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RE: Draft OIE Chapter on Dairy Cattle Production Systems

Dear Gary:

On behalf of our respective organizations, we submit for USDA's consideration comments on the draft OIE chapter on dairy cattle production systems. Those comments are attached.

In addition, it is our understanding that the latest version of the chapter on beef cattle and the proposed chapter on broiler chickens will be considered at the May OIE meeting. While we feel progress has been made on certain aspects of welfare for these species, we remain concerned about a few issues in particular. Accordingly, we offer the following comments and recommendations on the beef cattle and broiler chicken chapters:

**Proposed chapter on the welfare of broilers**

**Performance criteria**
Article 7.X.3.8 (performance) includes performance – including growth rate – among the useful indicators of broiler welfare. However, we believe that high growth rates are not necessarily an indicator of good welfare; indeed high growth rates are associated with an increased risk of leg problems, ascites and sudden death syndrome.

In their 2010 Scientific Opinion the European Food Safety Authority concluded that "the major welfare concerns for broilers are leg problems, contact dermatitis, especially footpad dermatitis, ascites and sudden death syndrome. These concerns have been exacerbated by genetic selection for fast growth and increased food conversion." The Opinion points out that there is an increased mortality associated with faster growth rates whereas slower growth rates have a lower mortality.

**Cages**
The Chapter continues to permit the keeping of broilers in cages. We believe that the Chapter should indicate that it is preferable for broilers not to be kept in cages as they compromise broiler welfare.

**Proposed amendments to chapter on the welfare of beef cattle**

**Tethering**
Our organizations are pleased that the OIE proposes to add a provision on tethering. This reads: "Cattle that are kept tethered should, as a minimum, be able to lie down, and if tethered outdoors, turn around and walk". However, we are concerned that cattle can be kept indoors on so short a tether that they cannot even walk and turn round. Accordingly, we believe that the Chapter should discourage the permanent tethering of cattle indoors and recommend that cattle should only be tethered indoors for short periods e.g. for veterinary purposes.

Please don't hesitate to contact us if we can provide further information or answer any questions.

CHAPTER 7.X.

# ANIMAL WELFARE AND DAIRY CATTLE PRODUCTION SYSTEMS

**AMENDMENTS PROPOSED BY U.S. ANIMAL PROTECTION ORGANIZATIONS* ARE HIGHLIGHTED IN YELLOW**

**(*AMERICAN SOCIETY FOR THE PREVENTION OF CRUELTY TO ANIMALS, ANIMAL WELFARE INSTITUTE, COMPASSION IN WORLD FARMING, HUMANE SOCIETY INTERNATIONAL, WORLD SOCIETY FOR THE PROTECTION OF ANIMALS)**

Article 7.X.1.

**Definition**

Dairy cattle production systems are defined as all commercial cattle production systems where the purpose of the operation includes some or all of the breeding, rearing and management of cattle intended for production of milk.

Article 7.X.2.

**Scope**

This chapter addresses the welfare aspects of dairy cattle production systems.

Article 7.X.3.

**Commercial dairy cattle production systems**

Commercial dairy cattle production systems include:

1. Housed or confined

   These are systems where cattle are in confinement and are fully dependent on humans to provide for basic animal needs such as food, shelter and water on a daily basis.

2. Pastured

   These are systems where cattle have the freedom to roam outdoors, and where the cattle have some autonomy over diet selection (through grazing), water consumption and access to shelter.

3. Combination systems

   These are systems where cattle are exposed to any combination of housing, confinement or pasture husbandry methods, either simultaneously, or varied according to changes in climatic conditions or physiological state of the cattle.

Article 7.X.4.

**Criteria (or measurables) for the welfare of dairy cattle**

The following outcome-based criteria, specifically animal-based criteria, can be useful indicators of *animal welfare*. The use of these indicators and their appropriate thresholds should be adapted to the different situations where dairy cattle are managed. Consideration should also be given to the design of the system. These criteria can be considered as a tool to monitor the efficiency of design and management, given that *animal welfare* will be affected by both system design and stockmanship.

1. Behaviour

Certain behaviours could indicate an *animal welfare* problem. These include decreased feed intake, locomotory behaviour and posture, altered lying time, human-animal relationship, altered respiratory rate and panting, and the demonstration of stereotypic, aggressive, depressive or other abnormal behaviours (Wiepkema *et al.*, 1983; Moss, 1992; Desire *et al.*, 2002; Appleby, 2006; Mason and Latham, 2004; Lawrence, 2008; Chapinel *et al.*, 2009).

2. Morbidity rates

Morbidity rates, including for *diseases* such as mastitis and metritis, lameness, metabolic diseases, parasitic diseases, post-procedural complication and injury rates, above recognised thresholds, may be direct or indirect indicators of the *animal welfare* status of the whole *herd*. Understanding the aetiology of the *disease* or syndrome is important for detecting potential *animal welfare* problems (Blecha, 2000). Scoring systems, such as lameness scoring, can provide additional information (Sprecher *et al*., 1997).

Both clinical examination and pathology should be utilised as an indicator of *disease*, injuries and other problems that may compromise *animal welfare*. *Post-mortem* examination is useful to establish causes of *death* in cattle.

3. Mortality rates

Mortality rates, like morbidity rates, may be direct or indirect indicators of the *animal welfare* status (Moss, 1992). Depending on the production system, estimates of mortality rates can be obtained by analysing causes of *death* and the rate and temporo-spatial pattern of mortality. Mortality rates can be reported daily, monthly, annually or with reference to key husbandry activities within the production cycle.

4. Changes in milk yield, body weight and body condition

In growing *animals*, body weight gain (failure to achieve appropriate growth curve) may be an indicator of animal health and *animal welfare*.

In lactating *animals*, body condition score outside an acceptable range, significant body weight change and significant decrease in milk yield may be indicators of compromised welfare (Roche *et al.*, 2004; Roche *et al.*, 2009).

In non-lactating *animals*, including bulls, body condition score outside an acceptable range and significant body weight change may be indicators of compromised welfare.

5. Reproductive efficiency

Reproductive efficiency can be an indicator of animal health and *animal welfare* status. Poor reproductive performance can indicate *animal welfare* problems. Examples may include:

– prolonged post-partum anoestrus,

– low conception rates,

– high abortion rates,

– high rates of dystocia,

– loss of fertility in breeding bulls.

6. Physical appearance

Physical appearance may be an indicator of animal health and *animal welfare*, as well as the conditions of management. Attributes of physical appearance that may indicate compromised welfare include:

– presence of ectoparasites,

– abnormal coat colour, texture or hair loss,

– excessive soiling with faeces, mud or dirt (cleanliness),

– abnormal swellings and lesions,

– feet abnormalities,

– emaciation.

