USA Comments

DRAFT CHAPTER 7.X.

ANIMAL WELFARE AND DAIRY CATTLE PRODUCTION SYSTEMS

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 kept housed ~~in confinement~~ and are fully dependent on humans to provide for basic animal needs such as food, shelter and water ~~on a daily basis~~. The type of ~~the~~ housing will depends on the environment, climatic conditions and management system. The animals may be loose housed or tethered, within this housing system.

   Rationale: Editorial

2. Pastured

   These are systems where cattle ~~have the freedom to roam~~ live outdoors, and ~~where the cattle~~ have some autonomy over diet selection ~~(through grazing)~~, water consumption and access to shelter. Pastured systems exclude any housing except that required for milking.

3. Combination systems

   These are systems where cattle are managed in ~~exposed to~~ any combination of housed ~~housing, confinement or~~ and pasture ~~husbandry methods~~ production systems, 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~~ impact of design and management, given that both of these can affect *animal welfare* ~~will be affected by both system design and stockmanship~~.

~~Consideration should also be given to the design of the system and stockmanship.~~

Rationale: Sentence is redundant with language in the preceding paragraph: "These criteria can be considered as a tool to monitor impact of design and management, given that both of these can affect *animal welfare*."

1. Behaviour

Certain behaviours could indicate an *animal welfare* problem. These include decreased feed intake, altered locomotory behaviour and posture, altered lying time, ~~human-animal relationship,~~ altered respiratory rate and panting, coughing, shivering and huddling, grooming and the demonstration of stereotypic, agonistic, ~~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 infectious and metabolic *diseases* ~~such as mastitis and metritis~~, lameness, ~~metabolic diseases, parasitic diseases~~, post-partum and post-procedural complications 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). Mastitis, lameness, reproductive and metabolic diseases are ~~also~~ particularly important animal health problems for adult dairy cows. Scoring systems, such as body condition, lameness ~~scoring~~ and milk quality, can provide additional information (Sprecher *et al*., 1997; Roche *et al*., 2004; EFSA, 2012)

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

Rationale: Editorial suggestions. Because these issues area already mentioned, the first sentence is explanatory, rather than new information as suggested by "also".

~~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.~~

Rationale: Similar such language is not proposed for Chapter 7.9.4.2., and the reasons for including this paragraph specifically in the Dairy chapter are not clear.

3. Mortality ~~and culling~~ rates

Mortality ~~and culling~~ rates, affect the length of productive life, and like morbidity rates, may be direct or indirect indicators of the *animal welfare* status (Moss, 1992). Depending on the production system, estimates of mortality and culling rates can be obtained by analysing the rate and causes of *death* ~~and culling~~ and ~~the~~ their temporal ~~tempore~~ and spatial patterns of ~~mortality~~ occurrence. Mortality ~~and culling~~ rates should ~~can~~ be ~~reported~~ recorded regularly, i.e. daily, monthly, annually or with reference to key husbandry activities within the production cycle.

Rationale: Similar such language is not proposed for Chapter 7.9.4.3., and it is not clear why "and culling" is specifically needed in this Dairy chapter. The inserted text is redundant as relevant information is captured in morbidity/mortality rates and the cause of death.

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

In growing *animals*, body weight ~~gain (failure to achieve appropriate~~ changes outside the expected growth rate ~~curve)~~ especially excessive sudden loss ~~may be~~ are ~~an~~indicators of poor ~~animal health and~~ animal health and *animal welfare*. Future performance, including milk yield and fertility, of replacement heifers can be affected by under or over-nutrition at different stages of rearing.

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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.

Rationale: Similar such language is not proposed for deletion in Chapter 7.9.4.4., and it is not clear why "animal health and" is specifically deleted in this Dairy chapter, but retained in the Beef Welfare chapter.

5. Reproductive efficiency

Reproductive efficiency can be an indicator of animal health and *animal welfare* status. Poor reproductive performance~~, compared with the expected standard for that particular breed,~~ can indicate *animal welfare* problems. Examples may include:

Rationale: Highly productive Holstein dairy cows are sub-fertile, (Moore and Thatcher, 2006) and this is directly tied to their level of milk production. Further, milk yield is genetically correlated with a number of serious production diseases including mastitis (Schukken et al., 1990; Van Dorp et al., 1998; Heringstad et al., 2003), lameness, and ketosis (Fleischer et al., 2001; Van Dorp et al., 1998). To compare reproductive efficiency with an "expected standard" for the breed could result in a false negative diagnosis of animal welfare problems, because the fertility standard for the Holstein breed is too low.

