

WELFARE OF DAIRY CATTLE – TODAY AND TOMORROW

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Abstract

The goal of this review is to discuss the most important issues in the dairy cattle welfare challenges that facing the dairy industry today and tomorrow, namely dairy cattle welfare indicators and standards and the most significant welfare problems, and to illustrate the role of science in addressing these challenges.

It should be noted that producers have always been concerned about the condition of dairy cattle and have tried to ensure that they are healthy and well nourished. In this tradition of the dairy cattle care, good welfare is seen largely as the absence of illness or injury and malnutrition. More recent concerns about dairy cattle welfare have focused on the pain and distress that the cattle might experience as a result of widely accepted management practices, and the possibility that the animals suffer as a result of being kept under apparently inadequate conditions.

The evidence suggests that, whilst improvements to the welfare of dairy cows in the developed and developing countries have been made, we believe that more can and should be done to ensure that a dairy cow has a life worth living. The critical dairy cattle welfare issues relate to the supply of trained, skilled dairy farmers and stockmen, the incidence, prevalence and causes of lameness, mastitis, metabolic diseases, injuries and the infertility rate, though this is not itself a direct measure of welfare, the lack of centralized recording schemes yielding data at the national level, breeding policies for dairy cattle and public surveillance of welfare.

Keywords: *dairy cattle, welfare, indicators, standards*

Introduction

An improved understanding of motivation, cognition and the complexity of animals' behaviour has led in the last 30 years to the rapid development of animal welfare (Broom, 1986; Hristov *et al.*, 2006; Blokhuis, 2008; Fraser, 2008; Broom, 2011, OIE, 2011). That also contributed to an increasing interest among scientists in the field of welfare of dairy cattle (Albright, 1987; Rushen and de Passille, 1998; EFSA, 2009; FAWC, 2009; EFSA, 2012; von Keyserlingk *et al.*, 2009).

It should be noted that producers have always been concerned about the condition of dairy cattle and have tried to ensure that they are healthy and well nourished. In this tradition of the cattle care, good welfare is seen largely as the absence of illness or injury and malnutrition (von Keyserlingk *et al.*, 2009). More recent concerns about dairy cattle welfare have focused on the pain and distress that the animals might experience as a result of widely accepted management practices and the possibility that animals suffer (Fraser, 2008). Over the past decade scientific research expanded on the welfare of cattle to address these issues (Phillips, 2002; Webster, 2005; Broom and Fraser, 2007; Rushen *et al.*, 2008; Grandin, 2010).

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indicators, standards and the most significant welfare problems, and to illustrate the role of science in addressing these challenges.

Dairy cattle welfare indicators and standards

Nowadays in the literature several definition of animal welfare and also a range of different type of welfare indicators are described (e.g., Dawkins, 1990; Hristov and Bešlin, 1991; Broom, 1996; Bracke *et al.*, 2001; Webster, 2005; Vučinić, 2006; Broom and Fraser, 2007; Hristov *et al.*, 2007b; Grandin, 2010). The definition of animal welfare is important in assessment of this very important issue mainly from production, public, moral and ethic reasons. Two approaches to definition of animal welfare have been dominating the scientific animal welfare debates: the "feeling" and "coping" definition (Hristov and Bešlin, 1991; Duncan, 1996; Vučinić, 2006; Grandin, 2010).

In the previous decade, great importance is given to the various indicators used to assess the welfare of dairy cattle (e.g., Bartussek *et al.*, 2000; Rousing *et al.*, 2000; Capdeville and Veissier, 2001; Fregonesi and Leaver, 2001, Johnsen, 2001; Keeling and Veissier, 2005; Maksimović and Hristov, 2007; Relić *et al.*, 2008; Hristov *et al.*, 2009; Keeling, 2009; Hristov *et al.* 2010b; Hristov *et al.*, 2011b, Ostojić-Andrić *et al.*, 2011). The welfare indicators are divided principally as direct and indirect, whether they take into account the wellbeing of dairy cows and the environment in which they are kept (Huxley and Whay, 2006; Vučinić, 2006; Anon., 2009; EFSA, 2009; Grandin, 2010; EFSA, 2012).

