green food for most farmers made economic sense as they could grow this themselves or exchange poultry manure for local market garden excess,

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[105] Merrett, "Poultry for Beginners. No. 5. Feeding Poultry," 15.

[106] C. J. Cussen, "Green Feed for Poultry," *NZPP* 1, no. 6, (1935): 9.

[107] "Pointers," *NZPP* 1, no. 1, (1935): 13. See also J.B. Merrett, "Well-Known Poultry Farms – No. 5," *NZPW* 1, no. 6, (1938): 12.

[108]"Onions for Health," *NZPW* 1, no. 5, (1938): 17. See also "Utility Poultry Club," *NZPJ*, 20 October 1922, 9.

[109] See for example, Orpington [pseud.], "Poultry Keeping. Chicken Factories," *AS*, 30 December 1932, 12.

[110] "Value of Green Food," *EP* 5 January 1935, 16.

whereas proprietary feed and supplements were costly.[111] However, by the late 1930s, journals stressed the importance of both cod liver oil and greens.[112] By 1960, vitamin-enriched commercial feeds were being used, at this stage as a supplement.[113]

Tonics

Alcohol was popularly prescribed as a medicinal tonic, early in the century[114] so while King reported on the damage of alcohol to chicken embryos, other farmers and scientists prior to 1920 conducted converse trials with adult birds. A 1902 poultry column reported of one farmer mixing the morning mash with hot beer to sustain winter egg production, while in 1911 it was reported that a French agricultural station scientist had trialled hens on wine with positive results.[115] Raymond Pearl, a fervent anti-prohibitionist, published on the effects of chicken alcohol consumption in 1917. His controversial results revealed lowered fertility in alcohol-gassed chickens, but healthier offspring.[116]

However, from the commencement of industry, commercial tonics were available.[117] Advertisements for Laymor's Tonic during WWII challenged poultry-keepers to keep 'up to date' with modern nutritional science, asserting that 'Hens need a tonic as well as humans',[118] while in the mainstream press, wartime chemists advertised tonics to ensure family health during meat and

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[111] "Poultry Notes," *EP*, 16 November 1935, 29.

[112] "Vitamin Feeding," *AS*, 25 November 1938, 14; L.C. Norris, "Vitamins Needed by Poultry " *NZPW* 3, no. 8, (1940): 29.

[113] McGillivray, "More About Vitamins," 25; W. & R. Fletcher (N.Z.) Ltd., "Vite-Adee Super Emulsion," *NZPW* 23, no. 7, (1960): 4.

[114] Brunton, *Medicine Transformed: Health, Disease and Society in Europe 1800-1930*, 376.

[115] "Poultry Yard," *AWN*, 25 May 1901, 43; "A Matter of Eggs," *PBH*, 9 December 1911, 2.

[116] Pearl gassed his chickens with alcohol to control intake. See Pauly, "How Did the Effects of Alcohol on Reproduction Become Scientifically Uninteresting?," 13.

[117] See for example S. Kirkpatrick and Co. Ltd., ""K" Poultry Tonic!," *NZPJ*, 20 May 1907, 47.

[118] "Are Your Poultry Keeping Methods Up To Date?," *Bay of Plenty Beacon*, 24 October 1944, 6.

egg rationing.[119] Laymor advertisements in the *NZPW* in 1949 played to notions of chickens as workers who would work better if looked after. 'Hettie the Hen' as a keen female worker of the postwar era,[120] eschewed the need for 'breaks', stating: 'Girls just need a good tonic and a bit of fuss made of them'(below).

Hettie the Hen makes a boast!

"Fewer feathers needn't mean few eggs!"

she says.

Dear Boss,

I don't agree that a hen can't produce an egg when she's moulting . . . feathers may fly but eggs will still be laid, says I, if you keep the girls in good fettle. An extra bit of help is what they want at this time, says I . . . a good tonic and a bit of fuss made of them.

They're willing enough, bless them . . . so . . .bring on the Laymor Tonic, Boss, and note the difference in our vigour and productiveness. I'm not saying that we'll lay quite so many eggs, Boss, while the feathers are flying, but Laymor Tonic will make us feel 100 per cent. better, and will do our best . . . and, I'm telling you . . . A Laymor Tonic best is pretty good!

Hopefully yours
Hettie the Hen

Laymor Tonic is a scientific tonic, made up of health-giving and body-nourishing medicinal ingredients essential for the highest standard of physical fitness which automatically enables the hen to carry out its natural function of laying throughout its laying season to a maximum extent. 7lb. carton, 10/6 (= 1/6 lb.), 28lb. Boxes, 39/6 (= 1/5 lb.), 56lb. Boxes, 74/6 (= 1/4 lb.). From your usual dealers.

BURCH & CO. (N.P.) LTD., BOX 49, NEW PLYMOUTH.

Figure 40. "Hettie the Hen" endorsing Laymour's Tonic in the *NZPW*, 1949.[121]

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[119] Maddox Chemist. The Vitamin Pharmacy, "Meat Rationing," *EP*, 8 July 1944, 5.

[120] The trend for women in the workforce commenced from the onset of WWII. See Tim Frank, "Bread Queues and Breadwinners: Gender in the 1930s," in *The Gendered Kiwi*, ed. Caroline Daley and Deborah Montgomerie (Auckland: Auckland University Press, 1999), 115, 122.

[121] Burch & Co. (N.P.) Ltd., "Hettie the Hen Makes a Boast," *NZPW* 12, no. 3, (1949): 85.

