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| <b>Institution:</b> University of Bristol  |  |  |
| <b>Unit of Assessment:</b> 6) Agriculture, Food and Veterinary Science   |  |  |
| <b>Title of case study:</b> Welfare outcome measures and enhanced management have improved farm animal welfare through national policy, industry practice and farm assurance schemes |  |  |
| <b>Period when the underpinning research was undertaken:</b> 2009 - 2015   |  |  |
| <b>Details of staff conducting the underpinning research from the submitting unit:</b>   |  |  |
| <b>Name(s):</b>  | <b>Role(s) (e.g. job title):</b>             | <b>Period(s) employed by submitting HEI:</b> |
| Siobhan Mullan   | Senior Research Fellow                       | 2009 – present                               |
| Sarah Lambton  | Lecturer in Livestock Welfare and Innovation | 2011 – present                               |
| David Main   | Lecturer in Livestock Welfare and Innovation | 1997 – 2017                                  |
| Claire Weeks   | Senior Research Fellow                       | 1990 – 2018                                  |
| Christine Nicol  | Professor of Animal Welfare                  | 1985 – 2017                                  |
| <b>Period when the claimed impact occurred:</b> 1 <sup>st</sup> August 2013 - 2020   |  |  |
| <b>Is this case study continued from a case study submitted in 2014?</b> No  |  |  |

## 1. Summary of the impact

University of Bristol (UoB) research has improved the welfare of over 84 million farm animals. We achieved this by developing new, quantifiable animal observations (outcome assessments) to evaluate the effects of environment and management on welfare. In collaboration with national farm assurance schemes, outcome assessments have been implemented on 16,400 UK farms. The UoB-led AssureWel project has improved farmer and veterinary practice, benefiting the welfare of six of the main terrestrial livestock types. Welfare outcome assessments and management strategies are integrated into Defra and RSPCA guidance, have informed UK government policy on beak trimming, are incorporated into UK food retailer supply chain, and have informed farm assurance schemes and official welfare guidelines in Europe and North America.

## 2. Underpinning research

Welfare outcome measures are quantifiable indicators that provide a direct measure of the welfare of the animals assessed. Previous assessments focussed on factors that influence welfare (inputs), such as environment and housing, rather than the effect (outcome) on the animals. University of Bristol (UoB) research has developed protocols for on-farm outcome assessments of health, physical condition and behaviour, for use in farm assurance schemes.

Research funded by the British Pig Executive (BPEX) [i] focused on optimising the validity, repeatability and feasibility of outcome assessments for farm assurance schemes. Farmers use these outcome assessments to focus their management in the most effective way to improve animal welfare. These studies on pig husbandry within the UK, included the first experimental evaluation of the impact of sampling strategy on the estimated prevalence of welfare outcome measures [1], revealed the influence of time of day on assessment results [2], and investigated repeatability of assessments [3]. This body of work generated specific recommendations for the implementation of welfare outcome measures into farm assurance schemes including a defined list of five measures, which need to be assessed every quarter by an attending veterinary surgeon. These recommendations were incorporated into the 'Real Welfare' scheme for farms/farmers during the final stage of pig rearing/production (finishing). Following a period of preparation by the industry, including training of all pig veterinary surgeons, the recommendations were implemented in full by Red Tractor and BPEX from April 2013.

Alongside research in pigs, a major grant from the Tubney Charitable Trust [iii] enabled UoB, in collaboration with RSPCA and the Soil Association, to establish bespoke welfare outcome assessments for five other key terrestrial livestock types (laying hens, broiler [meat] chickens,

### Impact case study (REF3)

dairy cattle, beef cattle and sheep), and accelerate the implementation of outcome measures within farm assurance schemes – The AssureWel Project.

In laying hens, one of the five outcome measures identified was feather cover [4], an indicator of injurious pecking (IP). IP includes gentle and severe feather pecking (pecking at the tips of feathers, and pecking, pulling and removal of the feathers of other hens, respectively) and vent and cannibalistic pecking (pecking at the skin and underlying tissues of other hens). IP has significant implications for bird welfare, health, mortality and productivity [5]. IP is routinely managed by beak trimming; beak trimmed flocks show less severe feather pecking and have lower mortality at 40 weeks [5]. Beak trimming is considered a mutilation, and consequently is prohibited by EU legislation, with a derogation to allow the procedure to prevent injurious pecking. The UK government is committed to regularly reviewing the need for this derogation, with the intention of implementing a ban on beak trimming if IP can be successfully managed via other means.

