The OIE ad hoc Group on beef cattle production systems (the ad hoc Group) met at the OIE Headquarters on 27-29 July 2009.

The members of the ad hoc Group and other participants at the meeting are listed at Appendix I. The adopted Agenda is at Appendix II.

**Agenda Item 1: Welcome and introduction**

Dr. Sarah Kahn, Head of the Trade Department of the OIE, welcomed all members and thanked them for their agreement to work with the OIE on this important topic. Dr. Kahn commented to the ad hoc Group that the development by the OIE of animal welfare standards relevant to livestock production systems is a relatively new area of work for the OIE. Dr. Kahn emphasised that this topic is of great interest to OIE Members and many organisations that are associated with the OIE.

Dr. Kahn reminded members that in developing their recommendations the diverse conditions relevant to all 174 OIE Members should be taken into account and the recommendations sufficiently flexible to make implementation feasible for Members to the greatest extent possible.

Dr. Kahn explained the procedure of adoption of OIE standards. The report of the meeting will be sent electronically to the OIE Animal Welfare Working Group (AWWG) for comments and (in September 2009) will be presented to the Terrestrial Animal Health Standards Commission (the Code Commission). Dr. Kahn drew the attention of members to one of the discussion papers, the report of the first meeting of the ad hoc Group on animal welfare and livestock production systems (Paris, 8-10 April 2008) in which three key elements influencing animal welfare are described, i.e.: animal health, environment and management.

Dr. Vallat, Director General of the OIE, joined the group on the final day of the meeting. He welcomed and thanked members for their participation. He stressed that OIE standards should be flexible, not prescriptive, and they should be both outcome- and science-based. It is important to list relevant scientific references in the report as science is the unique common denominator for OIE Members. Dr. Vallat confirmed that the development of OIE standards is normally based on a two-year cycle and indicated that the OIE would probably reconvene the ad hoc group early in 2010 to review Member comments on the Group’s report.

Dr. Thomson thanked the Director General of the OIE for this opportunity to work on a very important topic and summarised the work done by the Group during the meeting. Dr. Thomson welcomed OIE work on this topic, because animal welfare is important to the beef industry and relevant international guidelines are urgently needed. Dr. Thomson also mentioned that farmers accept their responsibilities for the welfare of their livestock and are in the best position to ensure good animal welfare.
Mr. Mohammed thanked the Director General for this opportunity to work on such an important issue and asked for the OIE to give more support to African farmers to help them to understand the work of the OIE. In the past, African farmers have seen the OIE as a regulatory organisation that develops strict and sometimes restrictive conditions for international trade. Now they are starting to see the OIE as an organisation that supports capacity building but they need more information. Dr. Vallat thanked Mr. Mohammed and informed him that the OIE puts priority on strengthening the capacities of developing country Members to help them to meet OIE standards.

**Agenda Item 2: Confirmation of the Terms of Reference (TOR)**

The members discussed the proposed TOR. Dr. Stuardo explained that the TOR and the ongoing work on livestock production systems were based on the discussion paper prepared by the OIE permanent Animal Welfare Working Group (AWWG) and the report of the *ad hoc* Group on Animal Welfare and Livestock Production Systems. Dr. Stuardo recommend that members discuss the pros and cons of outcome-based and resource-based criteria and that they consider following a similar approach to that followed by the *ad hoc* Group on Welfare and the Production of Broiler Chickens. This could also help OIE Members in their analysis of the report. The Group discussed and agreed to Dr. Stuardo’s recommendations and undertook to take into account the OIE guiding principles on animal welfare (see Chapter 7.1. of the *Terrestrial Code*).

**Agenda Item 3: Discussion of working documents and other relevant documents provided by members**

Documents submitted by the *ad hoc* Group Members were discussed at the meeting and some were used as references in developing a draft new chapter for the *Terrestrial Code* (Agenda Item 4).

The report of the *ad hoc* Group was structured along the following lines:

1. Definition of beef cattle production systems for use in the new *Terrestrial Code* chapter;
2. Scope of the recommendations;
3. Description of existing production systems for beef cattle production systems;
4. Identification and brief description of relevant ‘outcome based measurables’;
5. Recommendations on animal health, environment and management of beef cattle, with each being linked to outcome-based measurables as appropriate;
6. Future work;
7. References;
8. A draft new chapter for the *Terrestrial Code* (at Appendix IV).

The *ad hoc* Group adopted the proposed TOR (see Appendix III).

1. Definition of beef cattle for use in the new *Terrestrial Code* chapter

The *ad hoc* Group considered that the OIE recommendations should be designed with application to commercial beef production and proposed the following definition:

“Beef cattle production system’ means all commercial cattle productions systems where the purpose of the operation includes (some or all of) breeding, rearing and finishing of cattle intended for the production of beef for human consumption.

2. Scope of the recommendations

The scope of the recommendations is the ‘on farm’ aspects of beef production systems, from birth of the calf to finishing. The cow-calf, stocker-grower and finishing operations are of key importance in considering welfare of beef cattle.
3. Description of commercial beef production systems

Commercial beef production systems may be classified as follows:

a) **Intensive** (stocker and finishing): includes cattle that are in confinement and those that depend on the daily provision of feed, shelter and water in addition to other animal husbandry activities (Keane and Allen, 1998; Drennan and McGee, 2009; Petherick et al., 2009b);

b) **Extensive** (all areas): beef cattle raised in grazing habitats, which may very widely (Hemsworth et al., 1995; Waterhouse, 1996; Swanson, 2004; MacNeil and Heitschmidt, 2004; McGee and Drennan, 2005; Petherick, 2005; Drennan and McGee, 2009);

c) **Semi intensive** (mixed): includes any combination of intensive and extensive systems (McGee et al., 2005; Stafford and Gregory, 2008).

4. Criteria (measurables) that are useful indicators of beef welfare

The *ad hoc* Group noted that measurables can be based on the outcomes for the animal (outcome-based criteria) or the design of the system (resource-based or design-based criteria). The advantages and disadvantages of these two groups of criteria are well described in the report of the first meeting of the *ad hoc* group on animal welfare and livestock production systems, found as an annex to the report of the AWWG meeting of June 2008 [http://www.oie.int/eng/bien_etre/A_WG_AW_June%202008.pdf](http://www.oie.int/eng/bien_etre/A_WG_AW_June%202008.pdf)

The *ad hoc* Group agreed that outcome-based measurables may give a better indication of animal welfare because they reflect the complex interaction of several variables (e.g. experience and attitude of handlers and disease situation) that may be overlooked when relying on resource based criteria that focus on the design of the system. However, many animal-based measurables (e.g. mortality or weight gain) are not highly specific and are frequently dependent on multiple factors, which interact (e.g. environment, disease, management).

The *ad hoc* Group listed the following outcome-based measurables as potential useful indicators of beef cattle welfare (Table 1).