The United States strongly suggests removing the text "compared with the expected standard for that particular breed" because even though the whole population may be sub-fertile, the welfare problems remain and reproductive efficiency continues to be a valuable indicator of the problem.

Moore K and Thatcher W. 2006. Major advances associated with reproduction in dairy cattle. Journal of Dairy Science 89:1254–1266.

Heringstad B, Klemetsdal G and Steine T. 2003. Selection responses for clinical mastitis and protein yield in two Norwegian dairy cattle selection experiments. Journal of Dairy Science 86:2990-2999.

Fleischer P, Metzner M, Beyerbach M, Hoedemaker M and Klee, W. 2001. The relationship between milk yield and the incidence of some diseases in dairy cows. Journal of Dairy Science, 84(9)2025-2035.

Van Dorp TE, Dekkers JC, Martin SW, and Noordhuizen JP. 1998. Genetic parameters of health disorders, and relationships with 305-day milk yield and conformation traits of registered Holstein cows. Journal of Dairy Science 81(8):2264-70.

Schukken YH, Grommers FJ, Van de Geer D, Erb HN and Brand A. 1990. Risk factors for clinical mastitis in herds with a low bulk milk somatic cell count. 1. Data and risk factors for all cases. J Dairy Sci 73:3463-3471.

- anoestrus or extended post-partum interval ~~prolonged post-partum anoestrus~~,
- low conception rates,
- high abortion rates,
- high rates of dystocia,
- retained placenta,
- metritis,

– 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, injuries and lesions,

– discharges (e.g. from nose, eyes, reproductive tract),

– feet abnormalities,

– abnormal posture indicating pain (e.g. rounded back, head low),

– emaciation and dehydration.

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 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 abnormally or excessively during restraint and handling,

– disturbed behaviour in the chute or race such as reluctance to enter ~~behaviour~~,

– ~~percentage of~~ *animals* slipping or falling.

8. Complications ~~due to~~ from ~~routine~~ common procedures ~~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*, and treatment of certain conditions (e.g. disbudding, hoof trimming, displaced abomasum.) However, if these procedures are not performed properly, *animal welfare* can be compromised. Indicators of such problems could include:

Rationale: Editorial suggestion to clarify that the examples apply to the three previously listed bases for performance, rather than simply to "treatment of certain conditions".

– post procedure infection ~~and~~, swelling and pain behaviour,

– reduced feed and water intake

– post procedure body condition and weight loss,

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– morbidity and 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, environmental management, and stockmanship which include~~s~~ responsible husbandry and provision of 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 and management 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, lighting, 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, animal density (area and volume available per animal), lack of sufficient shade, ~~and~~ animal factors including breed, age, body condition, metabolic rate and stage of lactation, 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, reduction of animal density, 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~~ especially 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~~ especially abnormal postures, shivering and huddling, growth rate ~~curve~~, body condition and weight loss.

b) Lighting

~~Confined~~ Housed cattle that do not have sufficient 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 and safe inspection of the cattle (Arab *et al.*, 1995; Dahl *et al.*, 2000; Phillips *et al.*, 2000). The lighting should not cause discomfort to the animals. Housed dairy cows should be provided with subdued night time lighting.

Outcome-based measurables: behaviour, especially altered locomotory behaviour, morbidity, physical appearance~~,~~ ~~mobility~~

Request: We could not find technical information supporting this recommendation. The United States would appreciate being provided the scientific support for how lighting affects dairy cattle locomotory behavior, morbidity, and physical appearance.

c) Air quality

Good air quality and ventilation ~~is an~~ are important ~~factor~~ for the health and welfare of cattle by reducing the risk of respiratory discomfort and *diseases*. ~~It~~ Air quality 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~~ Air composition is influenced by ~~the stocking~~ animal 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 to prevent~~ing~~ the build-up of effluent gases (e.g. ammonia and hydrogen sulphide), including those from manure storage systems, and dust in the ~~confinement~~ housing unit. ~~Poor air quality and poor ventilation are risk factors for respiratory discomfort and *diseases*.~~ ~~The ammonia level in enclosed housing should not exceed 25 ppm.~~ Harmful ammonia levels cause a strong, unpleasant and irritating smell, strong taste, and may cause skin, eye, nose or throat irritation, in humans, and are also likely harmful for cattle.

