Humane Farm Animal Care
Animal Care Standards
January 2014

BEEF CATTLE

PO Box 82, Middleburg, VA 20118

HUMANE FARM ANIMAL CARE

Humane Farm Animal Care is a non-profit charity whose mission is to improve the lives of farm animals by providing viable, credible, duly monitored standards for humane food production and assuring consumers that certified products meet these standards.

Humane Farm Animal Care is approved by a consortium of Animal Protection Organizations, Individuals, and Foundations, such as the American Society for the Prevention of Cruelty to Animals and the Humane Society of the United States.

The Humane Farm Animal Care Standards have been developed to provide the only approved standards for the rearing, handling, transport and slaughter of Laying Hens for use in the Certified Humane® program. These standards incorporate scientific research, veterinary advice, and the practical experience of farmers. The standards are based on the Royal Society for the Prevention of Cruelty to Animals (RSPCA) guidelines, current scientific information and other practical standards and guidelines recognized for the proper care of animals.

Animal welfare is improved when livestock managers adhere to the following:

- Access to wholesome and nutritious feed
- Appropriate environmental design
- Caring and responsible planning and management
- Skilled, knowledgeable, and conscientious animal care
- Considerate handling, transport, and slaughter

PO Box 82, Middleburg, VA 20118

HUMANE FARM ANIMAL CARE'S SCIENTIFIC COMMITTEE

Leading animal scientists, veterinarians, and producers work with Humane Farm Animal Care to develop the *Animal Care Standards* for humane farming and continue to work with Humane Farm Animal Care to continually review new information pertaining to improving the lives of farm animals.

Kenneth E. Anderson, PhD	North Carolina State University, USA
Michael Appleby, PhD	World Animal Protection, USA
Richard Blatchford, PhD	University of California, Davis, USA
Elisabetta Canali, PhD	Università degli Studi, Milan, Italy
Sylvie Cloutier, PhD	Associate Director of Assessment, Canadian Council on Animal Care, Ottawa, Canada
Brenda Coe, PhD	Pennsylvania State University, USA
Hans Coetzee, PhD	Iowa State University, USA
Luiz Dematte, DVM, PhD	Industrial Director of Korin Ltd, and General Coordinator of Mokiti Okada Foundation, Brazil
Inma Estéves, PhD	Research Professor, Neiker-Tecnalia University, Spain
Anne Fanatico, PhD	Appalachian State University, USA
Valentina Ferrante, PhD	University of Milan, Italy
Trent Gilbery, MS	North Dakota State University, USA
Alan Goldberg, PhD	The Johns Hopkins University, USA
Temple Grandin, PhD	Colorado State University, USA
Thomas G. Hartsock, PhD	University of Maryland, USA
Jörg Hartung, DVM	Institute of Animal Hygiene, Welfare and Farm Animal Behavior University of Veterinary Medicine, Hanover, Germany
Brittany Howell, PhD	Fort Hays State University, USA
Pam Hullinger, DVM, MPVM	University of California Lawrence Livermore National Laboratory, USA
Joy Mench, PhD	University of California, Davis, USA
Suzanne Millman, PhD	Iowa State University College of Veterinary Medicine, USA
Malcolm Mitchell, PhD	SRUC, Scotland's Rural College, Scotland

Priya Motupalli, PhD	IKEA Food Global Sustainable Sourcing Specialist, Sweden
Ruth Newberry, PhD	Associate Professor, Norwegian University of Life Sciences; Adjunct Professor, Washington State University, USA
Abdullah Ozen, PhD	Professor, Firat University, Elazig, Turkey
Edmond Pajor, PhD	University of Calgary, Alberta, Canada
Jose Peralta, PhD, DVM	Western University of Health Science, College of Veterinary Medicine, Pomona California, USA
Rosangela Poletto, DVM, PhD	Professor, Instituto Federal do Rio Grande do Sul, Brazil
Martin Potter, PhD	Animal Welfare Consultant, Member of FAWT, UK and Advising Member of EIG, UK
Mohan Raj, PhD	Honorary Visiting Fellow, School of Veterinary Sciences, Bristol University, Bristol, UK
Jean-Loup Rault, PhD	Institute of Animal Husbandry and Animal Welfare at Vetmeduni, Vienna, Austria
Karen Schwean-Lardner, PhD	University of Saskatchewan, Canada
J.K. Shearer, PhD	Iowa State University, USA
Marilyn M. Simunich, DVM	Director, Animal Health Laboratory, Division of Animal Industries, Idaho State Dept. of Agriculture, USA
Carolyn Stull, PhD	Chairman, Scientific Committee University of California, Davis, USA
Janice Swanson, PhD	Michigan State University, USA
William VanDresser, DVM	Retired Extension Veterinarian, USA
Andreia De Paula Vieira, DVM, PhD	Animal Welfare Scientist, Universidade de São Paulo, Brazil
Daniel M. Weary, PhD	Professor and NSERC Industrial Research Chair, Animal Welfare Program, University of British Columbia, Canada
Julia Wrathall, PhD	Director, Farm Animals Division, RSPCA, West Sussex, UK
Adroaldo Zanella, PhD	Professor, Dept. Medicina Veterinária Preventiva e Saúde Animal / FMVZ Universidade de São Paulo, Pirassununga/SP, Brazil

TABLE OF CONTENTS

PART 1: INTRODUCTION

A. The Certified Humane® Label

The Certified Humane® program was developed to certify products from animals of farms that adhere to these standards. Upon satisfactory application and inspection, farmers and ranchers will be certified and may use the Certified Humane Raised and Handled® logo. Program participants are inspected and monitored by *Humane Farm Animal Care* annually. Charges levied are to cover inspections and program costs, which include promotional materials which help promote the products of the producers that are Certified Humane®.

B. Guide to the Use of the Animal Care Standards

- The broad objectives of the standard are described at the beginning of each section.
- The numbered requirements are the standards, all of which must be complied with.
- These standards are written to cover facilities in varying geographic and temperature regions and facilities utilizing different systems. Therefore, not all sections in these standards will apply to each facility.
- Boxed sections provide additional information or may highlight areas where the standards will be reviewed in the future.
- Farmers must also comply with any local, state or federal requirements for beef cattle production that affect the environment or safety of their product, as well as the Veterinary Practices Act of their state.

PART 2: NUTRITION - FOOD AND WATER

OBJECTIVES: Livestock must have access to fresh water and a diet formulated or assessed to maintain full health and promote a positive state of well-being. Feed and water must be distributed in such a way that livestock can eat and drink without undue competition.

A. Food

FW 1: Wholesome, nutritious feed
Cattle must be fed a wholesome diet which is:

1. Appropriate for their age and species
2. Fed to them in sufficient quantity to maintain them in good health; and
3. Formulated or assessed to satisfy their nutritional needs as established by the National Research Council (NRC) *Nutrient Requirements of Beef* Cattle and as recommended for the geographic area.

FW 2: Free access to food
Cattle must have free access to nutritious food each day, except when directed by a veterinarian.

FW 3: Feed records

a. Producers must have written records and/or labels of the feed constituents, the inclusion rate and constituents of compound feeds, and feed supplements, including those records from the feed mill or supplier; and
b. Make them available to the *Humane Farm Animal Care* Inspector during the inspection and at other times upon request.

FW 4: Substances prohibited in feed

a. No feedstuffs containing mammalian or avian-derived protein sources are permitted, with the exception of milk and milk products.
b. Cattle must not be implanted with any growth promoter.
c. Cattle must not be fed antibiotics, including ionophores, coccidiostats, or other substances deliberately to promote growth or feed efficiency.
d. Antibiotics can be used in individual cattle only therapeutically (i.e. disease treatment) as directed by a veterinarian.

FW 5: Body Condition

a. Cattle must be fed so they sustain full health and normal reproductive capacity over their maximum foreseeable life span.
b. Body condition change in cattle must be carefully planned and maintained according to the stage of production.
c. A body condition score (BCS) of 4 to 6 (on a 1-9 scale) is considered best for maintaining productivity and health. A body condition score of 2 or less requires immediate corrective action. No animal with BCS of less than 2 may be transported or leave the farm unless for veterinary treatment.

d. The following "Beef Cattle Body Condition Scoring" system or another approved system may be used to score beef cattle.

Score	Appearance	Condition
1	emaciated	skeletal
2	poor	very thin with bony protuberance
3	thin	thin fat cover
4	borderline	light fat cover over ribs, shoulder, hip
5	moderate	light fat cover over all body parts
6	good	medium fat cover
7	very good	frame fat cover is balanced
8	fat	fat deposits, tailhead, dewlap
9	obese	excessive fat deposits, tailhead, etc.

e. Body condition score must be regularly monitored with particular attention to weaning, 30 days post weaning, 90 days before calving, at calving, and at the beginning of breeding season.

FW 6: Avoiding changes in food

Efforts must be made to avoid sudden changes in the type and quantity of feed, unless such changes are made under the direction of a veterinarian or cattle nutritionist.

FW 7: Providing fiber

a. Adult cattle and calves over 30 days of age must be provided with feed or forage containing sufficient fiber to allow rumination.
b. The fiber must be of such quality and length as to prevent acidosis.

FW 8: Easy availability of food

a. Cattle must have adequate amounts of feed available to eliminate feed competition.
b. If feed is restricted in a dietary protocol, extra trough space must be provided to reduce feed competition.
c. The feeder space allowances in Appendix 1 must be met.

FW 9: Supplying adequate nutrients

a. Cattle must not be maintained in an environment that is likely to predispose them to nutrient deficiency.
b. Managers must be aware of mineral deficiencies and excesses on the farm and correct these as appropriate.
c. The National Research Council Guidelines can be used to determine the nutritional requirements of cattle and nutrient composition of feedstuffs.