Salts and Minerals

Farm livestock were being prescribed mineralised 'salt licks' from around 1920[122] and iodised salt supplements were marketed to poultry farmers. The latter was justified, as salt licks were, on the basis that confined intensive systems and soil deficiencies restricted mineral intake.[123] However, poultry farmer attitudes to salt appear to have also been influenced by wider debate about the physiological absorption of minerals in the animal body from the turn of the century. The *Southland Times* in 1897 for example, queried if eating salt on the basis of craving was wise as 'People and animals often learn to like what is not only good for them, but hurtful',[124] while the *Evening Post* in 1922 reported the American comparative pathology expert, Woods Hutchinson's advice to follow our natural cravings for salt. Salt in the body he explained, was as natural as sea water. The body, he instructed, would not fire without a teaspoon a day.[125]

Such ideas had health consequences for birds, as it did for the human populace. Brown made a special plea in his 1916 booklet, before salt licks or iodised salt products were marketed, instructing farmers not to give salt to their birds as it was the cause of many deaths,[126] and the *NZPP* in 1935 still noted that: 'many poultry-keepers, both large and small […] feed an excessive amount of salt to their birds of all ages, with fatal results. […] it is questionable if salt […] is necessary for the maintenance of feathered stock.[127] Continued adherence to over-simplified ideas about mineral deficiency as a cause for ill-health in

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[122] N.Z. Farmer's Co-op Distributing Co. Ltd., ""Co-op" Salt Licks Give You Well-Conditioned Stock," *Dominion*, 9 April 1920, 10; "Agricultural Items," *EG*, 17 January 1928, 8; Sundowner [pseud.], "Farmer and Stockbreeder," *AS*, 18 December 1929, 27.

[123] Oil and Accessories Ltd., "“NUTRA-MIN”," *NZPP* 2, no. 11, (1937): 5; "Minerals in Poultry-Feeding," *NZPP* 2, no. 17, (1937): 12.

[124] "Is Salt a Necessity for Animals," *ST*, 20 February 1897, 2.

[125] "On Eating Salt," *EP*, 3 June 1922, 14.

[126] Brown, *Bulletin No. 66 (New Series). Utility Poultry-Keeping*: 21.

[127] "Feeding the Flock," *NZPP* 1, no. 1, (1935): 12.

humans and domestic animals was acknowledged by Dr H.O. Askew, president of the Cawthron Institute in the 1950s at a Nelson meeting of the Royal Society:

> Just as vitamins became fashionable to discuss and to use so have these inorganic elements become. We are still in that period where it is fashionable, and sometimes even as a means of escape from any other explanation, to say that a certain ailment is due to a "trace element" deficiency.[128]

Sunshine

Emphasis on the subject of sunshine within poultry literature was heightened during the 1920s to 1940s, coinciding with the trend in public health.[129] McCollum's book had highlighted the importance of the 'sunshine vitamin' and the Sunlight League (founded in Britain by the eugenicists Sir William Abuthnot Lane and Saleeby) had its proponents in New Zealand.[130] Government health camps from 1938 and school physical education emphasised the importance of daily 'heliotherapy'.[131] Ideal farms highlighted in poultry journals of the 1930s emphasised flocks' healthy, sun-drenched environments.

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[128] Dr H.O. Askew, "Section B. Chairman's Address. Biology and the Trace Elements," *TPRSNZ* 82, no. 4, (1955): 871.

[129] For 1920s poultry press examples see "Successful Chick Growing," 18; E. Bostock Smith, "The Sun's Rays and Chick Rearing. Latest Discoveries in Research," *NZPJ*, 20 October 1926, 5; Peritus [pseud.], "Sunlight. Clinic, School and Factory.," *AS*, 4 August 1928, 9.

[130] S.K. Wilson, "The Aims and Ideology of Cora Wilding and the Sunlight League, 1930-1936" (M.A. thesis, University of Canterbury, 1980).

[131] White, *Growing Body: It's Nature, Needs and Training*: 132-135; Margaret Tennant, *Children's Health, the Nation's Wealth: A History of Children's Health Camps* (Wellington: Bridget Williams Books, 1994); Gush, "Beauty of Health: Cora Wilding and the Sunlight League."

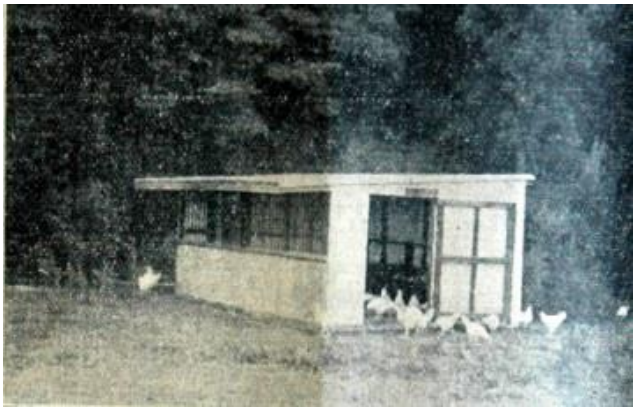

Figure 41. The Hutt Valley Poultry Co.'s portable colony house with a wide 'sun door' in the *NZPP*, 1936.[132]

While the WWII-era Labour Government was investing in a national State Housing Scheme with family homes oriented to receive maximum sunlight,[133] the Department of Agriculture was promoting similar reforms to poultry housing. The Department reminded poultry-keepers in the *NZPW* in 1940 that:

> Suitable environment plays an important part in the development and health of all living things. The full value of plenty of natural light, sunshine and fresh air is now appreciated by almost everybody. [This is] amply illustrated in the application of science to architecture and the construction of our latest hospitals, schools, factories, buildings and modern homes.[134]

Its two-page article, *Housing for Winter Egg Production*, featured photographs at different times of the year to illustrate how glass windows in a poultry house created the effect of a 'sun porch' (below). This sun-drenched layout was recommended for winter as it was both 'comforting to the birds' and 'Nature's best agent for the destruction of all disease germs.'

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[132] "Some Points of Interest on the Hutt Valley Poultry Company's Farm," *NZPP* 1, no. 12, (1936): 18.

[133] Malcolm McKinnon, ed. *New Zealand Historical Atlas* (Wellington: David Bateman in association with Historical Branch, Department of Internal Affairs, 1997), Plate 74.

[134] "Housing For Winter Egg Production," *NZPW* 3, no. 8, (1940): 16-17.