In the papers by Broom (1996, 2011) was emphasized that early attempts to define welfare referred to individuals being in harmony with nature, but the first usable definition incorporated feelings and health as part of attempts to cope with the environment. Most reviews of the welfare now start with listing the needs of the animal, including needs to show certain behaviours (Webster, 2005; Broom and Fraser, 2007; Grandin, 2010). This approach has used sophisticated studies of what is important to animals and has replaced the earlier general guidelines described as the freedoms. Many measures of the welfare are now used and indicate how good or how poor the welfare is (Broom, 2011).

For some time public and consumer pressure for assurance that farm animals are raised humanely has led to a range of private and public animal welfare standards, and for methods to assess compliance with these standards (Hristov *et al.* 2007a; Hristov *et al.*, 2010a; Rushen *et al.*, 2011). The standards need to be validated regarding the definitions of welfare that has broad support and which is amenable to scientific investigation (Hristov *et al.*, 2010a). According to Rushen (2003) concepts of animal welfare have not dealt adequately with the multidimensional nature of animal welfare. Ensuring that such standards acknowledge scientific uncertainty is also challenging, and balanced input from all scientific disciplines dealing with animal welfare is needed. On-farm assessment of animal welfare requires a combination of animal-based measures to assess the actual state of welfare and resource-based measures to identify risk factors (Rushen *et al.*, 2011; EFSA, 2012).

Back in 1987, Albright observed that needed research includes studying learned helplessness of cattle. Alert caretakers are encouraged to read behavior signals of cattle. Increased standing of cattle is often taken now as a sign of discomfort or discontent in studies of cow and calf confinement. Criteria that should be considered in assessing welfare or well-being are behavior, health, musculoskeletal soundness, productivity, physiological and biochemical characteristics, and reproduction.

The paper by von Keyserlingk *et al.* (2009) provides that concerns about the welfare of animals typically include 3 questions: is the animal functioning well (e.g., good health, productivity, etc.), is the animal feeling well (e.g., absence of pain, etc.), and is the animal able to live according to its nature (e.g., perform natural behaviours)?

In the paper written by Johnsen *et al.* (2001) were described and compared nine methods of assessing the welfare of farm animals at herd level. A distinction is made between two types of welfare parameter: the environmental and the animal-based. The relative weight of these parameters, together with variation in their measurability, explains many of the differences between the methods with which the paper is concerned.

The paper of Hristov *et al.* (2012, *in press*) scrutinized the most important group of welfare indicators that are based on an assessment of the current state of the welfare of dairy cows on farms with detailed consideration of their behavior, health, physiology, performance and disease resistance. In addition, the paper describes the indicators for the evaluation of welfare of dairy cows to observe a way of managing the farm and specific interactions between animals and housing systems. Several systems of welfare quality evaluation of dairy cattle are in use during last decade as Animal Need Index (Bartussek *et al.*, 2000), the related TGI200 in Germany (Sundrum *et al.*, 1994), the ethical account in Denmark (Sorensen *et al.*, 2001), Freedom Food schemes in the United Kingdom (FAWC (1993)), specific tools for dairy cows in France (Capdeville and Veissier, 2001) and Italy (Tosi *et al.*, 2001), assessment protocol for cattle which is developed within Welfare quality® project (2009) and finally the system of welfare indicators which was developed in Serbia within the national project "TR 20110: Development and implementation of welfare and biosecurity standards to improve the technology of cattle and pigs production" (Anon., 2011).

In the paper of Rushen (2003) were discussed some of the major conceptual and methodological problems that have arisen in attempts to assess the relative levels of farm animal welfare in different housing systems. In some cases these problems arise because applied research has not kept pace with more fundamental research.

