Modification of rearing conditions to improve welfare of layers: Basic and applied ethological studies

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Background

Despite the EU decision to ban battery cages completely from 2012, alternative housing systems for laying hens are not free of welfare problems. Cannibalism and feather pecking are not new problems, but their consequences are more serious in the alternative systems. Floor eggs are not a welfare problem but they are a practical problem. The Nordic countries have a vested interest in facilitating the transition from cages to loose-housing systems. This Nordic project is founded on complementary competence among the participants in scientific areas relevant for poultry rearing.

There has been extensive research addressing welfare problems in adult laying hens, however relatively little research has focussed on the young birds. Since the basis of many of the welfare problems can be traced back to the early experience of the birds, in particular the rearing environment during the first days and weeks, this project addresses the effects of early rearing conditions on the welfare of adult layers and their later performance in alternative systems in practice. Focus is on aviary systems, but some of the results will be of general relevance irrespective of housing system.

Aims of the project

The project aims at developing new knowledge on the ontogeny of the chicken as a way of understanding the mechanisms behind the main welfare problems in commercial egg production. These are the behavioural problems of feather pecking and cannibalism, as well as the question of which resources shall be provided under commercial conditions. We have addressed this at three different
developmental levels and studied the link from rearing to adulthood. The three levels of the project are:

1) Predisposition of the birds  
2) Development of behaviour  
3) Perception of resources

The studies consist of small-scale experimental and larger-scale practical parts, where some of the findings are tested under commercial conditions for their application by the poultry industry.

**Project organisation, funding and publications**

The project lasts 4 years (2003-2007) in most countries (3 years in Norway) and involves the financing of three PhD students and one postdoc, all also participating in project parts in another country. In the project description below, the countries involved in each project part are indicated in brackets.

The project was organised as NKJ-project no. 117 (Nordisk Kontaktorgan for Jordbruksforskning), with the following scientists involved (national project leaders mentioned first for each country): Norway: Morten Bakken and Andrew M. Janczak (postdoctor); Sweden: Linda Keeling, Stefan Gunnarsson and Anette Wichman (PhD student); Denmark: Björn Forkman and Anja Brinch Riber (PhD student); Finland: Hannu Saloniemi, Anna Valros (co-leader) and Matti Heikkilä (PhD student). Bjarne O. Braastad served as the coordinator of the project. In total, the project is funded by NOK 2.22 mill., SEK 2.08 mill., DKK 1.85 mill., and €231200 for the four Nordic countries involved.

Nine scientific papers are published or submitted from this project (see References), and 42 presentations and other reports have been made. More articles are in preparation.

**Predisposition of the birds**

The predisposition of a newly hatched chick to develop different behaviour patterns is determined by a combination of its genetic and prenatal experience. Since we used commercial strains of birds we will primarily analyse prenatal experiences on later behaviour (premating as well as prehatching experiences). These are the research questions of this project part:

1. How does housing conditions at various farms affect hormone concentrations in eggs, and do such hormone variations affect behavioural development? (N, S, DK)
2. How can injections of corticosterone in eggs be performed optimally? What is the relationship between corticosterone in the yolk and in the albumen? (N)

3. What is the relationship between the corticosterone level in injected eggs and the behavioural characteristics of the chick hatched from these eggs? (N, S)

**Development of behaviour**

The development of foraging and perching behaviour is investigated. In particular we focus on sensitive periods and consistency of behaviour, that is to say, at what age the bird develops the behaviour and, once developed, whether it persists throughout the bird’s life. These are the research questions of this project part:

1. What is the role of the mother hen in learning about resources?
   (i) Does presence of a mother hen affect chicks’ pecking behaviour? (DK)
   (ii) Do chicks reared with a mother hen learn to perch earlier? (DK, S, FIN)

2. Can altered light/dark regime affect behaviour favourably?
   (i) Can synchronized activity cycles be induced by short light/dark cycles? (DK)
   (ii) Can increased day-length increase the use of perches? (FIN, S)

**Perception of resources**

This deals with how behaviour is modified by the birds’ access to and perception of resources. In particular we focus on the timing of the provision of the resources and the effect of the physical attributes of the resource, that is to say, the best age to provide access to perches and the type of litter and design of perch that is most suitable. These are the research questions of this project part:

1. Is sham dustbathing 'normal' dustbathing for a bird who has never experienced litter? Are birds motivated to get access to litter even the first time? (S)

2. How does perching behaviour develop in different individuals? (FIN, S)

3. How does early access to perches affect later behaviour under commercial conditions? (FIN, S)

**Conclusions**

The research results from the four countries are presented in separate articles in the present volume (Janczak et al., 2007; Wichman and Keeling, 2007; Heikkilä et al., 2007; Riber and Forkman, 2007). Together these demonstrate an extensive
research effort that will be valuable when designing future rearing environments of layer-type chicks. Poultry consultants are recommended to read the published scientific articles in the References list below. Yet, there are still several unsolved questions, and research work on developmental mechanisms in domestic fowl must continue.

References