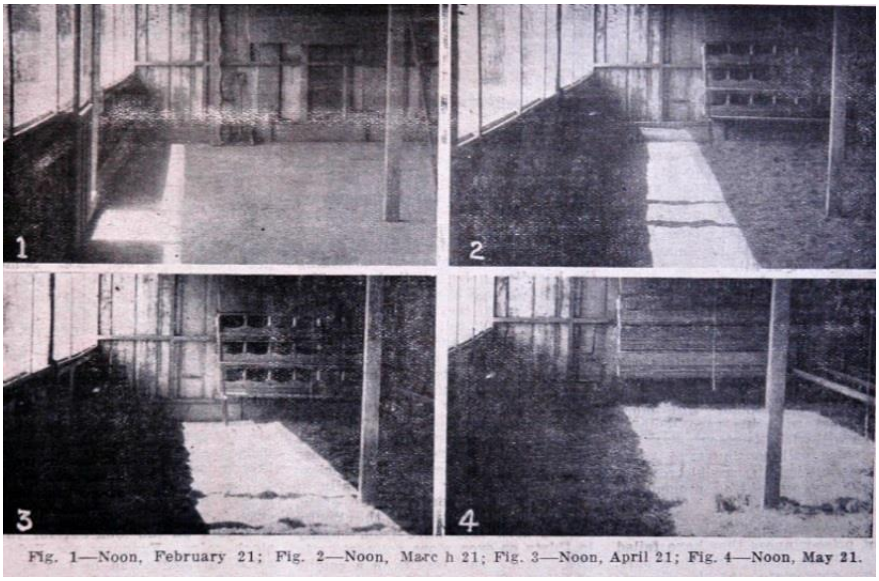

Figure 42. Photographs of seasonal light patterns in a 'sun porch' in the *NZPW*, 1940.[135]

Fresh Air and Hardening

A belief in the weakening effect of cossetting animals like hothouse plants had been a feature of nineteenth-century farming advice[136] and was readily transferred to human health advice, as demonstrated in an explanation of 'hardening theory' in the *Wairarapa Times* in 1904:

> […] don't coddle, but meet cold and wet and changes of temperature like a man — or, rather, like a horse, and you will run a better chance of being as strong as a horse. Of course you must strengthen your armour where it is weak, but if you recognise in yourself a weak place, a cold spot, don't cover it up with more clothes, but toughen it and toughen your entire body until it is impenetrable to those slight causes that produce colds.[137]

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[135] Figures 1-4 in ibid., 17.

[136] A. McHardy, "Housed and Clothed Sheep," *Daily Telegraph*, 19 June 1897, 2.

[137] "The Hardening Theory," *WDT*, 8 October 1904, 2.

Nineteenth-century infant hygiene ideas, revitalised around 1900, revived older notions of hardening infants by exposure to fresh, cold air.[138] King and Plunket were advocates of this principle, and King generally kept animals outdoors in the fresh air in order to 'harden' their constitutions. [139] However, modern concepts of hardening were modified by a belief in the need to balance this with warmth for the very young and vulnerable. French physicians leading research into comparative medicine and infant care in the late nineteenth century, had developed the incubator based upon the poultry industry's 'artificial mother', referring to their initial design as the 'brooding hen'.[140]

Brown echoed King in his emphasis upon the importance of fresh air for poultry. He stated in the *NZPJ* in 1911: 'Many a good strain has been destroyed by […] keeping the birds in closed-in stuffy quarters without sufficient exercise. Snug but open-front houses with ample dry runs are essential to the production of hardy stock.' [141] In the *NZPJ* in 1913, the 'Oxy-Vitaliser' for improving air circulation into farm incubators was promoted in general terms:

> Oxygen is the great life sustainer and germ destroyer. That is why the fresh-air treatment is advocated for tubercular patients. The face of those

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[138] Jeffrey Paul Baker, "The Machine in the Nursery: The Premature Infant Incubator and the Origins of Neonatal Medicine in France and the United States, 1880-1922" (PhD thesis, Duke University, 1993), 48-49.

[139] "To Save the Race. The Struggle for Health and Sanity. Lecture by Dr.Truby King," *EP*, 15 October 1909, 9; H.P.H.[pseud.], "Seacliff Lunatic Asylum," *OW*, 10 October 1900; "The Cool-Air Baby v. The Coddled Baby. How to Stop 40 Per Cent of Rejects," *NA*, 1 June 1915, 7; Hygeia [pseud.], "Our Babies," *Oamaru Mail*, 28 May 1915, 1.

[140] Baker, "The Machine in the Nursery: The Premature Infant Incubator and the Origins of Neonatal Medicine in France and the United States, 1880-1922," 76-78. Example of reports: "Health Column," *OW*, 7 September 1888, 37.

[141] Brown, "Common-Sense Poultry Keeping " 2.

> who live under conditions where the blood is properly oxygenated will always be found ruddy and glowing with health.[142]

Changing ideas about the appropriate temperature for young animals was reflected in varying opinion about the use of hot or cold brooders for chicks. An advocate for cold brooders in the *NZPJ* in 1927, for example, conceived of the issue of coddling chicks in survival-of-the-fittest terms, asserting that a weakened constitution was the main cause of dead-in-shell incubator chicks. To produce 'a hardy race of fowls', he favoured exposing them to plenty of 'fresh cold air' through summer and winter.[143] However, tough attitudes were often moderated on family farms. At the NZUPC meeting in 1927, a farmer emphasised that he did not believe in survival-of-the-fittest. He gave additional care to weaker chicks, wrapping them in a clothes basket and covering them with a blanket.[144]

Exercise

Throughout the period under study experts acknowledged that exercise was of benefit to chickens. Merrett for example, in the *NZPJ* in 1913 advised in terms of thermodynamic principles: 'To keep [chicks] strong and healthy, make them exercise. External heat alone will not keep them alive. Let there be internal heat produced, not only from the food given, but also by making them hunt for it.'[145] Similarly, the New Zealand publication, *Practical Poultry Keeping* (1950) advised that: '[e]nergy of movement will prove better than medicine in keeping poultry in healthy condition.'[146]

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[142] J.B. Merrett, "The Oxy-Vitalizer. What it Is. What it Does, and How it Does It," *NZPJ*, 20 November 1913, 3-4.

[143] "Producing the Hardy Fowl," 7. See also "Survival of the Fittest," *NZPW* 2, no. 1, (1938): 25. See also "Successful Chick Growing," 18.

[144] "Poultry Raising by the Incubator Method," 3.

[145] Merrett, "Beginner's Department," 23.

[146] *Practical Poultry Keeping: A Guide to the Breeding and Upkeep of Poultry in New Zealand*: 29.

