Hen homework

Researchers in Norway are currently investigating the welfare of laying hens housed in aviaries. **Drs Andrew M Janczak** and **Randi Oppermann Moe** explain how their team is working towards the development of methods that effectively safeguard the birds



To begin, what are the main objectives of your research into the development of optimal methods that safeguard welfare and productivity of laying hens?

We are developing and testing practical methods of optimising rearing conditions for laying hens. These contribute to reducing welfare problems connected with high fearfulness, high stress susceptibility, feather pecking, feather loss and the sub-optimal use of resources in a complex production environment. We focus on rearing for aviaries and furnished cages, as these forms of housing are most common in Norway. As well as studying effects on productivity, fear-related behaviour, cognition and stress hormoneproduction, we are investigating how the brain is affected by early exposure to fear-reducing treatments and enriched environments.

When did the ban on Conventional Battery Cages for laying hens come into effect in Norway? What are the positive and negative impacts of this and why is your research important in understanding the repercussions of this ban?

The ban on battery cages for housing of laying hens in the EU has been in force since January 2012 and the Norwegian industry has made a complete transfer to alternative housing within this deadline. The ban on battery cages is positive, as birds are now all given access to resources for performing important



behaviours, such as flapping, perching and dust-bathing. Consumers also want products that are produced using welfare-friendly methods. However, production using furnished cages and aviaries requires a higher level of producer competence. Flocks that are not handled properly may have problems because the housing no longer constrains the hens' behaviour.

Could you expand upon the outcomes of your work so far?

Good welfare in the aviary-reared birds was indicated by a greater proportion of birds expressing comfort behaviour and greater attention to a novel object placed in the home cage. Previous studies indicate that these behaviours are expressed to a greater degree by birds living in an environment they prefer. The results indicate that aviary rearing may produce happier hens.

What is the 'novel object test' and how have you been using this in your studies?

The novel object test involves hanging an unusual object – in this case a plastic bottle – inside the front wall of a pen containing eight to nine birds. We then observe the behaviour of one bird per cage for an eight minute period, in order to quantify its reaction to the novel item. We recorded the time the bird had its neck extended vertically with either eye orientated towards the object. Previous studies show that laying hens respond in this way when they are happy.

Have you been collaborating with other researchers or institutions on this study? If so, how has collaboration formed an important part of your work and what are the benefits of this approach?

International collaboration is vital for the scientific quality of the project and close collaboration with private enterprises ensures the relevance of the research and transfer of knowledge to end-users.

Internationally our main collaborators are Christine Nicol at Bristol University and Bas Rodenburg at Wageningen University. Tone Beate Hansen represents Animalia, which is a private sector research and development company. We also collaborate closely with several industry representatives, such as individuals from The Norwegian Independent Meat and Poultry Association and the Norwegian Pullet Rearing Association. Several of these persons also contribute through their membership in the project steering committee, with some represented in the project consortium.

The project is financed by producers through the Foundation for Research Levy on Agricultural Products (FFL) and the Agricultural Agreement Research Fund (JA). Animalia, the Norwegian School of Veterinary Science and the Universities Federation for Animal Welfare also fund the project.

Can you comment on the growing demand from consumers for 'free range' or ethicallyreared produce and explain how your research is important in this respect?

The Norwegian poultry industry has a genuine interest in supporting research and practical measures aimed at improving laying hen welfare. This is important for consumer perception of eggs as an ethically acceptable animal product. Scandinavia has exceptionally high welfare standards and does not beak trim birds, and can therefore be used as a good example and testing ground for animal-friendly production methods.

Chicken and egg

Following a ban on battery cages in Scandinavia, a collaborative research team at the **Norwegian School of Veterinary Science** is investigating the welfare of laying hens in various housing environments. By developing novel approaches to rearing, they aim to help the industry improve bird welfare and productivity

HOUSING SYSTEMS FOR egg-laying hens range from battery cages to free-range systems. Free-range hens usually have access to an outdoor area in addition to fixed or mobile housing, whereas traditional battery cages contain three hens, in close proximity, on a welded wire mesh floor. The disparity between battery and free-range life seems to lend itself to a black and white view of which system is more 'ethical' or more 'beneficial' to the birds' welfare. However, as one Norwegian research team is showing, this approach is not always wholly accurate.

Aviary systems are a very good example of a type of housing that challenges perceptions of bird welfare. More dynamic than battery cages, aviaries provide feed, water, perches and nest boxes at different heights, and the birds have access to a substrate that stimulates them to dust-bathe and forage. Yet, aviary-reared hens reportedly suffer problems with fearfulness, stress, feather pecking, feather loss and poorer utilisation of resources.

Conventional battery cages for hens were banned in Scandinavia in 2012 and the majority of Norwegian laying hens will now be reared in aviaries during the laying period. It is therefore important to discover the reasons behind these problems and develop practical methods with the aim of improving the welfare and productivity of laying hens. The answer lies in creating optimal rearing methods, housing and production practices. This is the focus for a team of researchers led by Dr Andrew M Janczak at the Norwegian School of Veterinary Science.

