Institution: Queen's University Belfast		
Unit of Assessment: UoA6		
Title of case study: Improved housing standards for commercial poultry		
Period when the underpinning research was undertaken: October 2008 to 2020		
Details of staff conducting the underpinning research from the submitting unit:		
Name(s): Niamh O'Connell	**Role(s) (e.g. job title):** Professor of Animal Behaviour and Welfare	**Period(s) employed by submitting HEI:** 2003 to present
Period when the claimed impact occurred: 2013 to 2020		
Is this case study continued from a case study submitted in 2014? No		

1. Summary of the impact (indicative maximum 100 words)

Societal Impact: Professor O'Connell's **farm-level, large-scale** research has led to **improved welfare of chickens**, by demonstrating welfare benefits of **windowed housing, perches and other types of environmental enrichment**. Provision of these large-scale data **informed changes to Red Tractor, RSPCA and RSPCA Australia quality assurance standards**.

Industrial/Economic impact:

Professor O'Connell's research **underpinned infrastructure changes on Moy Park farms**, a leading distributor of poultry products in the UK and Europe (>GBP10,000,000 investment), allowing conformation to high welfare standards. The research also underpinned a **major NGO-led welfare initiative** for broiler chickens (e.g. the Better/European Chicken Commitment) with commitment from European and American food companies.

2. Underpinning research (indicative maximum 500 words)

Public perception of poultry welfare can be poor, and with no legal requirements for environmental enrichment for broiler chickens, producers are creating their own "higher welfare" systems for a growing demand. QUB research led by Professor O'Connell has **improved the welfare of broiler chickens** through working closely with leading industry producers and **providing evidence-based consultation** on ways to enhance their housing. This research programme has also **underpinned changes to many welfare quality assurance standards** (e.g Red tractor and RSPCA schemes) as a consequence.

Professor O'Connell's research is typically conducted on commercial farms rather than in experimental facilities. The **large scale nature of this research is rare** and logistically challenging, but has resulted in the most relevant and impactful results for the industry. For example, within this REF cycle, Prof O'Connell and her team showed the **benefits of providing windowed housing**, with access to natural light leading to improved litter condition, an increase in bird activity levels and improved walking ability in a large-scale study with broiler

chickens **[3.1]**. **This was the first study of its kind** and is widely referred to globally in animal welfare policy and advocacy documents **[e.g. 5.1]**. Subsequent research by this team explored how best to further improve commercial windowed houses for broiler chickens, and demonstrated benefits associated with use of **straw bales and pecking objects [e.g. 3.1, 3.2]**.

Professor O'Connell and her team's research, within this REF cycle, also highlighted **significant animal health and welfare benefits** associated with a provision of a novel type of enrichment for commercial broiler chickens in the form of **dustbaths [e.g. 3.3]**. Their research showed that this type of enrichment not only reduced fearfulness but also improved leg health in commercially-housed birds. Professor O'Connell and her team's research has also led to the development of a **novel suspended platform perch**, which has now been **installed in all Moy Park, one of Europe's leading poultry producers, higher welfare houses.** These platform perches replaced the existing A-frame perches, following a large-scale preference test where six types of perches were compared under commercial conditions **[3.4]**.

Professor O'Connell has also worked with the laying hen industry to demonstrate ways in which housing for these birds can be further improved within the timeframe of this REF cycle. For example, aggressive behaviours and keel bone injuries in laying hens are significant welfare concerns for the egg industry worldwide, particularly as many producers are moving from caged to non-cage systems. **Large-scale research** by Professor O'Connell and colleagues utilising **approx. 40,000 birds**, in collaboration with Skea Eggs Ltd, **showed that use of aerial perches reduced aggressive behaviour and improved hen welfare** under free-range (e.g. non-caged) conditions. Specifically, this research was conducted by splitting commercial houses on farms into two halves with aerial perches fitted on one side and a total of 17 measures of behaviour, health and productivity taken at regular intervals to thoroughly assess hen welfare over a 1 year lay cycle. This research **demonstrated the benefits of aerial perches in terms of reduced aggression and fearfulness**, and improved body condition in laying hens. Importantly, productivity was not compromised and there was no consistent effect on keel bone injuries when aerial perches were provided **[3.5, 3.6].**

3. References to the research (indicative maximum of six references)

3.1) Bailie, C.L. and **O'Connell, N.E.** 2013. Influence of the provision of natural light and straw bales on activity levels and leg health in commercial broiler chickens. Animal, 7, 618-626.
3.2) Bailie, C.L. and **O'Connell, N.E.** 2015. The influence of providing perches and string on activity levels, fearfulness and leg health in commercial broiler chickens. Animal, 4, 660-668.

3.3) Baxter, M., Bailie, C.L. and **O'Connell, N.E.** 2018. Evaluation of a dustbathing substrate and straw bales as environmental enrichments in commercial broiler housing. Applied Animal Behaviour Science, 200, 78-85.
3.4) Bailie, C. L., Baxter, M., and **O'Connell, N. E**. 2018. Exploring perch provision options for commercial broiler chickens. Applied Animal Behaviour Science, 200, 114-122.
3.5) Donaldson, C.J, Ball, M.E.E. and **O'Connell, N.E.** 2012. Aerial perches and free-range laying hens: The effect of access to aerial perches and of individual bird parameters on keel bone injuries in commercial free-range laying hens. Poultry Science, 91, 304-315.
3.6) Donaldson, C.J and **O'Connell, N.E.** 2012. The influence of access to aerial perches on fearfulness, social behaviour and production parameters in free-range laying hens. Applied Animal Behaviour Science, 142, 51-60.