FW 10: Clean feeding equipment

a. Feed troughs/bunks must be kept clean and stale or moldy feed removed.
b. Automatic feed delivery systems (e.g. grain delivery systems barns or in corrals) must be kept:
    1. Clean;
    2. Free of stale feed; and
    3. Maintained in good working order.

FW 11: Minimizing contamination of water by feedstuffs
Feeding and watering equipment must be designed, constructed, placed and maintained so that contamination of the animals' feed and water is minimized.

> *The footing surrounding the eating area should be free of mud in depths greater than fetlock (ankle) height.*

FW 12: Avoiding unsuitable feedstuffs
Control practices must be in place to minimize:
a. Livestock access to poisonous plants and unsuitable feedstuffs.
b. Contamination of stored feeds by birds and vermin.

B. Food – Specific Provisions for Calves

FW 13: Diet requirements for calves
a. Calves must be fed on a wholesome diet, which meets or exceeds National Research Council requirements appropriate for their age, weight, behavioral and physiological needs.
b. Antibiotics cannot be used except therapeutically, as directed by a veterinarian.
c. All calves must have access to fresh water.

FW 14: Colostrum
a. Every newborn calf must receive adequate colostrum from its dam, from another newly calved cow, or from a powdered or frozen colostrum source, as soon as possible after it is born and certainly within the first 6 hours of its life.

> *As a precaution to prevent the transmission of Johne's Disease, the pooling of fresh or frozen colostrum from multiple cows is strongly discouraged.*

b. Calves must be allowed to suckle for the first 24 hours after birth. When suckling the cow is not possible, sufficient colostrum should be provided manually, with approximately 6 quarts (6 liters) of colostrum being administered by esophageal stomach tube, bottle or bucket over the first 24 hours.
c. For a further 48 hours, calves unable to nurse should receive approximately 6 quarts (6 liters) of colostrum/whole milk daily in at least two feedings.

FW 15: First feeds
a. All orphan calves or those unable to nurse must receive liquid food twice daily at least through the first 5 weeks of life and until they are eating adequate quantities of suitable solid food, at least 1.5lbs (0.7 kg) per day of a calf starter ration.
b. If calves are bucket fed, each calf should have access to an individual bucket.
c. Milk replacer must be mixed according to the manufacturer's instructions.
d. Orphan calves must have access to palatable calf starter feed after 8 days of age.

e. When a calf is more than 30 days old, it must have daily access to feed or forage material containing sufficient digestible fiber to stimulate the development of its rumen.

FW 16: Weaning

a. Calves must not be weaned from their mothers before an average of 6 months of age. *Derogations are acceptable for the following reasons: dry conditions, flooding, other conditions that require earlier weaning.*

> *A low stress weaning method is recommended. See Appendix 2 for recommended weaning methods.*

b. Orphan calves must not be weaned (ceasing to feed milk or milk replacer) before 5 weeks of age, unless directed by a veterinarian. Nutritional weaning must be accomplished gradually by either diluting the milk with water or reducing the milk volume over a period of at least 5 days.

C. Water

FW 17: Water supply

Cattle, including calves, must be provided with access to an adequate supply of clean, fresh drinking water, except when directed by the attending veterinarian.

FW 18: Water when cattle are housed

When cattle are housed, they must have access to water at all times, except when directed by the attending veterinarian.

> *Cattle generally require the following volume of drinking water:*
> *1 gallon per 100 lbs. (4 liters per 50 kg) live weight per day.*

FW 19: Watering equipment

a. Water troughs must be kept clean.
b. When automatic systems are used, they should be checked at least daily to ensure that they are dispensing water if no other source of ad lib water is available.
c. Water troughs must not result in wetting/fouling of bedded areas and must be accessed from concrete or other non-slip footing, when possible.
d. At pasture, the area around water troughs should be managed to avoid excessive puddles or mud, and if necessary, consideration should be given to using troughs on concrete aprons.

FW 20: Water for cattle at grass

a. When cattle are kept extensively at grass, a supply of fresh, clean water must always be available.
b. Grazing cattle should not have to walk long distances to access water: less than 1/2 mile (0.8 km) in steep, rough terrain to up to 2 miles (3.2 km) in smooth, flat terrain.
c. Natural surface water sources are not recommended but, if used, care must be taken to avoid potential disease risk.

d. The potential contamination of rivers, ponds, or streams with cattle feces must be avoided in planning water supply for cattle.
e. Local, state, and federal laws must be adhered to regarding cattle access to running or still water resources.

FW 21: Emergency water supply
Provisions must be in place to ensure an emergency supply of suitable drinking water is available in case normal supplies fail (e.g., due to freezing or drought)

PART 3: ENVIRONMENT

OBJECTIVE: The environment in which livestock are kept must take into account their welfare needs and must be designed to protect them from physical and thermal discomfort, fear, and distress, and allow them to perform their natural behavior. NOTE: These standards are written for beef cattle, which are raised outdoors on range or pasture.

A. Buildings

E 1. Environment for Cattle
Beef cattle must be raised with continual access to the outdoors.

E 2: Records of features of facilities
For all buildings, the key points relating to animal welfare must be recorded in the farm plan. These include:

1. Total floor area (in ft^2 or m^2)
2. Total bedded area (in ft^2 or m^2)
3. Maximum capacity of cattle in relation to age, weight, feeding and drinking, and bedding space.

If practical, this information should be displayed at or near to the entrance to each building.

E 3: Preventing injuries from environmental causes

a. There must be no physical features of the environment that may cause injuries to the animals that can be avoided.
b. Both indoors and outdoors, there must be no recurrent injuries on cattle that could be attributed to physical features of their environment (injury is defined as damage severe enough for the formation of granular scar tissue and to an extent significantly greater than would be caused by accidental bumps and scratches).

Excessive occurrence of the following may be indicators of environmental problems.

Neck calluses	*Knee, hock, swelling/calluses*
Teat/udder injuries	*Bruised soles*
Laminitis	*Soft feet*
Interdigital infections	*Hematomas*
Abscesses	*Broken tails*
Chronic scar tissue	

E 4: Handling Pens

a. Particular attention must be paid to handling pens.
    1. Floors must be made of non-slip material or be maintained so as to reduce the risk of slipping (sand, mats or other material applied when necessary).
    2. Floors must never be so rough as to cause hoof damage or so smooth as to result in slipping.
    3. Smooth concrete floors should be grooved approximately 1/3”- 1/2” (0.75 – 1.3 cm) or treated with a non-slip coating/belting.

E 5: Maintenance of passageways

Building alleyways, passages and gateways must be maintained in order to prevent damage to the animals’ hooves.

E 6: Limiting the use of toxic substances in buildings

Except when preservatives with an insecticidal or fungicidal role are used, cattle or calves must not come into contact with toxic fumes from surfaces with paints, wood preservatives or disinfectants.

E 7: Electrical installations

All electrical installations must be:

1. Inaccessible to cattle;
2. Well insulated;
3. Safeguarded from rodents;
4. Properly grounded;
5. Regularly tested; and
6. Meet local building codes.

E 8: Design of passageways

a. Passages, such as gates or alleys, must be of such a design and width, and so constructed, to allow two animals to pass freely (except in chutes or races).
b. Chutes and races should be designed to prevent balking and permit cattle to move smoothly through the system in a single line.
c. Efforts must be made to minimize the number of, and ideally exclude, blind alleyways in buildings.
d. Internal surfaces of housing and pens must be made of materials which can readily be cleansed, disinfected, or easily replaced when necessary.

C. Thermal Environment & Ventilation

E 9: Thermal conditions

Appendix 3 contains the Temperature Humidity Index (THI), which contains the values at which cattle become distressed.

a. The thermal environment within buildings where cattle are housed must not be so hot or so cold as to cause distress.
b. Pasture or range conditions must allow cattle access to features that allow relief during severe thermal swings.

E 10: Air movement

For all cattle, an assessment of their surrounding environmental temperature and air movement (draft) should be undertaken, taking into account:

1. Breed hardiness;
2. Age of stock;
3. Foreseeable climatic conditions; and
4. Natural shelter/shade.

E 11: Ventilation

a. Effective ventilation of buildings, permitting air movement at low velocity while avoiding drafts and minimizing the entrance of rain and snow, must be provided.

> *The prime concern relating to winter housing is to keep cattle out of wind, rain and snow which reduces insulation.*
>
> *Properly designed natural ventilation reduces the risks associated with mechanical failures.*

b. Building ventilation must aim to achieve a relative humidity below 80% when ambient conditions allow.

> *The objective is to provide a large volume of air and high ventilation rates to remove the moisture produced by the cattle and to reduce the number of airborne pathogens being passed from animal to animal.*
>
> *Factors contributing to providing good ventilation include sufficient and correctly positioned air inlets and outlets, and correct air inlet-outlet height differential.*
>
> *Professional advice should be sought if ventilation problems are encountered.*

E 12: Air quality

a. Provisions must be made to ensure that, when cattle are housed indoors, aerial contaminants do not reach a level at which they are noticeably unpleasant to a human observer (as specified by Environmental Protection Agency and Occupational Safety and Health Administration standards for particulates).
b. Where climatic conditions require cattle to be housed for a period of time, the ammonia concentration must not exceed 25 ppm.

> *Inhalable dust should not exceed 10mg/m^3.*

E 13: Indoor stocking rates

A building or pen must provide adequate space and must meet the floor or ground area space recommendations in Appendix 1.

