

SHORT TERM SCIENTIFIC MISSION (STSM) SCIENTIFIC REPORT

This report is submitted for approval by the STSM applicant to the STSM coordinator

Action number: CA 15134

STSM title: Assessment of Breed Differences in Damaging Behaviour in Large-Scale Multi-tier Barn

STSM start and end date: 16/06/2019 to 22/06/2019

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PURPOSE OF THE STSM:

The housing system in table egg production is an external factor that influences both the performance of birds and laying hen welfare (Dikmen et al. 2016, Windhorst 2017). Conventional cages have been banned in the European Union since 2012, and the housing of laying hens is permitted only in enriched cages or in non-cage systems.

The EU directive 1999/74/EC initiated the development of alternatives to conventional cages, such as aviaries or litter-based floor management systems in all member countries. Furnished cages, barn and free range systems spread within a comparatively short time period and changed the laying hen husbandry practices in large parts of Europe considerably.

It was reported that of the more than 380 million laying hens in EU countries, 55.6 % were kept in enriched cages, 25.7 % in barn systems and 14.1 % in free range or outdoor systems (EU Committee 2017). The highest percentage of enriched cages was to be found in Spain (92.9%), Poland (88.3%), France (69.1%) and Italy (65.7%). Barn systems were the dominating housing system in Sweden (77.5%), Netherlands (74.6%) and Austria (66.8%). Free range systems reached the highest values in the United Kingdom with 52.8 %, followed by France (18.2 %), Netherlands (15.5 %) and Spain (4.0 %). The highest number of laying hens in organic production was to be found in Germany and France (MEG 2017). The highest relative share of enriched cages showed Lithuania (95.6%) and Spain (92.9%). In barn egg production systems, Sweden (65.9%) and Austria (65.5%) were ranking in top positions. The United Kingdom (52.8%) and Ireland (40.5%) had the highest relative share of their laying hens in free range production systems. Organic laying hen husbandry reached the highest share in Denmark (28.6%) and Sweden (16.3%).

Many producers invested heavily in colony-cage systems but they have not satisfied the general public who still see these systems as “cages”. In recent years, consumer pressure has forced large retailer and restaurant companies to request eggs from cage-free systems (Mench and Rodenburgh 2018) and the egg producer are cautious about the change to a barn system.

Aviary hen housing system is one of the alternative egg production systems that are being used by some EU egg producers. The aviary system is designed as the cheapest possible alternative to a colony cage system and as a way of producing “cage-free” eggs at minimal cost and the farm is keen to keep costs as

low as possible. The motivation for adopting such a housing system is to improve bird welfare by allowing the hens to exercise natural behaviors, such as dust-bathing and perching.

So far the advantages and disadvantages of the various housing systems especially on laying hen welfare were studied intensively (Sherwin et al. 2010; Heerkens et al. 2015). Plumage damage is one of the biggest welfare problems in non-cage table egg production. Barn systems without outdoor access have an increased risk of bone fractures and highly variable risk of feather pecking and cannibalism (Windhorst 2017).

The causes of and preventative measures for pecking behavior and feather pecking are very complicated and multi-factorial elements (Rodenburg et al., 2013). Some of the predisposing factors are overcrowding, excessive light, insufficient feeders or drinking space, nutritional imbalances, feeding of only pelleted or concentrated feed, feeding high-energy diets heavy in corn or low in fibre, and injuries (Nicol et al., 2013; De Haas et al., 2014). The high prevalence of these harmful behaviours and feather damage within flocks mainly depends upon whether or not beak trimming is applied (Petek and McKinstry 2010; Nicol 2018). The evidence shows that beak-trimmed birds perform feather pecking at equivalent rates, but this pecking is far less damaging to skin and feathers than for intact beak birds (Riber and Hinrichsen 2017). Some scientific evidence suggests that feather pecking and cannibalism could be largely prevented by the use of appropriate husbandry techniques without the use of beak trimming (Petek 2013; Kaukonen and Valros 2019). There have been some on-farm studies on pecking and the welfare of laying hens (Sherwin et al., 2013; Gilani et al., 2013). A husbandry advisory tool was developed to reduce injurious pecking in free-range layer chickens in the United Kingdom (Lambton et al., 2013).

Husbandry practices, stocking rate and flock size may affect laying hen welfare (Nicol et al. 2006). Stocking rate has been examined as a factor in a number of epidemiological surveys of laying hen behaviour (Gunnarsson et al., 1999; Oden et al., 2002) but most studies have been conducted in relatively small-scale experimental facilities (Nicol et al., 1999; Estevez et al., 2002)

The aim of the main project I involved is to evaluate breed differences in damaging behaviour in laying hens kept in a multi-tier aviary barn system and is to obtain baseline data on plumage and other welfare parameters at the higher stocking density. There is a lack of knowledge about which breeds might be best adapted to such an environment. In accordance with the aim of the main project therefore, the purposes of this short term scientific mission were:

-To test recording protocol to measure plumage quality had already been designed by the host institution and used in previous studies and to observe bird pecking behaviour in a large scale and relatively high stocking density multitier aviary layer housing system.

-To share knowledge about scientific and practical approaches on how to avoid pecking behavior and how to assess pecking damage in layer chickens

-To see the strategies that British farmers have been implementing to prevent feather pecking in layer chickens in a multitier system.

DESCRIPTION OF WORK CARRIED OUT DURING THE STSM

WG3 of the Cost Action GroupHouseNet focusing on links between environment, health, and damaging behaviour in laying hens. In accordance with WG3 this STSM consisted of two main activities:

- ✓ Pre and post visit work (Lab. study) in the Host Institute
- ✓ Practical work (farm visit) to evaluate plumage quality and pecking behaviour of the birds.