Rationale: "Poor air quality and poor ventilation are risk factors for respiratory discomfort and *diseases*" is suggested for deletion as it is repetitive to the information in the first paragraph.

Although the prescriptive standard that ammonia "not exceed 25 ppm" has been adopted into other production system chapters (7.9.5.2.c. and 7.10.4.2.c.), the United States requests that the OIE Animal Welfare chapters continue to strive for outcome-based parameters. The concern is not with the prescriptive standard, *per se*. In fact, the U.S. Occupational Health and Safety Administration (OHSA) has an 8-hour limit of ammonia exposure at 25 ppm in the workplace.

We are proposing this new language that is taken from the information on the risks of ammonia exposure provided by the U.S. Centers for Disease Control (CDC), Agency for Toxic Substances and Disease Registry, Division of Toxicology and Human Health Sciences.

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

d) Noise

Cattle are adaptable to different levels and types of noise. However, exposure of cattle to sudden and unexpected noises, including from personnel, should be minimised where possible to prevent stress and fear reactions. Ventilation fans, alarms, 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 especially altered locomotory behaviour, changes in milk yield.

Request: We could not find technical information supporting this recommendation. The United States would appreciate being provided the scientific support for how noise alters dairy cattle locomotory behavior, and causes 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; Barrientos *et al.,* 2013; Chapinal *et al*., 2013).

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

In housed systems calving areas should be thoroughly cleaned and provided with fresh bedding between each calving. Group pens for calving should be managed based on the principle 'all in - all out'. The group calving pen should be thoroughly cleaned and provided with fresh bedding between each animal group. The time interval between first and last calving of cows kept in the same group calving pen should be minimised.

Outdoor calving pens and paddocks should be selected to provide the cow with a clean and comfortable environment. (See also 7.x.5.1 point 2 point i.)

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, wet bedding (Fregonesi *et al.*, 2007)) should not be included in the determination ~~calculation~~ of the area available for cattle to lie down.

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

~~Facilities~~ Flooring, bedding, resting surfaces and outdoor yards should be cleaned as conditions warrant, to ensure good hygiene and minimise disease risk.

In pasture systems, stock should be rotated between paddocks to ensure good hygiene and minimise disease risk.

Some form of bedding should be provided to all animals housed on concrete. In straw, sand or other bedding systems such as rubber mats, crumbled-rubber-filled mattresses and waterbeds, the bedding should be suitable (e.g. hygienic, non-toxic) and maintained to provide cattle with a dry and comfortable place in which to lie (Fisher *et al.*, 2003; Zdanowicz *et al.*, 2004; Bell, 2007; Bell and Huxley, 2009;Fregonesi, *et al.,* 2009).

The design of a standing, or cubicle, or free stall, should be such that the *animal* can stand and lie comfortably on a solid surface (e.g. length, width and height should be appropriate for the size of the largest animal) (Tucker *et al.* 2003; Tucker *et al.*, 2004; Bell 2007; Cook *et al.*, 2008; Tucker *et al.*, 2009; Bernardi *et al.*, 2009; Anderson, 2010). There should be sufficient room for the animal to rest and to rise adopting normal postures, to move its head freely as it stands up, and to groom itself without difficulty. ~~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 at least one space per cow (Fregonesi *et al.*, 2007).~~

Rationale: This sentence that the United States recommends for deletion is repetitive to the 2nd sentence of the 1st paragraph of this Article, 7.x.5.1.e), that reads "All cattle in a group should have sufficient space to lie down and rest at the same time".

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

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 tethered whether indoors or outdoors, they should, as a minimum, be able to lie down, ~~and~~ stand up, maintain normal body posture, ~~and turn around~~ unimpeded. Cows kept in tie stall housing should be allowed sufficient untethered exercise to prevent welfare problems. When tethered outdoors they should be able to walk. *Animal handlers* should be aware of the higher risks of welfare problems where cattle are tethered (Loberg *et al.*, 2004; Tucker *et al.*, 2009).