E 14: Partially roofed shelters

When cattle are kept in partially roofed units they must be provided with

1. Effective shelter from the wind; and
2. A dry, comfortable lying area.

D. Wind Breaks – Sun Shade – Sprinklers

E 15: Thermoregulation

a. All cattle facilities must provide cattle with the opportunity to thermoregulate properly.
b. Cattle must be provided with adequate space to perform behavioral adjustments important to thermoregulation and have access to facilities or natural shelters or barriers.

> *A one or two-sided structure with a roof can provide shelter to cattle during periods of intense cold. Structures should be built with the open sides facing south or east (depending on prevailing winds) to maximize effects of solar radiation during the winter.*

E 16: Windbreaks

Windbreaks are required for cattle on pasture and/or in feedyards. Windbreaks can consist of natural tree belts, fences, or manmade structures that are strategically placed to block prevailing winds. Natural geographic features such as hills or canyons may be used in pasture range grazing conditions.

> *Windbreaks are recommended in mounded south sloping feedyards in the northern part of the U.S. A 10 ft. (3 m) minimum is the recommended height and can cut wind speed by half for 150 ft.(45 m) downwind or a 13 ft.(4 m) windbreak for 200 ft.(61 m) downwind. Windbreaks can also serve as snow control during the winter months.*

E 17: Shade

a. Sunshades for cattle in open pastures or feedyards are essential in regions where heat and humidity can be extreme. Shade, either natural or artificial, must be provided for these cattle.
b. For feedlots during hot summer conditions, in addition to shade, water systems must be used to provide cooling for the cattle.

> *In some areas of the United States, cattle are exposed to conditions of extreme heat. Shade provisions can help prevent heat distress, especially in animals not conditioned to such extremes. Shades in the southwest U.S. should be 12 to 14 ft (3.7-4.3 m) high. Shades in the eastern U.S. need be only 7 to 9 ft (2.1-2.7 m) high. The size and number of cattle in a group will determine the amount of shade (size and number of shade areas) needed. In general, young stock need 8 to 13 ft^2 (0.7-1.2 m^2) per animal and adult cattle need 20 to 27 ft^2(1.9-2.5 m^2) per animal.*
>
> *Evaporative cooling through the use of water sprinklers, misters, water cannons or other appropriate devices, can help prevent heat distress, especially in cattle feedyards, during periods of extreme heat.*

E 18: Feedyards

a. Open dirt feedyards should be mounded to provide dry resting areas for cattle and meet Environmental Protection Agency Standards for control of dust.
b. During periods of prolonged wetness, mud must be managed so the depth of mud in the loafing area is not excessive or sufficient to cause cattle difficulty walking to and from feeding and watering areas. Mud must not be allowed to exceed fetlock (ankle) depth for more than very brief periods.

E. Area/Space Allowances

E 19: Lying area

a. Cattle must have access at all times to a lying area which is:
    1. Well-drained or well maintained with dry bedding, and
    2. Of sufficient size to accommodate all cattle lying down together in normal resting posture.
b. During periods of prolonged wetness, mud must be managed so the depth of mud in the loafing area is not excessive or sufficient to cause cattle difficulty walking to and from feeding and watering areas.
c. Mud over fetlock (ankle) depth is not allowed in passageways, or adjacent to waterers or feeding areas.
d. The floor or ground area recommendations in Appendix 1 must be met.

E 20: Hard floors

a. Hard surfaced pens should be made from materials that are impervious to water and urine.
b. Surfaces must be slip resistant grooved or scored but not abrasive to cattle's feet. Diamond grooves are preferred with a depth of 0.5 inches x 4 inches (1.3cm x 10cm).
c. Hard surfaced pens used for resting, health recovery, or calving should be properly bedded with moisture absorbent bedding or rubber mats.
d. Manure handling systems need to be considered when designing barns using hard surface flooring systems, in order to prevent run-off and other environmental hazards.
e. Acceptable hard floors include grooved or unfinished concrete, partial concrete slats, plastic covered expanded metal, or rubber mats.

E 21: Feedyards

a. Cattle may be finished in feedyards.
b. Open housed growing cattle must be grouped according to size and age.
c. Open feedyards should be sloped to promote proper drainage away from resting/loafing areas, water supply, feed troughs/bunks, and fence lines.
d. Space and slope will change with drier or wetter climates, seasons, and soil types. Feedyards must be constructed to provide for adequate space, social and physical environment and comfort of the cattle based on requirements for the geographic region in which they are located.
e. All local, state and federal environmental regulations must be followed.

E 22: Feedyard air quality- SEE E 11

E 23: Space allowance

a. The floor or ground area recommendations in Appendix 1 must be met.
   The space allowance for cattle housed in groups should be calculated in relation to the whole environment, the age, sex, live weight, and behavioral needs of the stock, taking account of the presence or absence of horns and the size of the group.
b. Every animal must have sufficient access to water, feed, and a resting area.
c. Cattle must be managed so as to remain reasonably clean.

E 24: Special holding areas

Special or temporary holding areas should be available for use during calving season, especially for first calf heifers or cows experiencing calving problems.

E 25: Freedom of movement

Except as noted in E26, all cattle must at all times have:

1. Sufficient freedom of sideways movement to be able to groom themselves without difficulty;
2. Sufficient room to lie down and freely stretch their limbs; and
3. Sufficient room to rise and turn around.
4. Cattle must not be tethered.

E 26: Confinement is Prohibited

Cattle must not be closely confined except in the following circumstances, and even then only for the shortest period of time necessary:

1. For the duration of any examination, routine test, blood sampling, veterinary treatment;
2. While they are being fed on any particular occasion;
3. For the purpose of marking, washing or weighing;
4. While accommodation is being cleaned;
5. During the procedure of artificial insemination; or
6. While they are awaiting loading for transportation.

F. Lighting

E 27: Sufficient light in buildings

In all cattle housing, adequate lighting, whether fixed or portable, must be available to enable them to be thoroughly inspected at any time.

G. Calving Environment

E 28: Calving areas

Calving pens or lots must have a bedded resting area, of such a size and with close access to a means of restraint (e.g. chute, head gate) as to permit a person safely to attend the cows and their calves. Suggested dimensions of holding areas or indoor accommodations are found in Appendix 1. Cows must be kept separate from other livestock other than calving cows.

E 29: Indoor calving pen design
When calving cows are temporarily kept in a building, the following must apply:

1. They must be provided with a clean, dry bedded area that is equipped with a means of restraint and adequate lighting that permits a person to attend the cows and their calves safely if necessary;
2. Feed and water must be available;
3. Close-up cows must be kept separate from other cattle or other species of livestock (individual pens are preferable).

E 30: Environmental conditions
Insulation, heating and ventilation of the building must ensure that the air circulation, dust level, temperature, air relative humidity and gas concentrations are kept within limits which are not harmful to calves.

E 31: Surfaces suitable for cleaning
Internal surfaces of indoor calving and hospital pens must be of materials which can be easily cleaned.

E 32: Monitoring
a. Heifers calving on pasture or range must be checked at least daily and preferably more frequently for signs of impending parturition.
b. All cows must be checked on a regular basis for calving problems. A check at least daily is strongly recommended but frequency must be based on history of calving problems, parity, and pasture and weather conditions.
c. It is strongly recommended that first calf heifers be kept in a separate pasture or range area from the adult cow herd.
d. Weather conditions must be considered when determining frequency of monitoring during calving season, with higher frequency during adverse weather.

H. Bull Pens

E 33: Bull pen management
a. Bull pens must be sited to allow the bull sight, sound and odor of other cattle and general farm activity.
b. They should be attended to at least daily by farm staff.

E 34: Bull pen design
a. Individual accommodation for an adult bull of average size must include a bedded sleeping area and loafing area (see Appendix 1 for ground and floor area and feeder space recommendations).
b. Bull pens must be safe for the stock-keepers tending them. Adequate restraining facilities and an escape route must be provided.
c. In areas used for breeding, the floor should not be slatted or slippery.

I. Handling Facilities

E 35: Passageways

a. Alleyways and gates must be designed and operated so as not to impede the movement of cattle.
b. When operating gates and catches, every effort must be made to reduce excessive noise, which may cause distress to the animals.
c. If noise from the equipment is causing animal distress, noise reduction mechanisms must be installed.

E 36: Maintenance of restraint equipment

a. Hydraulic or manual restraining chutes must be adjusted for proper size of cattle.
b. Regular cleaning and maintenance of all working parts is imperative to proper working of the system and safety of the cattle and handlers.
c. Hydraulic restraint systems should have their pressure relief valves adjusted to avoid excessive pressure applied to cattle during restraint.

E 37: Solid-sided equipment

It is strongly recommended that solid sides be used in races, chutes, crowding pens and loading ramps to avoid distraction and balking in cattle.

E 38: Loading facilities

a. Loading facilities:
    1. Should provide a ramp of no more than a 20% incline;
    2. Must be kept clean; and
    3. Must be well lit.
b. Both loading ramps and tailgates must be fitted with means of preventing the cattle from slipping and falling off.
c. Loading ramps should be fitted with appropriately designed and spaced foot battens.

> *Consideration should be given to providing a loading bay and/or ramp that is well lit and enables animals to walk straight into or out of the vehicle on the level or slight gradient with a minimum of shadows.*

J. Specific Provisions for Calves

E 39: Facilities for stressed calves

a. While healthy young calves can tolerate low air temperatures, newborn animals, calves that have been transported or deprived of food, and sick calves, are particularly susceptible to hypothermia. Hypothermia and additional stress must be minimized in susceptible calves by housing them in a well-ventilated building, by the use of thick, dry bedding, and by the avoidance of drafts or provision of supplemental heat.
b. If calving on pasture, pastures should be selected that provide cows with a dry calving environment and access to natural or artificial shelter as weather conditions dictate.