**Table 1:** Outcome-based measurables as potential useful indicators of beef cattle welfare.

<table>
<thead>
<tr>
<th><strong>Beef cattle production</strong></th>
<th><strong>Animal-based criteria</strong></th>
<th><strong>Design-based criteria</strong></th>
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<tbody>
<tr>
<td>Animal health</td>
<td>Behaviour, mortality rates, weight gain, body condition scoring,</td>
<td>Planned herd health program,</td>
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<td></td>
<td>reproductive rates, morbidity rate</td>
<td>protection from predators,</td>
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<td>pasture management, selection</td>
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<td>of stock genotype, stock</td>
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<td></td>
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<td>handling</td>
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<tr>
<td>Nutrition/Water</td>
<td>Mortality rates, weight gain, body condition score (BCS), reproductive</td>
<td>Adequate feed and water,</td>
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<td></td>
<td>rates</td>
<td>pasture management, stocking</td>
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<td></td>
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<td>density, stock handling</td>
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<tr>
<td>Environment/shelter</td>
<td>Weight gain, mortality rates, physical</td>
<td>Availability and quality of</td>
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<td></td>
<td>appearance, behaviour, reproductive rates</td>
<td>water, stock handling,</td>
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<td>emergency action plan</td>
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<td>Human-animal interaction</td>
<td>Weight gain, chute exit speed,</td>
<td>Demonstrable competences of</td>
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<td></td>
<td>musculo-skeletal injuries, falling, electric prod use</td>
<td>handlers, facility design</td>
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<td>Husbandry procedures</td>
<td>Rate of post-procedure complications, weight gain, mortality</td>
<td>Training and demonstrable</td>
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<td></td>
<td>rates</td>
<td>competences of handlers</td>
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</tbody>
</table>
a) **Behaviour**

Certain behaviours could be an indicator of animal welfare problems. These include depression, anorexia, increased respiratory rate or panting, and the demonstration of stereotypic behaviours (Wiepkema et al., 1983; Moss, 1992; Desire et al., 2002; Appleby, 2006; Mason and Latham, 2004; Lawrence, 2008).

b) **Morbidity rates**

Morbidity rates could be direct or indirect indicators of the animal welfare situation. Understanding the aetiology of the disease or syndrome is important for detecting potential animal welfare problems (Blecha, 2000). In many cases the incidence of disease conditions (both infectious and non infectious diseases) is associated with management factors.

c) **Mortality rates**

Mortality rates, like morbidity rates, could be direct or indirect indicators of the animal welfare situation (Wittum et al., 1992; 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 (Waldner et al., 2001).

d) **Weight gain and body condition score**

In growing animals, weight gain could be an indicator of animal health and animal welfare. Poor body condition score and significant weight loss could be an indicator of compromised welfare in mature cattle.

e) **Reproductive rates**

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

- Anoestrus or extended post-partum interval
- Low conception rates
- Abortion rates

f) **Physical appearance**

Physical appearance can 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
- Coat that is rough or excessively soiled with faeces, mud or dirt
- Dehydration
- Emaciation
- Depression
g) **Handling responses**

Improper handling can result in fear and distress in cattle. Indicators could include:
- Chute exit speed (Burrow and Corbet, 2000)
- Chute behaviour score (A temperament scale has been developed for cattle to evaluate the extent of response to restraint in a squeeze chute, ranging from standing calmly to violently shaking the chute and trying to escape (Grandin, 1998))
- Locomotion problems and musculo-skeletal injuries
- Falling
- Rate of use of electric prod

h) **Rate of post-procedure complications**

Surgical and non-surgical procedures are commonly performed in beef 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 (Jubb et al., 2003). Indicators of such problems could include:
- Post procedure infection and swelling
- Myasis/miasis
- Gait abnormalities
- Mortality

i) **Post-mortem pathology**

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

j) **Survivability**

Survivability is the ability of an animal to remain alive or continue to exist. Survivability can be an indicator of animal health and animal welfare, as well as the conditions of management.

5. **Recommendations**

The *ad hoc* Group agreed that reference should be made as appropriate to existing OIE standards, i.e. on:
- Transport of animals
- Slaughter for human consumption
- Killing for disease control
- Identification and traceability
- Disease surveillance and reporting
- Animal feeding
- Use of antimicrobials
- Prevention and eradication of OIE listed diseases

The *ad hoc* Group made specific recommendations in regard to the elements listed below.
5.1. **Biosecurity and Animal Health**

5.1.1. **Biosecurity and disease prevention**

Biosecurity means a set of measures designed to protect a herd from the entry of infectious agents.

Biosecurity programmes should be implemented, commensurate with the risk of disease and in accordance with relevant recommendations found in *Terrestrial Code* chapters on OIE listed diseases.

These programmes should address the control of the major routes for disease and pathogen transmission:

- Cattle
- Other animals
- People
- Equipment
- Vehicles
- Air
- Water supply
- Feed

Outcome based measurables: morbidity rate, mortality rate, reproductive efficiency.

5.1.2. **Animal health management**

Animal health management is a means to prevent diseases occurring in cattle herds and to provide appropriate treatments for animals when disease occurs. There should be an effective programme for the prevention and treatment of diseases, consistent with the programs established by the Veterinary Services as appropriate.

Those responsible for the care of cattle should be aware of the signs of ill-health, such as reduced food and water intake, weight gain 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-Pelazw et al., 2008; FAWAC, Ireland; Sowell et al. 1999; Schwartzkopf-Genswein et al. 2003; Gibb et al., 1998; Buhman et al. 2000; Hart, 1987; Tizard, 2008; Weary et al., 2009).

Cattle at higher risk of disease require more frequent inspection by animal handlers. If animal handlers are not able to determine the causes of ill-health/distress or to correct these, or if they suspect the presence of a listed reportable disease, they should seek advice from those having training and experience, such as bovine veterinarians or other qualified advisers. Veterinary treatments should be prescribed by a qualified veterinarian.

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

Animal handlers should have experience in caring for downer cattle (Burton et al., 2009; Green et al. 2008; Grandin, 2001; Stull et al. 2007). They should also have experience in managing chronically ill and injured animals. Euthanasia of non-responding cattle should be done as soon as recovery is deemed not to be possible (AABP, 1999; AVMA, 2007).

Outcome based measurables: morbidity rate, mortality rate, reproductive efficiency, behaviour, physical appearance, and body condition score.
5.2. Environment

5.2.1. Thermal environment

Although cattle can adapt to a wide range of thermal environment (particularly if breeds are chosen as appropriate to the environmental conditions), sudden fluctuations in weather can cause heat or cold stress.

a) Heat stress

The thermal heat index (THI) is influenced by air temperature, relative humidity and wind speed (Silanikove, 2000; Hahn, 1999; Hahn et al., 2001; Brown-Brandl et al., 2003; Webster, 1991; Webster, 2001; Webster, 2003; Mader et al., 2004; Brosh et al., 2004; Gaughan et al., 2008; Sparke et al., 2001). As the THI increases, the risk of hyperthermia increases (Hahn and Mader, 1997). Cattle that have been fed for a longer period and are fatter are more susceptible to heat stress (Mader, 2003).

Animal handlers should be aware of the critical THI threshold for their animals. When the THI is expected to reach this threshold routine, daily husbandry activities that include cattle movement should cease. As the THI moves into emergency levels, animal handlers should institute an emergency action plan that could include the provision of shade (Mader et al., 1999b) and drinking water, or sprinkling water to penetrate the hair coat (Mitlohner et al., 2001).

b) Cold stress

Protection from wind and rain should be provided where possible, particularly for young stock that are outdoors for the first time (Higgins and Dodd, 1989; Mitlohner et al., 2002). Protection could be provided by natural or man made structures.

Animal handlers should ensure that cattle have access to adequate feed and water during cold stress. At times of extreme weather conditions, such as heavy snow falls or blizzards, animal handlers should institute an emergency action plan to provide cattle with shelter, feed and water.