7. Handling responses

Improper handling can result in fear and distress in cattle. Indicators could include:

– evidence of poor human-animal relationship, such as excessive flight distance,

– negative behaviour at milking time, such as reluctance to enter to the milking parlour, kicking, vocalisation,

– percentage of *animals* striking restraints or gates,

– percentage of *animals* injured during handling, such as bruising, lacerations, broken horns and fractured legs,

– percentage of *animals* vocalising during restraint and handling,

– chute or race behaviour,

– percentage of *animals* slipping or falling.

8. Complications due to routine procedure management

Surgical and non-surgical procedures may be performed in dairy cattle for improving *animal* performance, facilitating management, and improving human safety and *animal welfare*. However, if these procedures are not performed properly, *animal welfare* can be compromised. Indicators of such problems could include:

– post procedure infection and swelling,

– body condition and weight loss,

– mortality.

Article 7.X.5.

**Provisions for good animal welfare**

Ensuring high welfare of dairy cattle is contingent on several management factors, including system design and stockmanship which includes responsible husbandry and appropriate care. Serious problems can arise in any system if one or more of these elements are lacking.

Each recommendation includes a list of relevant outcome-based measurables derived from Article 7.X.4. This does not exclude other measures being used where appropriate.

1. Recommendations on system design including physical environment

When new facilities are planned or existing facilities are modified, professional advice on design in regards to animal health and welfare, should be sought (e.g. Milk Development Council, 2006).

Many aspects of the environment can impact on the health and welfare of dairy cattle. These include heat and cold, air quality, noise, etc.

a) Thermal environment

Although cattle can adapt to a wide range of thermal environments particularly if appropriate breeds are used for the anticipated conditions, sudden fluctuations in weather can cause heat or cold stress.

i) Heat stress

The risk of heat stress for cattle is influenced by environmental factors including air temperature, relative humidity and wind speed, and animal factors including breed, age, body condition, metabolic rate and coat colour and density (West, 2003; Bryant *et al.*, 2007).

*Animal handlers* should be aware of the risk that heat stress poses to cattle and of the thresholds in relation to heat and humidity that may require action. As conditions change, routine daily activities that require moving cattle should be amended appropriately. If the risk of heat stress reaches very high levels the *animal handlers* should institute an emergency action plan that could include provision of shade, fans, easy access to additional drinking water, and provision of cooling systems as appropriate for the local conditions (Igono *et al.*, 1987; Kendall *et al.*, 2007; Blackshaw and Blackshaw, 1994).

Outcome-based measurables: feed and water intake, behaviour, including respiratory rate and panting, morbidity rate, mortality rate, changes in milk yield.

ii) Cold stress

Protection from extreme weather conditions should be provided when these conditions are likely to create a serious risk to the welfare of cattle, particularly in neonates and young cattle and others that are physiologically compromised. This could be provided by extra bedding and natural or man-made shelters (Manninen *et al.*, 2002).

During extreme cold weather conditions, *animal handlers* should institute an emergency action plan to provide cattle with shelter, adequate feed and water.

Outcome-based measurables: mortality and morbidity rates, physical appearance, behaviour including abnormal postures, shivering and huddling, growth curve, body condition and weight loss.

b) Lighting

Confined cattle that do not have access to natural light should be provided with supplementary lighting which follows natural periodicity sufficient for their health and welfare, to facilitate natural behaviour patterns and to allow adequate inspection of the cattle (Arab *et al.*, 1995; Dahl *et al.*, 2000; Phillips *et al.*, 2000).

Outcome-based measurables: behaviour, morbidity, physical appearance, mobility.

c) Air quality

Good air quality is an important factor for the health and welfare of cattle. It is affected by air constituents such as gases, dust and micro-organisms, and is influenced strongly by management and building design in housed systems. The air composition is influenced by the stocking density, the size of the cattle, flooring, bedding, waste management, building design and ventilation system.

Proper ventilation is important for effective heat dissipation in cattle and preventing the build-up of effluent gases (e.g. ammonia and hydrogen sulphide) and dust in the confinement unit. Poor air quality and poor ventilation are risk factors for respiratory discomfort and *diseases*.

Outcome-based measurables: morbidity rate, behaviour, mortality rate, respiratory rate or panting, changes in weight and body condition score, growth curve.

d) Noise

Cattle are adaptable to different levels and types of noise. However, exposure of cattle to sudden and unexpected noises should be minimised where possible to prevent stress and fear reactions. Ventilation fans, feeding machinery or other indoor or outdoor equipment should be constructed, placed, operated and maintained in a manner that minimises sudden and unexpected noise.

Outcome-based measurables: behaviour, changes in milk yield.

e) Flooring, bedding, resting surfaces and outdoor areas

In all production systems cattle need a well-drained and comfortable place to rest (Baxter *et al.*, 1983; Baxter, 1992; Moberg and Mench, 2000; Bell and Huxley, 2009; O'Driscoll *et al.*, 2007). All cattle in a group should have sufficient space to lie down and rest at the same time (Kondo *et al.*, 2003).

Particular attention should be given to the provisions for calving areas. The environment in such areas (e.g. floors, bedding, temperature and hygiene) should be appropriate to ensure the welfare of calving cows and new born calves.

Floor management in housed production systems can have a significant impact on cattle welfare (Ingvartsen *et al.*, 1993; Rushen and de Passillé, 1992; Barkema *et al.*, 1999; Drissler *et al.*, 2005). Areas that compromise welfare and are not suitable for resting (e.g. places with excessive water and faecal accumulation) should not be included in the calculation of the area available for cattle to lie down.

Slopes of pens should be maintained to allow water to drain away from feed troughs and not pool excessively in the pens.

Facilities should be cleaned as conditions warrant, to ensure good hygiene and minimise disease risk.

Some form of bedding should be provided to all animals housed on concrete. Softer surfaces, such as rubber mats, crumbled rubber-filled mattresses and waterbeds, can provide an alternative to bedding. In straw, sand or other bedding systems, the bedding should be maintained to provide cattle with a dry and comfortable place in which to lie (Bell, 2007; Bell and Huxley, 2009; Fisher *et al.*, 2003; Zdanowicz *et al.*, 2004). Cow comfort scores, based on the proportion of cows lying down in the resting area, should be used to ensure that flooring and bedding is comfortable.

**Justification for Revision**

1. Research has documented reduced longevity and increased lameness in cows housed in stalls without bedding . Softer stall flooring reduces the physical impact of lying. Cows kept on softer flooring stand up and lie down almost twice as often as cows on concrete (see Rushen et al. 2007).

Bergsten & Frank. 1996. Sole hemorrhages in tied heifers in early gestation as an indicator of laminitis: Effects of diet and flooring. Acta Veterinary Scandinavia 37:375-382.

