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**Effects of outdoor runs in poultry
production systems on animal welfare and
health, product quality and environment**

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Preface

The laying hen sector in Europe

The laying hen sector in Europe is economically important but heavily debated. The minimum EU standards and requirements for housing and transportation of laying hens have become more stringent during the last decades to improve welfare and health of the animals. The ordering of the European market of e.g. table eggs contributes to a higher transparency for consumers to distinguish products from different production systems. To some extent consumers are willing to pay, or actually do pay premium prices for products from free-range laying hens. However, there is an ongoing debate about the advantages and disadvantages of providing laying hens with outdoor areas. Implications of outdoor areas for food safety, animal welfare and health, environmental impact and societal values might be conflicting.

World-wide, and certainly in Europe, laying hens are typically housed in battery cages since the introduction of this system in the late 1960s. However, a change towards husbandry systems with an outdoor run can be observed in several European countries during the last 5 years. This is due partly to the substantial increase in organic egg production and partly to an increase in free-range production systems producing so-called 'Freiland eggs'. Market and chain arrangements demand that both production systems are equipped with an outdoor run. The strong consumer demand for such table eggs caused a quick shift towards production systems with an outdoor run.

State of the art in knowledge on outdoor runs

The scientific and practical knowledge on outdoor runs for laying hens is limited and not explicit. Outdoor runs are being used in practice at a substantial number of farms only since recently, and drawbacks and problems related to the outdoor run have only become clear during the last years. Hands-on attempts to solve practical problems are gradually overtaken by more scientific studies to systematically record, report and exchange characteristics of outdoor runs. Typical practical problems of farmers relate to predation of hens, unpredictable and increased levels of diseases and parasites, with subsequent high mortality rates, and muddy areas near the hen house. Typical chain problems relate to the use of medicines and antibiotics (risk of residues in the food), dioxin levels in the eggs, and food safety (e.g. *Salmonella* and *Campylobacter* infestations), whereas a possible outbreak of Avian Influenza (AI), nutrient losses to the environment and acceptance of production systems are typical societal issues. It appeared that the hands-on efforts to solve these problems have not been very successful so far, and that many solutions have major drawbacks. In order to study and solve these problems in a more holistic and integrated way, a multi- or even interdisciplinary approach is needed.

The workshop

A European workshop on societally acceptable poultry farming, entitled 'Should hens be kept outside?' was held from 18 to 20 April 2005. The focus of this workshop was on societal, ethical, aesthetical and functional aspects of an outdoor run for laying hens. Participants included scientists, farmers, environmental specialists, policymakers and representatives of consumer organizations. The workshop was organized by the Animal Sciences Group of Wageningen University and Research Centre on behalf of and sponsored by the Dutch Ministry of Agriculture, Nature and Food Quality (research programme 'Societally Acceptable Livestock Farming').

On the first day two poultry farms with egg production systems with an outdoor run were visited. Presentations and discussion sessions were held at the congress centre Jonker-Bosch in Nijmegen, The Netherlands on the second and third day. The workshop provided a unique opportunity for the participants to exchange knowledge, experience and perspectives.

The workshop did not intend to seek a single, simple, unambiguous and commonly accepted answer to the question 'Should hens be kept outside?', because there is none. The many stakeholders in society and industry take different views, and thus make different choices. Furthermore, should all hens be kept outside, or just a fraction of them? And if we want them to be kept outside, is that as soon as possible, or should there be a transition period of some years? What exactly is an outdoor run? Is there a straightforward definition and how should an outdoor run look like?

The goals of the workshop were:

1. To produce a state of the art overview of the scientific and practical knowledge and insights into keeping poultry outdoors;
2. To set an agenda for the discussion (gaps in knowledge and opportunities) with the participants on dilemmas around free ranging of poultry,
3. To identify and strengthen the international network of people working with outdoor poultry.

The programme consisted of four themes:

1. Animal welfare and animal health;
2. Food safety and human health;
3. Environmental issues (emissions to air, water and soil) and labour quality;
4. Societal values (landscape, recreation and consumer perceptions).

For each of the four themes speakers were invited to present an overview of the latest scientific and practical knowledge or the viewpoint of their organization. In addition, short presentations were given by scientists. This special issue contains a selection of the presented papers.

The special issue

This special issue contains eight scientific papers that address a wide range of issues of outdoor runs for poultry. The paper of Knierim provides an overview of positive and negative aspects in relation to welfare and health of hens in housing systems with

an outdoor run, whereas Hegelund *et al.* present in detail the effects of the use of an outdoor run on plumage condition, mortality rate and egg production. De Mol *et al.* describe a model that analyses the contribution of specific elements of a housing system to the overall welfare of hens in various production systems, including the benefit of an outdoor run. Binnekamp & Ingenbleek describe retailer and consumer barriers on the road to market acceptance as encountered by products based on higher animal welfare standards, such as eggs from hens kept with an outdoor run. The paper of Koch & Elbers discusses the world-wide occurrence of High-Pathogenicity Avian Influenza (HPAI) outbreaks, the existence of AI virus infections in wild birds, and possible strategies to reduce the risk of the introduction of AI viruses into domestic poultry flocks. Avian Influenza is not only deadly for poultry, but can also be lethal to humans. Meuwissen *et al.* focus on the costs of a possible outbreak of HPAI in the Netherlands, with the use of models that quantify the probability of introduction at any farm and the probability of transmission to other farms. The contribution of De Vries *et al.* deals with the accumulation of dioxins, present in the outdoor environment, in eggs and its effect on human health; it describes the dioxin levels in eggs, causes for variation in these dioxin levels and possibilities to reduce them. Finally, Aarnink *et al.* assess the ammonia emission to the air and the nutrient load to the soil caused by the droppings of the hens in the outdoor run.

Acknowledgements

The guest editors are very pleased that NJAS - Wageningen Journal of Life Sciences publishes the main contributions of the workshop, and hope that this will contribute to the further development of a societally accepted and sustainable egg producing industry in Europe. They wish to thank the Ministry of Agriculture, Nature and Food Quality for its support.

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