Outcome based measurables: Mortality rates, physical appearance, behaviour.

5.2.2. Lighting

Confined cattle that do not have access to natural light should be provided with sufficient supplementary lighting for their health and welfare, to facilitate physiological and ethological (natural behaviour patterns) needs and to allow adequate inspection of the animals.

Outcome based measurables: Behaviour, morbidity, physical appearance.

5.2.3. Air quality

Good air quality is an important factor for the health and welfare of cattle in intensive and confined production systems. It is a composite variable of air constituents such as gases, dust and micro-organisms that is strongly influenced by the management of the beef producer. 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 CO₂, NH₃ and effluent gases in the confinement unit (Todd et al., 2008). Poor air quality and ventilation are risk factors for respiratory diseases.

Outcome based measurables: Morbidity rate, behaviour, mortality rate, weight gain, post-mortem pathologies.

5.2.4. Acoustic environment

Cattle are adaptable to different acoustic environments. However, exposure of cattle to sudden or loud noises should be minimized where possible to prevent stress and fear reactions (e.g. stampede) (Waynert et al., 1999). Ventilation fans, feeding machinery or other equipment should be constructed, placed, operated and maintained in such a way that they cause the least possible amount of noise.

Outcome based measurables: Behaviour.

5.2.5. Nutrition

The nutrient requirements of beef cattle have been well defined. Energy, protein, amino acid, mineral and vitamin contents of the diet are major factors determining the growth rate, feed efficiency, reproductive efficiency, and body composition. The ME requirement for maintenance (MEm) of an animal depends on its metabolic body size, or bodyweight (kgW ^0.75). For cattle, MEm is 0.5MJ/kgW^0.75 (Cecava, 1995; Spears, 1996; NRC, 1996; Keane and Allen 1998; Aharoni et al., 2004; McGee et al., 2005; Thompson and White, 2006; Freer, 2007; Preston, 2007).

Animal handlers should give cattle a level of nutrition that meets or exceeds their maintenance requirements (see reference above). Cattle in certain climates and production systems may experience short term periods of below maintenance nutrition without significantly compromising their welfare. Animal handlers should have adequate knowledge of the appropriate body condition score for their cattle and should not allow body condition score to drop below critical thresholds (Fordyce et al., 1990; Renquist et al., 2006). In times of severe drought, all steps should be taken to avoid starvation of animals wherever possible.

In intensive production systems cattle should have access to adequate feed and water supply to meet their physiological needs (Gonzalez, 2008; Gunter et al. 1994; Jacobs and van Niekerk, 1985; Zinn, 1989)

Feedstuffs and feed ingredients should be of an adequate quality to meet the nutritional needs of cattle. Under certain circumstances (e.g. drought, frost, and flood), feed and feed ingredients should be tested for the presence of substances (e.g. mycotoxins and nitrates) that can be detrimental to cattle health and welfare (Binder, 2007).
Cattle in intensive production systems typically consume diets that contain a high proportion of grain(s) (corn, milo, barley, grain by-products) and a smaller proportion of roughages (hay, straw, silage, hulls, etc.). As the proportion of grain increases in the diet, the relative risk of digestive upset in cattle increase. Animal handlers should understand the impact of cattle size, age, weather patterns, diet composition and sudden diet changes in respect to digestive upsets and their sequellae (acidosis, bloat, liver abscess, laminitis) (Nagaraja et al., 2007; Enemark, 2008; Vermunt and Greenough, 1994).

Where appropriate, beef producers may consult a nutritionist (private consultant, university or feed company employee) for advice on ration formulation and feeding programs.

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

The water quality and the method of supply can affect welfare. All cattle need adequate supply and access to palatable water that also meets their physiological requirements and free from contaminants potentially hazardous to cattle health (Lawrence et al., 2004b; Wright, 2007).

Outcome based measurables: Mortality rates, morbidity rates, behaviour, weight gain, body condition scoring, reproductive rates.

5.2.6. Flooring, bedding, resting surfaces (litter quality)

In all production systems cattle need a comfortable place to rest (Baxter et al., 1983; Baxter, 1992; Moberg and Mench, 2000; Mench et al., 1990; Ruis-Heutinck et al., 2000).

Pen floor management in intensive production systems can have a significant impact on cattle welfare (Ingvartsen et al., 1993; Rushen and de Passillé, 1992).

Mud depth should not consistently be deeper than the ankles of cattle in pens (De Rouchey et al., 2005).

Slopes of pens should be maintained to allow water to run off away from the feed bunks and not pool excessively in the pens.

If slope is not sufficient to allow for proper drainage, a mound should be constructed in each pen to allow cattle to have a dry place to lie down.

Pens should be thoroughly cleaned after each production cycle as conditions warrant.

If animals are housed in a slatted floor shed, the slat width should be appropriate to the hoof size of the animals to prevent injuries.

In straw or other bedding systems, the bedding should be maintained so that animals have a dry and comfortable place in which to lie.

Special requirements for slatted floor housing include the following:

Housed stock should have freedom of movement and ample floor space for lying, grooming and normal animal to animal interactions (Gygax et al. 2007).

A well designed, properly constructed and fully maintained slatted floor unit for cattle should provide the necessary comfort with minimum distress or injury to cattle. Escapes/creeps should be provided, if young calves are housed with adults, i.e. sucklers.
Housing of cattle is designed to provide shelter from winter climatic conditions and protect pastures from undue damage (poaching) in wet conditions particularly when grass is in short supply. Housing provides structured management (feeding, drinking, health check etc.) under controlled conditions. It also aids effective slurry and effluent control.

Slatted floor and loose bedded systems are two main house types used for accommodating beef animals. In many instances, hybrid house types have developed which are constructed using combinations of the above particularly in the situation where facilities have evolved over time e.g. the addition of slatted feed passage to a straw bedded loose house. In recent times the predominant house type in wetter areas utilises liquid manure storage systems. The move away from the traditional design layouts of open yards with self-feed silage has also been driven by the management problems associated with the high volumes of dirty water produced with these designs due to the high levels of annual rainfall.

Outcome based measurables: Morbidity rates (lameness), behaviour, weight gain, physical appearance.

5.2.7. Social environment

In extensive production systems, cattle form stable herds whose size appears to be limited only by the availability of pasture (Petherick, 2005). Cattle perceive a predator as a threat but not as a source of real alarm if they can maintain a satisfactory flight zone and can see (or think they can see) an escape route. Removing an individual from a herd will cause it distress. One exception is the cow about to calve, who will isolate herself from the herd to give birth. On open range and given plenty of space, cattle form stable sub-groups.

Management of cattle in outdoor and indoor intensive production systems methods should take into account the social environment of cattle as it relates to animal welfare (Le Neindre, 1989; Johannesson and Sørensen, 2000; Boe and Færevik, 2003; Bouissou et al., 2001; Würbel, 2009). Problem areas include: buller activity (Apley, 1999; Meyer et al., 2002, Blackshaw et al., 1997, Taylor et al., 1997), mixing of heifers and steers, mixing unfamiliar animals (Mench et al., 1990; Raussi, 2003; Gupta et al., 2005, Step et al., 2008; Uetake et al., 2007), feeding cattle of different size and age in same pens, insufficient space at the feeder (Gonzalez, 2008; Gunter et al. 1994; Jacobs and van Niekerk, 1985; Zinn, 1989; Gottardo et al., 2004), insufficient water access and mixing of bulls.