Exercise was considered particularly important for baby chicks and breeder-hens. Psychological as well as physical benefits were acknowledged with chicks, as this was emphasised by early commercial breeders. Saunders had observed that 'the active temperament common to all animal infancy' rebelled against confinement'.[147] King's public lectures also echoed this when he observed the natural romping of young 'human animals' when let out of school.[148] Exercise was recommended for the preservation of fertility in breeding hens, as with human females. The *NZPJ* observed, for example, in 1926 that '[c]onfinement and lack of exercise will cause barrenness in hens. Over-fat birds often become sterile because of tatty [*sic*] degeneration of the productive organs.'[149]

Post-WWII Curatives

The uptake of pharmaceuticals and insecticides in the 1940s and 1950s can be understood as an extension of the remedial and hygiene approaches of earlier decades. However, poultry experts were concerned about these so-called 'preventative' approaches, as they were marketed.[150] British expert, Tom Newman, cited in the *NZPW* in 1941 opposed pharmaceuticals because, he said, 'the use of internal drugs has proved futile; whatever else they may do they are more destructive of living tissue than curative.' He insisted that '[t]he power to resist disease must come from nature or the bird itself' and lamented that many flocks did not have the 'guts' to resist disease.[151] By the 1950s, many experts

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[147] Saunders, *Our Domestic Birds: A Practical Poultry Book for England and New Zealand*: 155-156.

[148] "Artificial Children," *Free Lance*, 18 August 1906, 6. Seacliff's hens enjoyed daytime free-range. See "Poultry Notes," *OW*, 30 September 1897, 7.

[149] "Work for the Month," *NZPJ*, 20 October 1926, 17. It was only in later decades, beyond 1960, that New Zealand farmers experimented with keeping breeding birds indoors in barns (Clarke, interview).

[150] See for example, W. & R. Fletcher (N.Z.) Ltd., "How Much is Coccidiosis Costing You?," *NZPW* 17, no. 8, (1954): 254.

[151] Tom Newman, "The Only Way to Command Poultry Health," *NZPW* 4, no. 5, (1941): 30.

observed that over-reliance on antibiotics had resulted in less attention to the established basics of health and disease prevention.[152]

Between 1958 and 1968, the 'poultry revolution' in Western countries caused a tripling in value of animal pharmaceuticals, and medical drug companies, mainly in the UK and the US, began to partner with veterinary companies or developing veterinary branches.[153] Historian Andrew Godley noted the dual-purpose application of Sulfonamide or 'sulpha' drugs, the precursors to antibiotics, which cured both Winston Churchill's pneumonia in 1943 and the Royal Circus lion, Nero, the following year.[154] Sulpha drugs were available through New Zealand general practitioners and hospitals by 1943 and were used on poultry farms from the early 1950s to the early 1960s.[155] Restrictions on the use of antibiotics for medical treatment were lifted in New Zealand in 1946[156] and they were in widespread use within the poultry industry by the mid-1950s.

The promotion of pharmaceuticals reflected a continued conception of general biology that was openly acknowledged within this era. In the *NZPW* in 1954

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[152] See for example, J.W. McClean, "The Use and Misuse of Antibiotics in Poultry-Feeding," *NZPW* 18, no. 1, (1955): 15-17; A.C. Howse, "Prevention of Diseases by Good Hygiene," *NZPW* 12, no. 2, (1955): 51-57.

[153] Godley and Corley, "Veterinary Medicines in Britain: Output and Industry Organisation since 1900," 363. The poultry industry was the largest market for these pharmaceuticals according to a US study in the 1970s. See Boyd, "Making Meat: Science, Technology, and American Poultry Production," 647-648. In New Zealand from 1946 some antibiotics were manufactured for agricultural purposes at a DSIR laboratory in Palmerston North. See "Animal Diseases. Local Manufacture of Penicillin," *EP*, 22 July 1946, 6.

[154] Godley and Corley, "Veterinary Medicines in Britain: Output and Industry Organisation since 1900," 362.

[155] Medical use: "Free Medicines," *AS*, 31 July 1943, 4.Poultry use: Ellco Ltd., "The NEW "Wonder Drug" Sulphaquinoxaline," *NZPW* 18, no. 2, (1955): 47; D.H.A. Rural (N.Z.) Ltd, "'Wonder Drug' Sulphaquinoxaline Controls Coccidiosis," *NZPW* 24, no. 4, (1961): 21.

[156] On penicillin availability for human treatment see "Not a Cure-All," *AS*, 24 March 1944, 6; "Ample Supplies. Penicillin Restrictions to End," *EP*, 4 October 1946, 8.

'Aurofac', just one of a number of antibiotic brands, was advertised to 'progressive farmers' as 'the animal feeding form of AUREOMYCIN, the antibiotic which has saved so many human lives' and 'the sensational new feeding factor'.[157] Aureomyacin was marketed as a revolutionary 'wonder food'.[158] The *Evening Post* reported in 1951 that US research had shown that adding small amounts of antibiotics in animal feed enhanced animal growth by 10 to 20 percent, which allowed the farmer to save on feed as antibiotics were inexpensive. It also noted that experiments were being conducted to investigate if 'the inclusion of antibiotics in the diet of infants might have beneficial effects'.[159]

Kerosene remained in use as an insecticide in the 1950s, but marketers of new insecticides for domestic and poultry farm purposes in the post-war period presented them as easy-to-use, 'combatants' against disease, playing to beliefs about scientific mastery and the moral connotations of order, beauty and efficiency.[160] The *NZPJ* in 1948 frequently advertised 'Gammexane' for the 'Clean, Easy and Effective' control of lice, fleas, and red mites. It reportedly had 'remarkable persistence'.[161] This was even more toxic than dichlorodiphenyltrichloroethane (DDT), which was also used to treat individual birds, poultry houses and domestic gardens in the 1950s.[162]

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[157] W. & R. Fletcher (N.Z.) Ltd., "Aurofac," *NZPW* 17, no. 3, (1954): rear cover.

[158] W. & R. Fletcher (N.Z.) Ltd., "Aurofac Revolutionizes Poultry Keeping," rear cover.

[159] "Antibiotics for Poultry and Pigs," *EP*, 17 September 1951, 12.

[160] "Control of Diseases and Pests in Household Poultry," 77. On the trend for 'minimising effort' in the 1950s and 1960s see Kate Jordan, "Golden Weather Gardening: New Zealand Home Sections, 1945-1970" (M.A. thesis, University of Auckland, 2010), 68, 81-83.

