



## Global Conference on Animal Welfare: an OIE initiative

**TOPIC:** Applying science to animal welfare

**TITLE:** Food, water and malnutrition

**AUTHOR:** Lawrence, A.B., Tolcamp, B., Cockram, M.S., Simm, G., Ashworth, C., Dwyer, C.M.

Presenting Author: Alistair Lawrence, Sustainable Livestock Systems, Scottish Agricultural College, West Mains Road, Edinburgh, EH9 3JG,

### ABSTRACT:

An animal's requirements for nutrients are determined by both its genotype and its biological state. Nutrients are required for development and the functioning of the body's biological systems. Complex psychological processes have evolved to integrate/ translate these requirements into behaviour to efficiently locate/ consume nutrients in the environment. Thus behaviour expresses the interaction between the animals' nutrient requirements and environmental constraints on access to nutrients. Development of welfare standards would be helped by understanding the 'rules' determining animals' nutrient requirements, and the tolerance of the animal for failing to meet its requirements. Tolerances should be based on health and behavioural responses rather than on yields. Development of standards for food and water requires consideration of a number of discipline areas and their interactions:

- (1) Periods of water and food deprivation: There are a number of instances where farm animals may be temporarily denied access to food and water such as during transport and lairage before slaughter. Research on the effects of food and water deprivation during transport is important in developing transport standards (e.g. setting species-specific maximum journey and rest times, the latter where animals are allowed to feed and drink). There remain important areas for future research including a better understanding of the interactions between nutrient deprivation and other transport stressors. Transport conditions in other regions/ countries can differ; development of global standards for access to food and water during transport should build on and develop the existing research base.
- (2) Food restriction practices: The most widespread application of food restriction is in the breeding populations of pigs and broiler chickens, which arose without great consideration to animal welfare consequences. Subsequent research has indicated that commercial food restriction results in high/ sustained levels of feeding motivation (or hunger), although there remains scientific debate over the impact of that sustained hunger on welfare. This indicates the need for further research on the welfare costs of chronic hunger. Other than genetic solutions (see below), standards could be based on

novel nutritional strategies to reduce feeding motivation and provision of environmental opportunities for foraging behaviour.

- (3) Animal breeding and genotype x nutrition interactions: Animal breeding has had a significant impact on animals' nutrient requirements in all species subject to focused selection on yield. These elevated nutritional requirements can have significant impacts on animal welfare. One concern, especially with broiler breeding is that the reduced tolerance of highly selected lines to variations in specific nutrients (e.g. for skeletal development) can have potentially large impacts on welfare. However in addition to these concerns animal breeding also has the potential to enhance welfare for example through broadening breeding goals to include health and welfare traits. Constructive development of animal breeding practices in relation to animal welfare concerns would be greatly eased by adoption of international codes of practice and the OIE could play a key role in promoting this approach.
- (4) Malnutrition and water restriction in extensive systems: Animals in extensive systems may experience undernutrition and malnutrition as a result of overgrazing, climatic conditions or lack of economic resources to provide supplementary feeding. The consequences can have adverse effects on both health and behaviour. Similarly animals in extensive systems are dependent on natural sources of water for drinking which maybe restricted, subject to pollution or competition from other animal and human users. Extensively managed livestock should not be overlooked when considering standards in relation to food and water despite a current lack of public concern over the issue.
- (5) Pre-natal nutrition and development: There is increasing evidence that nutrition of the fetus can influence the health and welfare of the neonate and with likely longer-term influences into later life. For example, supply of micro-nutrients at key early stages of embryonic development has been shown to have a beneficial impact on neonatal survival. Research such as this indicates the importance of extending nutrient standards for welfare to the pre-natal phase.
- (6) Standardising measures to assess welfare impacts of nutrient restriction: As with many welfare issues, global welfare standards for nutrients require an international consensus on valid measures to assess responses/ tolerances to nutrient restriction, such as scientifically valid and robust behavioural/ physiological measures of hunger and thirst.