E 40: Quarantining calves
When there is a high risk of infectious disease then consideration must be given to the individual quarantining of calves for the initial rearing period. Producers must consult local or state veterinary professionals to determine the length of quarantine period when disease risk is high.

E 41: Space for calves
The floor or ground area recommendations in Appendix 1 must be met.

K. Fencing

E 42: Design and maintenance of fences
a. All fencing, including gates, must be adequately inspected and maintained on a regular basis.
b. In particular, electric fences must be designed, installed, used and maintained so that contact with them does not cause more than momentary discomfort to the cattle.
c. Feedbunk dividers must be designed so as to avoid any potential threat to the animals, for example, becoming trapped between the dividers or panels.

PART 4: MANAGEMENT

OBJECTIVES: A high degree of caring and responsible management is vital to ensure good animal welfare. Managers and caretakers must be thoroughly trained, skilled and competent in animal husbandry and welfare, and have a good working knowledge of their system and the livestock under their care.

A. Managers

M 1: Farm Plan
All records, checklists, health plans, contingency plans, farm pest control plans, written standard operating and emergency procedures, policies and publications that the HFAC Animal Care Standards for Beef Cattle require the producer to keep and maintain, must be made available for the HFAC inspector.

M 2: Understanding the standards
Managers must ensure that:

1. All stock-keepers have a copy of the Humane Farm Animal Care, *Animal Care Standards for Beef Cattle;*
2. They and the stock-keepers are familiar with the standards; and
3. They and the stock-keepers understand the standards.

M 3: Management and record keeping activities
Managers must:

1. Develop and implement suitable training for stock-keepers, with regular updates and opportunities for continuing professional development. Producers/Managers must be able to demonstrate that staff with responsibilities for stock care have the relevant and necessary skills to perform their duties and, if necessary, are given the opportunity to participate in an appropriate form of training;
2. Develop and implement plans and precautions to cope with emergencies that affect the well being of animals, such as fire, flood and interruption of supplies;
3. Provide an Emergency Action Plan, highlighting procedures to be followed by those discovering an emergency such as fire, flood, or power failure sited, in an easily accessible location which must include:
    a) Procedures to be followed by those discovering such an emergency
    b) The location of water sources for use by the fire department
    c) An address, map grid (GPS) reference, and/or postal code to locate the unit easily.
4. Ensure the Animal Health Plan (see H1) is implemented and regularly updated and that the required data are recorded appropriately;
5. Maintain and make available to the *Humane Farm Animal Care* inspector, records of quarantine procedures and use of medication. These records must include documentation on all incoming and outgoing stock on the farm, as well as types and quantities of medicines used;

6. Ensure animals to be transported including cull cows are fit for transport to their final destination. For unfit animals, alternative arrangements should be made, including on-farm euthanasia if necessary.

M 4: Mitigating problems

a. Managers must understand the times and circumstances in which cattle are prone to welfare problems on their own unit.
b. Managers must be able to demonstrate their competence in recognizing and dealing with these problems.

M 5: Awareness of the welfare implications of management practices

a. Managers must be aware of the welfare implications of calving, injection, oral dosing, dehorning**,** identification procedures, and castration.
b. They must also be aware of welfare concerns related to breeding, particularly the selection of suitable bulls, semen and embryos for use in heifers.

M 6: Training

a. Prior to being given responsibility for the welfare of livestock, employees must be properly trained and/or have the experience appropriate to their job responsibilities, and:
    1. Be able to recognize signs of normal behavior, abnormal behavior, and fear;
    2. Be able to recognize signs of common diseases and knowing when to seek help;
    3. Have a basic knowledge of body condition scoring;
b. In addition, livestock managers must be properly trained or have the experience appropriate to their areas of responsibility and be able to demonstrate the ability to achieve the above, plus the following:
    1. Knowledge of what constitutes proper nutrition in cattle;
    2. Understanding of functional anatomy of the normal foot and its care and treatment;
    3. Understanding the functional anatomy of the normal teat and udder;
    4. Knowledge of calving and the care of the newborn calf;
    5. Understanding of fundamental principles of cattle breeding and genetics.
c. Formal or on-the-job training should be available to staff (including temporary and part-time employees).

M 7: Compassionate treatment

a. Managers must be able to demonstrate competence in handling animals in a positive and compassionate manner.
b. Managers must be able to demonstrate their proficiency in procedures that have potential to cause suffering e.g. injections, foot trimming, dehorning, castration, and identification.

M 8: Complaints to Operators

a. To be certified, an Operation must maintain systems for receiving, responding to, and documenting complaints alleging the Operation's failure to comply with *Humane Farm Animal Care* standards (ISO §15).
b. Whenever an Operator receives a complaint, the Operator must:
    1. Take appropriate action to respond to the complaint and

2. Correct any deficiency in the products or services that affect their compliance with the requirements for certification.

c. Written records must be retained by the Operation for a minimum of 3 years from the date of the records' creation. Records must contain information documenting:
   1. All complaints received (written or verbal),
   2. The actions taken by the operator to respond to the complaint.
d. These records must be made available to *Humane Farm Animal Care* upon request. *Humane Farm Animal Care* will review these records at least annually, during the operation's annual inspection.
e. If a farm operation has "organic" or "natural" certification, operators must notify *Humane Farm Animal Care* if an adverse ruling related to the operation's organic or natural status (such as suspension or revocation of certification, fine, or sanction) is levied against the operation by another certifier or by a governmental program which regulates the industry.

> *The complaints log is ONLY for recording if someone makes a complaint to a producer about their compliance with the HFAC Standards.*

B. Handling

M 9: Quiet handling

Animals must be handled with care and in a manner that imposes the minimum possible stress on the animals. When moving cattle, the facility's design and its surrounding environment must be considered. Handlers should strive to move cattle at a slow, comfortable pace and refrain from using loud noises to move cattle or hitting them in a manner that might cause injury.

M 10: Anticipating animal stress factors

Animal handlers must be trained to understand and identify the stress factors that cattle may be subjected to in advance of handling. They must be knowledgeable of how cattle react towards other cattle, towards humans and to strange noises, sights, sounds and smells, and work to minimize these stressors.

> *Cattle have the following behavioral characteristics, which must be taken into consideration when cows are moved:*
>
> - *They have a wide field of vision and may startle if they see moving objects even at long distances.*
> - *They have acute hearing, so they should not be subjected to loud noises.*
> - *They are herd animals and, if possible, should not be left in isolation.*

M 11: Handling in passageways

a. Cattle must not be driven unless the exit or the way forward for the lead animal is clear.
b. Cattle must not be rushed or run along alleyways, passageways or through gateways.

M 12: Benign handling

a. Sticks and flags may be used as benign handling aids, i.e., as extensions of the arms.
b. No animal must be pulled or lifted by the tail, skin, ears or limbs.
c. Aggressive tail twisting (e.g. jacking) can cause tails to break, especially in young animals, and is prohibited.
d. Sticks must not be used to beat cattle.
e. The use of electric prods is prohibited, except when animal and human safety is in jeopardy and it is the means of last resort.
f. Pulling or dragging calves is specifically prohibited.

M 13: Equipment

A cattle handling unit must be available, comprised of a collecting system and a method of restraint, appropriate to the type, temperament and numbers of stock to be managed.

M 14: Calving aids

a. Calving aids must only be used to assist in a delivery and not to produce a calf as quickly as possible.
b. Before any type of calving aid is used, the cow must be examined to ensure that the calf is properly presented and of a size for which natural delivery can be reasonably expected, without causing undue pain and distress to either the dam or the offspring.

M 15: Rapid diagnosis and treatment

a. All efforts must be made to ensure a prompt and proper diagnosis/treatment of any sick animal.
b. If it does not respond, euthanasia must be considered.
c. No live animal can leave the farm or be transported unless it is able to walk unassisted.

M 16: Non-ambulatory animals

a. All non-ambulatory animals must be treated without delay.
b. Appropriate equipment (e.g. sling or harness, sled, bucket of a front end loader, floatation tank, or stone boat) must be available to move an injured or non-ambulatory animal. For moving non-ambulatory animals, whatever type of lifting gear is used, care must be taken not to cause unnecessary pain or distress to the animal.
c. No live animal can leave the farm or be transported unless it is able to walk unassisted (except for veterinary care).
d. The use of hip-lifters is permitted only for emergency, short-term assistance. Cattle must never be left unattended when hip-lifters are in use.
e. All non-ambulatory and injured animals must be provided with deep bedding, shelter from adverse weather, and accessible water and feed.
f. Where the prognosis for recovery of a non-ambulatory animal is poor, early intervention by euthanizing the animal on farm must be undertaken.

For acceptable methods of moving non-ambulatory cattle refer to the American Meat Institute's Guidelines (available at www.animalhandling.org.

C. Managing replacement animals

M 17: Brought-in calves

a. On arrival at stocker and feeder operations, calves must not be mixed with calves from other sources until their health status has been determined.
b. Acquired calves must be rested in comfortable conditions.

D. Identification

M 18: Identification equipment

a. If neckbands, tail bands, ear tags or leg bands are used, they must be fitted with care and adjusted as required to avoid unnecessary pain or distress.
b. Face branding of any type is prohibited
c. Wattling (waddling) and ear splitting are prohibited.

M 19: Marking

Marking of cattle for identification and other purposes must be done with care by trained, competent operators so as to avoid unnecessary pain or distress to the animals, both at the time of marking and subsequently.

> *Research has shown that while both hot branding and freeze branding are painful procedures, there is some indication that freeze branding may be less painful.*

M 20: Temporary marking

Methods used for temporary marking must be non-toxic, e.g. crayons, paint and chalk markers especially developed for livestock.

