For Science, Love and Money: The Social Worlds of Poultry and Rabbit Breeding in Britain, 1900-1940

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Abstract

This paper traces the joint histories of poultry and rabbit breeding by fanciers, and for commercial and scientific purposes, in early 20th century Britain. I show that the histories of the social worlds that bred for these different purposes are intertwined, as are the histories of poultry and rabbit breeding in general. To properly understand the history of scientific breeding we must therefore understand the general context of breeding in which this occurred. In the paper I show that as fancy poultry and rabbits were taken up for scientific research at the start of the 20th century they became scientific specimens and boundary objects between the social worlds. Their existence as boundary objects motivated the social worlds to coordinate their work through translators and trading zones. By the 1930s all three coordination methods were being used simultaneously.

Key Words: fancying, commerce, boundary objects, translators, trading zones.

Introduction

Recent historical research indicates that there was little distinction between breeders and geneticists prior to 1915 (Sapp, 1983: 336; Paul & Kimmelman, 1988: 285). This paper

refines this conclusion. Geneticists and breeders were very similar at this time because they shared objects, techniques and people. However, as Thomas Gieryn (1995: 413) points out, scientists tend to define science by what they produce (Truth) and breeders produced quite different things from geneticists (exhibition organisms or biological products).

Animal breeders, who are the focus of this paper, were in fact situated in three different social worlds at the start of the 20th century: science, fancying and commerce. Social worlds are 'a set of common or joint activities or concerns, bound together by a network of communication' (Strauss, 1982: 172). The concerns of breeders in each of these cases were to generate knowledge, beauty and money. Despite different production aims, the worlds had a number of similarities: they bred the same animals and they shared animal breeding and maintenance practices.

This paper is divided into two parts. The first part investigates the intertwined histories of poultry and rabbit breeding in these three social worlds and argues that these histories are not separable. The second part investigates how the social worlds coordinated their interactions and argues that the existence of boundary objects motivated people to become translators between the worlds and motivated the worlds to create trading zones.

Part One: History

The history of breeding is usually told as three separate histories: the history of fancying, the history of science and the history of commerce. Yet, as I show in this section, these histories are intertwined. No one of them can be properly understood without some knowledge of the others. It may be thought that the worlds became linked because commercial breeders created a demand for scientific knowledge about breeding, which led scientists to turn to fanciers for animals and advice on keeping them. However, this model does not fit what actually happened. In this case, the opportunity to do breeding research preceded the demand for it.

The first group of poultry and rabbit breeders to get a strong sense of their own identity were poultry and rabbit fanciers. Fancying became an extremely popular pastime in Britain in the latter half of the 19th century. By the end of the century a wide variety of animals, including poultry, rabbits, dogs, cats and mice, were being bred for beauty and exhibited at animal shows.

There were ideological differences between the different animal fancies. Fanciers colluded with the social class system by imitating their betters. They strove for high social rank, rather than wanting to overthrow the very idea of social ranking. The ideal of social mobility was embodied in all fancies because the specimen that best embodied the breed's features would win, even over specimens with a better ancestral pedigree. The human analogy was that a man should be deemed a gentleman if he behaved as befitted one, regardless of his parents' status. However, while all fanciers judged animals (or plants) on the merit of their appearance, many, such as dog fanciers, had studbooks.

These books only listed animals whose pedigrees were considered acceptable, usually those that were purebred for four or five generations. Only animals in the studbooks could enter fancy shows. Thus dog fancying combined the ideals of birthright and merit, and unsurprisingly was mainly the preserve of the aspiring middle-classes (Ritvo, 1987: 84; Derry, 2003: 55-59). Poultry and rabbit fanciers had no studbooks and thus embodied the ideal of merit, regardless of birth. This ideology was consistent with the poultry and rabbit fanciers' mainly working class backgrounds.[i]

[Figure 1 placed here.]

During the latter part of the 19th century and the beginning of the 20th, poultry and rabbit clubs formed. These set the standards by which particular breeds of poultry and rabbits were judged at shows, and thus breeders tried to make their animals conform to them. This was usually done by selecting parents that generally conformed to the standards. When one parent was slightly lacking in a character, the other was chosen to be especially strong in it. Standards covered all aspects of the animal's appearance. With the exception of a few characters, known to arise from crossbreeding, fancy animals were expected to breed true. This was the case even when there was no studbook. Despite the embodied ideology of merit being more important than pedigree, there was a taboo against crossbreeding in both the poultry and rabbit fancies.