THE PROJECT

The aim of the group is to provide insights and new knowledge regarding the complexities of rearing hens for laying – specifically, how rearing conditions influence their cognitive, emotional and physiological development. Overall, the team seeks to discover the circumstances under which the birds experienced the best welfare – particularly in the rearing and production stages, which are heavily interlinked.

A major proportion of the work comprises largescale on-farm studies. As part of these studies, birds are reared under different conditions and distributed to laying hen farms. The hens and their welfare are then studied throughout the production period.

In the first study, one rearing company raised 7,500 birds in aviaries and an equal number in rearing cages. Half of the birds reared under each of the two conditions were then distributed to each of two different egg producers using furnished cages so that each farm contained birds both from aviary and cage rearing. The birds were then compared using the group's novel methodology.

It was anticipated that hens reared in aviaries would be frustrated when moved to furnished cages at 16 weeks of age, and as a result would experience poorer welfare. Surprisingly, the researchers found the opposite was true, with birds from aviaries displaying evidence of better welfare once moved to the furnished cages compared with their cage-reared counterparts, up to at least 19 weeks of age. By 21 weeks of age, aviary and cage reared birds showed no discernible differences.

A PARTNER RESEARCH GROUP

The 'Animal Welfare Research Group', led by Dr Randi Oppermann Moe, and the Production Animal Research Laboratory, led by Janczak, are closely linked. This collaborative multidisciplinary team provides laboratory resources for veterinary, epidemiological, ethological, physiological, endocrine, genetic and immunological approaches to the study of animal welfare. The partnership performs research with the aim of better understanding and improving animal welfare. This complements Janczak's work, with its more specific focus generating new knowledge on hen physiology and behaviour related to positive and negative emotions, as well as on the development of valid welfare indicators.

Janczak's laboratory continues to pursue its interest in addressing specific cognitive,

emotional and physiological effects of rearing hens. So far, results indicate that exposure to more complex and mildly-challenging social and spatial environments during early development should produce birds that are good at navigating and finding resources. Furthermore, these factors are thought to contribute to the birds' ability to interact socially and direct pecking at feed and substrates instead of feathers. If reared in this manner, hens should also show low levels of fear and appropriate physiological stress reactions that subside quickly when the disturbance has passed.

MEASURING THE EFFECTS

The means and methods by which to measure cognitive, emotional and physiological effects are not particularly straightforward or clear cut. For example, measures of spatial cognition can involve testing a bird's ability to utilise nest-boxes and perches in an aviary system, or their ability to locate a reward within a labyrinth under laboratory conditions. Measures of emotions can involve registration of comfort behaviour or avoidance of a stockperson on a farm, response to a rewarding signal, or avoidance of an aversive object or person in the laboratory. Physiological measures of stress may involve measurement of the stress hormone corticosterone or its metabolites.

The team must also take into account that alterations in coping ability, fearfulness and cognition may be associated with changes in concentrations of neurohormones, neurotransmitters, and neuroactive immune proteins, as well as altered gene expression and neuron morphology in specific brain regions.

FUTURE PLANS

The remainder of the project will focus on making smaller adjustments within aviary rearing systems in order to further reduce fear and stress by exposure to appropriate enrichment at critical periods during rearing. Large-scale studies will be used to develop methodology that can be utilised by laying hen rearing companies to improve the welfare of laying hens. Indeed, the industry participates directly in the project: the group is in ongoing dialogue with both rearing companies and egg producers.

During 2012, the group made 10 popularscientific presentations to producers in the form of lectures or short articles. Towards the end of the project, the researchers plan to organise a final workshop and produce a report containing recommendations for improved rearing methods which will also be widely disseminated to rearing companies.

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INTELLIGENCE

REARING LAYING HENS: DEVELOPMENT OF OPTIMAL METHODS THAT SAFEGUARD WELFARE AND PRODUCTIVITY

OBJECTIVES

The project aims at producing new knowledge to help understand how rearing conditions influence cognitive, emotional and physiological development in laying hens. Close collaboration with the poultry industry will ensure the relevance of this research. Knowledge gained through the project will be actively shared with industry representatives and producers to facilitate a smoother transition from conventional systems to aviaries and furnished cage, thereby contributing to ensuring the welfare of laying hens and the competitiveness of egg producers.

PARTNERS

Norwegian School of Veterinary Science

Norwegian University of Life Sciences

Norwegian Veterinary Institute

Animalia

FUNDING

Foundation for Research Levy on Agricultural Products (FFL) • Agricultural Agreement Research Fund (JA) • Animalia • The Norwegian School of Veterinary Science • Universities Federation for Animal Welfare

CONTACT

Andrew Janczak

Project Coordinator

Norwegian School of Veterinary Science Ullevålsvn 72, Innkjøring Thulstrupgt, Norway

T +47 22 96 45 00 E andrew.janczak@nvh.no

DR ANDREW M JANCZAK grew up in

California and took his training at The Norwegian University of Life Sciences, Norway, prior to spending a year working at the USDA in Indiana. He has worked at the Norwegian School of Veterinary Science since 2008 (see Research Gate profile).

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DR RANDI OPPERMANN MOE was trained

as a veterinarian at the University of Veterinary Medicine Hannover, Germany. She has worked at the Norwegian School of Veterinary Science since 1990. Her focus is research and teaching in animal welfare (see Research Gate profile).