Buenger et al. 2001. Analysis of survival in dairy cows with supplementary data on type scores and housing systems. Journal of Dairy Science 84:1531-1541.

Faull et al. 1996. Epidemiology of lameness in dairy cattle: The influence of cubicles and indoor and outdoor walking surfaces. Veterinary Record 139:130-136.

Rushen et al. 2007. Effect of softer flooring in tiestalls on resting behavior and leg injuries of lactating cows. Journal of Dairy Science 90:3647-3651.

Vokey et al. 2001. Effects of alley and stall surfaces. Journal of Dairy Science 84:2686-2699.

2. Cow comfort scores and cow preference tests can be useful in identifying features of housing systems that are important to animals and provide a source of information about how cattle perceive their environment and how they rank the various options provided to them. For a review of cow preference tests see Rushen et al. 2008. The Welfare of Cattle. Dordrecht, The Netherlands: Springer, pp. 154-161.

The design of a standing, or cubicle, or free stall, should be such that the *animal* can stand and lie comfortably on solid surface (e.g. length, width and height should be appropriate for the size of the animal) (; Anderson, 2010; Bell 2007; Bernardi *et al.*, 2009; Cook *et al.*, 2008; Tucker *et al.*, 2003; Tucker *et al.*, 2004; Tucker *et al.*, 2009). Where possible, this design should allow for the *animal* to move its head freely as it stands up. Where individual spaces are provided for cows to rest, there should be one space per cow (Fregonesi *et al.*, 2007).

Alleys and gates should be designed and operated to allow free movement of cattle. Slippery surfaces should be avoided (e.g. grooved concrete; metal grating, not sharp; rubber mats or deep sand) to minimise slipping and falling (Haufe *et al.*, 2009; Rushen and de Passilé, 2006).

If a housing system includes areas of slatted floor, cattle, including replacement stock, should have access to a solid lying area. The slat and gap widths should be appropriate to the hoof size of the cattle to prevent injuries (Hinterhofer *et al.*, 2006; Telezhenko *et al.*, 2007).

If cattle have to be temporarily tethered, they should, as a minimum, be able to lie down, ~~and stand up,~~ stand up, turn around, and walk short distances unimpeded. *Animal handlers* should be aware of the higher risks of welfare problems where cattle are tethered (Loberg *et al.*, 2004; Tucker *et al.*, 2009). Because the risk for behavioral problems, fear and pain associated with housing are highest for tie-stalls, dairy cattle should not be tethered on a permanent basis, and such systems should be phased out as soon as possible. Cows kept in tie-stall housing should be provided daily access to an exercise area.

**Justification for Revision**

From Rushen et al. 2008. The Welfare of Cattle. Dordrecht, The Netherlands: Springer, p. 145:

"Tie-stall housing limits how much the animal can move. If cows are also milked in the stall they may be tethered for months on end. In addition, there is a lack of opportunity for close physical contact between animals, combined with an inability to escape completely from aggressive neighbours. When tied in the stall, the animal cannot turn around and may not be able to groom all parts of its body."

In addition to the science cited above, the following studies also concluded that the tethering of dairy cows has negative implications for their welfare, and that exercise reduces lameness:

Keil et al. 2006. Effects of frequency and duration of outdoor exercise on the prevalence of hock lesions in tied Swiss dairy cows. Preventive Veterinary Medicine 74(2-3):142-153.

Loberg et al. 2004. Behaviour and claw health in tied dairy cows with varying access to exercise in an outdoor paddock. Applied Animal Behaviour Science 89(1-2):1-16.

Redbo. 1992. The influence of restraint on the occurrence of oral stereotypies in dairy cows. Journal Applied Animal Behaviour Science 35(2):115-123.

Regula et al. 2004. Health and welfare of dairy cows in different husbandry systems in Switzerland. Preventative Veterinary Medicine 66:247-264.

Veissier et al. 2008. The motivation of cows to walk as thwarted by tethering.Journal of Animal Science 86(10):2723-2729.

**As evidence of the importance of exercise, US dairy industry standards require dairy cattle housed in tie-stalls be "turned out daily for exercise (weather permitting)."** (See National Milk Producers Federation. 2010. National Dairy Farm Program Animal Care Manual, p. 33.)

Where breeding bulls are in housing systems, care should be taken to ensure that they have sight of other cattle with sufficient space for resting and exercise. If used for natural mating, the floor should not be slatted or slippery.

Outcome-based measurables: morbidity rates (e.g. lameness, pressure sores), behaviour, changes in weight and body condition score, physical appearance (e.g. hair loss, cleanliness score), growth curve.

f) Location, construction and equipment

Farms for dairy cattle should be situated in an appropriate geographical location for the health, welfare and productivity of the cattle.

All facilities for dairy cattle should be constructed, maintained and operated to minimise the risk to the welfare of the cattle (Grandin, 1980).

Equipment for milking, handling and restraining dairy cattle should only be used in a way that minimises the risk of injury, pain or distress.

Electrified equipment (e.g. cow trainer, electrified gate) has been associated with increased incidence of welfare problems and should not be used.

Cattle should preferably have access to pasture. Cattle in housed or pastured production systems should be offered adequate space for comfort and socialisation (Kondo *et al.*, 2003).

**Justification for Revision**

1. Access to pasture is a key component of dairy cow welfare, as cattle naturally spend a considerable amount of time grazing.

Ruckebusch & Bueno. 1978. An analysis of ingestive behaviour and activity of cattle under field conditions. Applied Animal Ethology 4(4):301-313.

2. Lameness has also been tied to insufficient physical activity. Studies have shown that increased exercise and access to pasture can improve cow gait and may have a positive effect on hoof health.

Chapinal et al. 2013. Herd-level risk factors for lameness in freestall farms in the northeastern United States and California. Journal Dairy Science 96:318–328.

Hernandez-Mendo et al. 2007. Effects of pasture on lameness in dairy cows. Journal of Dairy Science 90(3):1209-1214.

Keil et al. 2006. Effects of frequency and duration of outdoor exercise on the prevalence of hock lesions in tied Swiss dairy cows. Preventive Veterinary Medicine 74(2-3):142-153.

Loberg et al. 2004. Behaviour and claw health in tied dairy cows with varying access to exercise in an outdoor paddock. Applied Animal Behaviour Science 89(1-2):1-16.

Olmos et al. 2009. Hoof disorders, locomotion ability and lying times of cubicle-housed compared to pasture-based dairy cows. Livestock Science 125(2-3):199-207.

Regula et al. 2004. Health and welfare of dairy cows in different husbandry systems in Switzerland. Preventive Veterinary Medicine 66(1-4):247-264.