Breeders sent their animals by rail to take part in exhibitions. The animals often travelled unaccompanied, being transferred onto different trains en route by railway officials. They

were met at the other end and, after the exhibition, reloaded onto a train back home by show marshals. This system of animal transport was much used by fanciers, and was later exploited by geneticists to send experimental organisms across the country to other researchers.[ii]

It was very prestigious for animal fanciers to win prizes at exhibitions,[iii] and prize-winning animals became status symbols for their owners, engendering as much love and pride as someone today might show to their Ferrari. However, it was also extremely prestigious to create a new breed. New breeds could be created by mutations that gave rise to characters that found favour with fanciers. This happened in the case of Rex rabbits, where the mutation, Rex, produced rabbits with extremely smooth coats due to the shortness of their guard hairs (Richardson, 1930a).[iv] Fanciers could also deliberately create new breeds by hybridizing existing breeds to join favourable characters together in the resultant offspring (Wood, 1930). These breeding practices were shared by fanciers, commercial breeders (who also wanted to improve their varieties and create new, better ones), and scientists.[v]

Poultry and rabbits were also bred for scientific research during the 19th and 20th centuries. During the latter part of the 19th century, fancy animals attracted the interest of biologists concerned with evolution and heredity. The role fancy pigeons played in the development of Charles Darwin's theory of evolution is well known to historians of biology (Secord, 1981; Bartley, 1992).[vi] By 1902 both fancy poultry and fancy rabbits were being used in Britain to test the Mendelian laws of inheritance. Fancy animals were

used, because fancy breeds were characterized by physical features that could easily be traced through generations and they tended to breed true for those characteristics. By crossing animals from different fancy breeds geneticists could therefore quickly determine whether the features re-appeared in future generations in the proportions predicted by the Mendelian laws (Kohler, 1994: 28).

Poultry had an additional advantage for scientific research. Even as early as 1900 there was a commercial market for chicks. Scientists could sell their surplus chicks to help fund their research. The British geneticist, William Bateson, obtained extra money for his work in this way (Punnett, 1950: 5-6). Thus, chicks crossed the boundary between fancying and science, and between science and commerce.

Fanciers, scientists and commercial breeders not only passed animals between each other and shared breeding techniques; they also shared practices of keeping the animals. To experiment with animals, scientists had to rear them on suitable food, in healthy living conditions and, when appropriate, persuade them to breed.[vii] Such husbandry could cause scientists problems. Bateson wrote in 1902: 'In the first two years of the experiment [with poultry] many troubles occurred, mostly owing to overcrowding and errors arising from inexperience' (Bateson & Saunders, 1902: 90). The problem could have been worse though; Bateson wrote that fanciers had provided him with useful practical information. The utility of fancy animals for science and fanciers' and commercial breeders' knowledge about husbandry thus provided incentive for scientists to contact other types of breeders.[viii]

However, such contact between scientists and other breeders gave rise to problems. The British geneticist, Francis Crew, recalled that while he enjoyed the trips the (British) Genetical Society made to poultry shows and found them profitable, he also 'came to realize clearly that I was not alone in finding it difficult to communicate with these "practical men"' (Crew, 1969: 14). However, he went on to say that since knowledge of an animal's genetics is based on knowledge of it's husbandry, geneticists who worked with fowls could talk on an equal basis with commercial fowl breeders. The class barrier that Darwin met when dealing with fanciers (Secord, 1981: 186) was probably also a barrier to later scientist-fancier interactions. Scientists were predominantly middle-class, in contrast to the predominantly working class fanciers and commercial rabbit and poultry breeders. However, it is worth noting that a number of scientists had previously been fanciers (for example, Francis Crew and James Pickard) and some fanciers participated in science (for example, Richard Staples-Browne, as Crew [1969: 9] describes).