Rationale: It is not possible to turn around while being tethered indoors at a stanchion.

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, especially ~~(e.g.~~ lameness~~,~~ and injury rates (e.g. hock and knee injuries and skin lesions ~~pressure sores~~), behaviour, especially altered posture, grooming and locomotory behaviour, changes in weight and body condition ~~score~~, physical appearance (e.g. hair loss, cleanliness score), growth rate ~~curve~~.

f) Location, construction and equipment

The impacts of climate and geographical factors on dairy cattle should be evaluated when farms are established. Efforts should be made to mitigate any negative impacts of those factors, including matching dairy breed to location and consideration of alternate sites.

~~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).

In pasture and combination systems tracks and races between the milking area and paddocks should be laid out and managed so as to minimise the overall distances walked. Construction and maintenance of tracks and races, including their surface, should minimise any risk to the welfare of the cattle, especially from foot health.

Equipment for milking, handling and restraining dairy cattle should only be used in a way that minimises the risk of injury, pain or distress. Manufacturers of such equipment should consider animal welfare when preparing operating instructions.

Electrified equipment ~~designed to control animal behaviour~~ (e.g. cow trainer, electrified gate)if not designed and maintained properly, ~~that has been associated with increased incidence of~~ may cause welfare problems ~~should not be used~~.

Rationale: This is consistent with the later comments about electrical fences in the next paragraph that these devices should be used only according to manufacturer's instructions.

Electric fences should be well-designed and maintained to avoid welfare problems, and used only according to manufacturer's instructions

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Cattle in all ~~housed or pastured~~ production systems should be offered adequate space for comfort and socialisation (Kondo *et al.*, 2003).

Where access to an outdoor area, including pasture, is possible, there may be additional benefits to dairy cattle from the opportunity to graze and exercise, and a decreased risk of lameness.

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. Pastures and pens should be free of debris and refuse that could cause harm or injury to the animals.

Rationale: New language for consideration.

Where possible, there should be a separate~~d~~ area ~~to closely examine~~ where individual *animals*~~,~~ can be examined closely and which should have restraining facilities.

~~A hospital area for~~ When relevant, sick and injured *animals* should ~~be provided so the *animals* can~~ be treated away from healthy *animals* When a dedicated space is provided this should accommodate all the needs of the animal e.g. recumbent animals may require additional bedding or alternative floors.

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 designed and operated to minimise stress ~~crowding~~ and prevent injuries and lameness.

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

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

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~~ contact information for key service 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.~~

Preventive measures for emergencies should be input-based rather than outcome based. Contingency plans should be documented and communicated to all responsible parties. Alarms and back-up systems should be checked regularly.

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 up-to-date ~~appropriate~~ training to equip them with the necessary practical skills and knowledge of dairy cattle behaviour, handling, health, biosecurity, 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 and maintained, commensurate with the best possible ~~desired~~ *herd* health status, available resources and infrastructure, 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, including introductions to the herd,
– calves coming from different sources,
– other domestic animals, ~~and~~ *wildlife*, and pests,
– people including sanitation practices,
– equipment, tools and facilities,
– *vehicles*,
– air,
– water supply, feed and bedding,
– manure, waste and dead stock disposal
– ~~feed,~~
– semen and embryos.

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* (in particular mastitis, lameness, reproduction and metabolic diseases).

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, births, 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.

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~~At national or regional level there should be programmes to gather records and monitor diseases of importance for animal welfare.~~

Rationale: This is beyond the scope of the OIE. For example, Grass Founder in horses can cause laminitis, which is an animal welfare issue. We do not support National and Regional level programmes to gather records and monitor for Grass Founder.

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 cattle ~~herds~~. *Animal handlers* should take measures to prevent lameness, and monitor the state of feet and claws and maintain foot health (Sprecher et al., 1997; Flower and Weary, 2006; Chapinal et al., 2009)

Those responsible for the care of cattle should be aware of early specific signs of *disease* or distress (e.g. coughing, ocular discharge, changes in milk appearance, 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 be competent ~~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 and milked as necessary. They should be provided shade and protected from predators. They should not be transported or moved unless absolutely necessary ~~except~~ for treatment or diagnosis. Such movements should be done carefully using methods avoiding dragging or excessive lifting.