3. Access to pasture may also reduce the incidence of mastitis among dairy cows and the rate of culling for mastitis.

Barkema et al. 1999. Management practices associated with the incidence rate of clinical mastitis. Journal of Dairy Science 82:1643-1654.

Washburn et al. 2002. Reproduction, mastitis, and body condiiton of sesonally calved Holstein and Jersey cows in confinement or pasture systems. Journal of Dairy Science 85:105-111.

In all production systems, feed and water provision should allow all cattle to have unimpeded access to feed and water (DeVries and Keyserlingk, 2005; DeVries *et al.*, 2005, DeVries *et al.*, 2004; Endres *et al.*, 2005). Feeders and water providers should be clean and free of spoiled, mouldy, sour, unpalatable feed and faecal contamination.

Milking parlour, free stalls, standings, cubicles, races, chutes and pens should be free from sharp edges and protrusions to prevent injury to cattle.

Where possible, there should be a separated area to closely examine individual *animals*, which should have restraining facilities.

A hospital area for sick and injured *animals* should be provided so the *animals* can be treated away from healthy *animals*.

Hydraulic, pneumatic and manual equipment should be adjusted, as appropriate, to the size of cattle to be handled. Hydraulic and pneumatic operated restraining equipment should have pressure limiting devices to prevent injuries. Regular cleaning and maintenance of working parts is imperative to ensure the system functions properly and safe for the cattle.

Mechanical and electrical devices used in facilities should be safe for cattle.

Dipping baths and spray races are sometimes used in dairy cattle production for ectoparasite control. Where these are used, they should be designed and operated to minimise the risk of crowding and to prevent injury and drowning.

Collecting yards (e.g. entry to the milking parlour) should be operated to minimise crowding and prevent injuries and lameness.

The loading areas and ramps should be designed to minimise stress and injuries for the *animals* and ensure the safety of the *animal handlers*, accordingly to Chapters 7.2., 7.3. and 7.4.

Outcome-based measurables: handling response, morbidity rate, mortality rate, behaviour, changes in weight and body condition score, physical appearance, lameness, growth curve.

g) Emergency plans

Where the failure of power, water and feed supply systems could compromise *animal welfare*, dairy producers should have contingency plans to cover the failure of these systems. These plans may include the provision of fail-safe alarms to detect malfunctions, back-up generators, access to maintenance providers, ability to store water on farm, access to water cartage services, adequate on-farm storage of feed and alternative feed supply.

Dairy producers should have contingency plans to cover the evacuation of animals in case of emergency (e.g. fire, flooding).

Outcome-based measurables: mortality, morbidity, behaviour, vocalization.

2. Recommendations on stockmanship and animal management

Good management and stockmanship are critical to providing an acceptable level of *animal welfare*. Personnel involved in handling and caring for dairy cattle should be competent and receive appropriate training to equip them with the necessary practical skills and knowledge of dairy cattle behaviour, health, physiological needs and welfare. There should be a sufficient number of *animal handlers* to ensure the health and welfare of the cattle.

a) Biosecurity and animal health

i) Biosecurity and disease prevention

Biosecurity means a set of measures designed to maintain a *herd* at a particular health status and to prevent the entry or spread of infectious agents.

Biosecurity plans should be designed and implemented, commensurate with the desired *herd* health status and current *disease* risk and, for OIE *listed diseases* in accordance with relevant recommendations found in the *Terrestrial Code*.

These biosecurity plans should address the control of the major sources and pathways for spread of pathogens:

– cattle,

– other domestic animals and *wildlife*,

– people,

– equipment,

– *vehicles*,

– air,

– water supply,

– feed,

– semen.

Outcome-based measurables: morbidity rate, mortality rate, reproductive efficiency, changes in weight and body condition score, changes in milk yield.

ii) Animal health management

Animal health management means a system designed to optimise the physical and behavioural health and welfare of the dairy *herd*. It includes the prevention, treatment and control of *diseases* and conditions affecting the *herd*.

There should be an effective programme for the prevention and treatment of *diseases* and conditions, formulated in consultation with a *veterinarian*, where appropriate. This programme should include the recording of production data (e.g. number of lactating cows, animal movements in and out of the *herd*, milk yield), morbidities, mortalities, culling rate and medical treatments. It should be kept up to date by the *animal handler*. Regular monitoring of records aids management and quickly reveals problem areas for intervention.

For parasitic burdens (e.g. endoparasites, ectoparasites and protozoa), a programme should be implemented to monitor, control and treat, as appropriate.

Lameness is a problem in dairy *herds*. *Animal handlers* should monitor the state of feet and claws and maintain foot health (Chapinal *et al.*, 2009; Sprecher *et al.*, 1997). Except where lameness is already at a low level, a program should be implemented to reduce the incidence of lameness and maintain it at a low level.

**Justification for Revision**

The European Food Safety Authority (EFSA) has concluded that " Most lame cows are in pain and have greater difficulty in coping with their living conditions than non-lame cows because of the effects of the foot or leg disorder on walking, lying comfort, standing up and avoidance behaviour". EFSA recommended that "Because of the high risk of lameness in dairy cattle all dairy farmers should implement a lameness prevention programme". European Food Safety Authority, 2009. Scientific Opinion of the Panel on Animal Health and Welfare of the on a request from European Commission on welfare of dairy cows. *The EFSA Journal* (2009) 1143:1-38.

Those responsible for the care of cattle should be aware of early specific signs of *disease* or distress (e.g. coughing, ocular discharge, changing locomotion score), and non-specific signs such as reduced feed and water intake, reduction of milk production, changes in weight and body condition, changes in behaviour or abnormal physical appearance (FAWC, UK, 1993; Ott *et al.*, 1995; Anonymous, 1997; Blecha, 2000; EU-SCAHAW, 2001; Webster, 2004; Mellor and Stafford, 2004; Millman *et al.*, 2004; OIE, 2005; Appleby, 2006; Broom, 2006; Gehring *et al.*, 2006; Fraser, 2008; Blokhuis *et al.*, 2008; Mench, 2008; Fraser, 2009; Ortiz-Pelawz *et al.*, 2008; FAWAC, Ireland; Hart, 1987; Tizard, 2008; Weary *et al.*, 2009).

Cattle at higher risk of *disease* or distress will require more frequent inspection by *animal handlers*. If *animal handlers* suspect the presence of a *disease* or are not able to correct the causes of *disease* or distress, they should seek advice from those having training and experience, such as *veterinarians* or other qualified advisers, as appropriate. In the event of an *OIE listed disease* being suspected or diagnosed, the official veterinary services should be notified (see Chapter 1.1. of the *Terrestrial Code*).

*Vaccinations* and other treatments administered to cattle should be undertaken by people skilled in the procedures and on the basis of veterinary or other expert advice.