In the 19th century, the breeding of poultry and rabbits for food was mainly done by farmers' wives for household needs or domestic income rather than as part of an organized industry (Brown, 1934a: 79; Whetham, 1978: 14; Holderness, 2000: 490; Davis & Demello, 2003: 63).[ix] It was only during the early part of the 20th century that large-scale poultry and rabbit breeding industries began to be organized. This occurred as part of a general shift from crop to livestock agriculture in Britain during the Agricultural Depression that lasted from 1879 to 1914 (Turner, 1992: 46, 48; Holderness, 2000: 490-

494).[x] These changes in agricultural practice were accompanied by changes in people's eating habits.[xi] During the 19th century, eggs were a seasonal product, but by the end of the century imports provided a more constant supply and eggs were starting to be consumed daily.

Despite the shift from crop to livestock production, British farmers did not immediately take advantage of the increasing demand for eggs and poultry. This was because landed gentry viewed poultry as game for shooting and farmers viewed poultry as part of their wives' domain (Brown, 1934a: 77-79). Promoters of commercial breeding tried to change farmers' attitudes by educating them about market opportunities and profitable methods of poultry rearing (Bourke, 1987).

Commercial poultry breeding also began to be organized on an international scale at the turn of the 20th century. In 1912 an International Association of Poultry Instructors and Investigators was founded, which established triennial International Poultry Congresses. However, due to the intervention of World War I and government disinterest in organizing them, the first Congress was not held until 1921 at The Hague (Brown, 1934a: 186; 1930b). The Congresses were held triennially from 1921, incorporating rabbits from 1927 (House, 1927). They consisted of exhibitions of livestock, national and commercial exhibits, and paper reading sessions. As discussed later, these Congresses became an important opportunity for the different types of breeders to meet each other.

Despite these earlier developments, the practice of keeping poultry and rabbits for food expanded substantially after World War I (King Wilson, 1929: 305; Holderness, 2000: 490). The war initially had an adverse effect on poultry and rabbit rearing, as many keepers culled their stocks before enrolling in the army (Brown, 1933; Anonymous, 1939). Rabbit breeding increased later in the war due to the government's promotion of rabbits as a food source, but poultry rearing did not increase due to grain shortages (Richardson, 1933).

The contraction of the poultry industry during World War I led to the foundation of the National Poultry Council (NPC) in July 1920, which was designed to represent all poultry societies. In 1921 the NPC learned that the government had made £1 million available for scientific agricultural research.[xii] The NPC lobbied the government to create a National Poultry Institute for scientific research into poultry keeping. A year later the government agreed to provide £50,000 for a National Poultry Institute and research stations on the condition that the Council raised £6,500 from poultry keepers towards the project (Brown, 1930a: 302; 1934b). The money was raised by 1924 and the National Poultry Institute Scheme came into force. Under this scheme scientific research on poultry (and rabbits) was funded at six institutes (Brown, 1930c; Anonymous, 1931; Francis, 1931a, b, c).[xiii] The type of scientific research differed at each institute. The National Poultry Institute Scheme thus created an institutional relationship between poultry and rabbit scientists of different disciplines.

General food shortages continued after World War I, and so the Government continued to promote rabbit breeding. Many rabbit breeders simply aimed to supply themselves with fresh meat. However, there was also a reasonably sized market for rabbit flesh, with imports being valued at over £750,000 in 1929 (approximately a quarter of the value of poultry imports), and thus many rabbit breeders intended to market their produce (King Wilson, 1929: 305). At this time British rabbit breeders realised that continental breeders were also breeding rabbits for their pelts, and Angora rabbits for wool. Fur breeds were therefore imported from the continent. Angora rabbits were also purchased from fanciers, and rabbits began to be bred and selected for their coats in Britain (Pickard, 1931: 96-97; Pickard & Crew, 1931: 3).

From the mid-1920s rabbit breeders began to organize themselves into an industry. This organization was partly piggybacked onto the organization of the poultry industry and, where this was not the case, it tended to be inspired by the poultry industry. One example was the creation of the National Rabbit Council (NRC). The NRC was established at the end of the 1920s to represent all commercial breeders of rabbits, regardless of whether they marketed fur, meat or wool (Anonymous, 1929a: 108).

