Welfare of meat producing poultry

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Summary
Scientific investigations of the welfare of meat producing poultry have focussed mainly on broilers. The welfare of any individual bird depends on its genetic make-up and the environment in which the bird is reared. Factors such as stocking density, litter moisture and food availability are aspects of the environment which affect the welfare of not only broilers, but all meat producing birds. In this short paper, a few of these issues are raised and discussed briefly in the context of meat poultry welfare.

Keywords: welfare; poultry; broilers; genetic selection; housing conditions

Introduction

Poultry for meat production includes species such as the domestic hen, turkey, quail, duck, goose, and ostrich, and in this context also game birds such as partridge and pheasant reared primarily for hunting. In terms of meat produced and consumed, the broiler industry far outsize the others, and in 2007 the production of broiler meat was 8.3 million tons in the EU-27. In comparison, the same number for USA was 16.2 million tons, equivalent to almost 8.9 billion broilers. China and Brazil produced 11.4 and 10.3 million tons, respectively, in the same year (USDA, 2008).

This does not mean that the welfare of the other species is not of interest or is less important, but the majority of scientific studies on welfare of meat producing poultry has concentrated on broilers and – to a lesser extent – turkeys. A search in the scientific literature on 'welfare' combined with each of the species mentioned above yielded 40 and 29 references on quail and ducks, 20 and 11 on ostriches and geese, 5 and 4 on pheasants and partridges, but 393 hits on broilers and 93 on turkeys. We thus know more about the welfare of these two types of meat poultry, although we should bear in mind that the difference between different strains of broilers may be as vast as the difference between a goose and a duck.
A number of review papers deal with the welfare of one or more of these types of fowl (e.g. Martrenchar, 1999; Mench, 2002; Bessei, 2006), and instead of re-iterating these overviews, I will dip into the welfare discussion and briefly highlight three examples, primarily from the broiler literature, that touch upon issues of great importance to the producer, the consumer, and – not least – the birds themselves. Although the emphasis is on broilers, many of the issues raised are of relevance to many of the other types and species of meat producing poultry as well.

Stocking density – how to assess quality of space?

In legislation regarding the housing of broilers thresholds for stocking density are defined as a maximum permissible live weight in kg per m^2 (Bessei, 2004). The EU broiler directive 2007/43/EF of 28th of June 2007 allows up to 42 kg/m^2 provided certain conditions are met, especially in terms of maximum mortality. However, in terms of

animal welfare and the experience of the individual bird of its surroundings, stocking density in terms of birds per m^2 may be a more relevant measure. One absurd consequence of only limiting live weight per area is that it in effect allows 1.000 day-old chicks per m^2 before maximum density is reached, which would be more than two layers of birds.
For fast growing broilers there is of course a predictable relationship between the number of birds and the maximum density at slaughter depending on the final live weight. A density of 40 kg/m^2 could for example be reached by 20 birds each weighing 2.0 kg, or by 16 birds each weighing 2.5 kg. The main issues of stocking density in relation to welfare are i) access to resources such as food and water (Leone and Estevez, 2008a); ii) how stocking density affects the immediate environment of the birds in terms of litter moisture, ambient temperature and relative humidity (e.g. Meluzzi *et al.*, 2008); and iii) enclosure size and its effects on locomotion (Leone and Estevez, 2008b). These issues are pertinent to welfare independent of the growth rate of the birds in question, although faster growth is more likely to have adverse effects on e.g. litter moisture. Thus, stocking density affect the health and welfare of broilers, not least through changes in the quality of the environment (Dawkins *et al.*, 2004, Estevez, 2007).

Foot pad dermatitis as an animal based welfare indicator
Assessment of foot pad dermatitis in broilers (Berg, 1998; Ekstrand *et al.*, 1998) has been compulsory in Sweden since 1994 and in Denmark since 2002, and more countries are considering the system. In Denmark the legislation stipulates that representative samples of 100 feet are to be taken from all flocks of broilers delivered to Danish slaughterhouses. These feet are each scored on an integer scale of 0, 1 and 2 by independent, competent assessors. Score 0 is assigned to feet with no or very superficial signs of dermatitis; score 1 is given to feet with mild or intermediate dermatitis and score 2 is given to feet with severe dermatitis causing wounds, scabs or bleeding (Ekstrand *et al.*, 1998).
The introduction of compulsory and systematic foot pad assessment has led to a decrease in the prevalence and severity of foot-pad dermatitis in broilers over time in Sweden (Berg and Algers, 2004) as well as in Denmark (Figure 1). The improvements have been achieved through a combination of measures such as prevention of water leakage from the drinkers, and heating the chicken houses prior to introducing the litter to prevent condensation between floor and litter. Most of the improvements occur during the first three years after the system is introduced (Berg and Algers, 2004), but annual decreases in the prevalence and severity of foot-pad dermatitis are still seen in Denmark during the winter months (Figure 1), when it is usually more of a challenge to keep the litter dry and friable.
The prevention of foot pad dermatitis is of course not the only improvement necessary to ensure the welfare of meat poultry. However, as an example of an animal based welfare indicator foot pad assessment is fast and simple, yet robust and relatively cheap.