The most significant welfare problems in dairy cattle

Given a natural healthy life, cows can live for twenty years or more. However, high yielding dairy cows are usually culled after three lactations, because they are chronically lame or infertile (EFSA, 2009; von Keyserlingk *et al.*, 2009; EFSA, 2012). Mastitis is also very important cause. It is well known that there are a large number of bacteria, both contagious and environmental, that are capable of causing mastitis. In some countries, records of the incidence of clinical and subclinical mastitis for individual cows are collected regularly as part of disease surveillance. Examples of other endemic diseases that may lead to premature culling of dairy cattle are tuberculosis, bovine viral diarrhoea, infectious bovine rhinotracheitis, leptospirosis and Johne's disease, although some of these can be controlled by vaccination. Metabolic diseases of dairy cows are important in terms of lost production and poor welfare and include ketosis, milk fever, left displaced abomasum and acidosis. Many other causes as overproduction of milk, restrictive housing systems, poor nutrition, and physical disorders impair the animals' welfare in industrial dairy operations. In their fragile end-of-production state, handling, transport, and slaughter raise additional welfare concerns (FAWC, 2009; EFSA, 2009; 2012).

It is well known fact that cows kept indoors have less opportunity to act naturally and exercise. Very often poor ventilation and high humidity increase the risk and spread of infection. Hard concrete flooring can cause foot damage and is more painful for lame cows to stand and walk on. Also, zero-grazing systems have been linked to increased lameness. Some herds are kept on concrete floors with inadequate bedding. These are uncomfortable for the cows to walk, stand or lie down on. Management and nutritional factors can have a large effect, often obscuring the influence of housing. The behavior of the cow, particularly time spent lying or standing, can influence the likelihood of lameness. The diet of high yielding cows often has relatively little fibrous content and is inappropriate for their type of digestive

system. This can lead to acidosis and painful lameness from laminitis (von Keyserlingk *et al.*, 2009; Hristov *et al.*, 2011; de Vries *et al.*, 2011; Shearer and van Amstel, 2011).

In commercial dairy farming, nearly all calves are taken away from their mother shortly after birth. This causes severe distress to both the cow and the calf and has long-term effects on the calf's physical and social development. The most significant welfare problems in dairy calves in intensive rearing conditions have been investigated in the paper by Hristov *et al.* (2011). These problems mainly result from inadequate intake of colostrum (separation from the mother), inadequate ventilation (resulting in inappropriate airflow, low or high temperatures, high humidity and poor air quality), poor floor conditions (wet floor, without bedding), inadequate monitoring of health, exposure to pathogens causing respiratory and gastrointestinal disorders and occurrence of iron deficiency. In addition, on cattle farms in our country welfare problems in calves originate from continuous restocking (no "all in - all out") and mixing calves from different sources, as well as insufficiently balanced solid food, insufficient access to water and generally poor response of farmer to health problems, especially necessary dietary changes. A special welfare problem is insufficient floor space allowance which results in calf's discomfort.

In the EFSA reports (2009; 2012) and opinion of FAWC (2009) was suggested that nearly all diseases affect the welfare of dairy cows to some degree. In recent decades, a marked increase has occurred in the incidence of various production diseases in dairy cattle of which lameness is the most prevalent. Lameness continues to be a common problem across many types of housing. Lameness of dairy cattle is a very visible well-being issue as well as a production and economic issue. In the paper of Hristov *et al.* (2011) analysed the most significant predisposing factors and causes of lameness of dairy cows. It is considered that lameness is related to the genetics of the animal, housing and nutrition. High levels of production do not necessarily lead to increased lameness, although genetic correlations between levels of production and the incidence of lameness suggest that continued high selection for milk production will likely exacerbate the problem.