Both the NRC and its successor, the British Rabbit Council (BRC), raised money for scientific research. In 1929 research on rabbit heredity and physiology at the Edinburgh Animal Breeding Research Department was under threat because of a lack of funds. A sub-committee of the NRC was formed to consider the matter, and they met with representatives of the Department of Agriculture for Scotland to explain the importance

of the research for rabbit breeders and the importance of the industry in Britain (Anonymous, 1929b). They persuaded the Department to fund the rabbit work until April 1930 (Anonymous, 1929c: 792). After that date the Development Commission[xiv] agreed to fund the work throughout the 1930s on the condition that rabbit breeders contributed to the funding. These funds were raised at first under the auspices of the NRC and later through the BRC (Anonymous, 1930a; Sherbourne et al., 1932; Pickard, 1934).

The social (and sub-social) worlds of fancying, scientific breeding and commercial breeding were thus bound together in numerous different and significant ways.[xv] Practitioners knew inhabitants of different worlds; sometimes personally, sometimes only by name. Money, animals and information flowed between the worlds, allowing members of each to meet their own aims. For this to happen the worlds had to coordinate themselves and as I show in the next section they did this in a variety of ways.

Part Two: Coordinating Worlds

In this section I discuss the three major ways in which the social worlds of breeding coordinated themselves. Boundary objects were the major link between the worlds and were used to coordinate information. Translators passed information between worlds and promoted the worlds to each other. The worlds also had a number of trading zones, which allowed the members of different worlds to communicate directly with each other.

Boundary Objects

Boundary objects are ‘scientific objects which both inhabit several intersecting social worlds … *and* satisfy the informational requirements of each of them’ (Star & Griesemer, 1989: 393, emphasis in original). As Star and Griesemer point out, boundary objects need to be plastic enough to adapt to the requirements of the different worlds but robust enough to have a common identity across them. The poultry and rabbits that inhabited the social worlds of breeding were boundary objects in this sense.

As Lorraine Daston (2000: 5) argues, scientific objects (and thus boundary objects) have histories: when they enter the world of science they come into being as scientific objects, and as they leave the scientific object dies. Poultry and rabbits have not always inhabited the worlds of science, fancying and commerce; they entered them one by one in the 19th century. First, poultry and rabbits entered the world of fancying. Fanciers moulded them into different breeds with certain characteristics. They, rather than scientists, created the poultry and rabbits that belonged to the ‘second nature’ of domestication (Kohler, 1994: 9). These animals were still recognisably rabbits and poultry but they had been constructed (selectively bred) in accordance with criteria that fanciers valued in their practices of exhibiting and judging them. Such construction did not end in the 19th century but became an established practice for fanciers, scientists and commercial breeders in the century that followed.

Geneticists began to experiment with fancy animals at the start of the 20th century because they bred true for different, readily visible characters. They valued these animals

because their offspring's characters were predictable. Fanciers on the other hand valued the aesthetic appearance of the breed's characters. In addition, early in the 20th century geneticists came to understand these characters in terms of underlying homozygous genes. The same phenotypic traits were thus understood in different ways by fanciers and geneticists and valued for different reasons. As geneticists started to use fancy rabbits and poultry in their research, these animals became both scientific specimens and boundary objects between scientists and fanciers.

[**Figure 2 placed here**]

Poultry and rabbits also acted as boundary objects between scientists and commercial breeders. Scientists used commercial breeds in their work because doing so enabled them to persuade commercial breeders more easily that the research would be of interest to them, thus enlisting political and financial support from the breeders. [xvi] One example of this occurring is Reginald Punnett and Michael Pease's work on auto-sexing poultry. Punnett and Pease were interested in the interaction between two genes that caused bars of colour on the feathers of poultry. To study this they introduced both genes into the Campine breed. The strain they created, Cambar, produced chicks whose sex could be identified at birth by the pattern on their down (Punnett and Pease, 1930). The ability to tell a chick's sex at birth was potentially valuable to producers of eggs because it could prevent them from raising cockerels. However, Campine was not a commercial breed of poultry and so the resultant Cambar breed was a poor producer of eggs, in terms of both size and quantity (Pease, 1933). To make their discovery commercially viable, Punnett

and Pease developed an auto-sexing strain of the commercial poultry breed, Brown Leghorn (Punnett, 1938), which was adopted by the commercial world and hence became a boundary object.