Buller animals should be identified and removed from the pen immediately and only be reintroduced with proper management practices. If reintroduction fails these animals should be housed separately from pen mates. Animal handlers should aim to group cattle of the same size and age in pens (Grandin, 1998; Grandin, 2003; Grandin, 2006). Depending on the feeding system used, the health status and the size of the cattle, animal handlers should provide adequate access to the feeder and water drinkers (Peel, 2003).

Adequate fencing should be provided to prevent animal welfare problems that may be caused by inappropriate mixing of groups of cattle.

Outcome based measurables: Behaviour, physical appearance, weight gain, morbidity and mortality rate

5.2.8. Stocking density

High stocking densities may have an adverse effect on animal welfare. Indicators may include growth rate, feed efficiency, survivability, carcass quality and behaviour (locomotion, resting, feeding and drinking behaviours) (Martin and Bateson, 1986; Gupta et al., 2007; Fisher et al., 1997b; Hickey et al., 2003a).
In extensive outdoors systems, stocking density should be managed to ensure an adequate feed supply for the cattle (Diaz-Solis et al., 2009; Stafford and Gregory, 2008).

In other production systems, stocking density should be managed to ensure that crowding does not adversely affect the key components of normal cattle behaviour (Ingvartsen and Anderson, 1993). Beef cattle should be able to lie down freely without the risk of injuries, move freely around the pen and access feed and water (Lowe et al., 2001; Hickey et al., 2003a; Mader and Colgan, 2007; Jacobs and van Niekerk, 1985). Stocking density should be managed to ensure that weight gain is not adversely affected by crowding (Andersen et al., 1997; Fisher et al., 1997b; Hickey et al., 2003a; Gupta et al., 2007; Petherick and Phillips, 2009a). Stereotypic behaviours (such as excessive tongue rolling) can be an indicator of overcrowding of confined cattle.

Outcome based measurables: Behaviour, morbidity rate, mortality rate, weight gain, physical appearance.

5.2.9. Outdoor areas

Not applicable.

5.2.10. Protection from predators

Where practical, cattle should be protected from predators.

Outcome based measurables: Mortality, injuries, behaviour, physical appearance.

5.3. Management

5.3.1. Genetic selection

In addition to productivity, welfare and health considerations should be taken into account when choosing a breed for a particular location or production system (Lawrence et al., 2001; Lawrence et al., 2004a; Prayaga, 2004; Wolfova et al., 2005; Boissy and Le Neindre, 1997; Boissy et al., 2007; Jensen et al., 2008; Veissier et al., 2008; Dargatz et al., 2008). Relevant genetic traits include nutritional maintenance requirements, ectoparasite resistance and heat tolerance.

Within a breed, individual animals can be genetically selected to propagate offspring that exhibit the following traits beneficial to animal health and welfare: Maternal ability, birth weight, milking ability, body conformation and temperament.

Outcome based measurables: Morbidity rate, mortality rate, behaviour, physical appearance, reproductive efficiency.

5.3.2. Weaning

Weaning means the transfer of the calf from nursing the dam or being fed with milk or milk replacer to a fibrous diet. In beef cattle production systems, weaning can be a stressful time in the calf’s life (Hickey et al., 2003b; Arthington et al., 2005; Walker et al., 2007; Newberry and Swanson, 2008; Weary et al., 2008; Blanco et al., 2009).

Calves should only be weaned once their digestive systems have developed sufficiently to enable them to maintain growth and welfare.

The practice of creep feeding is sometimes utilised prior to weaning to help the calf to adapt to a solid diet (Drennan and McGee, 2009).

Different weaning strategies are used in beef cattle production systems*. These include ‘abrupt separation’, fence line separation and the use of devices placed in the nose of the calf to discourage suckling.
Special care should be taken if abrupt weaning is immediately followed by transportation off farm as research has shown that calves are at risk of increased morbidity under these circumstances.

[*Research has shown that, preconditioning was favored as an effective method for the prevention of morbidity and mortality due to bovine respiratory disease (BRD) (Duff and Galyean, 2007; Arthington et al., 2008; Seeger et al., 2008). During this preconditioning, animals are weaned, vaccinated, castrated, dehorned, and handled well before transportation as opposed to occurring simultaneously or after cattle are extremely stressed. In beef cattle, research on weaning-associated stress has focused on the effect of cow-calf separation on the calf itself (Hickey et al., 2003), the effect of calf age at weaning (Arthington et al., 2005; Blanco et al., 2009) and various weaning strategies designed to mitigate the associated weaning stress in the calf (Price et al., 2003; Haley et al., 2005; Lynch et al., 2008; Walker et al., 2007; Boland et al., 2008; Weary et al., 2008; Drennan and McGee, 2009).

Beef 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, weight gain.

5.3.3. Painful husbandry procedures

Surgical husbandry practices that have the potential to cause pain are routinely practiced on cattle for reasons of production efficiency, animal health and welfare and human safety. Where possible, these procedures should be performed in such a way as to minimize any pain and stress on the animal, including the performance of the procedure at as early an age as possible and/or the use of analgesia.

Future options for enhancing animal welfare in relation to these procedures include: 1) ceasing the procedure and addressing the current need for the practice through management strategies; 2) breeding animals that do not require the procedure; 3) replacing the current procedure with a non-surgical alternative that has been shown to enhance animal welfare; or 4) performing the procedure in a way that minimises pain.

Examples of such practices include: castration, dehorning, spaying (ovariectomy), tail docking and identification.

a) Castration

Castration of beef cattle is performed in many production systems to reduce aggression and sexual behaviour (Field, 1971; Seideman et al., 1982; Jennings et al., 1984; Fell et al., 1986; Molony et al., 1995; Kent et al., 1996; Fisher et al., 1996; Fisher et al., 1997a; Bretschneider, 2005; Stafford et al., 2002; Stafford and Mellor, 2005b; Ting et al., 2005), improve human safety, remove the risk of unwanted pregnancies in the herd, and enhance production efficiency (Keane, 1999) by producing beef that better meets market requirements.

Where it is necessary to castrate beef cattle, producers should seek guidance from veterinarians as to the optimum method and timing for their type of cattle and production system.

Methods of castration used in beef cattle include surgical (knife) removal of the testes (Molony et al., 1995; Stafford et al., 2002; Fisher et al., Ting et al., 2003a; Ting et al., 2003b; Ting et al., 2004; Pang et al., 2006), ischaemic methods (banding or ringing (Pang et al., 2006; Fisher et al., 2001; Rust et al., 2007), and crushing of the spermatic cord (burdizzo operation (Keane, 1999; Earley and Crowe, 2002; Ting et al., 2003a; 2003b; 2004; Boesch et al., 2008; Pang et al., 2009).
Where practical, cattle should be castrated before the age of 3 months, or at the first available handling opportunity after they reach the age of 3 months.

Producers should seek guidance from veterinarians on the availability and advisability of analgesia/anaesthesia for castration of beef cattle (Stafford and Mellor, 2007; Pang et al., 2009), in older animals (Ting et al., 2003c). Where practical analgesia/anaesthesia could be used in other categories.

Operators performing castration of beef cattle should be trained and competent in the procedure used and be able to recognise the signs of post-procedure complications.

b) Dehorning

Horned beef cattle are commonly dehorned in order to reduce animal injuries and hide damage, improve human safety, 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, 2005a). Where practical and appropriate for the production system, the selection of polled cattle can obviate the need for dehorning.