[161] McDougall Cooper & Robertson (N.Z.) Ltd., "New British Insecticide "Gammexane"," *NZPW* 11, no. 1, (1948): 7.

[162] "Control of Diseases and Pests in Household Poultry," 75-77; Francis A. Carey, "Benzene Hexachloride (BHC)," Encyclopaedia Britannica, accessed 24 August 2014, http://tinyurl.com/kjox39b. For advertisement example see Ivon Watkins Ltd., "Now NEXA Brings Health and Beauty to your Garden!," *WN*, 28 December 1955, 33.

Conclusion

This chapter examined how many ideas about chicken health and treatment were understood in relation to general and human health concepts. Twentieth-century comparative pathology in its initial, broad, preventative sense emerged from familiar traditions of constitutional health which were understood to apply to all animals, including humans. Comparative pathology at the turn of the century was largely concerned with hygiene and zoonotic disease, and farmers attributed poultry disease to the conditions that caused ill-health in humans. Medicines prior to 1920 that were in use by poultry farmers consisted of general domestic remedies.

By the 1920s, deluging poultry and human habitations alike with disinfectants became less fashionable as a cure-all. Bayon noted in his 1934 text that poultry-keeping was by this time predominantly focussed on strengthening constitutional health, aligning with general trends. Poultry leaders stressed fresh air, sunshine, exercise and nutrition, and, as discussed in chapter four, a balance of rest and work to avoid fatigue.

Fundamental laws of health were publicly reinforced by numerous health experts and leaders. King's perspectives have been highlighted within this chapter as he was a key proponent of constitutional principles within farming and public health. Gilruth and Lord Bledisloe have also been mentioned as advocates of comparative perspectives within the general farming community. Malcolm, McCollum and others articulated nutritional health principles by reference to experimental animals. The chicken was a particularly popular experimental animal within nutritional science, and poultry nutrition as an emerging specialist field drew upon general research.

The post-WWII era marked the end of truly preventative, constitutional health approaches on the poultry farm. Experts expressed concern about over-reliance on pharmaceuticals. The promotion of sulpha drugs, antibiotics and insecticides

for farm and general human use presented these products as the magic bullet for human and non-human animals alike.

Conclusion

This study examined why the comparison of chickens with humans was sustained within the poultry press between 1900 and 1960, a period associated with scientific specialisation and rationally-efficient industry. I argued that this mode of description possessed both professional and popular validity as it was consistent with the way modern biology was taught and discussed. We have seen that the notion of fundamental biological principles, or 'general biology', was reinforced from above, below and within the poultry industry: *above* from professional science, which generalised from experimental animals in this era when the determination of fundamental principles within living organisms remained a core preoccupation, *below*, from informal family and school science education, public media and popular science books, and *within* from existing poultry breeder tradition based within naturalist biology.

This study has demonstrated how general biology was an important ideological construct underpinning ideas and attitudes to animals and living things generally in the first half of the twentieth century. It reaffirmed the naturalists' common-sense and unified view of the fundamental needs of human and non-human animals. Poultry industry description reflected the various sub-disciplines of general biology – comparative psychology, ecological theory with ideas about nature's economy and worker speciality, general physiology and notions of efficiency and fatigue in the animal worker, race science and eugenics, comparative pathology and natural laws of hygiene. These discourses within the poultry press were collectively conceived and reinforced each other. General biology as it was publicly articulated also enabled a synthesis of science, theology, humanitarian and other philosophical perspectives.

Although evolutionary ideas were crucial to this thinking, it has been argued that general biology is a more accurate framework than Social Darwinism due to the fact that general biology was discussed by scientists of the time, who championed this as a new era of modern research. Poultry breeders' ideas

reflected scientists' publicly-articulated blend of old and new. Ideas about sexual behaviour, aggression and virility, for example, drew upon contemporary endocrine research and evolutionary ideas about the fighting male.

While modern biology legitimated comparison, it has been acknowledged that comparison was *in part* a function of everyday poultry-keeping experience within relatively small farms where people had opportunities to discern the needs and preferences of individual birds. As noted in the introduction to this thesis, biologists in recent times have argued that humans' 'natural' identification with other animals is innate. However, this factor, and the context of smaller farms do not, on their own, explain the sustained phenomenon of comparison, and the various ways in which this was articulated, prior to 1960.

We have also seen that comparison served certain *functions* and agendas, including the advocacy, or denial, of kind treatment. Breeders compared humans and birds to engender consideration of common needs and respectful bird husbandry, to justify various industry methods, and to explain practical principles of husbandry in common-sense, comprehensible terms. False anthropomorphic description employed by advertisers and industry leaders served a propagandist or marketing function, appealing to common rationalisations of chicken-workers. Comparison was employed unconsciously as trope, and deliberately for educational or humourous effect.

Comparative description was continually affirmed by European and American scientists (such as the eugenic-geneticists Raymond Pearl and Reginald Punnett, pathologist Henry Bayon and behavioural psychologist A.M. Guhl), who were working with chickens and other animals in universities and agricultural stations in the first half of the twentieth century, conducting research that had both industry-specific and general application. It was also affirmed by mainstream press reports of biological research that utilised the experimental animal to explain human and animal biology generally. Internationally, and

within New Zealand on a smaller scale, zoologists, medical doctors, nutritionists, pathologists, veterinarians and others with various expertise in agriculture or other life sciences were influential public disseminators of this general biology in the first half of the century. Truby King, John Gilruth, Lord Bledsloe, John Malcolm and others have been highlighted as New Zealand examples.

To pick up on Ritvo's 'animal analog' phrase, it may be said that the poultry press reflected a 'human analog'. Poultry experts would cite medical or health research, such as reports about sunshine and feeding babies or non-specialists from applied fields such as Woods Hutchison on humans needing mixed diets. However, most often, general principles were framed as applying to all animals, including humans.

Chronological Patterns

Changing patterns in human-bird comparison were discernible over time in respect to psychology. An appreciation of chicken personality and of the intelligence of various breeds was heightened within the late nineteenth century as breeders absorbed ideas from evolutionary psychology. However, the business agendas of industry legitimated mechanistic ideas about instinct, reflexes and simpler cognition around the turn of the century.