E. Equipment

M 21: Using equipment

When equipment is installed which affects animal welfare, managers must be able to:

1. Operate the equipment properly;
2. Maintain the equipment;
3. Recognize common signs of malfunction; and
4. Appropriately act in the event of a failure of this equipment.

M 22: Automatic equipment

All automatic equipment (e.g. waterers, feed dispensers, electric fence) must be thoroughly inspected by a stockperson, or other competent person, not less than once each day, to check if they are working properly. When a defect is found in the automatic equipment:

1. The defect must be rectified promptly, or

2. If this is impracticable, such measures must promptly be taken (and must be maintained until the defect is rectified) as are required to safeguard the livestock from suffering unnecessary pain or distress as a result of the defect.

F. Inspection

M 23: Monitoring

a. Caretakers must inspect their livestock as frequently as is necessary to ensure the well-being of the herd.
b. Caretakers must explain the frequency of their inspections of their livestock to ensure the well-being of the herd.

G. Dogs

M 24: Managing stock dogs

Dogs, including working stock dogs, must be properly trained, must not cause injury or distress to cattle and must be kept under control at all times.

PART 5: HEALTH

OBJECTIVES: The environment in which livestock are housed must be conducive to good health. All producers must have a herd health plan that is in accordance with good veterinary and husbandry practices.

A. Health Care Practices

H 1: Animal Health Plan

a. An Animal Health Plan (AHP) must be drawn up and regularly updated in consultation with a veterinarian.
b. The AHP (which is part of the Farm Plan) must include details of:
    1. Nutrition program;
    2. Vaccination program;
    3. Parasite prevention;
    4. Biosecurity and infectious disease protocols, including tolerance limits on overall herd performance;
    5. Non-ambulatory (downer) animal procedure; and
    6. Euthanasia for culling and emergencies.
c. Records must be kept of all medical/animal health procedures that are performed

H 2: Mitigating health problems

Sudden deaths, disease outbreaks or mortality that cannot be readily identified by the manager must be investigated in consultation with a veterinarian.

H 3: Health monitoring

c. The herd must be monitored for herd performance including: production disease, infectious diseases, and injury as a result of housing/husbandry. For example:
    -Metabolic Disorders – (hypocalcaemia, hypomagnesaemia, ketosis, displaced abomasum, laminitis, bloat, acidosis)
    -Septicemia
    -Enteritis
    -Problems at Calving
    -Lameness
    -Calf Scours
    -Repetitive Physical Injury
    -Respiratory Diseases
    -Body Condition
    -Non-ambulatory animals
d. If any herd performance parameters fall outside the tolerance limits identified by the producer and the herd veterinarian, or casualty and culled cattle numbers exceed those specified in the AHP, a veterinarian must be consulted and management practices adjusted to try to resolve the problem.

H 4: Segregation pens

a. Contagious or downed animals must be segregated and cared for separate from the herd.
b. Any cattle suffering from illness or injury must be treated without delay, and veterinary advice sought when needed. If necessary, such animals must be euthanized.

> *In some circumstances, segregation is not feasible or may disrupt the social hierarchy or cause additional stress to the animal. The advantages of segregation should be weighed against its disadvantages, especially for mild illnesses or injuries that can be easily managed.*

c. Isolation pens must be of a size that is appropriate for the age, size and breed of the animal.
    1. The animal must be able to stand up, turn around, lie down, rest and groom itself without hindrance.
    2. Water, feed and shelter must be readily accessible at all times, unless otherwise directed by the veterinarian.
d. Water and feed must also be readily available to non-ambulatory animals, even if they are not housed in an isolation pen.
e. Urine and dung from hospital pens for sick and injured animals must be disposed of in a manner that prevents spread of infection to other stock.
f. Pens must be constructed to facilitate effective cleaning and disinfection of surfaces, and the possible removal of a carcass from the box.

H 5: Managing brought-in animals

Replacement animals brought in from other sources must be quarantined when necessary, vaccinated, and/or appropriately treated for disease, illness, parasitic infestation or other health-related problems in accordance with the AHP (or standard operating procedures or other written description of how this is to be done) before integration into the herd.

H 6: Grouping cattle

a. Loose-housed, polled and horned cattle must not be grouped together, except when a social group exists.
b. Precautions must be taken to prevent injury if mixing cattle.

H 7: Mitigating behavioral problems

If abnormal behavior activities develop repeatedly and inhibit normal functioning of the animal in any particular pen, a program of modification/enrichment must be pursued until the problem is overcome.

> *Possible abnormal behavior patterns:*
> *1. Repeated rubbing in the absence of disease*
> *2. Tongue rolling/aerophagia*
> *3. Pica (licking/chewing solid objects)*
> *4. Eating soil/sand/dirt*

5. Navel sucking

6. Ear sucking

7. Urine drinking

8. Persistent bellowing

*9. Excessive mounting**

** Within feedyards may be indicative of Buller Steer Syndrome. In this case the buller steer must be removed from the pen. Although the precise cause is not known studies indicate high stocking densities are a contributing factor.*

H 8: Controlling parasites and predators

a. It is essential that all practical measures be taken to prevent or control external and internal parasitic infestations as set forth in the Animal Health Plan.
b. When developing and implementing farm pest and predator control plans, physical exclusion methods and the removal of elements in the vicinity of livestock that might encourage the presence of pests and predators must be included.

Methods of physical exclusion and discouragement of pests and predators include:

- Construction/maintenance of fencing appropriate for excluding the pests/predators in question
- Removal of shelter/cover (e.g., weeds) in the area surrounding livestock buildings
- Removal/protection of obvious food sources
- Maintenance/proofing of buildings against pest and predators.

H 9: Foot care

Although foot problems are rare in extensively raised beef cattle, attention must be given to the condition of the feet of breeding cattle depending on their pasture or pen conditions. If a problem is identified, a foot care plan must be developed as part of the AHP, using methods that are appropriate to the condition and the individual farm.

- *As an aid to assessing the status of lameness in the herd, locomotion scoring may be utilized.*
- *Locomotion scores:*
- *No unevenness of gait, no apparent tenderness*
- *Uneven gait, slightly tender, some outward rotation of the limbs in the outside of the turning circle (abduction) or inside rotation of those limbs on the inside of the turning circle.*
- *Slight obvious lameness, but not affecting behavior*
- *Obvious lameness, difficulty in turning, behavior pattern affected, some weight loss*
- *Extreme difficulty in rising, difficulty in walking, adverse effects on behavior pattern, noticeable weight loss.*
- *[Manson & Leaver 1988]*

H 10: Physical alterations

a. The only potentially injurious husbandry procedures permitted under the Animal Care Standards are as follows (except those done for therapeutic reasons by a veterinarian):
   1. Although a rare procedure in beef cattle, supernumerary teats may be removed. Removal of supernumerary teats may be performed up to 5 weeks of age using pain control.
   2. Disbudding, as soon as a prominent bud has formed, around 2 months of age, can be conducted using a hot iron and using pain control.
      a) Cautery paste may be used to disbud calves that are no older than 7 days of age, with the paste being applied by a person who is proficient in the process, and pain control must be used.

> *Great care must be taken in applying the paste: hair around the horn bud must be clipped, paste must be applied only to the horn bud and rubbed in well, and petroleum jelly must be applied in a ring around the horn bud to prevent the paste from running. It is not recommended to carry out this procedure in wet conditions.*

      b) Horn removal on calves between 2 and 6 months of age may be conducted using pain control.
      c) The following methods are prohibited:
         1. sawing;
         2. banding;
         3. embryonic wires; and
         4. other methods not designed for the purpose of disbudding/dehorning
      d) The removal of horns from cattle over 6 months of age must:
         1. only be performed by a veterinarian, using a combination of sedative or local anesthesia and anti-inflammatory.
         2. not be a routine procedure.
   3. It is strongly recommended that if bull calves are to be castrated, this should be done at the earliest possible age.
      a) Castration may be accomplished by the application of a band (rubber ring) up to 7 days of age.
      b) Between 7 days and 6 months of age, other banding methods, such as "Calicrate" or "E-Z Bander" may be used only with pain control. For castration by spermatic cord crush (Burdizzo clamp), emasculator or surgical castration up to 6 months of age, pain control must be used.
      c) Surgical castration of bulls over 6 months of age must be performed by a veterinarian using sedation or local anesthesia, anti-inflammatory medication for pain control, and provisions for controlling bleeding.
   4. Tail docking is prohibited.
   5. Wattling (waddling) and ear splitting is prohibited.

b. All of these practices must be performed in a way that minimizes suffering and by trained and competent managers.
   1. The above procedures must:
      a) Not be performed on sick animals; and

b) Only be performed using appropriate, properly maintained equipment.

2. Use of a nose lead as the sole form of restraint is prohibited.

3. Pain Management: Metacam 20 (Meloxicam) is approved pain management in Canada and Canadian producers must use this for any of the procedures listed above. Metacom 20 has a 20-day meat withdrawal period.

4. In the U.S: see information below

Pain management options should be considered keeping in mind that use of unapproved drugs must follow the AMDUCA regulations. Meloxicam tablets administered orally at the rate of 0.45 mg/lb (1 mg/kg) are reported to be a cost-effective means of providing analgesia in cattle. In European countries where Meloxicam is approved, 15-day meat and 5-day withdrawal time for milk is recommended. See Appendix 4 for additional information on pain control methods. In Canada Metacom 20 has a 20-day meat withdrawal period and a 96-hour milk withdrawal period.