Where it is necessary to dehorn beef cattle, producers should seek guidance from veterinarians as to the optimum method and timing for their type of cattle and production system.

Where practical, cattle should be dehorned while horn development is still at the horn bud stage or at the first available handling opportunity when the cattle are beyond this age. This is because the procedure involves less tissue trauma when horn development is still at the horn bud stage, and there is no attachment of horn to the skull of the animal.

Methods of dehorning at the horn bud stage include removal of the horn buds with a knife, thermal cautery of the horn buds, or the application of chemical paste to cauterise the horn buds. Methods of dehorning when horn development has commenced involve the removal through of the horn cutting or sawing at the base of the horn close to the skull.

Producers should seek guidance from veterinarians on the availability and advisability of analgesia/anaesthesia for dehorning of beef cattle, in older animals. Where practical analgesia/anaesthesia could be used in other categories.

Operators performing dehorning of beef cattle should be trained and competent in the procedure used and be able to recognise the signs of post procedure complications.

c) Spaying (ovariectomy)

Spaying of heifers may be required for international trade or to prevent unwanted pregnancies under extensive production conditions. Reviews and descriptions of different spaying techniques have been published (Johnson, et al., 1987; Jubb et al., 2003; Rupp and Hamilton, 1995; Rupp and Kimberling, 1982). Surgical spaying should be performed by veterinarians. Veterinarians performing the spaying technique should understand the availability and advisability of analgesia/anaesthesia for spaying of beef cattle.

d) Tail docking

Tail docking is sometimes performed in beef cattle to prevent tail tip necrosis in confinement operations (Busch and Kramer, 1995 (beef bulls); Schrader et al., 2007). Research shows that increasing space per animal and proper bedding are effective means for preventing tail tip necrosis. (Drolia et al. 1991; Schrader et al. 2001) Therefore tail docking of beef cattle is not recommended.
c) Identification

Ear-tagging, ear-notching, tattooing, freeze branding and the use of radio frequency identification devices (RFID) are methods used to permanently identify beef cattle and are not considered to cause animal welfare problems. In some situations hot iron branding may be required or may be the only practical method of permanent identifying beef cattle. Hot branding of cattle should be done by experienced operators and should be performed quickly and with appropriate equipment. Identification systems should be established also according to the Chapter 4.1. of the Terrestrial Code on General principles on identification and traceability of live animals.

Outcome based measures: Rate of post-procedure complications, mortality rate, behaviour, physical appearance, weight gain.

5.3.4. Handling and inspection

Beef cattle should be inspected at intervals appropriate to the production systems and the risks to the health and welfare of the animals.

Animals that may benefit from more frequent inspection include: neonatal calves (Bakheit and Greene, 1981; Larson et al., 1998; Townsend, 1994), cows in late gestation (Boadi and Price, 1996; Dargatz et al., 2004; Mee, 2008; Odde, 1996), newly weaned calves, cattle experiencing environmental stress and cattle on which painful husbandry procedures or veterinary surgical procedures have been performed.

Animal handlers should be competent to recognise the normal signs of health, disease and compromised welfare of beef cattle.

Beef cattle that are sick or injured should be given appropriate treatment at the first available opportunity. If animal handlers are unable to provide appropriate treatment, veterinary advice should be obtained.

If the prognosis of the animal is poor and there is little chance of recovery, humane euthanasia should be considered. Humane methods for killing cattle are found in Chapter 7.6.5 of the Terrestrial Code.

Recommendations on the handling of cattle are found in Chapter 7.6, Articles xxx of the Terrestrial Code.

Where beef cattle from extensive systems are herded or otherwise managed in a handling facility, they should be moved quietly. Weather conditions should be taken into account and cattle should not be herded under extremely hot or cold conditions. Cattle should not be driven to the point of collapse. Properly trained dogs can be effective aids in driving cattle.

Outcome based measurables: Handling response, morbidity rate, mortality rate, behaviour, reproductive efficiency, weight gain.

5.3.5. Personnel training

All people responsible for beef cattle should be competent according to their responsibilities and should understand cattle husbandry, behaviour, biosecurity, general 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 and/or practical experience.

Outcome based measurables: Handling response, morbidity rate, mortality rate, behaviour, reproductive efficiency, weight gain.
5.3.6. Emergency plans

Beef producers should have contingency plans to cover the failure of power, water and feed supply. Depending on the circumstances and the farming system, contingency plans may address fail-safe alarm devices to detect malfunctions, back up generators, access to maintenance providers, ability to store water on the farm, access to water cartage services, adequate on farm storage of feed and alternative sources of feed.

As appropriate to the circumstances and the farming system, contingency plans should be in place to minimise and mitigate the effects of natural disasters or extreme climatic conditions e.g., heat stress, drought, blizzards and flooding. Emergency plans should also address the management of the farm in the face of an emergency disease outbreak, consistent with national programs and recommendations of Veterinary Services as appropriate.

5.3.7. Location, construction and equipment of farms

Farms for beef cattle should be situated in an appropriate geographical location for the health, welfare and productivity of the animals while considering environmental sustainability.

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

Equipment for handling and restraining beef cattle should only be used in a way that minimises the risk of injury, pain or distress (Watts and Stookey, 1999).

Cattle in intensive and extensive production systems should be provided with sufficient space to meet their needs, including for comfort, socialization and environmental management.

In intensive production systems, the feeder should be large enough so that animals have access to feed adequate to their nutritional needs and the feed should be clean and free of spoiled, mouldy, sour, packed or unpalatable feed. The feed should be kept within reach of the animal. Beef cattle should have access to clean drinking water at all times.

Floors in housing facilities should be properly drained, and barns and handling alleys should provide traction to prevent injuries to animals and handlers.

Handling alleys and housing pens must be free of sharp edges and protrusions to prevent injury to animals and handlers.

Alleys and gates should be designed and operated to avoid impeding cattle movement. Slippery surfaces should be avoided, especially where cattle enter a single file alley leading to a chute and where they exit the chute. Grooved concrete, metal grating (not sharp), rubber mats or deep sand can be used to minimize slipping and falling. Quiet handling is essential to minimize slipping. Animal handlers should try to avoid excessive noise when operating gates and catches as this may stress the animals.

Hydraulic and manual restraining chutes should be adjusted as appropriate to the size of cattle being handled. Working parts should be regularly cleaned and maintained to ensure the system functions properly and is safe for the cattle and handlers.

It is important to ensure that mechanical and electrical devices used in housing facilities are safe for animals and animal handlers.

Where dipping baths are used in beef cattle production for ectoparasite control they should be designed and operated to minimise the risk of crowding, injury or drowning.
The loading of the animals at the farms should be conducted accordingly to Chapters 7.2., 7.3. and 7.4. (Transport of animals by sea, land and air respectively)

Outcome based measurables: Handling response, morbidity rate, mortality rate, behaviour, weight gain, physical appearance, lameness.

5.3.8. On farm harvesting

Refer to Section 5.3.3.

5.3.9. Humane killing

When dealing with animals that are injured or diseased, a prompt diagnosis should be made to determine whether the animal should be humanely killed or should receive additional care.

Animal handlers should provide feed and water to non-ambulatory cattle at least once daily.