The reports of early behaviourist studies on learning supported attention to chicken intelligence. Popular speculation about innate and learnt personality features in all animals continued to influence poulty discourse over the decades. This was reinforced by post-WWII sociobiological research, including Guhl's work on chicken memory and social behaviour. References to chicken character 'types' (entwining theories of psychology, eugenics and physiology), were sustained throughout the eugenic half century and into the 1950s.

In the 1950s, leaders continued to assert that chickens were friendly, sociable creatures, and maintained attention to psychological needs. However, the rationale of influential leaders advocating cage systems encouraged a

perception of chickens as simpler machines and attention to human-bird comparison only in terms of negative behaviour within intensive systems.

Broad patterns were also discernible within each of the other areas of biology addressed within the thesis. Early mechanist description of the chicken worker body aligned with progressive optimism about technology and biological science. Concerns about overworked hens were evident throughout the period, but were predominant in the interwar decades with heightened concern about disease within factory farming and with the broader emphasis on fatigue and the science of work. Overt references to poultry eugenics, and experiments with selection by precise measurement coincided with the intense focus on eugenic science within society prior to the 1930s. This was also a time when breed experimentation, disease and economic factors demanded strict culling. However, associated references to chicken races and weaklings, concern about meddling in the natural laws of breeding, commentary on rooster or working hen character type and on beauty as well as utility continued within the 1940s and 1950s. With advice on bird health, we observed a shift of emphasis from an initial focus on disinfectants, germs and zoonotic disease to preventative health factors in the interwar period. While changes within the poultry industry influenced these patterns, they were strongly correlated with the public communication of general biology pertaining to areas of human medicine and biology.

By 1960, the shift from human-bird comparison to chicken-plant comparison was influenced by changes in breeding and monocrop, mass-production processes that emerged in the post-WWII period. This also coincided with a shift from promoting general biology to a greater focus on specialist poultry science and training.

Humanitarian and Theological Perspectives

This study has revealed that humanitarian and theological ideas were entwined with general biology, and that theological ideas, explicit within, for example,

description of chick embryonic development, were particularly evident prior to 1930. It has also extended scholarship in regard to sustained moral attitudes, assisting the argument for a more nuanced image of capitalist farmers in this period. Older poultry breeders, hobbyists and women on family farms were important advocates of moral perspectives, although they were increasingly sidelined during the period. Occasional references to the wondrous mechanisms of the chicken's body and the 'Great Designer' continued in the 1940s. However, Christian sentiment beyond 1930 was more overtly expressed within rural women's magazines.

Those promoting moral animal husbandry in the interwar period reminded farmers that the theological notion of dominion implied rights and responsibility. This chimed with evolutionary and ecological ideas about interspecies cooperation and mutual aid. Concern with energy loss, waste, chicken-worker fatigue and the degradation of chicken races into the 1940s were associated with moral concerns and ideas about progress that had spiritual resonance. Commentary that acknowledged chickens as sensitive creatures with individual personalities and traits may be understood in terms of quasi-religious, vitalist sentiment that was reinforced within popular biology and school nature study into the 1950s. The humanitarian correlation of chickens with workers, children or women to which farmers had a duty of protective care was sustained.

While overt theological reasoning declined, it needs to be acknowledged that scientific and humanitarian perspectives were intertwined with theological worldviews which, historians have argued, were sustained into the 1960s. A 'residual' or diffusive theology, evident within commentary about moral husbandry and natural laws, continued in this period.

Welfare

General biology, combined with moral and practical factors contributed to discernible trends, but also variable attitudes, in respect to bird welfare. The

late nineteenth century was a period of heightened concern with bird welfare due to both evolutionary psychology legitimating attention to chicken intelligence and emotion, and humanitarian concerns about mechanistic biology and emerging industry. Moral concerns in the interwar period were partly due to mass production and the new technology of mammoth incubators, and disease and degeneration concerns. Economic and cultural pressures forced farmers to sublimate ethical concerns during WWII and immediately afterwards, as was evident in images of soldier-hens.

However, diverse opinion rather than a hegemonic rejection of bird interiority characterised wartime commentary. Some farmers applied survival-of-the-fittest principles to chicks and fowls, others nursed them. Older fancy breeders, side-line operators and commercial egg farmers often held disparate views. Merrett commented that the New Zealand industry struck a balance between fancier sentiment and American commercialism.

Throughout this period a moral code as regards to animals was advocated on the basis of biologically-based ideas about similarity and difference (human exceptionalism in terms of intelligence and civilised morality). Animal cruelty, as with animal husbandry generally, was correlated with farmer character and social behaviour. Views about what constituted cruelty were changing, as illustrated in the turn-of-the-century criticisms of King's force-feeding methods on his Seacliff farm. False assumptions of interspecies similarity also led to confusion and unintentional cruelty, as with ideas about birds needing large amounts of protein and salt or weather-exposed quarters to harden constitutions.

Although there were variable attitudes to birds in this period, conversations were maintained about fundamental animal needs. Today's animal welfare

educators might well learn from educators of the early twentieth century.[1] An emphasis upon fundamental psychology and biology prior to instruction in industry science would support empathetic husbandry. Similar arguments have been made by activist-scholars.[2]

Nature Study

We have seen that comparative description was a prominent mode of science communication instilled at a school age. Poultry expert perspectives, particularly of the pre-WWII period prior to Bobby coming on board, mirrored many of the views of nature study and elementary science educators. This study has added a new dimension to local and international scholarship on nature study and agricultural education, which has granted little attention to human-animal relations.

Nature study may be understood, at least in part, as a reaction to experimental biology and industry – as an effort to preserve vitalist sentiment and values in regards to living creatures. The study of nature was a primary means by which this secularising and industrialising nation expressed its spirituality and gentler beliefs about connectedness. Teachers' resistance to agricultural education may now be understood in light of this. Nature study was evidently also a means of negotiating tension with the farming sector. It encouraged kindness to animals congruent with traditional husbandry while assisting rationalisation of animal workers through an emphasis on interdependence, mutual aid within the economy of nature, and animal industry as natural laws.

This study contributes to New Zealand's scholarship on the popular and civic transmission of evolutionary ideas. It has highlighted that evolutionary ideas were conveyed through school and popular general biology (and manifest

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[1] On this topic, see Raymond Anthony, "Farming Animals and the Capabilities Approach: Understanding Roles and Responsibilities though Narrative Ethics," *Society & Animals* 17, (2009): 263-265.