Animal handlers should also be competent in assessing fitness to transport, as described in Chapter 7.3.

In case of chronic *disease* or injury, when treatment has failed or ~~been attempted and~~ recovery ~~deemed~~ is unlikely (e.g. cattle that are unable to stand up, unaided or refuse to eat or drink), the *animal* should be humanely killed (AABP, 2013; AVMA, 2013) and in accordance to Chapter 7.5 or Chapter 7.6 as applicable.

Animals suffering from photosensitisation should be provided with ~~offered~~ shade and where possible the cause should be identified.

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

iii) Emergency plans for disease outbreaks

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. Feeding systems should be designed to minimise agonistic behaviour.

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~~ scoring systems 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 and stored to minimise contamination and deterioration (CA 2004, CAC/RCP 54-2004). 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, when grain is given to dairy cattle it should be introduced slowly and constitute no more than 50% of the daily diet.~~ Palatable fibrous food 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.

Rationale: The recommendation is too prescriptive. The first sentence of that paragraph already addresses the concern and risk of grain proportion in diets.

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; Huzzey *et al.*, 2005; Bertoni *et al.*, 2008; Goldhawk *et al,* 2009; Jawor *et al.,* 2012; Vickers *et al.,* 2013).

Feeding calves all-liquid diets limits the physiological development of the fore-stomach and the normal development of the process of rumination. Calves over two weeks old should have a sufficient daily ration of fibrous food to promote rumen development (Reece & Hotchkiss, 1987)

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.*, 2004a; Cardot *et al.*, 2008).

Outcome-based measurables: mortality rates, morbidity rates, behaviour, especially agonistic

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behaviour (at the feeding area), changes in weight and body condition ~~score~~, reproductive efficiency, changes in milk yield, growth rate ~~curve~~ vocalisation.

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; Sato *et al.*, 1993; Jóhannesson and Sørensen, 2000; Bøe and Færevik, 2003; Bouissou *et al.*, 2001; Kondo *et al.*, 2003). 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~~ decreased space allowance, insufficient space at the feeder, insufficient water access and mixing of bulls.

Rationale: Editorial comment for language consistency with Article 7.x.5.2.d).

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 agonistic behaviour ~~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).

When other measures have failed, cattle that are expressing excessive agonistic activity or excessive mounting behaviour 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). When farmers intend to change the phenotype of their animals, they should take appropriate measures to reduce this risk.

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

d) ~~Stocking density~~ Space allowance

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

Space allowance ~~Stocking density~~ should be managed taking into account different areas for lying, standing and feeding. ~~such that c~~ Crowding should not ~~does not~~ adversely affect normal behaviour of cattle and durations of time spent lying. (Bøe and Færevik, 2003).

~~This includes the ability to All cattle should be able to rest simultaneously, and each animal to lie down freely, stand up and move around freely. without the risk of injuries, move freely around the pen and access feed and water.~~ Housing allows cattle to easily stand up, lie down, adopt normal resting postures and have visual contact with other cattle. In growing animals space allowance ~~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, 2009). If abnormal behaviour is seen, corrective measures should be taken, such as increasing space allowance, ~~reducing stocking density~~, redefining the areas available for lying, standing and feeding.

Rationale: The first original first sentence has the text "move around freely", which is not possible in an indoor stanchion facility with a tethered cow. Animals should be able to scratch or exhibit other behaviors but turning around while tethered is not possible. This would also be consistent with the recommended language change to 7.X.5 1 e).

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, especially depressive behaviour, morbidity rate, mortality rate, changes in weight and body condition ~~score~~, physical appearance, changes in milk yield, parasite burden, growth rate ~~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.*, 2004b; Boissy and Le Neindre, 1997; Dillon *et al.*, 2006; Boissy *et al.*, 2007; Jensen *et al.*, 2008; Veissier *et al.*, 2008; Macdonald *et al.*, 2008). ~~Examples of these include nutritional maintenance requirement, ectoparasite resistance and heat tolerance.~~

In breeding programmes, at least as much attention should be paid to criteria conducive to the improvement of cattle welfare, including health, as to production criteria. The conservation and development of genetic lines of dairy cattle, which limit or reduce animal welfare problems, should be encouraged. Examples of such criteria 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.