A systematic review of the literature (funded by the Tubney Charitable Trust [ii]) identified potential management strategies, which were used to develop bespoke management packages. The data, gathered across 100 flocks on 63 farms, showed that employing a bespoke management package (53 flocks) was associated with 12% lower plumage scores and 24% fewer severe feather pecks compared with control flocks (no management package, 47 flocks) and that the more strategies employed, the lower the levels of IP [5]. This evidence [5] was used to produce the FeatherWel guide, freely available to stakeholders, to inform and disseminate best practice management strategies for commercial flocks and was later incorporated into the AssureWel project and manual. A Defra-commissioned study carried out by UoB [6] supported farmers with non-beak trimmed flocks to employ strategies from the FeatherWel guide to manage IP. These strategies were found to be generally beneficial; however, rates of IP were very variable, and where IP did occur damage was rapid and severe.

### 3. References to the research

- 1) **Mullan S**, Browne WJ, Edwards S, Butterworth A, Whay HR, **Main DCJ**. (2009). The effect of sampling strategy on the estimated prevalence of welfare outcome measures on finishing pig farms. *Applied Animal Behaviour Science*, 119:39-48. DOI:[10.1016/j.applanim.2009.03.008](https://doi.org/10.1016/j.applanim.2009.03.008)
- 2) **Mullan S**, Edwards SA, Butterworth A, Whay HR, **Main DCJ**. (2009). Interdependence of welfare outcome measures and potential confounding factors on finishing pig farms. *Applied Animal Behaviour Science*, 121(1): 25-31. DOI:[10.1016/j.applanim.2009.07.002](https://doi.org/10.1016/j.applanim.2009.07.002)
- 3) **Mullan S**, Edwards SA, Butterworth A, Whay HR, **Main DCJ**. (2011). Inter-observer reliability testing of pig welfare outcome measures proposed for inclusion within farm assurance schemes. *The Veterinary Journal*, 190(2):e100-109. DOI:[10.1016/j.tvjl.2011.01.012](https://doi.org/10.1016/j.tvjl.2011.01.012)
- 4) **Main DCJ**, **Mullan S**, Atkinson C, Bond A, Cooper M, Fraser A, Browne WJ. (2012). Welfare outcomes assessment in laying hen farm assurance schemes. *Animal Welfare*, 21, 389–396. DOI:[10.7120/09627286.21.3.389](https://doi.org/10.7120/09627286.21.3.389)
- 5) **Lambton S**, Nicol CJ, Friel M, **Main DCJ**, McKinstry JL, Sherwin CM, Walton J, **Weeks CA**. (2013). A bespoke management package can reduce levels of injurious pecking in loose-housed laying hen flocks. *Vet Record*, 172: 423-429. DOI:[10.1136/vr.101067](https://doi.org/10.1136/vr.101067)
- 6) **University of Bristol, School of Veterinary Science** (2015). Defra Project AW1145: [A study to test the effectiveness of management strategies in reducing injurious pecking of laying hens with intact beaks in non-cage systems](#)

#### Grant Funding:

- i) **Main DCJ**. Adding value to farm assurance: On-farm evaluation of health and welfare outcomes, British Pig Executive (BPEX), 2006 – 2009, GBP247,067
- ii) Sherwin CM, **Main DCJ**, **Nicol CJ**, **Weeks CA**. Reducing injurious pecking by implementing existing knowledge, Tubney Charitable Trust, 2008 – 2011, GBP886,294
- iii) RSPCA, Soil Association and UoB, AssureWel project, Tubney Charitable Trust, 2010 - 2016, GBP2.7 million
- iv) **Nicol CJ**. A study to test the effectiveness of management strategies in reducing injurious pecking of laying hens with intact beaks in non-cage systems, Defra, 2012-2015, GBP464,055