In the first day of the visit we made a pre-visit work after a general meeting with animal welfare team in the

Host Institute. The following two days we visited the research farm to test the recording protocol to plumage quality. The host institution was organised a visit to a layer farms which was capacity over 65,000 birds on each floor of a double-decker house, in total over 138,000 birds in the house. The birds aged between 40 to 50 weeks at time of visit were kept in “colonies” of 3,800 separated by wire mesh. The housing system has multitier blocks each with tiers and nest boxes, feed tracks and drinker lines distributed on each level. Birds have access to move through each level and underneath each block. The birds were classified according to the research plan to allow comparison of behaviour and welfare measures of different breeds and are currently housed at relatively high stocking density (22-23 birds/sqm) on the litter. They were observed in their normal group to monitor the pecking behaviour and plumage quality. During the farm visit, plumage quality and damaging behavior of a small number of laying hens in the flocks were evaluated based on the main research protocol.

Plumage Quality

To determine plumage quality, the birds were selected at random for scoring in front, middle and back area of the litter and slatted part of the houses. The recording protocol to measure plumage quality had already been designed by the host institution and used in previous studies by project leader/supervisor. The supervisor of the project, Professor Nicol, had already provided clear guidelines on how to conduct the field work. A distance scoring system, which is a more animal-friendly, more effective, less stressful, and easier way to determine damaging hazards, was used to assess plumage quality in laying hens (Bright et al., 2006; Lambton et al., 2013). Three areas of the hens’ bodies were scored (rump, back and neck) from 0 (well-feathered body part with no or very little damage) to 4 (severe damage to feathers, several or large naked areas and/or broken skin). Tail and wing were also scored from 0 (intact feathers) to 4 (all feathers missing or broken and/or evidence of bleeding from broken skin).

Behavioural observations

The focal animal sampling method were used to record pecking/damaging behavior in the birds (Martin and Bateson, 1986). The observations were carried out on litter in accordance with a 5 min observation period after a standstill for 1-2 min to maintaining a clear view of the observation area (*the observation area was aprox. 1x1 m*). The number of pecks of gentle feather pecking (GFP) were recorded, as well as the number of pecks for severe feather pecking (SFP), and aggressive pecking (AP). At the start and end of 5 min observation period, the number of birds in each area was counted and recorded.

Performance and environmental data

Alongside the scoring plumage quality and pecking observations it was measured some environmental data such as light intensity, sounds and temperature/humidity with related equipment (*light meter, sound meter and data logger etc.*) inside the house. External egg quality and bird distribution was recorded in the groups according to the research protocol. It was reported that some performance data such as bird weight, mortality and the number of floor eggs in the groups was taken by farm staff using the recording protocol for each pen.

DESCRIPTION OF THE MAIN RESULTS OBTAINED

Feather pecking may have a serious effects on poultry welfare. When searching for an on-farm solution to reduce this harmful behaviour, it is important to identify the potential risk factors involved in the development of feather pecking on every flock.

In the main project, which was quite comprehensive in terms of data investigated, data collection and monitoring has just start a short time ago and will take place more than one year period to get a coherent and accurate picture of the welfare and performance of birds in a cage-free systems. I participated just two days in the experimental part in such a large project. At the time this report is written, the data collected are not enough for analysis. Descriptive statistics for means, variation, and range for plumage condition and associations between plumage condition and related data investigated during the entire project will be then calculated. However, it was a good opportunity for me to update myself about measuring plumage quality and to see the effects of multitier aviary system in a relatively high stocking capacity on pecking

activity and plumage quality of laying hens.

Further knowledge gained.

During the STSM, I had the opportunity to participate in a seminar in the Host Institute. One of the PhD student presented a seminar on the topic of how to stop wasting research animals in the experiment? I would like to say again this STSM was a great opportunity of networking with colleagues from animal welfare group in the Royal Veterinary College.

Turkey is the 8th table egg producer and second egg exporter in the World and is actively working to raise the welfare of poultry in Turkish farm. New legislations regarding protecting of laying hen has been launched by the government. According to the legislation on the protection of layer chicken it is planning to ban conventional cages in table egg production in year of 2023. Most poultry farmers in Turkey moving (probably will be moving) towards furnished colony cages. But, pressure from consumer or other food system stakeholders (like retailers) might be resulting in a large-scale move away from cages to non-cage systems that provide hens with more behavioral opportunities than cages at some future point. Therefore, probably, the findings obtained from this study would play also a key role for decision of Turkish egg producer whether such this system might work in Turkey.

FUTURE COLLABORATIONS (if applicable)

Overall, this STSM allowed me to network with relevant scientific experts in the field of animal welfare in the Royal Veterinary College. It motivated me to the further work in this field and provided me with a lot of new ideas. I believe that this STSM will also mean the start of a collaboration between the Royal Veterinary College and my home Institute. I wish to thank Professor Christine Nicol, Dr Siobhan Abeyesinghe, Miss Kate Norman and other member of the Animal Welfare Science and Ethics group in the Royal Veterinary College for their valuable assistance during the STSM.

The data collection in the main project is still continue and will take place more than one year and is expected to intensify gradually. A second STSM visit is planning towards the end of the data collection period on the basis of data collection program in the main project. I am thinking of that the second STSM will provide an opportunity to see the effects of the factors investigated in the project and other relevant issues of laying hen welfare in the multitier aviary non-cage housing system.

After returning from the STSM, all the knowledge gained will be first used for transfer targeting specially farmers, but also veterinarians and other stakeholders involved in the table egg industry. I will be involved in a meeting organized by Turkish Egg Producers Association in October 2019 in Turkey.

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