4. Details of the impact (indicative maximum 750 words)

Societal Impact: Professor O'Connell and her team's research has led to **enhanced poultry quality assurance for the consumer.** For example, **the Red Tractor Assurance,** the largest farm assurance scheme in the UK, **updated their standards to require that all houses be fitted with windows** by October 2020, and that **perches are provided to birds**. Their testimonial [**5.1**] states:

"*our members have been phasing in windows with around 90% already providing natural light this way.*" They also indicate that the results of our natural light and perch research "…*have informed the requirements of our standards and continue to influence the welfare of the approximately 1 billion chickens produced in the UK each year under our scheme.*"

The **RSPCA Assured** standards for laying hens, applying to over 1,200 members and approximately 23,500,000 hens in the UK, have also incorporated research by Professor O'Connell and team. This research informed **revisions to the 2017 UK RSPCA Freedom Food Standards [5.2]**, see references to our research on page 20, and in Appendix 3 of revised guidelines] to specify that **all new and existing laying hen housing must provide raised perch space** (at least 8 cm per bird) **by 1st August 2018**. RSPCA Assured also provided a testimonial [**5.3**] on the impact of our broiler welfare research on their standards, indicating the research is :

"…*invaluable in enabling us to ensure that our standards reflect the latest scientific research, helping to ensure the birds under RSPCA Assured have a life worth living.*"

RSPCA Australia, with over 500,000,000 broilers in their scheme, also state in their testimonial [**5.4**] that research into effects of natural light by Professor O'Connell and team informed recent changes to the RSPCA AFS Meat Chicken Standards. These include a requirement that artificial light must provide at least the broad spectrum visible to humans by 1st July 2021. Their current recommendations to producers (within the RSPCA AFS Meat Chicken Information Notes) recommend providing broiler chickens with natural light, again informed by the research by O'Connell and colleagues. They also refer to the impact of this group's research on perches and other environmental enrichments on their standards and recommendations:

"…*RSPCA Australia wishes to recognise the work published from Queen's University Belfast which has assisted in our efforts to improve the welfare of layer hens and meat chickens in Australia. The body of work dealing with perching provision for layer hens and lighting and enrichment in broiler chickens has led to knowledge exchange...for example, our submission of the proposed draft Australian Welfare Standards and Guidelines-Poultry and the RSPCA Approved Farming Scheme...*"

Industrial/economic impact: An increasing number of food companies are signing up to welfare initiatives requiring higher standards for broiler chickens (including natural light, perches and pecking objects) by 2026. For example, to date 100 European companies have signed up to the 'European Chicken Commitment', and 183 US companies have signed up to the 'Better Chicken Commitment' (estimated to account for 10% of US broiler production (currently approximately 920,000,000 broilers per year)). A testimonial from **Compassion in World Farming** [**5.5**] indicates how research by Professor O'Connell and colleague into natural light, perches and other forms of environmental enrichment helped underpin the new standards, and outlines the ways in which this research has been widely used to encourage companies to sign up to the European/Better Chicken Commitment. Companies from the UK, Europe and America have signed up to this commitment with a promise to improve welfare standards for broilers by 2026. **World Animal Protection (WAP)** also outline in a testimonial [**5.6**] their use of Professor O'Connell's work on broiler environmental enrichment in their Global Broiler Framework:

"…*The research has contributed to our work to impact the lives of broiler chickens through policy change...*"

This framework sets out welfare practices they wish food companies to adopt and relies on scientific rationale. Following the evidence supplied by Professor O'Connell's team on the ability for perches and dust baths to promote natural behaviours, WAP confirm that:

''*…a large Brazilian producer updated their standards in 2018 to include environmental enrichment. This change positively impacts the lives of over 60 million chickens annually…*''

One example of a company who have worked closely with Prof O'Connell is **Moy Park**, who are one of the largest private sector poultry businesses in the UK and Europe. Their testimonial [**5.7**] indicates that the 2013 natural light publication influenced their move to install windows across 100% of their broiler estate. They indicate that their early move to windowed housing enabled them to **leverage a point of difference** with their customers. A key recent impact is the introduction of suspended platform perches to their higher welfare broiler houses. This was informed by research by Prof O'Connell and team in 2018, and they indicate that it has **helped to bolster their reputation on animal welfare with key customers.**

5. Sources to corroborate the impact (indicative maximum of 10 references)

5.1) Testimonial from Red Tractor Assurance
5.2) RSPCA (2017). RSPCA welfare standards for laying hens. Available from: https://science.rspca.org.uk/sciencegroup/farmanimals/standards/layinghens Document also attached.
5.3) Testimonial from RSPCA Assured
5.4) Testimonial from RSPCA Australia
5.5) Testimonial from Compassion in World Farming
5.6) Testimonial from World Animal Protection
5.7) Testimonial from Moy Park Ltd