#### 4. Details of the impact

##### National implementation of welfare outcome assessments

From 2011 to 2017, welfare outcome assessments [1-3, 5] were implemented within farm assurance schemes across the UK. The AssureWel project developed freely available, scheme-specific protocols and implemented welfare outcome assessments into the UK 'Red Tractor Assurance', 'RSPCA Assured' and 'Soil Association Certification' schemes. Guidance and best practice were distilled in the final AssureWel Manual, which is available to download or as a printed copy; it is used across the farming, supply chain and food retail industries to improve animal welfare. From 2013 to 2020, over 200 farm assurance assessors from the UK, Europe and the USA were trained on farms and via the AssureWel webtool. This was the only major new national initiative at the time to focus on these outcome measures and helped farmers to seek support from other sources. UoB researchers provided expert consultancy on welfare outcome assessment to NGOs including Compassion in World Farming and World Animal Protection.

Data from AssureWel associated schemes shows that, for pigs, dairy cows and non-cage laying hens, >95% of all farms in the UK are incorporated in the schemes (Table 1) [A].

**Table 1** – Summary of welfare outcome assessment implementation (2019).

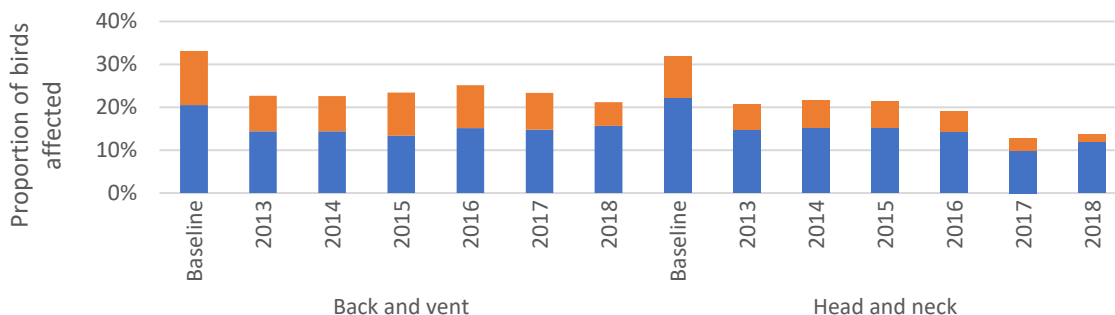
| Species (Schemes: a=Red Tractor, b=RSPCA, c=Soil Association) | No. (%) UK farms within schemes | No. animals on those farms | No. animals assessed per cycle |
|---|---------------------------------|----------------------------|--------------------------------|
| Laying hens (b,c)   | 1,400 (>95% of non-cage farms)  | 20,000,000                 | 70,000                         |
| Pigs (a,b,c)  | 1,600 (>95%)                    | 5,000,000                  | 1,600,000                      |
| Dairy cows (a,b,c)  | 11,000 (>95%)                   | 1,800,000                  | 110,000                        |
| Beef cattle (b,c)   | 1,100 (5%)                      | 65,000                     | 22,000                         |
| Sheep (b,c)   | 1,000 (2%)                      | 400,000                    | 20,000                         |
| Broilers (b,c)  | 300 (5%)                        | 57,000,000                 | 2,500,000                      |
| <b>Total</b>  | <b>16,400 (18%)</b>             | <b>84,265,000</b>          | <b>4,322,000</b>               |