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

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 any teaser animal used during collection and in accordance with Chapter 4.6.

Artificial insemination and pregnancy diagnosis should be performed by a competent operator and in accordance with the provisions of Chapter 4.7..

Embryo transfer should be performed under an epidural or other anaesthesia by a trained operator, preferably a *veterinarian* or a *veterinary para-professional* and in accordance with the provisions of Chapter 4.7.and Chapter 4.8.

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

h) Dam and ~~S~~sire selection and calving management

Dystocia is ~~can be~~ a welfare risk to dairy cattle (Proudfoot *et al*, 2009). Heifers should not be bred before they reach ~~are at~~ the 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

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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, especially rate of dystocia, retained placenta and metritis, body condition ~~score~~.

i) New born calves (see also 7.x.5 1e)

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 and ventilation of the birthing area should consider the needs of the newborn calf. Soft, dry bedding and supplemental heat can help prevent cold stress.

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~~, preferably from their own dam, and~~ within 24 hours of birth to provide passive immunity. Colostrum is most beneficial if received during the first six hours after birth. Where there is risk of disease transfer from the dam, colostrum from a healthy cow should be used. ~~Where possible, calves should continue to receive colostrum or equivalent for at least five days after birth.~~

Rationale: For health or welfare purposes it not necessary for a calf to receive colostrum from their own dam. Indeed it is contraindicated if the dam's colostrum is of poor quality. The most important aspects of colostrum feeding are quantity, quality and time after birth and these aspects are already covered. The justification for feeding colostrum for five days is questioned and it could contribute to confusion about the critical colostrum feeding requirements. The United States is unaware of any sound scientific information supporting the value of colostrum feeding to newborn calves beyond 24 hours in production settings. If this is included a credible source should be listed.

~~Where new~~ Recently born calves ~~need to be~~ should not be transported until the navel ~~has healed~~, is dry, or is dipped in a disinfectant such as iodine, and after which time any transport required ~~this~~ should be carried out according to Chapter 7.3.

Rationale: Complete healing is an extended process that can take weeks. The critical issue is that the umbilical cord remnants are dry, or protected (dipped) and are not a nidus for infection.

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 rate ~~curve~~.

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 is ~~can be~~ stressful for both cow and calf (Newberry and Swanson, 2008; Weary *et al.*, 2008). Early separation before bonding is established can be less stressful.

16

Rationale: It is common industry practice in the United States to recommend early cow-calf separation to ensure improved animal health and welfare outcomes. Early separation helps to minimize exposure of calves to infections and allows for manual feeding and verifcation that calves receive adequate colostrum in a timely manner. In comparing the behavior of cow-calf pairs separated at 6 hours, 1 day or 4 days after birth, Weary and Chua (2000) only observed changes in behavioral responses of those cows separated 4 days after birth, such as increased vocalizations. Similarly, Lidfors (1996) found that cows separated from their calves 4 days after birth spent less time lying, vocalized more, and ruminated less than those cows separated from their calves immediately after birth. Weary and Chua (2000) also found calves separated at 4 days moved more and spent more time with their head out of the pen than calves separated at 6 hours. Krohn et al (1999) reported that calves separated at 4 days were more fearful of humans compared to calves separated immediately after birth.

References:

Weary DM, Chua B. (2000) Effects of early separation on the dairy cow and calf Separation at 6h, 1 day and 4 days after birth. *App Anim Behav Sci* 67:177-188.

Lidfors LM (1996) Behavioural effects of separating the dairy calf immediately or 4 days post-partum *App Anim Behav Sci* 49:269-283.

Krohn CC, Foldager J, Mogensen (1999) Long-term effect of colostrum feeding method on behaviour in female dairy calves. *Acta Agric Scan* 49:57-64.

For the purposes of this chapter, weaning means the change from a milk-based diet to a fibrous diet and the weaned calf no longer receives milk in its diet. This change should be made ~~done~~ gradually and calves should be weaned only when their ruminant digestive system has developed sufficiently to enable them to maintain growth, health and good welfare (Roth *et al.*, 2009).

