Institution: University of Oxford

Unit of Assessment: UOA5

Title of case study:

Transforming the welfare of commercially-reared poultry

1. Summary of the impact

Professor Marian Dawkins' research at the University of Oxford has established rigorous metrics of welfare for commercially-reared chickens and ducks, that have had a major impact on policy and practice. Her findings in relation to stocking densities for broiler chickens influenced the 2007 EU Broiler Directive; this was adopted by the UK in 2010, and has had a major impact on the industry. For ducks, research examined the provision of water, for which there were contradictory indications with respect to welfare and bacterial infections, and identified solutions for both. Since 2010 this has been incorporated into duck welfare programmes in which both Defra and industry participate.

2. Underpinning research

Worldwide, the rearing of poultry for meat is carried out on a vast scale to meet rising demand from consumers. Billions of broiler (meat) chickens are reared every year, including around 6 billion in Europe and over 800 million in the UK. In addition, the use of ducks for meat is on the increase; around 18 million a year are currently produced in the UK and duck meat accounts for 5% of the poultry market. Most birds are raised using intensive farming methods; this has become an issue of public concern from an animal welfare standpoint, but from an economic point of view it is also critical that attention is paid to the birds' welfare in order to keep mortality levels to a minimum.

Over the last decade Professor Marian Dawkins at the Department of Zoology has led a research programme that has sought to provide a firm empirical basis to guide decisions about the welfare of both chickens and ducks reared for meat. This rigorous, evidence-based research has been carried out in close collaboration with the UK poultry industry.

Broiler chicken welfare

Prior to Dawkins' research, stocking density was widely regarded as the key factor affecting the welfare of broiler chickens. The EU's major review of broiler welfare, SCAHAW 2000, discussed the importance of good air and litter quality but focused mainly on the need to limit stocking density. Following this review, Dawkins and colleagues carried out the largest experiment ever conducted on chickens (a two-year trial on 11 farms with a total of 2.7 million birds, involving the unprecedented cooperation of 90% of major companies in the UK broiler industry), in which stocking density was experimentally varied under commercial conditions. The study, published in 2004, confirmed that very high densities (≥ 42 kg/m^2) affected birds' welfare. However it also showed for the first time that at less extreme densities (≤ 38 kg/m^2), stocking density *per se* was not the principal determinant of broiler chicken welfare; the greatest impact arose from differences amongst producers in the environment they provided. In particular, poor air and litter quality, and temperature and humidity outside recommended limits, were shown to lead to more leg defects (a primary indicator of chicken health) and bird deaths[1].

Duck welfare

There are currently no legal requirements for commercially-reared ducks to have access to water for bathing or swimming. Duck producers have found that if they give their ducks access to bathing water, the ducks defecate in the water and become contaminated with *Campylobacter,* thus compromising food safety as well as the health of the ducks. As a result of these logistical and health difficulties the only source of water for many farmed ducks has been through overhead nipple drinkers.

Dawkins conducted a study, again involving the cooperation of commercial duck producers, into the welfare implications for ducks of different types of water source. Groups of ducks were reared with access to baths allowing swimming, troughs allowing head-dipping, showers, or nipple

drinkers only. The results showed for the first time that water is necessary for the health of ducks; a lack of access to any bathing water adversely affected body and plumage condition. However, ducks showed no particular preference for baths that allowed swimming over showers or troughs. The research therefore suggested that commercial farmers could improve duck welfare as much by providing water in shallow troughs or from showers (both hygienic and economical of water) as from actual ponds or baths[2]. Further research investigated other factors affecting duck welfare in commercial practice and established that, as for broiler chickens, duck welfare was dependent on proper control of air and litter quality, temperature and humidity[3].