Note: *Derogation to this standard will only be granted if the farmer can show that they cannot legally obtain sedatives, local anesthetics or similar medications.*

H 11: Medicines must be:

a. clearly labeled
b. Stored in accordance with label instructions
c. Kept in a secure store which is safe from animals and unauthorized people
d. Kept separate from food producing areas
e. A person responsible for the management of the medicine storage must be indicated and that person must keep the appropriate records for stock control purposes.
f. Any medicines used in the U.S. must be licensed for use in the U.S.

H 12: Induction of parturition

Induction of parturition must never be used as a routine management procedure, but is acceptable in accordance with the veterinarian's recommendations.

H 13: Ultrasound for pregnancy detection

Non-veterinarians performing rectal ultrasound pregnancy detection must have received appropriate training in the relevant techniques.

H 14: Genetically modified or cloned animals

The use of genetically modified and/or cloned animals and their offspring is prohibited.

B. Casualty Animals

H 15: Euthanasia

a. Each farm must have provisions for timely and humane euthanasia of casualty cattle. This can be accomplished on-farm by a named, trained, competent member of farm

staff, a slaughterer, or a veterinarian. The method of euthanasia that will be used in each age group of animals must be specified in the Animal Health Plan.

b. If there is any doubt as to how to proceed, the veterinarian must be called at an early stage to advise whether treatment is possible or whether humane slaughter or euthanasia is required to prevent suffering. If an animal is in severe pain that is uncontrollable, then the animal must be promptly euthanized.
c. Nothing stated here is intended to discourage the prompt diagnosis and appropriate treatment of any ill or injured animal.

A copy of the AVMA Guidelines on Euthanasia is available on the HFAC website, www.certifiedhumane.org in the Standards section.

H 16: Carcass Disposal

Disposal of the carcass (cadaver) must meet local requirements and regulations.

PART 6: TRANSPORTATION

Objectives: Animal transport systems must be designed and managed to ensure livestock are not subjected to unnecessary distress or discomfort. The transport and handling of livestock must be kept to an absolute minimum. Personnel involved in transport must be thoroughly trained and competent to carry out the tasks required of them. ALL cattle transported to slaughter as Certified Humane® must have spent their entire lives on Certified Humane® farms.

T 1: Loading facilities

a. Loading facilities
    1. Should provide a ramp of no more than 20% incline.
    2. Must be clean, and
    3. Must be well lit.
b. Both loading ramps and tailboards must be fitted with means of preventing the cows from slipping and falling off.
c. Ramps may be of concrete or earth and, when concrete, must be fitted with appropriately designed and spaced foot battens and also covered with litter.

> *Consideration must be given to providing a loading bay and/or ramp that is well lit and enables animals to walk straight into or out of the vehicle on a level or slight gradient.*

T 2: Passageways

a. Alleyways and gates must be designed and operated so as not to impede the movement of cows.
b. When operating gates and catches, every effort must be made to reduce excessive noise, which may cause distress to the animals.
c. If noise from the equipment is causing the animals distress, noise reduction mechanisms must be installed.

T 3: Transport personnel

a. Personnel in charge of cattle transporters must be able to demonstrate competence in handling cattle when loading and unloading them, and while in transit.
b. Animal handlers must be knowledgeable about likely stressors and how cattle react towards other cattle, towards humans and to strange noises, sights, sounds and smells.

> *Cattle have the following behavioral characteristics, which must be taken into consideration when cows are moved:*
>
> - *They have a wide field of vision and may startle if they see moving objects even at long distances.*
> - *They have acute hearing, so they should not be subjected to loud noises.*
> - *They are herd animals and, if possible, should not be left in isolation.*

T 4: Handling in passageways

a. Cattle must not be driven unless the exit or the way forward for the lead cow is clear.
b. The animal must not be rushed or run along alleyways, passageways, or through gateways.

T 5: Benign handling

a. Sticks and flags may be used as benign handling aids, i.e., as extensions of the arms.
b. No animal must be pulled or lifted by the tail, skin, ears or limbs.
c. Aggressive tail twisting (e.g. jacking) can cause tails to break, especially in young animals, and is prohibited.
d. Sticks must not be used to beat cattle.
e. The use of electric prods is prohibited, except when animal or human safety is in jeopardy and it is the means of last resort.
f. Pulling or dragging calves or other cattle is specifically prohibited.

T 6: Pre-transport feed and water

a. All cattle, including calves, must have access to water up to the point of transport.
b. All cattle, including calves, must have access to food until at least 5 hours prior to loading onto the truck.

T 7: Transport time

The timing of transport for any purpose must be planned between the transporter and producer, and slaughterhouse, if applicable, to minimize traveling and waiting time for the cattle.

T 8: Records of transport

Producers must keep records of transport of animals off their farm, including:

a. Date of transport
b. Number of animals transported and their destination
c. Trucking company
d. Type of vehicle used

T 9: Casualty animal transport

a. A sick or injured ambulatory animal may only be transported:
    1. If it is being taken for veterinary treatment or it is being taken to the nearest available place for humane slaughter; and
    2. If the said animal is suitable for loading, traveling and unloading (can walk unassisted).
b. No animal with a BCS of less than 2 may be transported or leave the farm unless for veterinary treatment.

PART 7: SLAUGHTER

A: Slaughter procedures

S 1: Slaughter systems

All slaughter systems must be designed and managed to ensure livestock are not caused unnecessary distress or discomfort.

a. The slaughter plant must meet the American Meat Institute (AMI) Guidelines (as written by Dr. Temple Grandin with the exception of the allowance for ritual slaughter).
b. AMI Guidelines can be found at www.certifiedhumane.org under the Standards section.
c. The slaughter plant must be inspected by Humane Farm Animal Care's inspectors to verify compliance with the AMI Guidelines.
d. HFAC will also audit the slaughter plant for traceability to ensure that all the product that is labeled with the Certified Humane® logo originates from Certified Humane® farms.

PART 8: APPENDICES

Appendix 1: Stocking Density and Feeder Space Requirements

Table 6-1. Floor or ground area and feeder space recommendations for beef cattle used in agricultural research and teaching[1,2,3]

Area or space	Calves, 180 to 380 kg (400 to 800 lb)		Finishing cattle, 360 to 545 kg (800 to 1200 lb)		Bred heifers, 360 kg (800 lb)	
	m^2	ft^2	m^2	ft^2	m^2	ft^2
Floor or ground area						
Open lots (no barn)						
Unpaved lots with mound (includes mound space)	14.0 to 28.0	150 to 300	23.2 to 46.5	250 to 500	23.2 to 46.5	250 to 500
Mound space, 25% slope	1.9 to 2.3	20 to 25	2.8 to 3.3	30 to 35	2.8 to 3.3	30 to 35
Unpaved lot, 4 to 8% slope, no mound	28.0 to 55.8	300 to 600	37.2 to 74.4	400 to 800	37.2 to 74.4	400 to 800
Paved lot, 2 to 4% slope	3.7 to 4.7	40 to 50	4.7 to 5.6	50 to 60	4.7 to 5.6	50 to 60
Barns (unheated cold housing)						
Open front with dirt lot	1.4 to 1.9	15 to 20	1.9 to 2.3	20 to 25	1.9 to 2.3	20 to 25
Enclosed, bedded pack	1.9 to 2.3	20 to 25	2.8 to 3.3	30 to 35	2.8 to 3.3	30 to 35
Enclosed, slotted floor	1.1 to 1.7	12 to 18	1.7 to 2.3	18 to 25	1.7 to 2.3	18 to 25
Feeder space when fed:	cm	in	cm	in	cm	in
Once daily	45.7 to 55.9	18 to 22	55.9 to 66.0	22 to 26	55.9 to 66.0	22 to 26
Twice daily	22.9 to 27.9	9 to 11	27.9 to 33.0	11 to 13	27.9 to 33.0	11 to 13
Free choice grain	7.6 to 10.2	3 to 4	10.2 to 15.2	4 to 6	10.2 to 15.2	4 to 6
Self-fed roughage	22.9 to 25.4	9 to 10	25.4 to 27.9	10 to 11	27.9 to 30.5	11 to 12
	Cows, 455 kg (1,000 lb)		Cows, 590 kg (1,300 lb)		Bulls, 680 kg (1,500 lb)	
	m^2	ft^2	m^2	ft^2	m^2	ft^2
Floor or ground area						
Open lots (no barn)						
Unpaved lots with mound (includes mound space)	18.6 to 46.5	200 to 500	28.0 to 46.5	300 to 500	46.5	500
Mound space, 25% slope	3.7 to 4.2	40 to 45	3.7 to 4.2	40 to 45	4.7 to 5.6	50 to 60
Unpaved lot, 4 to 8% slope, no mound	32.5 to 74.3	350 to 800	32.5 to 74.3	350 to 800	74.3	800
Paved lot, 2 to 4% slope	5.6 to 7.0	60 to 75	5.6 to 7.0	60 to 75	9.3 to 11.6	100 to 125
Barns (unheated cold housing)						
Open front with lot	1.9 to 2.3	20 to 25	2.3 to 2.8	25 to 30	3.7	40
Enclosed, bedded pack	3.3 to 3.7	35 to 40	3.7 to 4.7	40 to 50	4.2 to 4.7	45 to 50
Enclosed, slotted floor	1.9 to 2.3	20 to 25	2.0 to 2.6	22 to 28	2.8	30
Feeder space when fed:	cm	in	cm	in	cm	in
Once daily, limited feed access	61.0 to 76.2	24 to 30	66.0 to 76.2	26 to 30	76.2 to 91.4	30 to 36
Twice daily, limited feed access	30.5 to 38.1	12 to 15	30.5 to 38.1	12 to 15	—	—
High-concentrate diet, ad libitum	12.7 to 15.2	5 to 6	12.7 to 15.2	5 to 6	—	—
High-forage diet, ad libitum	30.5 to 33.0	12 to 13	33.0 to 35.6	13 to 14	—	—

[1]Primarily based on MWPS (1987).
[2]Values are on a per-animal basis in a pen environment.
[3]In favorable (e.g., dry) climates, area accommodations may be less than indicated in this table.