~~If necessary,~~ ~~d~~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 after separation (vocalisations, activity of the cow and calf) , physical appearance, changes in weight and body condition ~~score~~, growth rate ~~curve~~.

k) Rearing of replacement stock

General comments: This section deals with replacement stock but it also includes recommendation for calves. It may be useful to clarify the distinction between this section and the 2 previous ones the category of animals and the period of life targeted.
Where possible, replacement stock should be reared in groups. Animals in groups should be of similar age and physical size (Jensen and Kyhn, 2000; Bøe and Færevik, 2003).

Whatever the housing system, it should first allow farmers to monitor easily health events and to minimize the risk of disease spread. 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). (Camiloti, et al. 2012)

Rationale: The risk of poor welfare associated with disease is of particular relevance for calves and need immediate corrective action.

Where possible, replacement stock should be reared in groups. Animals in groups should be of similar age and physical size (Jensen and Kyhn, 2000; Bøe and Færevik, 2003).

Rationale: Second paragraph should be reworded to take into account those who use individual calf housing. The current wording seems to prefer one production system over the other. There are proven benefits to raising calves in individual housing.

Whether reared individually or in group pens ~~When in pens~~, each calf should have enough space to be able to turn around, rest, stand up and groom comfortably and see ~~and touch~~ other animals. (see also 1.e).

Rationale: The purpose some farmers chose to utilize individual hutches for the first few weeks is to avoid animal contact, thereby minimizing disease transfer.

Replacement stock should be monitored for cross-sucking and appropriate measures taken to prevent this occurring (e.g. provide~~sion of~~ sucking devices, revise or modify feeding practices, provide other environmental enrichments ~~use of nose guards or temporary separation~~) (Seo *et al*., 1998; Jemsem, 2003; De Paula Vieira *et al*., 2010; Ude *et al*., 2011).

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, especially cross-sucking, altered grooming and lying behaviours, injuries, physical appearance, changes in weight and body condition ~~score~~, growth rate ~~curve, reproduction efficiency~~.

l) Milking management

Milking, whether by hand or machine, 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 personnel, the udder and milking equipment (Barkema *et al.*, 1999; Breen *et al.*, 2009). All cows should be checked for abnormal milk at every milking.

Milking machines, especially automated milking systems, should be used and maintained in a manner which minimises injury to teats and udders. Manufacturers of such equipment should provide operating instructions that consider animal welfare.

A regular milking routine should be established relevant to the stage of ~~the~~ lactation and the capacity of the system. ~~(e.g.~~ For example, cows ~~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.~~

Animal handlers should regularly check the information provided by the milking system and act accordingly to protect the welfare of the cows.

~~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, milk quality, 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.~~

~~Future options for enhancing *animal welfare* in relation to these procedures include: ceasing the procedure and addressing the current need for the operation through management strategies;~~

~~breeding cattle that do not require the procedure; or replacing the current procedure with a non-surgical alternative that has been shown to enhance *animal welfare.*~~

Rationale: This document should only address current practices, not those that could happen in the future. This document can be updated at a later date as practices change.

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

i) Disbudding and ~~D~~ dehorning ~~(including disbudding)~~

Dairy cattle that are naturally horned are commonly disbudded or 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.

Rationale: The United States suggests adding disbudded or before the first use of "dehorned" in the text, to avoid giving the impression that the traumatic operation of dehorning – which is subsequently strongly discouraged – is common. All subsequent uses of "dehorn" do make the distinction appropriately.

Performing disbudding at an early age where practicable, is preferred, rather than dehorning older cattle.

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 done at an appropriate age before the horn bud has attached to the skull.

Guidance from a *veterinarian* or *veterinary paraprofessional* as to the optimum method and timing for the type of cattle and production system should be sought. The use of anaesthesia and analgesia are strongly recommended when performing disbudding, and should always be used when dehorning. Appropriate restraint systems and procedures are required when disbudding or dehorning.