Fast, lean and efficient: Modern broilers and their parents
Genetic selection for efficient and fast meat production has led to increases in the growth rates of broilers of more than 65% in the last 30 years. This has been achieved through focused quantitative selection without invoking more recent techniques of genetic assessment and manipulation. The goal of profitable and efficient meat production has been fulfilled; however, this vastly increased yield has come at a cost.

As a direct consequence of their genetic make-up, modern broiler chickens are prone to a number of diseases and pathological conditions, such as lameness and cardio-vascular problems. In addition, behavioural changes are seen, in particular when comparing modern broiler strains with slower growing breeds. Some of these changes, such as decreased activity, are a result of the massive increase in protein deposition seen in these birds.

In order to obtain production animals with a high genetic potential for growth, the parent stock have to be in possession of these traits as well. However, in order to be able to breed, the hens are fed restrictively for long periods of time during rearing. The level of restriction of these females corresponds to 30-50% of their *ad libitum* energy intake. Smaller pellets with more fibre are now fed to broilers breeders often directly into the litter with an aim to extend foraging, reduce hunger and prolong satiety; and breeding companies currently include more welfare related traits, such as actively selecting against leg problems. But are these efforts too little too late, and do we have to start from scratch to be able to engage the full genetic diversity (Muir *et al.*, 2008)?

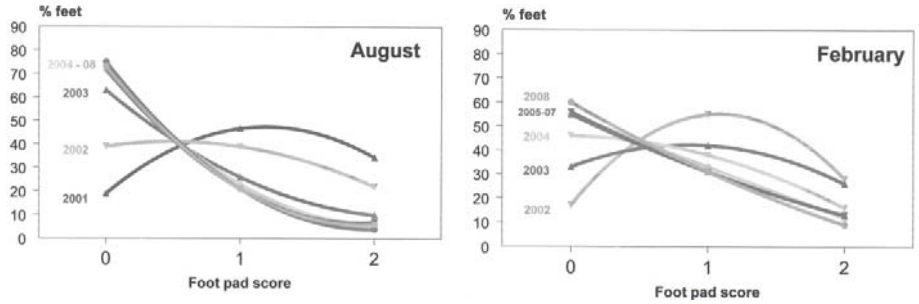

Figure 1. *The distribution on the three foot pad scores in 2001-2008 of samples of feet from all broiler flocks slaughtered in Denmark in August and February, respectively (Source: Danish Veterinary and Food Administration/Danish Poultry Council)*

References

- BERG, C. and ALGERS, B. (2004). Using welfare outcomes to control intensification: the Swedish model. . In: Weeks, C.A. and Butterworth, A. (Eds): Measuring and auditing broiler welfare. CABI Publishing, Wallingford, UK, pp. 223-229.
- BERG, C.C. (1998). Foot-pad dermatitis in broilers and turkeys - prevalence, risk factors and prevention. Acta Universitatis Agriculturae Sueciae, Veterinaria 36. PhD thesis.
- BESSEI, W. (2004). Stocking density. In: Weeks, C.A. and Butterworth, A. (Eds): Measuring and auditing broiler welfare. CABI Publishing, Wallingford, UK, pp. 133-143.
- BESSEI, W. (2006). Welfare of broilers: a review. Worlds Poultry Science Journal 62: 455-466
- DAWKINS, M.S., DONNELLY, C.A. and JONES, T.A. (2004). Chicken welfare is influenced more by housing conditions than by stocking density. Nature 427: 342-344.

- EKSTRAND, C., CARPENTER, T.E., ANDERSSON I., and ALGERS, B. (1998). Prevalence and control of foot-pad dermatitis in broilers in Sweden. British Poultry Science 39: 318-324.
- ESTEVEZ, I. (2007). Density allowances for broilers: Where to set the limits? Poultry Science 86: 1265-1272.
- LEONE, E.H. and ESTEVEZ, I. (2008a). Space use according to the distribution of resources and level of competition. Poultry Science, 87: 3-13.
- LEONE, E.H. and ESTEVEZ, I. (2008b). Use of space in the domestic fowl: separating the effects of enclosure size, group size and density. Animal Behaviour 76: 1673-1682.
- MARTRENCHAR, A. (1999). Animal welfare and intensive production of turkey broilers. Worlds Poultry Science Journal 55: 143-152.
- MELUZZI, A., FABBRI, C., FOLEGATTI, E. and SIRRI, F. (2008). Effect of less intensive rearing conditions on litter characteristics, growth performance, carcase injuries and meat quality of broilers. British Poultry Science 49**:** 509-515.
- MENCH, J.A. (2002). Broiler breeders: feed restriction and welfare. Worlds Poultry Science Journal 58: 23-29.
- MUIR, W.M., WONG, G.K.S., ZHANG, Y., WANG, J., GROENEN, M.A.M., CROOIJMANS, R.P.M.A. , MEGENS, H.J., ZHANG, H., OKIMOTO, R., VEREIJKEN, A., JUNGERIUS, A., ALBERS, G.A.A., LAWLEY, C.T., DELANY, M.E., MACEACHERN, S. and CHENG, H.H. (2008). Genome-wide assessment of worldwide chicken SNP genetic diversity indicates significant absence of rare alleles in commercial breeds. Proceedings of the National Academy of Sciences 105: 17312-17317.
- USDA (2008). Poultry and products. Annual report from the National Agricultural Statistics Service of the United States Dept. of Agriculture (www.nass.usda.gov).