The following slope and space allowances are typical of Midwest feedyards.

Slope (%)	Space Per Animal (ft^2)
2	400-800
2-4	250-400
4	150-250

Appendix 2: Recommended Weaning Methods

Weaning time can be stressful for cows and calves. Under traditional weaning systems, changes in environment, diet composition, and pathogen exposure can reduce animal performance and result in health problems.

Fenceline weaning is a management system in which the calves are removed from their dams but are allowed to see, hear, and smell their dams. Depending on the fencing used, physical contact may also be possible. It has the potential to reduce stress related to transport, changes in environment, and diet adaptation. Fenceline weaning may also reduce labor demands and costs associated with drylot facilities.

Considerations

1. Fencing should be substantial enough to prevent the calves from nursing and keep the cows and calves separated. Producers have used various combinations of electric and non-electric, and high-tensile, barbed, and woven wire fencing. For cattle that have not been exposed to electric fencing, either woven wire or at least 5 strands of electric fencing will likely be necessary. If the cattle are familiar with electric fencing, three strands will likely be sufficient. Yet another option is to utilize 4 to 5 strands of barbed wire combined with a single strand of electric fence offset from the main fence.
2. Pasture the cows and calves together in the pasture where the calves will be after weaning. One week in the pasture allows time for the calves to become familiar with the fences and water source. At weaning time, return the calves to the same pasture and move the cows to the adjoining pasture.
3. Some producers have found it useful to use a yearling or a cow without a calf in the weaning pasture to lead the calves to the water source.
4. Performance of the weaned calves is highly dependent on forage quality and quantity. Options to provide high quality forage in the weaning pasture are:
    1. Graze early in the season and allow adequate re-growth prior to weaning,
    2. Harvest hay and then graze at weaning time.
    3. Plant ryegrass, small grains or other annual forages to provide high quality forage.
5. Fenceline weaning fits well into a management system where maximize gain is not important (replacement heifer development or backgrounding calves).
6. The need for supplementation of calves weaned on pasture depends on forage quality and quantity and the desired average daily gain.

http://www.extension.org/pages/13547/fenceline-weaning-for-beef-cattle

Appendix 3: Temperature-Humidity Index

Instructions:

1. Establish the baseTHI from the Chart 1 below. Locate current temperature in the left column and the nearest relative humidity in the top row. Base THI is THI at intersection point.

2. If skies are mostly clear, go to Chart 2; if partly to mostly cloudy go to Chart 3.

3. Determine the adjusted THI by finding your THI from Step 1 in the left column and windspeed in the top row. Point of intersection of row and column is the adjusted or effective THI.

4. Determine heat stress potential from categories listed below Charts.

Chart 1 - Temperature-Humidity Index (THI)

Temperature (F) - Current Hour	Relative Humidity													
	15%	20%	25%	30%	35%	40%	45%	50%	55%	60%	65%	70%	75%	80%
105	83	84	86	87	88	89	91	92	93	95	96	97	99	100
104	82	84	85	86	88	89	90	91	93	94	95	96	98	99
103	82	83	84	86	87	88	89	91	92	93	94	96	97	98
102	81	83	84	85	86	87	89	90	91	92	94	95	96	97
101	81	82	83	84	86	87	88	89	90	92	93	94	95	96
100	80	82	83	84	85	86	87	88	90	91	92	93	94	95
99	80	81	82	83	84	85	87	88	89	90	91	92	93	94
98	79	80	82	83	84	85	86	87	88	89	90	91	93	94
97	79	80	81	82	83	84	85	86	87	88	89	91	92	93
96	78	79	80	81	82	83	85	86	87	88	89	90	91	92
95	78	79	80	81	82	83	84	85	86	87	88	89	90	91
94	77	78	79	80	81	82	83	84	85	86	87	88	89	90
93	77	78	79	80	80	81	82	83	84	85	86	87	88	89
92	76	77	78	79	80	81	82	83	84	85	85	86	87	88
91	76	76	77	78	79	80	81	82	83	84	85	86	86	87
90	75	76	77	78	79	79	80	81	82	83	84	85	86	86
89	75	75	76	77	78	79	80	80	81	82	83	84	85	86
88	74	75	76	76	77	78	79	80	81	81	82	83	84	85
87	73	74	75	76	77	77	78	79	80	81	81	82	83	84
86	73	74	74	75	76	77	78	78	79	80	81	81	82	83
85	72	73	74	75	75	76	77	78	78	79	80	81	81	82
84	72	73	73	74	75	75	76	77	78	78	79	80	80	81
83	71	72	73	73	74	75	75	76	77	78	78	79	80	80
82	71	71	72	73	73	74	75	75	76	77	77	78	79	79
81	70	71	72	72	73	73	74	75	75	76	77	77	78	78
80	70	70	71	72	72	73	73	74	75	75	76	76	77	78
79	69	70	70	71	71	72	73	73	74	74	75	76	76	77
78	69	69	70	70	71	71	72	73	73	74	74	75	75	76
77	68	69	69	70	70	71	71	72	72	73	73	74	74	75
76	68	68	69	69	70	70	71	71	72	72	73	73	74	74
75	67	68	68	68	69	69	70	70	71	71	72	72	73	73
74	67	67	67	68	68	69	69	70	70	70	71	71	72	72
73	66	66	67	67	68	68	68	69	69	70	70	71	71	71
72	65	66	66	67	67	67	68	68	69	69	69	70	70	70
71	65	65	66	66	66	67	67	67	68	68	68	69	69	70
70	64	65	65	65	66	66	66	67	67	67	68	68	68	69

THI = T - (0.55 - (0.55 * (RH/100))) * (T - 58)

Potential Heat Stress Category

Normal < 70	Aware 70-74	Alert 75 - 78	Danger 79 - 83	Emergency > 83

THI Adjusted for Wind Speed and Solar Radiation

Chart 2 - Clear (No Haze or Cloud Cover) Afternoon Conditions

THI \ Wind Speed (mph)	24	22	20	18	16	14	12	10	8	6	4	2	0
90	75	76	78	80	82	83	85	87	89	91	92	94	96
88	73	74	76	78	80	81	83	85	87	89	90	92	94
86	71	72	74	76	78	79	81	83	85	87	88	90	92
84	69	70	72	74	76	77	79	81	83	85	86	88	90
82	67	68	70	72	74	75	77	79	81	83	84	86	88
80	65	66	68	70	72	73	75	77	79	81	82	84	86
78	63	64	66	68	70	71	73	75	77	79	80	82	84
76	61	62	64	66	68	69	71	73	75	77	78	80	82
74	59	60	62	64	66	67	69	71	73	75	76	78	80
72	57	58	60	62	64	65	67	69	71	73	74	76	78
70	55	56	58	60	62	63	65	67	69	71	72	74	76
68	53	54	56	58	60	61	63	65	67	69	70	72	74
66	51	52	54	56	58	59	61	63	65	67	68	70	72
64	49	50	52	54	56	57	59	61	63	65	66	68	70

Chart 3 - Partly Cloudy (1/3 to 2/3 overcast) or Hazy Afternoon Conditions

THI \ Wind Speed (mph)	24	22	20	18	16	14	12	10	8	6	4	2	0
90	72	73	75	77	79	80	82	84	86	88	89	91	93
88	70	71	73	75	77	78	80	82	84	86	87	89	91
86	68	69	71	73	75	76	78	80	82	84	85	87	89
84	66	67	69	71	73	74	76	78	80	82	83	85	87
82	64	65	67	69	71	72	74	76	78	80	81	83	85
80	62	63	65	67	69	70	72	74	76	78	79	81	83
78	60	61	63	65	67	68	70	72	74	76	77	79	81
76	58	59	61	63	65	66	68	70	72	74	75	77	79
74	56	57	59	61	63	64	66	68	70	72	73	75	77
72	54	55	57	59	61	62	64	66	68	70	71	73	75
70	52	53	55	57	59	60	62	64	66	68	69	71	73
68	50	51	53	55	57	58	60	62	64	66	67	69	71
66	48	49	51	53	55	56	58	60	62	64	65	67	69
64	46	47	49	51	53	54	56	58	60	62	63	65	67

Potential Heat Stress Category

Normal < 70 **Aware 70-74** **Alert 75 - 78** **Danger 79 - 83** **Emergency > 83**

THI Adjustments based on panting rates of feedlot cattle.
Dr. Terry L. Mader , Beef Cattle Specialists
University of Nebraska
Haskell Ag Lab - Concord, NE

Appendix 4: Pain Control

Recommendations for Castration and Dehorning of Cattle

Hans Coetzee, *BVSc, Cert CHP, PhD, MRCVS, DACVCP*
Department of Veterinary Clinical Sciences, Kansas State University, Manhattan, KS 66506

Abstract

Pain associated with routine husbandry procedures such as dehorning and castration is increasingly being scrutinized by the public. The results of a survey of AABP and AVC members suggest that surgical castration with a scalpel followed by emasculator (>200 lb or 90 kg) or twisting (<200 lb or 90 kg) is the most common castration method used by practitioners in the United States. Risk of injury to the operator, calf size, handling facilities, and experience were the most important considerations in selecting a castration method. Non-surgical castration is perceived to cause more adverse events than surgical castration. One in five veterinarians currently report using anesthesia or analgesia at the time of castration. Ninety percent of veterinarians vaccinate and dehorn at the time of castration. The Barnes dehorning tool appears to be the most common method of dehorning used in the US. Results of studies that use plasma cortisol or weight gain to determine the optimal timing and method of castration and use of analgesia are often equivocal or conflicting. The preliminary findings of a study using electroencephalography to examine the effect of age at the time of castration on brainwave activity show a more prominent shift toward high-frequency, low-amplitude brain activity in older calves compared with six-week-old calves. Meloxicam tablets administered orally at 0.45 mg/lb (1 mg/kg) may provide a convenient and cost-effective means of providing analgesia in cattle. A mean peak plasma concentration (Cmax) of 3.10 ug/mL (Range: 2.64 – 3.79 ug/mL) was recorded at 11.64 hours (Range: 10 – 12 hours) with a half-life (T ½ λz) of 27.54 hours (Range: 19.97 – 43.29 hours) after oral meloxicam administration. In recent studies we found that meloxicam administered prior to dehorning at 0.23 mg/lb (0.5 mg/kg) IV significantly increased average daily weight gain in calves after dehorning. A second study found that calves receiving oral meloxicam 24 hours prior to surgical castration tended to have a lower incidence of bovine respiratory disease.