*Animal handlers* should have experience in managing chronically ill or injured cattle, for instance in recognising and dealing with non-ambulatory cattle, especially those that have recently calved. Veterinary advice should be sought as appropriate.

Non-ambulatory cattle should have access to water at all times and be provided with feed at least once daily. They should not be transported or moved except for treatment or diagnosis.

Such movements should be done carefully using methods avoiding excessive lifting. At no time should cows be pulled by a chain attached to the leg, pushed off of trucks, or forced to stand using methods that cause additional pain and suffering. Animals that are unlikely to recover or will not be treated should be euthanized using an accepted method described in Chapter 7.6 in the location they are discovered, without delay. If a cow must be moved, she should be gently rolled onto a sled or other device where the sled can be pulled to a new location..

**Justification for Revision**

Animal protection organizations have documented severe welfare problems with moving downed cattle, especially spent dairy cows, and feel the issue deserves more attention here. The statement that non-ambulatory cattle should be moved using "methods avoiding excessive lifting" does not protect cows from the types of abusive treatment that we have seen in the field. For example, cows, unable to walk, are forced down loading ramps off of trucks, have their tails twisted in an effort to get them stand, are pushed with a forklift, and pulled by chains wrapped around a limb, further exacerbating pain and causing injury (see video here: www.youtube.com/watch?v=kaM7Hpu47FY). If the OIE code is to have meaningful language on downed animals, this language must be strengthened to exclude the common but unacceptable practices, especially in the dairy cattle chapter.

There is much scientific and practical support for the language changes we recommend:

EFSA. 2009. Scientific report on the effects of farming systems on dairy cow welfare and disease: Report of the Panel on Animal Health and Welfare. Annex to the EFSA Journal 1143:1-38. www.efsa.europa.eu/en/efsajournal/doc/1143r.pdf

Green et al. 2008. Factors associated with occurrence and recovery of nonambulatory dairy cows in the United States. Journal of Dairy Science 91:2275-2283.

Stull et al. 2007. A review of the causes, prevention, and welfare of nonambulatory cattle. Journal of the American Veterinary Medical Association 231(2):227-234.

2008. What to do about downer cows? Hoard's Dairyman, August 25. www.vetmed.ucdavis.edu/iawti/local-assets/pdfs/downer_workshop.pdf

*Animal handlers* should also be competent in assessing fitness to transport.

In case of chronic *disease* or injury, when treatment has been attempted and recovery deemed unlikely (e.g. cattle that are unable to stand up, unaided or refuse to eat or drink), the *animal* should be humanely killed (AABP, 1999; AVMA, 2007) and in accordance to Chapter 7.6.

*Animals* suffering from photosensitisation should be offered shade.

Outcome-based measurables: morbidity rate, mortality rate, reproductive efficiency, behaviour, physical appearance and changes in weight and body condition score, changes in milk yield.

iii) Emergency plans

Emergency plans should cover the management of the farm in the face of an emergency *disease outbreak*, consistent with national programmes and recommendations of *Veterinary Services* as appropriate.

b) Nutrition

The nutrient requirements of dairy cattle have been well defined. Energy, protein, mineral and vitamin content of the diet are major factors determining milk production and growth, feed efficiency, reproductive efficiency, and body condition (National Research Council, 2001).

Cattle should be provided with access to an appropriate quantity and quality of balanced nutrition that meets their physiological needs. Where cattle are maintained in outdoor conditions, short term exposure to climatic extremes may prevent access to nutrition that meets their daily physiological needs. In such circumstances the *animal handler* should ensure that the period of reduced nutrition is not prolonged and that extra food and water supply are provided if welfare would otherwise be compromised.

*Animal handlers* should have adequate knowledge of appropriate body condition scores for their cattle and should not allow body condition to go outside an acceptable range according to breed and physiological status (Roche *et al.*, 2004; Roche *et al.*, 2009).

Feedstuffs and feed ingredients should be of satisfactory quality to meet nutritional needs. Where appropriate, feed and feed ingredients should be tested for the presence of substances that would adversely impact on animal health (Binder, 2007).

The relative risk of digestive upset in cattle increases as the proportion of grain increases in the diet or if quality of silage is poor. Therefore, grains if given to dairy cattle should be introduced slowly and constitute no more than 50% of the daily diet. Palatable fibrous food (at least 10%), such as silage, grass and hay, should be available ad libitum to meet metabolic requirements in a way that promotes digestion and ensures normal rumen function.

**Justification for Revision:**

While we support the acknowledgement that a diet high in grain risks “digestive upset,” we don’t believe this statement goes far enough, and it certainly doesn’t provide any guidance as to what constitutes an appropriate amount of grain in the diet of dairy cattle.

Abnormally concentrated diets can lead to rumen acidosis (Kleen et al. 2003. Subacute ruminal acidosis: A review. Journal of Veterinary Medicine 50:406-414) and laminitis (Donovan et al. 2004. Influence of transition diets on occurrence of laminitis in Holstein dairy cows. Journal of Dairy Science 87:73-84), among other conditions.

Abrupt dietary changes can result in shock or death (Goff. 2006. Major advances in our understanding of nutritional influences on bovine health. Journal of Dairy Science 89: 1292-1301).

*Animal handlers* should understand the impact of cattle size and age, weather patterns, diet composition and sudden dietary changes in respect to digestive upsets and their negative consequences (displaced abomasum, sub-acute ruminal acidosis, bloat, liver abscess, laminitis) (Enemark, 2008; Vermunt and Greenough, 1994). Where appropriate, dairy producers should consult a cattle nutritionist for advice on ration formulation and feeding programmes.

Particular attention should be paid to nutrition in the last month of pregnancy, with regards to energy balance, roughage and micronutrients, in order to minimise calving and post-calving diseases and body condition loss (Drackley, 1999; Bertoni *et al.*, 2008; Huzzey *et al.*, 2005).

Calves over seven days old should receive a daily ration of at least 200 grams of roughage. At 15 weeks of age or older, at least 500 gram of roughage, of which at least 10% is long fiber feedstuff, should be provided. To promote welfare the feed should contain sufficient iron to ensure a minimum hemoglobin level of 6.0 mmol/l.

**Justification for Revision:**

1. Feeding calves all-liquid diets limits the physiological development of the fore-stomach and the normal process of rumination, and can also lead to hairball formation, which can clog the rumen and result in digestive problems and even death (Cozzi et al. 2002. The provision of solid feeds to veal calves. Journal of Animal Science 80:357-366).

Morrisse et al. (1999. Influence of dry feed supplements on different parameters of welfare in veal calves. Animal Welfare 8:43-52) studied changes in the rumen of calves fed either an all-liquid diet or ones supplemented with pelleted straw and cereals and found that calves on the pellet-supplemented diet showed increased reticulo-rumen weight, the presence of small papillae that help nutrient absorption from food, and significantly fewer hairballs.