There are a number of ways in which boundary objects can meet the informational requirements of multiple social worlds (Wenger, 2002: 107). The poultry and rabbits discussed above met their requirements by being able to accommodate different interpretations of their breeding behaviour. Breeding journals were also boundary objects in as much that they belonged both to the worlds of fancying and commerce, although they were not scientific objects. One way these journals met the different informational requirements of the two worlds was by being modular: members of different worlds tended to read different articles and features. The journal editors rarely tried to coordinate the worlds, but occasionally the articles were of interest to both. Events, such as the International Poultry Congresses, were announced and discussed within these journals. They thus transmitted information that allowed practitioners of both worlds to attend coordinating events, either physically or virtually through reports about them. The journals also published articles by translators, allowing them to pass information from the world of science either to fanciers or commercial breeders, or to both simultaneously.

Translators

One means of coordinating social worlds is via translators.[xvii] Translators pass information between worlds by selecting information from one world, which is relevant

to another, and presenting it in a format that the second world will understand. They may pass the information in either written or oral form.

Harry Collins and Robert Evans (2002: 254) have classified expertise into three levels: no expertise, interactional expertise and contributory expertise. Contributory expertise is sufficient to contribute to the work of a social world. Interactional expertise is sufficient to interact with members of a social world in a meaningful way and no expertise means that the level of expertise is not yet sufficient for either of these purposes.

An individual may have contributory expertise without having interactional expertise. The example Collins and Evans (2002: 255-257) provide are the Cumbrian sheep farmers of Brian Wynne's study of the relationship between scientists and sheep farmers after fall-out from Chernobyl contaminated the Cumbrian grassland. These farmers had contributory expertise in the ecology of the local grassland but they did not have interactional expertise with ecologists. In the case of the different breeding social worlds, members of each had contributory expertise in the other worlds. They could contribute knowledge of the animals' genetics or how to maintain the animals but they did not necessarily have interactional expertise. In other words they could not necessarily pass this information on.

Translators must always have interactional expertise in both of the worlds between which they translate and further skills such as journalism, teaching and so on (Collins and

Evans, 2002: 258). Since the translators I discuss were full members of at least one of the breeding social worlds they had contributory and interactional expertise in both worlds.

One such translator was E. C. Richardson, a respected rabbit fancier and a member of the (British) Genetical Society.[xviii] Each week Richardson wrote a column for the international fanciers' and commercial breeders' journal, *Fur and Feather*. Through his columns Richardson promoted and explained scientific research to his readers. He gained much of his information from discussions at the Genetical Society and from articles published in the *Journal of Genetics*.[xix] Scientists also sent him copies of their papers and general scientific information (Richardson, 1931, 1932, 1937). There is little evidence that Richardson contributed his expertise in animal breeding to the scientific world. He appears to have utilised his interactional expertise with the scientific world to further his contribution to the fancy world. However, this does not mean that he did not have contributory expertise in the scientific world and he may have passed it on verbally to other members of the Genetical Society.

[**Figure 3 placed here**]

As well as passing information, translators promoted the different worlds to each other. This could be done via the information they translated but also through the respect and standing they had in multiple social worlds. The latter was an important factor in motivating the breeding worlds to work together to ensure there was funding for rabbit research at Edinburgh University. The person in charge of this research, James Pickard,

was a highly prominent rabbit fancier as well as a rabbit scientist (Watmough, 1934: 6; Anonymous, 1934; Faulker, 1938a, b). As secretary of the NRC (and later BRC) from its foundation and throughout the 1930s, it is not surprising that the NRC knew that the work required support nor that they thought it worthy of their support.

Trading Zones

The social worlds of breeding also coordinated themselves through a number of trading zones. Members of different social worlds find it difficult to communicate directly with each other because words carry broad meanings and connotations that are not shared between worlds. A trading zone is a domain at the boundary of multiple worlds where members of different social worlds can work together to create local meanings. This is usually done by restricting and altering the meaning of words (and/or images and so on) to create a pidgin language (Galison, 1997: 46-47, 803-44).

In this section I discuss a number of different trading zones. There is little direct evidence that members of the breeding social worlds created local meanings in them. However, the number of trading zones discussed below strongly suggests that the members of the different social worlds found their contact profitable and thus communication was possible.