Non-ambulatory cattle should be moved very carefully. Dragging non-ambulatory beef cattle is unacceptable. Cattle should not be lifted with chains onto transportation conveyances. Acceptable methods of transporting non-ambulatory animals include a sled, low-boy trailer or in the bucket of a loader.

When treatment is attempted, cattle that are unable to sit up unaided and refuse to eat or drink should be humanely euthanized as soon as recovery is deemed not possible.

Cattle that are non-ambulatory should not be sent to a livestock market or to a processing facility.

Humane killing should be performed in a manner to avoid pain and suffering (AABP, 1999; AVMA, 2007).

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

Reasons for euthanasia may include:

- Severe emaciation, weak cattle that are non-ambulatory or at risk of becoming downers
- Non-ambulatory cattle that will not sit up, refuse to eat or drink, or have not responded to therapy
- Rapid deterioration of a medical condition for which therapy has been unsuccessful
- Severe, debilitating pain
- Compound (open) fracture
- Spinal injury
- Central nervous system disease
- Multiple joint infections with chronic weight loss

Methods for the humane killing of beef cattle are found in Chapter 7.6.5 of the Terrestrial Code.

6. Future work

The ad hoc Group discussed and agreed on further work that would be needed to support the development of the draft chapter (see Appendix IV).
7. Scientific references


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OIE ad hoc Group on Animal Welfare and Beef Cattle Production Systems / July 2009
OIE AD HOC GROUP ON ANIMAL WELFARE AND BEEF CATTLE PRODUCTION SYSTEMS

Paris, 27-29 July 2009

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OIE AD HOC GROUP ON ANIMAL WELFARE AND BEEF CATTLE PRODUCTION SYSTEMS

Paris, 27-29 July 2009

Provisional Agenda

1. Welcome and introduction – Dr. Vallat
2. Confirmation of Terms of Reference and comments from Chair of the ad hoc Group
3. Discussion of working documents and other relevant documents provided by the ad hoc Group Members
4. Development standards
5. Review and finalise report of meeting
Draft Terms of Reference

Taking into account:

- the recommendations of the OIE ad hoc group on animal welfare and livestock production (report of meeting held 8-10 April 2008) and
- the existing animal welfare and animal health standards in the Terrestrial Animal Health Code (the Code):

Elaborate draft animal welfare standards for beef cattle production for eventual inclusion in the Code.

These standards should cover, inter alia:

- appropriate definitions;
- housing;
- feeding and watering of the animals;
- environmental considerations;
- management of endemic and emerging diseases;
- prevention of major infectious diseases (biosecurity) and planning for managing disease outbreaks;
- prevention and control of other diseases
- emergency management plans (e.g., disease outbreak, failure of electrical systems, fire, etc.);
- handling facilities (on farm only – transport and slaughter are covered elsewhere in the Code);
- management practices (e.g. dehorning, reproduction);
- personnel training;
- pasture management;
- protection from predators.
Article 7.X.1. Definitions

The ad hoc Group discussed the application of the OIE recommendations and decided that these should be designed with application to commercial beef production. Beef cattle production systems are defined as all commercial cattle productions systems where the purpose of the operation includes some or all of the breeding, rearing and finishing of cattle intended for beef consumption.

Article 7.X.2. Scope

The first priority is to address the on farm aspects of the production systems, from birth through to finishing. The areas of emphasis are cow-calf, stockers and finishing beef production.

Article 7.X.3. Commercial beef cattle production systems

Commercial beef cattle production systems include:

1. **Intensive (stocker and finishing)**
   
   Would include cattle that are placed on confinement. Animals are depending on the daily animal husbandry for provision of feed, shelter and water.

2. **Extensive (all areas)**
   
   Would include from a wide range grazing habitat.

3. **Semi Intensive (mixed)**
   
   Would include a combination of intensive and extensive systems.

Article 7.X.4. Criteria or measurables for the welfare of beef cattle

The following outcome (animal) based measurables can be useful indicators of welfare

1. **behaviour**
2. **morbidity rates**
3. **mortality rates**
Annex IV (contd)

4. weight gain and body condition score
5. reproductive rates
6. physical appearance
7. handling responses
8. rate of post-procedures complications
9. post-mortem pathology
10. survivability.

Article 7.X.5.

Recommendations

1. Biosecurity and Animal Health

   a) Biosecurity and disease prevention

      Biosecurity means a set of measures designed to protect a herd from the entry of infectious agents.

      Biosecurity programmes should be implemented, commensurate with the risk of disease and in accordance with relevant recommendations found in Terrestrial Code chapters on OIE listed diseases.

      These programmes should address the control of the major routes for disease and pathogen transmission:

      i) cattle
      ii) other animals
      iii) people
      iv) equipment
      v) vehicles
      vi) air
      vii) water supply
      viii) feed.

      Outcome based measurables: morbidity rate, mortality rate, reproductive efficiency.

   b) Animal health management

      Animal health management is a mean to prevent diseases occurring in cattle herds and also providing treatments for animals when disease occurs. There should be an effective programme for the prevention and treatment of diseases consistent with the programs established by the Veterinary Services as appropriate.
Those responsible for the care of cattle should be aware of the signs of ill-health, such as reduced food and water intake, weight gain and body condition, changes in behaviour or abnormal physical appearance.

Cattle with higher risk for disease will require more frequent inspection by animal handlers. If animal handlers are not able to determine the causes of ill-health or distress or to correct these or suspect the presence of a listed reportable disease. They should seek advice from those having training and experience, such as bovine veterinarians or other qualified advisers. Veterinary treatments should be prescribed by a qualified veterinarian.

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 caring for downer cattle. They should also have experience in managing chronically ill or injured animals. Euthanasia on non-responding cattle should be done as soon as recovery is deemed not possible.

Outcome based measurables: morbidity rate, mortality rate, reproductive efficiency, behaviour, physical appearance and body condition score.

2. Environment
   a) Thermal environment

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

i) Heat stress

The Thermal Heat Index (THI) is influenced by air temperature, relative humidity and wind speed. As the THI increases the risk of hyperthermia increases. Also as cattle are fed longer and become fatter are more susceptible to heat stress.

Animal handlers should be aware of the critical THI threshold for their animals. When the THI is expected to reach this threshold routine daily processes that include cattle movement should cease. As the THI moves into emergency levels the animal handlers should institute an emergency action plan that could include shade, drinking water, sprinkling water to penetrate the hair coat.

ii) Cold stress

Protection from wind and rain should be provided where possible, particularly for young stock outdoors for the first time. This could be provided by natural or man made shelter structures.

Animal handlers should also ensure that cattle have access to adequate feed and water during cold stress. During time of heavy snow fall or blizzard animal handlers should institute an emergency action plan to provide cattle with shelter, feed and water.

Outcome based measurables: Mortality rates, physical appearance, behaviour.
Annex IV (contd)

b) Lighting

Confined cattle that do not have access to natural light should be provided with sufficient supplementary lighting for their health and welfare, to facilitate natural behaviour patterns and to allow adequate inspection of the animals.

Outcome based measurables: Behaviour, morbidity, physical appearance.

c) Air quality

Good air quality is an important factor for the health and welfare of cattle in intensive and confined production systems. It is a composite variable of air constituents such as gases, dust and micro-organisms that is strongly influenced by the management of the beef producer. 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 CO$_2$, NH$_3$ and effluent gases in the confinement unit. Poor air quality and ventilation are risk factors for respiratory diseases.