2. In 2006 the European Food Safety Authority (EFSA) recommended blood hemoglobin concentrations to be maintained at a minimum of 6.0 mmol/l throughout the life of the calf (European Food Safety Authority. 2006. Scientific opinion on the risks of poor welfare in intensive calf farming systems. An update of the Scientific Veterinary Committee report on the welfare of calves. Adopted May 24, 2006. The EFSA Journal 366:1-36).

Numerous scientific studies have linked milk-replacer diets with insufficient iron levels.

Reece & Hotchkiss. 1987. Blood studies and performance among calves reared by different methods. Journal of Dairy Science 70:1601-1611.

Welchman et al.1988. Hematology of veal calves reared in different husbandry systems and the assessment of iron deficiency. Veterinary Record 123:505-510.

Dairy producers should become familiar with potential micronutrient deficiencies or excesses for housed and pastured production systems in their respective geographical areas and use appropriately formulated supplements where necessary.

All cattle, including unweaned calves, need an adequate supply and access to palatable water that meets their physiological requirements and is free from contaminants hazardous to cattle health (Lawrence *et al.*, 2004b; Cardot *et al.*, 2008).

Outcome-based measurables: mortality rates, morbidity rates, behaviour, changes in weight and body condition score, reproductive efficiency, changes in milk yield, growth curve.

c) Social environment

Management of cattle should take into account their social environment as it relates to *animal welfare,* particularly in housed systems (Le Neindre, 1989; Jóhannesson and Sørensen, 2000; Bøe and Færevik, 2003; Bouissou *et al.*, 2001; Kondo *et al.*, 2003; Sato *et al.*, 1993). Problem areas include: agonistic and oestrus activity, mixing of heifers and cows, feeding cattle of different size and age in the same pens, high stocking density, insufficient space at the feeder, insufficient water access and mixing of bulls.

Management of cattle in all systems should take into account the social interactions of cattle within groups. The *animal handler* should understand the dominance hierarchies that develop within different groups and focus on high risk *animals*, such as very young, very old, small or large size for cohort group, for evidence of bullying and excessive mounting behaviour. The *animal handler* should understand the risks of increased agonistic interactions between *animals*, particularly after mixing groups. Cattle that are suffering from excessive agonistic activity should be removed from the group (Bøe and Færevik, 2003; Jensen and Kyhn, 2000; von Keyserlingk *et al.*, 2008).

*Animal handlers* should be aware of the *animal welfare,* problems that may be caused by mixing of inappropriate groups of cattle, and provide adequate measures to minimise them (e.g. introduction of heifers in a new group, mixing of *animals* at different production stages that have

different dietary needs) (Grandin, 1998; Grandin, 2003; Grandin, 2006; Kondo *et al.*, 2003).

Horned and non-horned cattle should not be mixed because of the risk of injury (Menke *et al.*, 1999).

Outcome-based measurables: behaviour (e.g. lying times), physical injuries, changes in weight and body condition score, physical appearance (e.g. cleanliness), lameness scores, changes in milk yield, morbidity rate, mortality rate, growth curve.

d) Stocking density

High stocking densities may increase injuries and have an adverse effect on growth curve, feed efficiency, and behaviour such as locomotion, resting, feeding and drinking (Martin and Bateson, 1986; Kondo *et al.*, 2003).

Stocking density should be managed such that crowding does not adversely affect normal behaviour of cattle (Bøe and Færevik, 2003). This includes the ability to lie down freely without the risk of injuries, move freely around the pen and access feed and water. Stocking density should also be managed such that weight gain and duration of time spent lying is not adversely affected by crowding (Petherick and Phillips, 2009a). If abnormal behaviour is seen, measures should be taken such as reducing stocking density.

In pastured systems, stocking density should depend on the available feed and water supply and pasture quality (Stafford and Gregory, 2008).

Outcome-based measurables: behaviour, morbidity rate, mortality rate, changes in weight and body condition score, physical appearance, changes in milk yield, parasite burden, growth curve.

e) Protection from predators

Cattle should be protected as much as possible from predators.

Outcome-based measurables: mortality rate, morbidity rate (injury rate), behaviour, physical appearance.

f) Genetic selection

Welfare and health considerations, in addition to productivity, should be taken into account when choosing a breed or subspecies for a particular location or production system (Lawrence *et al.*, 2001; Lawrence *et al.*, 2004a; Boissy and Le Neindre, 1997; Boissy *et al.*, 2007; Jensen *et al.*, 2008; Veissier *et al.*, 2008; Dillon *et al.*, 2006; Macdonald *et al.*, 2008). Examples of these include nutritional maintenance requirement, ectoparasite resistance and heat tolerance.

Individual *animals* within a breed should be selected to propagate offspring that exhibit traits beneficial to animal health and welfare by promoting robustness and longevity. These include resistance to infectious and production related *diseases*, ease of calving, fertility, body conformation and mobility, and temperament.

The use of cows genetically selected for very high milk yields entails certain risks to health and welfare. Such cows are more susceptible to a range of health problems including lameness, reduced fertility and disease, especially mastitis (European Food Safety Authority, 2009).

Outcome-based measurables: morbidity rate, mortality rate, behaviour, physical appearance, reproductive efficiency, lameness, human-animal relationship, growth curve, body condition score outside an acceptable range.

**Justification for Revision**

In a comprehensive review of the scientific literature, the European Food Safety Authority concluded “Long term genetic selection for high milk yield is the major factor causing poor welfare, in particular health problems, in dairy cows. … The genetic component underlying milk yield has also been found to be positively correlated with the incidence of lameness, mastitis, reproductive disorders and metabolic disorders.”

European Food Safety Authority, 2009. Scientific Opinion of the Panel on Animal Health and Welfare on a request from European Commission on welfare of dairy cows. The EFSA Journal (2009) 1143, 1-38.

g) Artificial insemination, pregnancy diagnosis and embryo transfer

Semen collection should be carried out by a trained operator in a manner that does not cause pain or distress to the bull and in accordance with Chapter 4.6.

Artificial insemination and pregnancy diagnosis should be performed by a competent operator.

Embryo transfer should be performed under an epidural or other anesthesia by a trained operator, preferably a *veterinarian* or a *veterinary para-professional*.

Outcome-based measurables: behaviour, morbidity rate, reproductive efficiency

h) Sire selection and calving management

Dystocia can be a welfare risk to dairy cattle. Heifers should not be bred before they are at stage of physical maturity sufficient to ensure the health and welfare of both dam and calf at birth. The sire has a highly heritable effect on final calf size and as such can have a significant impact on ease of calving. Sire selection for embryo implantation, insemination or natural mating, should take into account the maturity and size of the female.