[**Figure 4 placed here**]

The most important trading zones in the poultry and rabbit breeding worlds were the International Poultry Congresses.[xx] The Congresses were established by commercial breeders, but fanciers and scientists also participated in them. The work of the National Poultry Institutes was displayed in the education and research section of the British national exhibit.[xxi] Papers were also read at the Congresses by scientists who were part of the Scheme and, in addition, by members of the Edinburgh Institute of Animal Genetics. Commercial poultry and rabbit breeders from Britain and other nations also presented papers and thus the sessions brought scientists and other breeders into contact with each other's ideas.[xxii]

Although it is possible that fanciers, commercial breeders and scientists simply read their papers past each other at the majority of these Congresses, it seems likely that local meanings were created when scientists, fanciers and commercial breeders interacted at the exhibits. The 41st meeting of the (British) Genetical Society was held at the 1930 Congress and, following the meeting, geneticists working with all kinds of organisms visited the exhibitions. This was not the only time that Genetical Society meetings were held in conjunction with breeders' shows. In 1935 the 55th meeting was held in conjunction with the National Show of Cage Birds.[xxiii] The local meanings created through these interactions only existed for a very brief time, but their existence made it more likely that further local meanings would be created at future Poultry Congresses and fancy shows.

The other important trading zone between the breeding worlds was the scientific committee of the NRC. Between the NRC's formation in 1929 and its merger to become the British Rabbit Council (BRC) in 1934, husbandry men, reproductive physiologists, veterinarians and geneticists all served on its scientific committee (Anonymous, 1929b; 1932a, b; Pickard, 1933). Though the BRC had no scientific committee, numerous scientists served on its Central Council (Anonymous, 1935). Scientists could thus provide advice to fanciers and commercial rabbit breeders through the NRC and BRC and learn about their practices in order to improve their own husbandry.

Trading zones were also created by scientists. Annual poultry conferences were held at the Harper Adams Agricultural College from 1917 and a day was added for discussions about rabbits in 1928 (Anonymous, 1929e; 1930b). At the conferences, scientists reported on their work, while commercial breeders spoke about the economic and political aspects of breeding (Anonymous, 1929d; 1929e). The conferences occurred at a scientific institution and scientists found them useful enough to attend and speak at, but reports of them are found in journals for fanciers and commercial breeders, rather than in scientific journals. The scientific world protects its boundaries closely because of their association with cultural authority (Gieryn, 1995: 405). This trading zone was thus portrayed as part of the Agricultural College's outreach work to the agricultural community rather than as part of science itself.

Conclusion

During the latter part of the 19th century, fanciers bred rabbits and poultry into a variety of breeds, which bred true for particular characters. At the start of the 20th century geneticists realized that these fancy animals were ideal for testing the Mendelian laws. Thus at that time, fancy poultry and rabbits became scientific specimens and boundary objects between the worlds of fancying and science. As other scientists began to use fancy poultry and rabbits in their work they also become boundary objects between the different scientific disciplines.

As the commercial breeding worlds developed, they also adopted fancy breeds and so the poultry and rabbits became boundary objects with this world too. Commercial breeds provided an additional incentive for their use by scientists: their deployment in scientific work helped scientists to persuade commercial breeders that the work was in their interests.

Once scientists were using poultry and rabbits in their work, they needed to know how to breed and maintain them. The practical and informational requirements for doing so encouraged them to create trading zones with fanciers. The perceived benefits of forming links between the worlds worked both ways, as a number of fanciers became translators and the commercial breeding world created a number of trading zones such as the International Poultry Congresses.

By the 1930s boundary objects, translators and trading zones were simultaneously coordinating the breeding worlds. However, the boundary objects were created first, and their existence motivated members of the commercial, fancying and scientific worlds to form trading zones and to become translators.

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Notes

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[i] There was a hierarchy of fancy animals, with dogs being the most prestigious, going down to lesser creatures such as poultry and rabbits, with rodents at the bottom (Ritvo, 1987: 116).

[ii] The clearest example of British geneticists taking advantage of this system of transport comes from the collaborative 'dog experiments' conducted by the Genetical Society during the 1930s. References to the use of railway travel are scattered throughout the 'Dog Experiment' boxes in the Genetical Society Archives. See, for example: Unsigned letter to Crew, 28 April 1936, file 13, box Dog Experiments 1, Genetical Society Archives, John Innes Centre, Norwich Research Park, Colney, Norwich, NR4 7UH.