##### Improved animal welfare

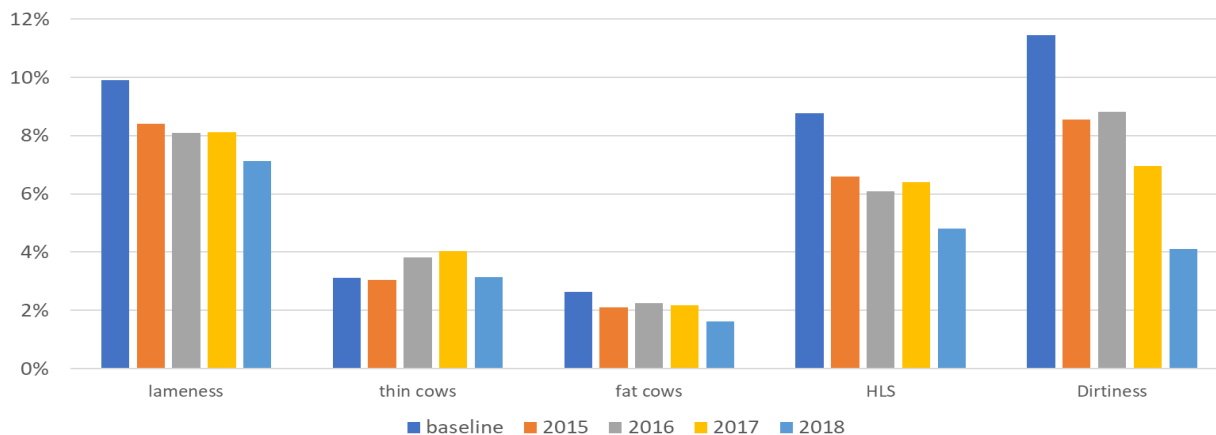
**Pigs** – Data collected via the 'Real Welfare' scheme shows ongoing improvements in pig husbandry and welfare [Bi]. The UK Chief Veterinary Officer welcomed the Real Welfare report [Bii], describing it as '*a practical way of monitoring changes and promoting welfare improvements over time, as well as supporting the industry in demonstrating welfare standards to consumers and retailers*' [Biii].

**Laying Hens** – Peer-reviewed analysis of welfare outcome assessments in non-caged laying hens reveals that feather loss, an indicator of injurious pecking, has reduced by 35% on the head/neck region and additionally 31% over the back/vent [C]. Updated data suggests that this welfare benefit for approximately 1,800,000 birds is being maintained over time (Figure 1) [A].

**Cattle** – Compared with 2014 baseline data, in 2018, 45,000 fewer cows were lame (28% reduction), 18,000 fewer were fat (38% reduction), 72,000 fewer suffered from hair loss lesions or swellings (HLS) (45% reduction), and 135,000 fewer were dirty (64% reduction) (Figure 2) [A]. Not only is lameness painful and requires treatment, it also leads to production losses estimated at GBP248 per case or GBP11,200,000 per year to the UK industry.



**Figure 1** – Proportion of laying hens recorded with slight (blue) and severe (orange) feather loss on two body areas over time (mean: 766 farms and 38,300 birds assessed per year).



**Figure 2** – Proportion of cattle recorded as lame, thin, fat, with hair loss, lesion or swelling (HLS), or dirty over 5 years (Sep 2013 – Aug 2018) (mean: 7,000 farms and 70,000 cows assessed per year).

**Informed national regulatory policy**

Based on the evidence from the Defra commissioned study into beak trimming [6] and advice from the Beak Trimming Action Group (BTAG) [Di] of which Professor Nicol was a member, in 2015 the UK government decided not to ban beak trimming [Dii]. The then Secretary of State for Environment, Food and Rural Affairs added that *‘the BTAG report also identified improved management techniques that could reduce feather pecking. The Government expects to see these techniques introduced across the laying hen sector’* [Dii]. The majority of mainstream laying hen flocks are beak trimmed (cage and non-cage housed; >40 million birds); all of these flocks have a reduced risk of severe outbreaks of cannibalism as a result of the UK government’s decision not to ban beak trimming.

Codes of practice for farm animal welfare developed by Defra under the Animal Welfare Act (2006) have a regulatory role to help establish or disprove a person’s liability if a case reaches prosecution. The codes of practice for Laying Hens and Pullets [Ei], Meat Chickens and Meat Breeding Chickens [Eii] and Pigs [Eiii], all promote welfare outcome assessments to monitor welfare and direct users to the UoB-led AssureWel and FeatherWel projects for guidance on measuring welfare outcomes.

The Lion code, which applies to approximately 95% of UK egg production, *requires* producers to implement at least six management strategies from the FeatherWel guide [Fii]. In addition, the RSPCA Welfare Standards for Laying Hens (2017) [Gii] *require* that all of their farms (housing more than 20 million hens) have a copy of the FeatherWel guide, are familiar with the contents and implement the recommendations as appropriate. Moreover, many of the welfare standards for pullets and laying hens in the RSPCA Assured scheme include ‘requirements and guidance based on research and work by The University of Bristol’ [Gi]. Implementation of strategies from this guide benefits the welfare of the majority of loose-housed laying hens in the UK (more than 20 million hens annually).