[2] See for example, Herzog, "Darwinism and the Study of Human-Animal Interactions," 361-367.

within the poultry press) in subtle ways, evading the Creationist debate by focusing on the human-animal continuum within general biology. Past historical analyses of Darwinian theory in education which consider only direct use of the term 'evolution' or references to Darwin have overlooked the various means by which the notion of biological continuity was conveyed and the integration of evolutionary ideas into popular thought.

King's reiteration of natural laws and human-animal comparison assisted the reception of evolutionary ideas. He similarly evaded explicit discussion of Darwin, talking instead in more palatable, comparative terms, drawing upon the accepted framework of general biology. Overall, King's approach to education reflected a blend of evolutionary ideas, experimental, comparative biology, and an emphasis on media engagement that was typical of biology educators of his era.

Eugenics

This study has explored eugenics in poultry industry discourse in more depth than existing international scholarship, uniting the observations of cultural scholars who have observed the eugenic gaze and science historians who dismiss farmers' comments as Social Darwinist rhetoric. It situates both within the broader context of comparative, general biology as it was understood within the farming sector.

This study reveals that it is useful and valid to consider this era, in cultural and ideological terms, as the age of eugenic farming. While eugenic poultry scientists were ultimately of limited assistance to poultry breeders, a eugenic mindset was integral to the assessment of chickens, as with other living beings into the 1940s. It assisted the application of scientific objectivity to modern farming practice, establishing a harsh culture and language within industry that was sustained beyond WWII.

Stephen Garton in his study of Australasian eugenics stated that the key question in regard to this part of the world was why negative eugenic measures

failed to gain support to the degree they did in other countries.[3] My study suggests that one element of this may have been farming and domestic familiarity with livestock. Many New Zealanders were acutely aware of the harshness of modern farm practice. Concern about the transference of scientific principles between agriculture and human society built upon exisiting humanitarian concerns about the correlated modern treatment of animals and people. Animal-keepers were particularly cognisant of environmental determinants and climatic determinism was integral to concepts of race for citizens and livestock.

The Poultry Industry

As the first thorough historical investigation into the New Zealand poultry industry, this thesis refutes conceptions of isolated insignificance and trend-following within the industry, and connects with the work of Tony Ballantyne and others who have encouraged attention to the global exchange of scientific ideas in the nineteenth and twentieth centuries, challenging views of periphery and centre.[4] For instance, as a key founding figure (and notably a private rather than government official), Merrett had international connections and appears to have been instrumental in establishing the WPSA. I also discovered Raymond Pearl's claim that egg laying competitions were an Australian initiative.

This thesis confirms that Sayer's observations of the British poultry industry – that it challenges assumptions about progressive modernity in agriculture – also applied in the New Zealand context. Although general biology was a modern construct, the modernisation of industry – in the sense of the application of specialist and standardised science and farming methods – was a prolonged process. Although poultry science was emerging as a specialist discipline, the standardised application of many aspects of this was not possible

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[3] Garton, "Eugenics in Australia and New Zealand: Laboratories of Racial Science," 243-244.

[4] See Ballantyne's 'Race and the Webs of Empire' (2001) article on Aryanism and this topic discussed in Bennett and Hodge, *Science and Empire: Knowledge and Networks of Science Across the British Empire, 1800-1970*: 16-17.

until, as discussed throughout this thesis, the genetic, pharmaceutical, technological and social and economic changes coalesced around 1960.

As this study was focused on the poultry industry, there are some constraints on the degree to which findings may be generalised to other New Zealand livestock industries. The poultry industry was unique in terms of its broad and largely hobbyist and part-time membership, and chickens as birds were one of the last of today's main primary industries to be brought into commercial production, with fancy breeders retaining strong connections with industry throughout this period. Star and Brooking in *Seeds of Empire* note with respect to the exchange of scientific information, that individual farmers with their informal networks and non-governmental channels were important along with Government services. This was particularly the case within the broad producer base of the poultry industry with its stretched government advisors. This situation affected the transmission of specialist scientific knowledge, and for this reason general principles may have been sustained in the poultry industry more than in others.[5]

Observations of differences between the poultry industry and other sectors were made at the time, such as comments about a reluctance to cull birds and poultry breeders' particularly diverse perspectives on breeding. It is possible that the chicken's role as an important experimental animal intensified comparative viewpoints. Poultry breeders were attuned to comparative principles through the constant reminder of the chicken as a model in eugenics research. The chicken was also particularly prominent within nutritional research.

However, it is likely that similar patterns will be found in other New Zealand livestock industries. Apart from the fact that dairy farmers kept sideline poultry farms, and specialist dairy and poultry science emerged at about the same time, general biology principles applied to all animals. Wood's analysis of early

[5] Star and Brooking, "The Farmer, Science and the State in New Zealand," 161.

twentieth-century British pig farming supports my argument that historical analysis of modern agriculture generally in this period should take into account both specialist technical knowledge and concepts underpinned by general biology.

Contribution to Scholarship

This study demonstrates that concepts of human-animal continuity did not abruptly end within nineteenth-century lay science and agriculture, but were continued, and in some respects expanded, within twentieth century general biology. Social historians in New Zealand have, as in other countries, focussed on our eugenic culture of the first half century as the source of the animal metaphor, paying scant attention to the broader context of modern scientific discourse. The poultry industry, with its broad hobbyist and domestic base, may be seen to reflect many of the lay science perspectives of the general populace. This study thus opens a dialogue within agricultural historiography, but also facilitates closer consideration of comparative description and general biology within other areas of the applied life sciences in the first half of the twentieth century.

Appendix A

Census of Poultry, 1861 to 1971

The below table is a compilation of data from the New Zealand Census in which poultry statistics were recorded from 1861 to 1971.