3. References to the research

1. Dawkins MS, Donnelly CA, Jones TA. (2004) Chicken welfare is influenced more by housing conditions than by stocking density. Nature 427: 342-344. doi: 10.1038/nature02226 ***Very large-scale study, revealing that differences among producers in the environment that they provide for chickens have more impact on welfare than stocking density.***

2. Jones TA, Waitt CD, Dawkins MS. (2009) Water off a duck's back: Showers and troughs match ponds for improving duck welfare. Appl Anim Behav Sci 116: 52-57. doi: 10.1016/j.applanim.2008.07.008 ***Demonstration that improved duck welfare results from access to water in troughs or overhead showers, not necessarily requiring ponds or baths.***

3. Jones TA, Dawkins MS. (2010) Environment and management factors affecting Pekin duck production and welfare on commercial farms in the UK. Brit Poult Sci 51: 12-21. doi: 10.1080/00071660903421159 ***Research showing that controlling temperature, humidity, litter moisture and ammonia, is crucial to the welfare of commercially-reared ducks.***

Funding for research: Grants in excess of £1.6M have been received for this work from Defra and the BBSRC.

4. Details of the impact

Since 2008 Professor Dawkins' research into the factors affecting the welfare of commercially-reared chickens and ducks has strongly influenced both legislation and practice in the poultry industry, as well as leading to improvements in the health and welfare of poultry.

Impact on policy and consequently on animal welfare

Broilers: Dawkins' 2004 research[1] concluded with a clear recommendation to the industry: 'Legislation to limit stocking density that does not consider the environment that the birds experience could thus have major repercussions for European poultry producers without the hoped-for improvements in animal welfare'. This led to significant changes in policy and practice.

SCAHAW 2000, the EU's review of broiler welfare, took the position that 'when stocking densities exceed approximately 30 kg/m^2, it appears that welfare problems are likely to emerge' regardless of other factors such as indoor climactic conditions. Dawkins' experimental work challenged this position, and provided a significant evidence base for the EU Broiler Directive[4,5] that was published in 2007 and in force from June 2010. Although setting a relatively low maximum stocking density of 33 kg/m^2, the Directive made a derogation: higher stocking densities of up to 39 kg/m^2 were legal provided that farm owners provided detailed documentation of chicken houses and met targets for maintenance of correct temperature, relative humidity and litter quality. Strict limits were also placed on air concentrations of ammonia and CO_2. (A further derogation allowed owners who were able to demonstrate consistently high standards and keep mortality rates very low to increase stocking density up to 42 kg/m^2). These derogations were influenced by Dawkins' conclusion that higher stocking densities will not necessarily adversely affect broiler chicken welfare provided the quality of their environment is good[5]. The 6 billion broiler chickens raised each year in Europe have benefited from these improvements.

Defra's Impact Assessment of the likely effects of the Directive[6] referred explicitly to Dawkins' research findings and used them to assist in the decision as to how the Directive would be implemented in the UK. Specifically, Defra decided not to adopt the derogation to allow the use of a higher stocking density (over 39 kg/m^2 and up to 42 kg/m^2) 'in the light of the Oxford University research which indicated that welfare problems increased as stocking densities of 40 kg/m^2 and higher were approached'[6]. Defra adopted the EU Broiler Directive with these amendments in 2010. All UK broiler producers have to comply with Defra's implementation of the Directive, which has led to a direct improvement in the welfare standards of the 800 million broiler chickens produced in the UK every year[6].

The research has also had an impact on standards for broiler chickens in New Zealand. A 2011 government report cites Dawkins' research and uses it to support the conclusion that 'New Zealand standards regarding stocking density (i.e. up to 38 kg/m^2) are appropriate as long as environmental conditions are taken into consideration'[7]. These standards subsequently became law in the 2012 Animal Welfare (Meat Chickens) Code of Welfare[8].

Ducks: Dawkins' 2009 paper[2] showed that shallow troughs or showers could support the same level of duck welfare as water deep enough to swim in, thus providing a safe and hygienic solution for duck producers. The research was again supported 'unreservedly' by the British Poultry Council[5], whose voluntary Duck Assurance Scheme (launched in 2010) has subsequently ensured that their standards with regard to provision of water for ducks reflect the research[5,9,10]. In addition, Dawkins' research into the environment and management factors affecting duck production and welfare[3] has been used by the RSPCA to support its recommendations for the commercial farming of ducks[11]. As a result, duck welfare standards have been raised.