## Impact case study (REF3)

### Informing international farming practice

AssureWel International is a group of stakeholders including representatives from farm assurance schemes in the USA, Germany, Austria, Netherlands and Serbia who have implemented welfare outcome assessment and maintain an online training and knowledge hub. Dr Mullan also leads the Global Animal Welfare Assurance (GAWA) initiative, an international alliance of higher welfare schemes, which requires monitoring of welfare outcomes by members.

In 2018, UoB were contracted to develop welfare outcome measures for the Belgian Pig Assurance Scheme (Belpork) covering 2,500 farms representing 50% of national production [H]. Dr Mullan led stakeholder workshops, pilot testing of measures and training of assessors enabling the scheme to begin formal monitoring of welfare outcomes in February 2020. Hennovation, an EU-funded Horizon 2020 project (UoB-led) used the laying hen industry as an example of initiating change through farmer led innovation. The project produced Feather Pecking Guidelines' [I] educating stakeholders with regard to the management of feather pecking. These guidelines [I] were co-authored by Dr Weeks, referred to the FeatherWel website, and have been translated into Dutch, Spanish and Czech.

### Change in practice by UK food retailers

Major UK food retailers have included welfare outcome measures within their supply chain requirements and acknowledge direct support of UoB in the process through provision of training to employees (Marks & Spencer: *'Operationally, we're supported by our suppliers and expert organisations such as Bristol University. All our agriculture managers are externally trained in animal welfare by Bristol University'*, Sainsbury's: *'We ensure that all relevant internal colleagues receive training on our health and welfare policies to guarantee their effective implementation. Recent examples include University of Bristol animal welfare courses'* and The Co-operative: *'We are working with....The University of Bristol to trial a new method of measuring chicken welfare called Qualitative Behavioural Assessment (QBA).'*), with the importance of this process being highlighted publicly in the drive to improve welfare by these and other retailers (Morrisons, Tesco and Waitrose) [J].

## 5. Sources to corroborate the impact

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- A) Mullan *et al.* (2020). Outcome measures implementation data (unpubl. data)
- B) i) Pandolfi *et al.* (2017). The 'Real Welfare' scheme: benchmarking welfare outcomes for commercially farmed pigs. *Animal*, 11(10): 1816-1824. DOI:[10.1017/S1751731117000246](https://doi.org/10.1017/S1751731117000246)  
 ii) Agriculture and Horticulture Development Board (2019). Pork: [Real Welfare update report \(2013–2017\)](#), and iii) Vet Times (2017). [UK's chief vet welcomes pig welfare report](#)
- C) Mullan *et al.* (2016). Animal welfare initiatives improve feather cover of cage-free laying hens in the UK. *Animal Welfare*, 25(2): 243-253. DOI:[10.7120/09627286.25.2.243](https://doi.org/10.7120/09627286.25.2.243)
- D) i) Beak Trimming Action Group (2015) [The Beak Trimming Action Group's Review](#)  
 ii) UK Parliament (2015) [Poultry: Animal Welfare: Written question – 17462](#)
- E) Defra - Code of practice for the welfare of: i) [Laying hens and pullets](#) (2018),  
 ii) [Meat Chickens and Meat Breeding Chickens](#) (2018) and iii) [Pigs](#) (2019)
- F) i) British Egg Industry Council (BEIC) (2020). Corroborating statement – Chairman  
 ii) British Egg Industry Council (BEIC) (Nov 2013) [Code of Practice for Lion Eggs](#)
- G) i) RSPCA (2020). Corroborating statement – Scientific Officer for Poultry  
 ii) RSPCA (2017). [RSPCA welfare standards for laying hens](#)
- H) Belpork (2020). About animal welfare: [Tools](#)
- I) Hennovation (2017). HenHub.eu [Feather pecking extension guidelines](#)
- J) UK Retailers: i) Marks & Spencer (2017) [Farming for the Future Report](#)  
 ii) Sainsbury's (2017) [Animal Health and Welfare Report](#)  
 iii) The Co-operative (2018) [Co-op Animal Welfare Standards and Performance](#)  
 iv) Morrisons (2019). [Farm Animal Health and Welfare Report 2019](#)  
 v) Tesco (2019). [Welfare Outcome Measures & Key Performance Measures](#)  
 vi) Waitrose (2017). [Animal Welfare at Waitrose](#)