Outcome based measurables: Morbidity rate, behaviour, mortality rate, weight gain, post-mortem pathologies.

d) Acoustic environment

Cattle are adaptable to different acoustics environments. However, exposure of cattle to sudden or loud noises should be minimized where possible to prevent stress and fear reactions (e.g. stampede). Ventilation fans, feeding machinery or other equipment should be constructed, placed, operated and maintained in such a way that they cause the least possible amount of noise.

Outcome based measurables: Behaviour.

e) Nutrition

The nutrient requirements of beef cattle have been well defined. Energy, protein, amino acid, mineral and vitamin contents of the diet are major factors determining the growth, feed efficiency, reproductive efficiency, and body composition.

Animal handlers should provide cattle a level of nutrition that meets or exceeds their maintenance requirements from the previously reference materials. It should be noted that cattle in certain climates and production systems may experience short term periods of below maintenance nutrition without compromise their welfare. Animal handlers should have adequate knowledge of appropriate body condition score for their cattle and should not allow body condition score to drop below these critical thresholds. In times of severe drought steps should be taken to avoid starvation of animals wherever possible.

In intensive production systems cattle should have access to adequate feed and water supply to meet their physiological needs.

Feedstuffs and feed ingredients should be of satisfactory quality to meet nutritional need and under certain circumstances (e.g., drought, frost, and flood), should be tested for the presence of substances (e.g. mycotoxins and nitrates) that can be detrimental to cattle health and welfare.
Cattle in intensive production systems typically consume diets that contain a high proportion of grain(s) (corn, milo, barley, grain by-products) and a smaller proportion of roughages (hay, straw, silage, hulls, etc.). As the proportion of grain increases in the diet, the relative risk of digestive upset in cattle increases. Animal handlers should understand the impact of cattle size, age, weather patterns, diet composition and sudden diet changes in respect to digestive upsets and their sequelae (acidosis, bloat, liver abscess, laminitis). Where appropriate beef producers should consult a nutritionist (private consultant, university or feed company employee) for advice on ration formulation and feeding programs.

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

The water quality and the method of supply can affect welfare. All cattle need adequate supply and access to palatable water that also meets their physiological requirements and free from contaminants potentially hazardous to cattle health.

Outcome based measurables: Mortality rates, morbidity rates, behaviour, weight gain, body condition scoring, reproductive rates.

f) Flooring, bedding, resting surfaces (litter quality)

In all production systems cattle need a comfortable place to rest.

Pen floor management in intensive production systems can have a significant impact on cattle welfare.

Mud depth should not consistently be deeper than the ankles of cattle in pens.

Slopes of pens should be maintained to allow water to run off away from the feed bunks and not pool excessively in the pens.

If slope is not sufficient to allow for proper drainage, a mound should be constructed in each pen to allow cattle to have a dry place to lie down.

Pens should be thoroughly cleaned after each production cycle as conditions warrant.

If animals are housed in a slatted floor shed, the slat width should be appropriate to the hoof size of the animals to prevent injuries.

In straw or other bedding systems the bedding should be maintained to allow animals a dry and comfortable place in which to lie.

Outcome based measurables: Morbidity rates (lameness), behaviour, weight gain, physical appearance.

g) Social environment

Management of cattle in outdoor and indoor intensive production systems methods should take into account the social environment of cattle as it relates to animal welfare. Problem areas include: buller activity, mixing of heifers and steers, feeding cattle of different size and age in same pens, insufficient space at the feeder, insufficient water access and mixing of bulls.
In the case of buller animals, they should be identified and removed from the pen immediately. Beef producers should utilize management practices to reintroduce these animals. If reintroduction fails these animals will have to housed separately from the pen mates. Animal handlers should work to feed cattle of the same size and age in the same pens. Depending on feeding systems, health status of the animals and size of the animals beef producer will need to allow adequate feeder space and water access for the cattle.

Adequate fencing should be provided to minimize any animal welfare problems that may be caused by mixing of inappropriate groups of cattle.

Outcome based measurables: Behavior, physical appearance, weight gain, morbidity and mortality rate.

h) Stocking density

High stocking densities may have an adverse effect on growth rate, feed efficiency, survivability, carcass quality and behavior (locomotion, resting, feeding and drinking).

In extensive outdoors systems stocking density should be managed to ensure an adequate feed supply for the cattle.

Stocking density should be managed such that crowding does not adverse impact key components of normal behavior of cattle. These include 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 is not adversely affected by crowding. Excessive tongue rolling can be associated with overcrowding of confined cattle.

Outcome based measurables: Behavior, Morbidity rate, mortality rate, weight gain, physical appearance.

i) Outdoor areas

Not applicable.

j) Protection from predators

Where practical, cattle should be protected from predators.

Outcome based measurables: Mortality, behaviour, physical appearance.

3. Management

a) Genetic selection

Welfare and health considerations, in addition to productivity, should be taken into account when choosing a breed for a particular location or production system. Examples of these include nutritional maintenance requirement, ectoparasite resistance and heat tolerance.

Individual animals within breed can be genetically selected to propagate offspring that exhibit the following traits beneficial to animal health and welfare: Maternal ability, birth weight, milking ability, body conformation and temperament.

Outcome based measurables: Morbidity rate, mortality rate, behaviour, physical appearance, reproductive efficiency.
b) Weaning

Weaning for the purposes of this document is the term to describe transfer of the calf to a fibrous diet from nursing the dam or being fed with milk or milk replacer. In beef cattle production systems, weaning can be a stressful time in the calf’s life.

Calves should be weaned only when their ruminant digestive systems have developed sufficiently to enable them to maintain growth and welfare.

The practice of creep feeding is sometimes utilised prior to weaning to help the calf more easily adapt to a solid diet.

There are different weaning strategies utilised in the beef cattle production systems. These could include abrupt separation, fence line separation and the use of devices placed in the nose of the calf to discourage suckling.

Special care should be taken if abrupt weaning is immediately followed by transportation off farm as research has shown that calves are at risk of increased morbidity under these circumstances.

Beef 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, weight gain.

c) Painful husbandry procedures

Surgical husbandry practices that have the potential to cause pain are routinely practiced on cattle for reasons of production efficiency, animal health and welfare and human safety. Where possible, these procedures should be performed in such a way as to minimize any pain and stress on the animal. Options to consider including the performing the procedure at as early an age as possible or where appropriate use of analgesia.

Future options for enhancing animal welfare in relation to these procedures include: 1) ceasing the procedure and addressing the current need for the operation through management strategies; 2) breeding animals that do not require the procedure; 3) replacing the current procedure with a non-surgical alternative that has been shown to enhance animal welfare; or 4) performing the procedure in a way that minimises pain.

Example of such interventions include: castration, dehorning, (spaying), tail docking, identification.

i) Castration

Castration of beef cattle is performed in many production systems to reduce inter-animal aggression, improve human safety, remove the risk of unwanted pregnancies in the herd, and enhance production efficiency by producing beef that better meets market requirements.

Where it is necessary to castrate beef cattle, producers should seek guidance from veterinarians as to the optimum method and timing for their type of cattle and production system.
Methods of castration used in beef cattle include surgical (knife) removal of the testes, ischaemic methods (banding or ringing), and crushing of the spermatic cord (burdizzo operation).

Where practical, cattle should be castrated before the age of 3 months, or at the first available handling opportunity beyond this age.