Pregnant cows and heifers should be managed during pregnancy so as to achieve an appropriate body condition range for the breed. Excessive fatness increases the risk of dystocia and metabolic disorders during late pregnancy or after parturition.

Cows and heifers should be monitored when they are close to calving. *Animals* observed to be having difficulty in calving should be assisted by a competent handler as soon as possible after they are detected.

Outcome-based measurables: morbidity rate (rate of dystocia), mortality rate (cow and calf), reproductive efficiency, body condition score.

i) New born calves

Receiving adequate immunity from colostrum generally depends on the volume and quality of colostrum ingested, and how soon after birth the calf receives it.

*Animal handlers* should ensure that calves receive sufficient colostrum within 24 hours of birth to provide passive immunity. Where possible, calves should continue to receive colostrum or equivalent for at least 5 days after birth.

Where new born calves need to be transported, this should be carried out according to Chapter 7.3.

Calves should be handled and moved in a manner which minimises distress and avoids pain and injury.

Outcome-based measurables: mortality rate, morbidity rate, growth curve.

**Suggested Revision**

Since newborn calves are especially vulnerable, this section should be expanded to cover additional topics to better ensure the welfare of these young animals. We recommend the following:

Calving aids should not be used to speed the birthing process, only to assist in cases of dystocia, and should not cause undue pain, distress, or further medical problems.

Newborn calves are susceptible to hypothermia. The temperature, ventilation, and air quality of the birthing area should meet the requirements of the newborn calf. Soft, dry bedding and supplemental heat can help prevent cold stress.

Calving pens should be thoroughly cleaned and disinfected between births.

Calves from different sources should not be mixed.

j) Cow-calf separation and weaning

Different strategies to separate the calf from the cow are utilised in dairy cattle production systems. These include early separation (usually within 48 hours of birth) or a more gradual separation (leaving the calf with the cow for a longer period so it can continue to be suckled). Separation can be stressful for both cow and calf (Newberry and Swanson, 2008; Weary *et al.*, 2008).

For the purposes of this chapter, weaning means the change from a milk-based diet to a fibrous diet. This change should be done gradually and calves should be weaned only when their ruminant digestive system has developed sufficiently to enable them to maintain growth, health and welfare (Roth *et al.*, 2009).

If necessary, dairy cattle producers should seek expert advice on the most appropriate time and method of weaning for their type of cattle and production system.

Outcome-based measurables: morbidity rate, mortality rate, behaviour, physical appearance, changes in weight and body condition score, growth curve.

k) Rearing of replacement stock

Young calves are at particular risk of thermal stress. Special attention should be paid to management of the thermal environment (e.g. provision of additional bedding, nutrition or protection to maintain warmth and appropriate growth).

~~Where possible,~~ Replacement stock should be reared in groups after the age of two weeks, unless otherwise directed by a veterinarian. Animals in groups should be of similar age and physical size (Bøe and Færevik, 2003; Jensen and Kyhn, 2000).

When in individual pens, each calf should have enough space to be able to turn around, rest, stand up and groom comfortably. A solid lying area with bedding (or mats) should be provided. Individual pen walls should not be solid and should allow calves to have direct contact with other calves.

**Justification for Revision:**

Although the recommendation of a solid lying area is given in Section 1e, it should be repeated here in the section for replacement stock, along with a recommendation for bedding or matting (see references for bedding provided in comments for Section 1e).

Housing in individual pens prevents social contact and limits opportunities for movement. Due to the inherent welfare problems seen with prolonged isolation, **the US veal industry has acknowledged that calves raised for veal should be housed in groups**. While the vast majority of veal calves in the United States were raised in individual pens a decade or so ago, today more than half are housed in group pens, and all will be by the end of 2017.

Several studies have documented the benefits of group housing, with no disadvantages in health or weight gains, including the following:

Chua et al. 2002. Effects of pair versus individual housing on the behavior and performance of dairy calves. Journal of Dairy Science 85:360-364.

Phillips. 2004. The effects of forage provision and group size on the behavior of calves. Journal of Dairy Science 87:1380-1388.

Replacement stock should be monitored for cross-sucking and appropriate measures taken to prevent this occurring (e.g. provision of sucking devices, use of nose guards or temporary separation).

Particular attention should be paid to the nutrition, including trace elements, of growing replacement stock to ensure good health and that they achieve an appropriate growth curve for the breed and farming objectives.

Outcome-based measurables: morbidity rate, mortality rate, behaviour, physical appearance, changes in weight and body condition score, growth curve, reproduction efficiency.

l) Milking management

Milking should be carried out in a calm and considerate manner in order to avoid pain and distress. Special attention should be paid to the hygiene of the udder and milking equipment (Barkema *et al.*, 1999; Breen *et al.*, 2009).

A regular milking routine should be established relevant to the stage of the lactation and system (e.g. female in full lactation may need more frequent milking to relieve udder pressure). All milking cows should be checked for abnormal milk at all milking times.

Where a milking machine is used, it should be maintained, according to the recommendations of the manufacturer, in order to minimise teat and udder damage.

Special care should be paid to *animals* being milked for the first time. If possible, they should be familiarised with the milking facility prior to giving birth.

Long waiting times before and after milking can lead to health and welfare problems (e.g. lameness, reduced time to eat). Management should ensure that waiting times are minimised.

Outcome-based measurables: morbidity rate (e.g. udder health), behaviour, changes in milk yield, physical appearance (e.g. lesions).

m) Painful husbandry procedures

Husbandry practices are routinely carried out in cattle for reasons of management, *animal welfare* and human safety. Those practices that have the potential to cause pain should be performed in such a way as to minimise any pain and stress to the *animal*.

Alternative procedures that reduce or avoid pain should be considered.

Example of such interventions include: dehorning, tail docking and identification.

i) Dehorning (including disbudding)

Dairy cattle that are naturally horned are commonly dehorned in order to reduce animal injuries and hide damage, improve human safety, reduce damage to facilities and facilitate transport and handling (Laden *et al.*, 1985; Petrie *et al.*, 1996; Singh *et al.*, 2002; Sutherland *et al.*, 2002; Stafford *et al.*, 2003; Stafford and Mellor, 2005). Where practical and appropriate for the production system, the selection of polled cattle is preferable to dehorning.

Where it is necessary to dehorn dairy cattle, producers should seek guidance from veterinary advisers as to the optimum method, use of anesthesia and analgesia, and timing for their type of cattle and production system.

Performing ~~dehorning or~~ disbudding at an early age, ~~where practicable~~, rather than dehorning adult cattle and the use of anaesthesia ~~or~~ and analgesia, under the supervision of a *veterinarian*, are strongly recommended.

