Slow and steady wins the race? No signs of reduced welfare in smaller broiler breeder hens at four weeks of age

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Abstract

Broiler breeder chickens are commonly reared under strict feed-restriction regimes to reduce obesity-induced health and fertility problems during adult life, and are assumed to experience a reduced welfare due to the resulting hunger. In these conditions, feed competition could influence the growth rate, so that the individuals falling behind in growth would experience more stress and hunger. We hypothesised that these chickens are poor competitors due to a reactive coping style and experience a further reduced welfare situation before size-sorting (‘grading’) at four weeks of age. Our results from open field, tonic immobility and home pen activity monitoring show signs of lower fear and higher home-pen activity levels in smaller hens and do not support the idea of reactive copings. H/L ratios of smaller hens were also found to be lower, indicating less stress in these birds. Dissections of smaller and larger four-week breeder hens may offer an explanation in the form of a relatively larger gastrointestinal tract in smaller birds. We argue that this is a form of habituation to restricted feeding, offering these birds a physiological stress coping mechanism, and that low early growth rate may not always be a sign of poorer welfare in broiler breeders.

Keywords: animal welfare, broiler breeders, chicken, feed restriction, growth, stress

Introduction

During the last 50 years broiler chickens have been selected for increasingly efficient meat production, leading to an astonishing 400\% increase in growth rate while decreasing feed conversion ratios (FCR) by 50\% (Zuidhof et al 2014). These improvements in production traits do however come at a price for the parental chicken generation, the broiler breeders. The high growth rate of broilers is not only coupled to high rates of cardiovascular and skeletal pathologies, but also to reduced fertility due to follicular hypersensitivity to local growth factors (GFs), premature HPA axis maturation and obesity-induced lipotoxicity in ovarian tissues (Bruggeman et al 1999; Decuyper et al 2002; Chen et al 2006). To overcome these problems, broiler breeders are commonly reared under feed-restriction regimes which may reach feeding levels as low as a third of ad libitum intake during the most intense periods (de Jong et al 2002). The hunger and feeding frustration experienced by broiler breeders are often acknowledged as one of the major animal welfare problems of our time but there is also evidence that the stress can be alleviated to some extent by good rearing practices, such as litter-based flooring which allows for natural foraging behaviours and gradual habituation to the restriction regime (Hocking et al 1993, 1996).

Feed restriction in itself has been found to decrease flock uniformity (Zuidhof et al 1995), and the rushed eating and increased competition for feed that go along with it could justify the increased heterogeneity (Bennett & Leeson 1989; Zuidhof et al 1995). This heterogeneity in growth is expected to arise due to unequal distribution of feed between individuals, which specifically leads some animals to fall behind in growth (Aviagen 2013). According to the ‘uniformity is healthy’ hypothesis (cf Dawkins et al 2013), individual animals experiencing adverse conditions will increase physiological and behavioural heterogeneity within their flock and so a lack of uniformity can be interpreted as a sign of welfare problems (Zuidhof et al 1995; Dawkins et al 2013). Flock uniformity in growth is also one of the major quality measures used in commercial broiler breeder rearing, where the aim is to keep the coefficient of variance (CV) for body mass low to facilitate animal management (Aviagen 2013). Based on this, we would expect lower welfare in the under-feeders, ie the smaller animals, which may be experiencing an intensified feed-restriction. Commercial rearing farms attempt to alleviate this problem by size-sorting (‘grading’) the animals at four weeks of age, putting the smaller birds in a separate pen with less feed competition.

It is well known that individual animals have different abilities and strategies for coping with stressful situations. The coping style of an individual is influenced by both genotype and experiences during early development, but is then rather fixed (Koolhaas et al 1999). While wild animals