Impacts on the economy and commerce

Dawkins' research is judged by British poultry producers to have had a major beneficial impact on the industry. The Chief Executive of the British Poultry Council praises Dawkins' 'scientific rigour and ... disciplined and wholly objective approach' which 'shifted the focus of debate on welfare improvement from stocking density *per se* to the wider context of husbandry and management factors'[5]. This has assisted the industry by helping to protect producers from more stringent measures that could have had significant economic implications for them without necessarily improving bird welfare. Two of the largest poultry companies have also corroborated the way in which Dawkins' research has helped the industry. The Agricultural Director of Cargill Meats Europe, a leading supplier of poultry products to retail, food service and food manufacturing customers, states that Dawkins has 'contributed to and shaped standards in the industry assurance scheme' and has helped 'shape our views on how we take the business (and industry) forward, balancing the needs for growth, productivity and efficiency with welfare, food safety and environmental considerations'[12]. The General Manager of Cobb Europe states that 'prior to [Dawkins'] study [on stocking densities] the industry was being driven down a road of ever-reducing stocking density because it was believed stocking density was the most important factor contributing to adverse broiler welfare. [Marian's research] led the broiler industry to refocus on factors within their control with a proven ability to improve broiler welfare outcomes. Without this study I do not believe the broiler sector would have made the progress it has'[13]. Cobb is one of the world's largest chicken breeding companies and a subsidiary of Tyson Food Inc.

Gressingham, one of the UK's major duck producers, has changed practice as a result of Dawkins' research. The Technical Director (Agriculture) at Gressingham states that 'the industry has changed their production protocols in light of Marian's work as they are more aware of the needs of the bird, how to assess welfare, and the wider implications on the environment and food safety. This has helped Gressingham to deliver transparency and consumer confidence that the products are reared in the best possible way based on peer reviewed science'[14].

The willingness of major companies to both acknowledge the importance of Dawkins' research, and to be guided by its conclusions, is evidence of the reach her work has had throughout the UK poultry industry.

5. Sources to corroborate the impact

4. http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2007:182:0019:0028:EN:PDF ***EU Directive laying down minimum rules for the protection of chickens kept for meat production, with key rulings influenced by Dawkins' research.***

5. Letter from the Chief Executive of the British Poultry Council (held on file), corroborating the influence of Dawkins' research on the EU Broiler Directive, the incorporation of her findings into the industry's Red Tractor Chicken Assurance and Duck Assurance Schemes, and positive impacts on practices within the UK poultry industry.

6. http://www.legislation.gov.uk/ukdsi/2010/9780111503546/pdfs/ukdsifia_9780111503546_en.pdf ***Defra assessment which specifically (p6, para 7) mentions Dawkin's stocking density research as having influenced their decisions on how to implement the EU Broiler directive.***

7. http://www.biosecurity.govt.nz/files/regs/animal-welfare/req/codes/meat-chickens-code-report.pdf ***2011 New Zealand NAWAC report into the welfare of broiler chickens, citing Dawkins' research in paras 15 and 18 as the basis for advice on acceptable stocking densities.***

8. http://www.mpi.govt.nz/Default.aspx?TabId=126&id=1432 ***2012 New Zealand broiler chicken Code of Welfare produced from the report at [7]***.

9. http://www.publications.parliament.uk/pa/cm201213/cmhansrd/cm121016/text/121016w0001.htm ***Record of answer by David Heath, Minister for Agriculture and Food, to Parliamentary question by Chris Williamson about duck welfare, corroborating the fact that the Defra-sponsored research undertaken by Dawkins has contributed to improved duck welfare on UK farms.***

10. http://www.britishpoultry.org.uk/?p=2233 ***The British Poultry Council's Duck Assurance Scheme, including recommendations on access to bathing water.***

11. http://www.rspca.org.uk/ImageLocator/LocateAsset?asset=document&assetId=1232730067367&mode=prd ***RSPCA guidance citing four of Dawkins' duck research papers to support its recommendations.***

12. Email from the Agricultural Director of Cargill Meats Europe (held on file), ***corroborating Dawkins' contribution to shaping standards in the poultry industry, helping farmers to keep a balance between economic and welfare considerations.***

13. Email from the General Manager of Cobb Europe (held on file), ***corroborating the way in which Dawkins' research has helped the industry by refocusing the welfare debate onto factors other than merely stocking density.***

14. Email from the Technical Director (Agriculture) at Gressingham (held on file), ***corroborating improvements to duck welfare at Gressingham as a result of Dawkins' research.***