Other methods of disbudding 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. ~~This method is not recommended because pain management is difficult.~~

Rationale: This statement may be based on studies where this procedure was conducted on calves 4-8 weeks of age; however this procedure should be used on younger calves. Calves treated with caustic paste at less than 14 days of age (as recommended in product directions) exhibit less evidence of pain than alternative procedures. Vickers et al (2005) compared the responses of calves (aged 10-35 days) to hot iron disbudding and caustic paste disbudding. They found that caustic paste disbudding causes behavioral signs of discomfort and pain for at least 4 hours but that the pain is less than that caused by dehorning with a hot iron, even when performed under local anesthesia.
Vickers KJ, Neil L, Kiehlbauch LM & Weary DM (2005) Calf response to caustic paste and hot-iron dehorning using sedation with and without local anaesthetic *J Dairy Sci* 88:1454-1459.

Operators should be trained and competent in the procedure used, and be able to recognise the signs of pain and complications that may include excessive bleeding, sinus infection.

~~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, and the use of anaesthesia or 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.~~

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).

ii) Tail docking

Research shows that tail docking does not improve the health and *welfare of* dairy cattle ~~*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 (Sutherland and Tucker, 2011).

iii) Identification

~~Ear-tagging, ear-notching, tattooing, freeze branding and radio frequency identification devices (RFID) are preferred methods of permanently identifying dairy cattle from an *animal welfare* standpoint. The least invasive approach should be adopted whichever method is chosen (e.eg minimum number of ear tags per ear, size of notch). It should be accomplished quickly, expertly and with proper equipment. 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.~~

~~Freeze branding is thought to be less painful than branding with a hot iron. Both methods should be avoided as alternative identification methods exist (e.g. electronic identification or ear-tags). When branding is used, operator should be trained and competent in procedures used and be able to recognise signs of complications.~~

~~Identification systems should be established also according to Chapter 4.1.~~

Ear-tagging, ear-notching, tattooing, freeze branding and radio frequency identification devices (RFID) are preferred methods of permanently identifying dairy cattle from an *animal welfare* standpoint. 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.

Rationale: The United States suggests that the proposed Article revert to the original language, which is identical to the language in Article 7.9.5.3.e.V). It is not clear why information on the same topic needs to be different between the Animal Welfare and Beef Cattle Production chapter (7.9.) and this chapter of Dairy Production.

Outcome-based measurables: ~~postprocedural complication rate~~, morbidity rate (post-procedural complications), abnormal behaviour, vocalisations, 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~~ Lactating cows should be inspected at least once a day. Some *animals* ~~may benefit from~~ should be inspected more frequently, ~~inspection~~ for example: neonatal calves (Larson *et al.*, 1998; Townsend, 1994), cows in late gestation (Boadi and Price, 1996; Mee, 2008; Odde, 1996, Proudfoot, K., et al. 2013), 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 and ~~provided that the animal can move freely~~ *animals* that have little or no room to move should not be subjected to physical force or goads and other aids which compel movement. Dairy cattle should not be prodded in sensitive areas including the udder, face, eyes, nose or ano-genital region. Electric prods should not be used on calves (see also point 3 of Article 7.3.8.).

Rationale: This alternative language is taken from Chapter 7.5.2.1.f.

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 stress the cattle and cause fear and should keep them under control at all times. The use of dogs is not appropriate in housed systems, collection yards or other small enclosures where the cattle cannot move freely away.

Cattle are adaptable to different visual environments. However, exposure of cattle to sudden ~~or persistent~~ movement or changes in 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, especially altered locomotory behaviour, vocalisations. ~~reproductive efficiency, changes in weight and body condition score, changes in milk yield.~~

Specific comment: It is not clear how a human-animal relationship could be measured to be a useful outcome.

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, reproductive management techniques, 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.

Specific comment: It is not clear how a human-animal relationship could be measured to be a useful outcome.

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p) Disaster management

Plans should be in place to minimise and mitigate the effect of disasters (e.g. earthquake, flooding, fire, hurricane). Such plans may include evacuation procedures, identifying high ground, maintaining emergency food and water stores, destocking and humane killing when necessary.

~~Plans should be in place to minimise and mitigate~~There should also be plans to address 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.

Humane *killing* procedures for sick or injured cattle should be part of the disaster management plan.

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.

– as part of disaster management response

For a description of acceptable methods for humane *killing* of dairy cattle see Chapter 7.6.

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