Year	% with 1-12 birds (No. of flocks in brackets)	% with 13-24	% with 25-49	% with 50-99	% with 100-499	% with 500-999	% with over 1000	No. of h/holds keeping birds tallied to left F=Fowl D=Ducks	No. of h/holds keeping any poultry F,D,G,T	Av. flock no.	No. of poultry in millions	No. of fowls in millions	Poultry per head of pop'n	Human pop'n in millions
1861	-	-	-	-	-	-	-	-	-	-	0.24	-	2.4	0.1
1864	-	-	-	-	-	-	-	-	-	-	0.38	-	2.2	0.2
1867	-	-	-	-	-	-	-	-	-	-	0.68	-	3.1	0.2
1871	-	-	-	-	-	-	-	-	-	-	0.87	-	3.4	0.3
1874	-	-	-	-	-	-	-	-	-	-	1.1	-	3.5	0.3
1878	-	-	-	-	-	-	-	-	-	-	1.3	-	3.2	0.4
1881	-	-	-	-	-	-	-	-	-	-	1.6	-	3.2	0.5
1886	-	-	-	-	-	-	-	-	-	-	1.7	-	2.9	0.6
1891	-	-	-	-	-	-	-	-	-	-	1.8	-	2.9	0.6
1906	-	-	-	-	-	-	-	-	-	-	3.2	2.8	3.6	0.9
1911	-	-	-	-	-	-	-	-	-	-	3.7	3.2	3.7	1.1
1916	-	-	-	-	-	-	-	-	134 234	-	3.5	3.1	3.2	1.1
1921	30.7 (43 913)	37.8 (54 098)	22.5 (32 202)	7.3 (10 387)	1.7 (2372)	0.1 (96)	0.02 (41)	143 119 F	145 993 (55%)	24.4	4.0	3.5	3.3	1.3
1926	35.8 (55 278)	40.7 (62 710)	17.8 (27 459)	4.3 (6 692)	1.2 (1 868)	0.1 (148)	0.04 (66)	154 221 F	158 856 (52%)	21.5	3.8	3.3	2.8	1.4

1936	39.6 (65 669)	41.3 (68 479)	12.8 (21 286)	4.4 (7 296)	1.6 (2 715)	0.2 (310)	0.1 (194)	165 949 F/D	166 354 (44%)	23.3	4.0	3.5	2.6	1.6
1945	48.7 (77 465)	35.0 (55 716)	10.7 (16 966)	3.1 (4 953)	1.8 (2 916)	0.3 (497)	0.3 (490)	159 003 F/D	159 333 (40%)	27.6	4.5	4.1	2.6	1.7
1951	56.2 (100 009)	33.3 (59 160)	6.9 (12 247)	1.8 (3 288)	1.3 (2 351)	0.3 (512)	0.2 (366)	177 933 F	180 723 (36%)	21.5	4.2	3.8	2.2	1.9
1956	60.9 (115 783)	30.52 (58 019)	5.4 (10 270)	1.4 (2 588)	1.2 (2 322)	0.3 (569)	0.3 (521)	190 072 F	192 736 (34%)	21.1	4.5	4.1	2.1	2.2
1961	63.8 (102 224)	28.7 (45 894)	4.4 (7 108)	1.1 (1 765)	1.1 (1 720)	0.4 (623)	0.5 (773)	160 107 F	163 476 (26%)	26.1	4.5	4.2	1.9	2.4
1966	65.1 (77 303)	27.5 (32 711)	4.3 (5 123)	1.1 (1 250)	0.9 (1 084)	0.3 (368)	0.8 (1 011)	118 850 F	122 844 (17.2%)	41.6	5.3	4.9	2.0	2.7
1971	66.9 (61 747)	26.1 (24 106)	4.5 (4 156)	0.9 (1 036)	0.5 (527)	0.2 (147)	0.9 (811)	92 530 F	92 359 (16.7%)	55.5	-	5.1	-	2.9

Notes:

1896 and 1901 censuses: No poultry numbers were recorded, although Appendix B noted poultry occupations.

1936 onwards: Census data included Māori.

1945 figures were higher due to Spring-time hatching and census-timing.

F,D,G,T = Fowls, ducks, geese and turkeys. Fowl numbers were recorded with duck numbers in 1936 and 1945.

In calculating percentages of households keeping poultry (sixth column from the right, bracketed), figures from the total number of 'inhabited dwellings' were used. Inhabited dwellings included hospitals and hotels. The latter were included as many institutions kept poultry.

The recording of broiler numbers (birds raised for meat) commenced in 1966 and totalled 1.17 million. These figures were noted separately in the NZ Census of Population and Dwellings (Appendix A).

Appendix B

Male: Female Ratios from the NZ Census 'Occupations'* Data For Those Identifying their Principle Occupation as 'Poultry Farmer', 1891 – 1956

Year	Male	Female	Approximate ratio, male to female	Total
1891 (p.259)	3	2	1.5 : 1	5
1896 (p.361)	22	10	2 : 1	32
1901 (p.386)	130	29	4 : 1	589
1906 (p.452)	346	44	8 : 1	452
1911 (p.502)	524	65	8 : 1	589
1916 (p.131)	496	103	5 : 1	599
1921 (p.135)	504	54	9 : 1	558
1926 (p.44)	511	51	10 : 1	562
1936 (p.88)	778	133	6 : 1	911
1945 (p.2)	1093	233	4 : 1	1326
1951 (p.21)	980	200	4 : 1	1180
1956 (pp.43, 54)	1008	239	4 : 1	1247

*In 1945 and 1956 figures were recorded under 'Industries and Occupations'; in 1951 under 'Industries, Occupations and Incomes'.

Figures pertain to assisting relatives who identify primarily as poultry farmers, those working for wages or salary with poultry farming as their main income, and unemployed poultry farmers. It excludes those with poultry-farming as a sideline.

Appendix C

Analysis of Content within New Zealand Public School Syllabus Texts for Nature-Study and Elementary Agriculture (From Preparatory Classes to Standard VII/Form III)

Subject	1928 (pp. 218-221) and 1937 (pp. 220-223).
General biology theme throughout, including those with a focus on evolution and nature study	40
General biology experiments e.g. food groups, principles of respiration, acids and alkalines, 'elementary hygiene' and physiology	13
Agriculture, incl. soil, manures, weeds, animal nutrition, school gardening, plant experiments	27
Science specialities (not general or agriculturally-specific) e.g. botany, zoology, chemistry, bacteria, geology, geography	16
Human biology (may include general biology but this not overall focus) e.g. human physiology, health and hygiene	4
Nature study, NZ fauna/flora e.g. NZ plants, NZ birds, NZ wildflowers, NZ animals, NZ sea shells, NZ entomology, Australasian plant life	9
Total	109

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