Farm animal welfare: assessing risks attributable to the prenatal environment

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Abstract

An ever-expanding scientific literature highlights the impact of the prenatal environment on many areas of biology. Across all major farmed species, experimental studies have clearly shown that prenatal experiences can have a substantial impact on outcomes relevant to later health, welfare and productivity. In particular, stress or sub-optimal nutrition experienced by the mother during pregnancy has been shown to have wide-ranging and important effects on how her offspring cope with their social, physical and infectious environment. Variation in the conditions for development provided by the reproductive tract or egg, for instance by altered nutritional supply or hormonal exposure, may therefore explain a large degree of variation in many welfare- and productivity-relevant traits. The scientific literature suggests a number of management practices for pre-birth/hatch individuals that could compromise their later welfare. Such studies may have relevance for the welfare of animals under human care, depending on the extent to which real life conditions involve exposure to these practices. Overall, the findings highlight the importance of extending the focus on animal welfare to include the prenatal period, an aspect which until recently has been largely neglected.

Keywords: animal welfare, early life, farming, foetal, gestation, prenatal

Introduction

The existence of variation, whether within an individual over time or between individuals in different litters, pens, farms or production systems, is of fundamental importance in animal welfare research. Suffering, a critical component of most definitions of animal welfare, can only be a property of the individual. Yet individual variation is often overlooked in the search for average treatment effects (Provenza 2008). Questions as to why particular combinations of genotype and environment cause a phenotypic outcome indicative of reduced welfare are clearly important. One possibly important source of individual variation within animals, beyond that attributable to genetic variation, is the prenatal environment (Braastad 1998; Lay 2000). From a welfare perspective, environmental effects that occur prior to birth or hatch have received less consideration than postnatal events, although they are now coming to prominence. This area is of particular interest, as many of the traits that can be affected by early life experiences, such as stress reactivity, behaviour, and immune function, are highly relevant to the ability of animals to exist under human management conditions and avoid states of suffering.

The transition from prenatal to neonatal life is clearly an important one for all living individuals. Mellor and Diesch (2006) have argued that this is the point at which animals become capable of suffering. However, even if individuals are not conscious of a variable prenatal environment it can still dictate how successful they are at coping with later life (Braastad 1998). Since most farmed species are relatively precocial at birth it is also during the prenatal period that many key systems develop and become functional. Therefore, set-points and response thresholds may be permanently affected by variation in experience around this time. This highlights the need to consider the implications of the prenatal period for the future welfare of individuals.

This paper will discuss the possible contribution of variation in the prenatal environment to animal welfare outcomes in a variety of farmed species. The starting points for this discussion are the following two simple suppositions. Firstly, that there are a number of experimental studies showing that early life factors can cause changes during later life that are relevant for animal welfare. Secondly, despite these studies, there is some genuine uncertainty about the extent to which such factors matter in real life, ie under commercial farming conditions.

This paper will briefly review progress so far in terms of the animal welfare interest in early life experiences. This will lead to an appraisal of the current state of knowledge in the