Unsuitable designs of cubicles are commonly implicated in hock, back and hook bone lesions; feed barrier design and access to feed are implicated in neck and shoulder calluses. Risk factors for the more severe injuries associated with slipping and falling include the floor surface, loafing space/overcrowding, shed design (cow flow), poor stockmanship, social group size, care of high risk, recently-calved animals in the herd and bulling cows. The common injuries to dairy cows are hock abrasions and swollen hocks, neck calluses, calluses on the back, injuries of the hook bone and skeletal injuries after slipping, e.g. fractured or dislocated hips (Regula *et al.*, 2004, EFSA, 2009; FAWC, 2009; EFSA, 2012).

Recent research has shown that body condition affects both health and fertility. The cow with high genetic merit for milk production produces more milk partly because of a greater propensity for losing body condition to support milk production. This leads to a greater negative energy balance in early lactation, with more rapid loss and a slower recovery of body condition that, in turn, affects her ability to conceive. The immune resistance of high yielding cows in negative energy balance during early lactation is weak, raising susceptibility to some diseases. Cows of high genetic merit for milk production need a high level of management to ensure good nutrition, avoid extremes of body tissue loss and hence be fertile (EFSA, 2009; FAWC, 2009; Roche *et al.*, 2009; EFSA, 2012).

Infertility among high yielding dairy cows is linked to stress, poor body condition and the demands of high milk production on the cow's general health. Infertility is also influenced by concurrent disease, such as lameness and mastitis. Inappropriate phenotype for the system, poor management, inadequate feeding, breeding immature heifers and using inappropriate bulls that exacerbate dystocia, all contribute to infertility. Management of the dry cow is also critical to fertility, particularly to ensure that cow is neither too thin nor too fat at calving.

Appropriate nutrition is clearly important to avoid metabolic diseases. In addition, observing cows for heat and timing of insemination is crucial to good management (EFSA, 2009; FAWC, 2009; EFSA, 2012).

Good stockmanship is the key to good welfare and the quality of stockmanship is critical to the management of high yielding dairy cows. Sound education and up-to-date training of dairy farmers and stockmen are essential to promote and maintain good welfare in dairy herds (Hristov et al., 2010a).

When dairy cows come to the end of their productive life, they may be transported long distances to be slaughtered. The effects of land transport on animal welfare are described by Broom (2005). Animal welfare during and as a result of transport can be assessed by using a range of behavioural, physiological, pathological and carcass-quality indicators that are described in this paper. Measures of the extent of any disease, injury or mortality resulting from, or exacerbated by, transport are important because health is an important part of welfare. Factors affecting the welfare of animals before, during and after transport mainly related to: definition of the staff responsibilities and competence, attitudes to animals and need for training of staff, planning of journeys and methods of payment of staff, laws and retailers' codes, genetics, especially selection for high productivity, rearing conditions and experience, the mixing of animals from different social groups, handling and loading procedures, driving methods, space allowance and increased disease susceptibility and spread of disease.

Animal health, the most important aspect of their welfare, has vastly improved, as has the care of sick or injured animals. At the same time, the latest amenities used in livestock rearing, transport and slaughter are helping to eliminate situations involving extreme stress and suffering (Seng and Laporte, 2005).

Conclusion

On the bases of literature data about welfare of dairy cattle – today and tomorrow and experience of authors could be concluded:

- Dairy cattle health, the most important aspect of their welfare, has vastly improved, as has the care of sick or injured animals. At the same time, the latest amenities used in livestock rearing, transport and slaughter are helping to eliminate situations involving extreme stress and suffering;
- The evidence suggests that, whilst improvements to the welfare of dairy cows in the developed and developing countries have been made more can and should be done to ensure that a dairy cow has a life worth living;
- The critical dairy cattle welfare issues mainly relate to the incidence, prevalence and causes of lameness, mastitis, metabolic diseases, injuries, infertility overproduction of milk, restrictive housing systems, poor nutrition, and physical disorders impair the welfare of the animals in industrial dairy operations.

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