Thermal cautery of the horn bud by a trained operator with proper equipment is the recommended method in order to minimise post-operative pain. This should be at an appropriate age before the horn bud has attached to the skull. ~~Other methods of dehorning include: removal of the horn buds with a knife and the application of chemical paste to cauterise the horn buds. Where chemical paste is used, special attention should be paid to avoid chemical burns to other parts of the calf or to other calves.~~ Application of chemical paste to the horn buds is not recommended due to the pain involved and the risk of burns to the skin and eyes.

Methods of dehorning when horn development has commenced involve the removal of the horn by cutting or sawing through the base of the horn close to the skull. Operators removing developed horns from dairy cattle should be trained and competent in the procedure used, and be able to recognise the signs of complications (e.g. excessive bleeding, sinus infection). Dehorning should only be performed with the combined use of anesthesia during the procedure and analgesia post procedure.

**Justification for Revision**

1. There should be a strongly worded recommendation against the use of chemical paste. The paste can leak caustic chemicals from the site of application, even if applied carefully, damaging the skin and eyes of the calves, the udder of mother cows, and even other calves. Caustic paste ranks second in severity compared to other methods, only following amputation dehorning, on the basis of the acute cortisol, production and behavioural responses (see Stafford & Mellor 2005 below).

2. The use of both anesthetic and (not or) analgesics post procedure are required, particularly for dehorning, as research has shown that local anesthetic does not provide adequate post-operative pain relief (see discussion of dehorning in Rushen et al. 2008).

Morisse et al. 1995. Effect of dehorning on behaviour and plasma cortisol responses in young calves. Applied Animal Behaviour Science 43(4):239-247.

Rushen et al. 2008. The Welfare of Cattle. Dordrecht, The Netherlands: Springer, pp. 122-124.

Stafford & Mellor. 2005. Dehorning and disbudding distress and its alleviation in calves. The Veterinary Journal 169:337-349.

Stilwell et al. 2009. Effect of caustic paste disbudding, using local anaesthesia with and without analgesia, on behaviour and cortisol of calves. Applied Animal Behaviour Science 116:35-44.

ii) Tail docking

Research shows that tail docking does not improve the health and welfare of animals, therefore it is not recommended, as a routine procedure, to dock the tails of dairy cattle. As an alternative, trimming of tail hair should be considered where maintenance of hygiene is a problem.

iii) Identification

Ear-tagging, ear-notching, tattooing, and radio frequency identification devices (RFID) are preferred methods of permanently identifying dairy cattle from an *animal welfare* standpoint. Both hot iron and freeze branding cause intense pain. Freeze branding is painful but is thought to be less painful than branding with a hot iron. Both methods should be avoided as there are other ways to mark cattle (e.g. electronic identification or ear-tags). In some situations however hot iron branding may be required or be the only practical method of permanent identifying dairy cattle. If cattle are branded, it should be accomplished quickly, expertly and with the proper equipment. Identification systems should be established also according to Chapter 4.1.

**Justification for Revision**

Both hot iron and freeze branding are painful but freeze branding is the less painful of the two. Both, however, should be avoided, as praticable alternatives exist.

Lay et al. 1992. Effects of freeze or hot-iron branding of Angus calves on some physiological and behavioral indicators of stress. Applied Animal Behavior Science 33:137-147.

Schwartzkopf-Genswein et al. 1997. Behavior of cattle during hot-iron and freeze branding and the effects on subsequent handling ease. Journal of Animal Science 75:2064-2072.

Outcome-based measurables: postprocedural complication rate, morbidity rate, behaviour, physical appearance, changes in weight and body condition score.

n) Inspection and handling

Dairy cattle should be inspected at intervals appropriate to the production system and the risks to the health and welfare of the cattle. In most circumstances, cattle should be inspected at least once a day. Some *animals* may benefit from more frequent inspection for example: neonatal calves (Larson *et al.*, 1998; Townsend, 1994), cows in late gestation (Boadi and Price, 1996; Mee, 2008; Odde, 1996), newly weaned calves, cattle experiencing environmental stress and those that have undergone painful husbandry procedures or veterinary treatment.

Dairy cattle identified as sick or injured should be given appropriate treatment at the first available opportunity by competent and trained *animal handlers*. If *animal handlers* are unable to provide appropriate treatment, the services of a *veterinarian* should be sought.

Recommendations on the handling of cattle are also found in Chapter 7.5. In particular handling aids that may cause pain and distress (e.g. sharp prods, electric goads) should be used only in extreme circumstances. Dairy cattle should not be prodded in sensitive areas including the udder, eyes, nose or ano-genital region.

Where dogs are used, as an aid for cattle herding, they should be properly trained. *Animal handlers* should be aware that presence of dogs can cause fear and should keep them under control at all times. The use of dogs is not appropriate in housed systems.

Cattle are adaptable to different visual environments. However, exposure of cattle to sudden or persistent movement or visual contrasts should be minimised where possible to prevent stress and fear reactions.

Electroimmobilisation should not be used.

Outcome-based measurables: human-animal relationship, morbidity rate, mortality rate, behaviour, reproductive efficiency, changes in weight and body condition score, changes in milk yield.

o) Personnel training

All people responsible for dairy cattle should be competent according to their responsibilities and should understand cattle husbandry, animal handling, milking routines, behaviour, biosecurity, signs of *disease*, and indicators of poor *animal welfare* such as stress, pain and discomfort, and their alleviation.

Competence may be gained through formal training or practical experience.

Outcome-based measurables: human-animal relationship, morbidity rate, mortality rate, behaviour, reproductive efficiency, changes in weight and body condition score, changes in milk yield.

p) Disaster management

Plans should be in place to minimise and mitigate the effects of natural disasters or extreme climatic conditions, such as heat stress, drought, blizzard and flooding. Humane *killing* procedures for sick or injured cattle should be part of the emergency action plan. In times of drought, animal management decisions should be made as early as possible and these should include a consideration of reducing cattle numbers.

Reference to emergency plans can also be found in points 1 g) and 2a) iii) of Article 7.X.5.

q) Humane killing

For sick and injured cattle a prompt diagnosis should be made to determine whether the animal should be treated or humanely killed.

The decision to kill an *animal* humanely and the procedure itself should be undertaken by a competent person.

Reasons for humane killing may include:

– severe emaciation, weak cattle that are non-ambulatory or at risk of becoming downers;

– non-ambulatory cattle that will not stand up, refuse to eat or drink, have not responded to therapy;

– rapid deterioration of a medical condition for which therapies have been unsuccessful;

– severe, debilitating pain;

– compound (open) fracture;

– spinal injury;

– central nervous system *disease*;

– multiple joint *infections* with chronic weight loss; and

– premature calves that are unlikely to survive, or calves that have debilitating congenital defect.

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