Producers should seek guidance from veterinarians on the availability and advisability of analgesia/anaesthesia for castration of beef cattle, particularly in older animals.

Operators performing castration of beef cattle should be trained and competent in the procedure used, and be able to recognise the signs of complications.

ii) Dehorning

Beef cattle which are naturally horned are commonly dehorned in order to reduce animal injuries and hide damage, improve human safety, and facilitate transport and handling. Where practical and appropriate for the production system, the selection of polled cattle can remove the need for dehorning.

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

Where practical, cattle should be dehorned while horn development is still at the horn bud stage, or at the first available handling opportunity beyond this age. This is because the procedure involves less tissue trauma when horn development is still at the horn bud stage, and there is no attachment of horn to the skull of the animal.

Methods of dehorning at the horn bud stage include removal of the horn buds with a knife, thermal cautery of the horn buds, or the application of chemical paste to cauterise the horn buds. Methods of dehorning when horn development has commenced involve the removal through of the horn cutting or sawing at the base of the horn close to the skull.

Producers should seek guidance from veterinarians on the availability and advisability of analgesia/anaesthesia for dehorning of beef cattle, particularly in older animals.

Operators performing dehorning of beef cattle should be trained and competent in the procedure used, and be able to recognise the signs of complications.

iii) Spaying (ovariectomy)

Spaying of heifers is sometimes required for international trade or to prevent unwanted pregnancies under extensive rangeland conditions. Surgical spaying should be performed by veterinarians or by highly trained operators. Producers should seek guidance from veterinarians on the availability and advisability of analgesia/anaesthesia for spaying of beef cattle.

iv) Tail docking

Tail docking has been performed in beef cattle to prevent tail tip necrosis in confinement operations. Research shows that increasing space per animal and proper bedding are effective means in preventing tail tip necrosis. Therefore it is not recommended for producers to dock the tails of beef cattle.
v) Identification

Ear-tagging, ear-notching, tattooing, freeze branding and radio frequency identification devices (RFID) are preferred methods of permanently identifying beef 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 beef cattle. If cattle are branded, it should be accomplished quickly, expertly and with the proper equipment. Identification systems should be established also according to the Chapter 4.1. of the Terrestrial Code on General principles on identification and traceability of live animals.

Outcome based measures: Rate of post-procedures complications, mortality rate, behaviour, physical appearance, weight gain.

d) Handling and inspection

Beef cattle should be inspected at intervals appropriate to the production systems and the risks to the health and welfare of the animals.

Some animals may benefit from more frequent inspection for example: neonatal calves, cows in late gestation, newly weaned calves, and cattle experiencing environmental stress and after painful husbandry or veterinary surgical procedures.

Animal handlers need to be competent in recognising the clinical signs of health, disease and welfare of beef cattle.

Beef cattle identified as sick or injured should be given appropriate treatment at the first available opportunity. If animal handlers are unable to provide appropriate treatment, then the service of veterinarians should be enlisted.

If prognosis of the animal condition is poor with little chance of recovery, humane euthanasia of the animal should be considered. For a description of methods for the humane killing of beef cattle see Article 7.6.5. of the OIE Terrestrial Code.

Recommendations on the handling of cattle are also found in Chapter 7.5. and Articles 7.5.1. and 7.5.2. of the OIE Terrestrial Code.

Where beef cattle are herded into a handling facility from extensive conditions, they should be moved quietly. Weather conditions should be taken into account and cattle should not be herded in excessively hot or cold conditions. Cattle should not be driven to the point of collapse. Properly trained dogs can be effective tools for cattle herding.

Outcome based measurables: Handling response, morbidity rate, mortality rate, behaviour, reproductive efficiency, weight gain.

e) Personnel training

All people responsible for beef cattle should be competent according to their responsibilities and should understand cattle husbandry, behaviour, biosecurity, general 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 and/ or practical experience.

Outcome based measurables: Handling response, morbidity rate, mortality rate, behaviour, reproductive efficiency, weight gain.
f) Emergency plans

Beef producers should have contingency plans to cover the failure of power, water and feed supply. These plans may include the provision of fail safe alarm devices 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.

Plans should be in place to minimise and mitigate the effects of natural disasters or extreme climatic conditions e.g., heat stress, drought, blizzard and flooding. Emergency plans should also cover the management of the farm in the face of an emergency disease outbreak, consistent with national programs and recommendations of Veterinary Services as appropriate.

g) Location, construction and equipment of farms

Farms for beef cattle should be situated in an appropriate geographical location for the health, welfare and productivity of the animals while considering environmental sustainability.

All facilities for beef cattle should be constructed, maintained and operated to minimise the risk to the welfare of the animals and human safety.

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

Cattle in intensive or extensive production systems must be offered adequate space for comfort, socialization and environmental management.

In intensive production systems the feeder should be sufficiently large so that animals have adequate access to feed and they should be clean and free of spoiled, moldy, sour, packed or unpalatable feed. Also cattle should have access to clean and clear water at all times.

Floors in housing facilities should be properly drained, and barns and handling alleys should provide traction to prevent injuries to animals and handlers.

Handling alleys and housing pens must be free of sharp edges and protrusions to prevent injury to animals and handlers.

Design and operate alleys and gates to avoid impeding cattle movement. Avoid slippery surfaces, especially where cattle enter a single file alley leading to a chute or where they exit the chute. Grooved concrete, metal grating (not sharp), rubber mats or deep sand can be used to minimize slipping and falling. Quiet handling is essential to minimize slipping. When operating gates and catches, reduce excessive noise, which may cause distress to the animals.

Adjust hydraulic or manual restraining chutes to the appropriate size of cattle to be handled. Regular cleaning and maintenance of working parts is imperative to ensure the system functions properly and is safe for the cattle and handlers.

Mechanical and electrical devices used in housing facilities must be safe for animals and humans.

Dipping baths are sometimes used in beef cattle production for ectoparasite control. Where these are used, they should be design and operated to minimise the risk of crowding, injury or drowning.

The loading of the animals at the farms should be conducting accordingly to Chapters 7.2., 7.3. and 7.4. (Transport of animals by sea, land and air respectively).
Outcome based measurables: Handling response, morbidity rate, mortality rate, behaviour, weight gain, physical appearance, lameness.

h) On farm harvesting

Refer to point 3c) of Article 7.X.5.

i) Humane killing

A prompt diagnosis should be made to determine whether the animal should be humanely killed or receive additional care.

Animal handlers should provide feed and water to non-ambulatory cattle at least once daily.

Non-ambulatory animals should be moved very carefully and dragging non-ambulatory animals is unacceptable.

Likewise, animals should not be lifted with chains onto transportation conveyances. Acceptable methods of transporting non-ambulatory animals include a sled, low-boy trailer or in the bucket of a loader.

When treatment is attempted, cattle that are unable to sit up unaided and refuse to eat or drink should be humanely euthanized as soon as recovery is deemed not possible.

Cattle that are non-ambulatory must not be sent to a livestock market or to a processing facility.

Humane killing should occur without pain or suffering.

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

Reasons for euthanasia may include:

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

ii) non-ambulatory cattle that will not sit up, refuse to eat or drink, have not responded to therapy;

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

iv) severe, debilitating pain;

v) compound (open) fracture;

vi) spinal injury;

vii) central nervous system disease; and

viii) multiple joint infections with chronic weight loss.

For a description of other methods for the humane killing of beef cattle see Article 7.6.5. of the Terrestrial Code.