[iii] These prizes were ornamental or practical in nature, including cups, spoons and identity rings.

[iv] For the place of Rex rabbits in German genetics research see Von Schwerin (2004: 79-83, 94-103).

[v] Diane Paul and Barbara Kimmelman (1988) have previously pointed out that the technique of hybridization was shared by geneticists and breeders (both fancy and commercial). To put this discussion in Edmund Russell's (2004) terminology: fanciers, commercial breeders and scientists all wished to perpetuate and improve the macro biotechnology (poultry and rabbits) that they shared. However, the biotechnology was

being designed to produce different things: beauty, money and knowledge for fanciers, commercial breeders and scientists respectively.

[vi] For Darwin and breeders more generally see Secord (1985).

[vii] A vivid recollection of keeping poultry for genetic research is given by Punnett (1950: 5-6).

[viii] Geneticists' use of fancy mice has been noted by Karen Rader (2004, 32-34; 1999: especially 325). She also notes that fanciers not only provided geneticists with material for their work and knowledge of husbandry, but also with a broader social context in which mouse breeding was socially acceptable.

[ix] Bourke (1987) discusses the problems that the Irish government had in promoting poultry keeping at the turn of the 20th century, due to the fact that it targeted men when women were the traditional poultry keepers.

[x] However, Brian Short (1982) has pointed out that the growth of the poultry cramming industry in the Weald of Sussex (south of London) was not due to the agricultural depression, since the practice began prior to the depression.

[xi] Horowitz (2004) provides a good discussion of the way the poultry industry changed American eating habits after 1945.

[xii] The money was made available as part of the government's package of compensation for repealing the sections of the Corn Production Acts that guaranteed a minimum price for wheat and oats (Whetham, 1978: 140).

[xiii] For the inclusion of rabbits in the scheme see Watmough (1928: 269) and Leeming (1928: 120). The six institutes in the scheme were the National Poultry Institute at the Harper Adams Agricultural College for research into the husbandry of poultry and

rabbits; poultry and rabbit nutrition work was funded at the Animal Nutrition Institute, Cambridge University; experiments in breeding poultry and egg production were funded at Reaseheath; experiments on table poultry were funded at the Experimental Station at Wye; poultry and rabbit genetics was funded at Cambridge University; and research at the Ministry's Veterinary Laboratory at Weybridge was also funded.

[xiv] The Development Commission was established in 1910 by the British Government to aid British agriculture and forestry. One of the ways the Commission did this was by organizing and funding agricultural research in Britain. For further information see Olby (1991).

[xv] Though I have focused on Britain in this paper, the fact that the Dutch poultry geneticist, A.L. Hagedoorn, and the German rabbit geneticist, Hans Nachtsheim, both read papers at the International Poultry Congresses indicates that this conclusion probably applies to other national settings too (King Wilson, 1933: 359; Anonymous, 1936: 101). Previous historical research has revealed close links between Nachtsheim and rabbit fanciers in Germany (Von Schwerin, 2004: chapters two and three). However, since the history of breeding varies between countries there may also be important differences.

[xvi] See Latour (1987: 108-21) for a discussion of the ways in which scientists can translate other people's interests.

[xvii] Rodrigo Ribeiro (2007) discusses the similar case of interpreters acting as coordinators between two cultures. The difference between interpreters and translators is not an oral/written one. An interpreter acts as an intermediary between two people. A

translator is independent. They decide what to translate in order to contribute to or start a discussion in another social world.

[xviii] At this time the Genetical Society strictly controlled its membership, voting members in and restricting its membership to 120 people (Lewis, 1969: 4).

[xix] See for example, Richardson (1930b, 1934).

[xx] Later called the World Poultry Congresses.

[xxi] For example, the display at the 1933 Congress is described in Lewer (1933), Anonymous (1933a, b).

[xxii] For example, speakers at the 1936 Congress are listed in Richardson (1936).

[xxiii] Minute Book, Meetings 1919-1944, Genetical Society Archives, John Innes Centre, Norwich Research Park, Colney, Norwich, NR4 7UH: 141, 188, 191.

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