

Preface

Adequate nutrition is something that most of us take for granted. Yet, millions of farm animals face welfare and production problems because we, either wittingly or unwittingly, expose them to food shortages. Rangeland livestock have to cope with diminished food supplies during drought and flood; chickens and pigs are deprived of adequate food for periods during their production cycle; and dairy cows almost invariably suffer inadequate food supplies in early lactation to meet their very considerable energy requirements. In some cases, inadequate planning for extreme weather or the provision of unsuitable feeds renders farm animal production both inefficient and unproductive, as well as having major adverse effects on the welfare of the animals concerned. In extensive production systems, livestock owners are often inclined to keep as many animals as possible even if those cannot be fed adequately. Better quality and quantity of feed to enable the animals to grow to their potential would improve both their welfare and the profitability of the enterprise.

This document is divided into 11 chapters, each of which focuses on a different aspect of the interaction between nutrition and welfare, with emphasis on the provision of recommendations on how to alleviate nutritional and welfare problems. Welfare is perceived by animals through emotions, and the emotion most closely associated with nutrition, that of hunger, is given detailed consideration, particularly in relation to pigs and poultry fed restricted diets.

Starvation is commonly perceived to be an unacceptable level of malnutrition, in which the animal's function is severely compromised and hence its welfare. It results from an even longer period of feed restriction than that causing hunger. In this book, it is considered particularly in relation to rangeland cattle and sheep, which are frequently exposed to reduced feed levels as a result of climatic variation. Herbivores in extensive systems face temporal and spatial variation in the availability and quality of food and water, the chemical and morphological defences of plants, thermal stress, disease, predation, and competition. Many of the challenges herbivores face in extensive systems derive from the variability and unpredictability of the environment. Nutrient imbalances and natural toxins are also of greater importance than for livestock under intensive management systems.

Ruminant livestock are most often kept on marginal lands, with significant variation in feed supply and vulnerability to climate change. They show remarkable behavioural adaptability, not only for sward composition and height, but also for hot and cold environments, as well as enduring long periods foraging to find suitable pasture. However, under rangeland conditions, poor nutrition is the biggest welfare issue that livestock are confronted with, according to an Australian survey (Phillips et al. 2009). Undernutrition is therefore the biggest welfare problem for large numbers of stock. Advance preparation and low stocking rates will help farmers manage drought on rangelands, but it is anticipated that starvation in ruminant livestock will increase in future as a result of anthropogenic climate change and a shortage of energy crops to provide feed supplements.

The problems associated with short-term food deprivation are also considered in this book, particularly in the stressful conditions of animal transport, which has profound implications for vulnerable classes of livestock, such as calves. Feeding behaviour can be used as a tool to detect or prevent short-term problems. For example, automatic feeders can be used to detect changes in the feeding patterns of individual animals in a group, and these changes in turn can be used to identify health problems, often before clinical symptoms are present. Appropriate feeder design can improve animal welfare by eliminating competition between animals. Competition leads to uneven distribution of the feed between animals in a group, in which the lower ranking individuals lose out.

Provision of roughage is essential for ruminant livestock, but it is increasingly evident that it is also beneficial for monogastrics. Provision of roughage or fibre may in part alleviate hunger and reduce aggression in gestating sows and broiler breeders, may prevent the development of outbreaks of feather pecking in laying hens, and can provide environmental stimulation for growing pigs. Establishing a natural nutritional behavioural pattern in farm animals may be used to improve welfare as well as productivity. For example, post-weaning stress in piglets may be reduced by utilizing the innate curiosity and sensory modalities of this species, to the animals' advantage.

Diseases associated with malnutrition are given careful attention, arising both from specific nutrient deficiencies and from immunosuppression as a result of restricted macronutrient intake. Good nutrition can minimize tissue damage (from nutrient deficiencies or excesses) and ensure an optimal immune system activity. This helps to ensure freedom from disease (infectious or parasitic), but inflammatory responses should also be kept to a minimum by avoiding energy excesses and digestive disorders and by supplying specific compounds (omega-3 PUFA, CLA PUFA, antioxidants, etc.).

Throughout, it is recognized that early detection of welfare problems is a key to successfully controlling their impact, particularly on animal production, using tools such as regular observation of animal behaviour and condition. However, sometimes this is not possible such as when disasters occur, including earthquakes, floods, and wars. We are all too aware of these calamities in relation to their effects on humans, but we rarely consider that farm animals will be also severely affected, and in particular their feed and water supply. The emergency provision of feed to

animals in such situations is considered, and a chapter is devoted to provision of water, a key nutrient, to farm animals, since its deprivation, often in the extreme situations referred to above, results in loss of life faster than from any other nutrient deficiency.

This publication derives from an Expert Meeting co-ordinated by Harinder Makkar on the impact of nutrition on animal welfare, which took place in FAO Headquarters in Rome on 26–30 September 2011. The objectives of the meeting were to assess the current state of knowledge of the influence of nutrition of animals on their welfare and to identify feeding options for different livestock production systems that improve animal welfare, while increasing profitability of the livestock producers and ensuring safety and quality through the food chains. The meeting was attended by 11 leading scientists in the field, and a report from the meeting is available at <http://www.fao.org/docrep/017/i3148e/i3148e00.pdf>. A document containing case studies on enhancing animal welfare and farmer income through strategic animal feeding also emerged from this meeting and is available at <http://www.fao.org/docrep/017/i3164e/i3164e00.pdf>.

I hope that this book will stimulate researchers, teachers, government officials, international organization officers, donors, extension workers, veterinarians, and farmers to consider the important role that nutrition has to play in the welfare and productivity of farm animals.

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Reference

Phillips CJC, Wojciechowska J, Meng J, Cross N (2009) Perceptions of the importance of different welfare issues in livestock production in Australia. *Animal* 3:1152–1166

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