Résumé

La douleur résultant d'opérations routinières comme l'écornage et la castration retient de plus en plus l'attention du public. Une étude réalisée auprès des membres de l'American Association of Bovine Practitioners (AABP) et de l'Academy of Veterinary Consultants (AVC) montre que la méthode de castration la plus employée par les vétérinaires américains est la castration chirurgicale, effectuée par incision au scalpel suivie de l'enlèvement des testicules avec l'émasculateur (sur les veaux de plus de 90 kg, ou 200 lb) ou par torsion (veaux de moins de 90 kg, ou 200 lb). Les facteurs les plus considérés dans le choix de la méthode de castration étaient le risque de blessures pour le manipulateur, la taille du veau, les installations et outils disponibles et l'expérience du manipulateur. La castration non chirurgicale est perçue comme une méthode causant davantage d'inconvénients que la castration chirurgicale. Actuellement, un vétérinaire sur cinq dit avoir recours à l'anesthésie ou à l'analgésie lors de la castration. De plus, 90 % des vétérinaires interrogés disent pratiquer la vaccination et l'écornage en même temps que la castration. L'écorneur Barnes semble être l'outil d'écornage le plus utilisé aux États-Unis. Les études visant à déterminer le meilleur moment et la meilleure méthode pour l'écornage et l'analgésie d'après le dosage du cortisol plasmatique du sang ou le gain de poids donnent des résultats souvent équivoques ou contradictoires. Les résultats préliminaires d'une étude par électroencéphalographie de l'effet de l'âge à la castration révèlent que les veaux plus âgés tendent à avoir une activité cérébrale de fréquence plus élevée et d'amplitude plus faible que les veaux âgés de six semaines. La méloxicame, administrée par voie orale sous forme de comprimés à une dose de 1 mg/kg (0,45 mg/lb), semble une méthode d'analgésie pratique et rentable chez les bovins. Dans le plasma sanguin, le sommet de concentration moyen (Cmax) de la méloxicame était de 3,10 µg/mL (pour une variation de 2,64 à 3,79 µg/mL) et fut observé 11,64 heures (pour une variation de 10 à 12 heures) après l'administration orale de ce médicament, dont la demi-vie moyenne (T ½ λz) était de 27,54 heures (pour une variation de 19,97 à 43,29 heures). Dans une étude récente, nous avons observé que les veaux recevant 0,5 mg/kg (0,23 mg/lb) de méloxicame par voie intraveineuse avant l'écornage affichaient, après l'écornage, un gain de poids quotidien moyen significativement supérieur. Une seconde étude a montré que les veaux recevant la méloxicame par voie orale 24 heures avant la castration chirurgicale étaient moins fréquemment affectés par le complexe respiratoire bovin.

Introduction

Castration of male calves is one of the most common livestock management practices performed in the United States, amounting to approximately 15 million procedures per year.[19] Methods of castration are associated with either physical, chemical or hormonal damage to the testicles.[16] In many production settings, physical castration methods are the most common. These are subdivided into procedures involving surgical removal of the testes, or methods that irreparably damage the testicles by interruption of the blood supply using either a castration clamp[a], rubber ring[b], or latex band[c].

Benefits of castration include reduction in aggression and mounting behavior of males, causing fewer injuries in confinement operations and reduced dark-cutting beef.[9,18] Steers have higher quality meat with increased tenderness and marbling. Carcasses from steers therefore command higher prices at market when compared with bulls.[1] Castration also prevents physically or genetically inferior males from reproducing and prevents pregnancy in commingled pubescent groups.[9] Although the benefits of castration are widely accepted, all methods of castration produce physiological, neuroendocrine, and behavioral changes indicative of pain and distress.[16]

Societal concern about the moral and ethical treatment of animals is becoming more common.[14] In particular, negative public perception of castration and dehorning is increasing, with calls for the development of practices to relieve pain and suffering in livestock. Production agriculture is charged with the challenge of formulating animal welfare policies relating to routine management practices such as castration. To enable the livestock industry to respond to these challenges there is a need for data on management practices that are commonly being used in typical production settings.[8]

We conducted a web-based survey of members of the American Association of Bovine Practitioners (AABP) and Academy of Veterinary Consultants (AVC) who were asked to provide information about castration methods, adverse events, and husbandry procedures conducted at the time of castration. Invitations to participate in the survey were sent to e-mail addresses belonging to 1,669 AABP members and 303 AVC members. After partially completed surveys and missing data were omitted, 189 responses were included in the analysis. Surgical castration with a scalpel followed by testicular removal using manual twisting (cattle < 198 lb [90 kg]) or an emasculator (cattle > 198 lb [90 kg]) were the most common methods of castration. The potential risk of injury to the operator, size of the animal, handling facilities, and experience with the technique were the most important considerations used to determine the castration method. Swelling, stiffness, and increased lying time were the most prevalent adverse events observed following castration. One in five practitioners reported using an analgesic or local anesthetic at the time of castration. Approximately 90% of respondents said they also vaccinate and dehorn cattle at the time of castration. Equipment disinfection, prophylactic antimicrobials, and tetanus toxoid are commonly used to minimize complications following castration. The results of this survey provide insight into current bovine castration and management practices in the US.

AVMA guidelines suggest that animals should be dehorned and castrated at the "earliest age practicable". Everyone probably agrees that this is a good idea based on observations that animals castrated younger suffer less performance setback than those castrated at an older age. However, it is interesting to review the science supporting this recommendation. For the most part, this recommendation is based on studies evaluating plasma cortisol concentration and performance effects.

Reviewing the literature highlights several deficiencies. These include that age and method effects are rarely examined under the same set of experimental conditions. This requires extrapolation between studies done in six-week-old calves and studies done in three-month-old calves, which is very risky. Furthermore, the effect of performing dehorning and castration at the same time has not been evaluated until our group studied this fairly recently. The concurrent measurement of multiple novel indicators of pain and distress in the same population of animals is also currently deficient in the literature.

Age Effects

Table 1 shows the Cmax, which is the maximum cortisol concentration in serum, and the Tmax, which is the time after castration when maximum cortisol concentration occurred. When we consider rubber ring castration in six-day-old calves, we see the cortisol concentration was much lower and occurred much earlier than in two to four-month-old animals. However, the opposite is found for surgical castration, where there was a much higher cortisol concentration in six-day-old calves compared to two to four-month-old calves. This does not really fit with the hypothesis that surgical castration should be less stressful in younger calves. The literature suggests those six-day-old calves have a higher cortisol concentration than those older calves. This does not imply that we should wait and castrate them older, instead it illustrates that cortisol responses are an imperfect measure of pain associated with castration.

Table 2 shows the duration of plasma cortisol response elevation above pre-treatment levels. With rubber ring castration in six-day-old calves and two to four-month-old calves, the time above baseline cortisol

Table 1.

	Age				
Method	6 days	21 days	42 days	2-4 months	5.5 months
Rubber ring	60 (36 min)	45 (48 min)	45 (60 min)	76 (90 min)	
Latex band					101 (30-60 min)
Burdizzo	80 (24 min)	50 (24 min)	60 (24 min)	64 (30 min)	87 (30 min)
Surgery (pull)	105 (24 min)	65 (24 min)	110 (24 min)	68 (30 min)	
Surgery (cut)					129 (30 min)

Adapted from: Stafford K, Mellor D: The welfare significance of the castration of cattle: a review. *New Zealand Vet J* 53:271-278, 2005. (Reproduced with permission.)

Table 2.

	Age				
Method	6 days	21 days	42 days	2-4 months	5.5 months
Rubber ring	132 min		96 min	132 min	180 min
Latex Band				180 min	
Burdizzo	60 min	60 min	72 min	90 min	90 min
Surgery (pull)	132 min	84 min	132 min	180 min	
Surgery (cut)					360-600 min

Adapted from: Stafford K, Mellor D: The welfare significance of the castration of cattle: a review. *New Zealand Vet J* 53:271-278, 2005. (Reproduced with permission.)

response is identical. The duration of cortisol response was the same in those two age groups of calves, even though we currently recommend doing them as early as possible. The take home message is that measurement of plasma cortisol is not a perfect measure of pain in animals. Cortisol measurement will not answer the questions we need answered to address animal welfare concerns. In Table 2 we see that surgical castration in six-day-olds produces a much shorter duration of cortisol response than surgical castration in two to four-month-old animals. This is, typically, what we would expect. However, there are also aspects of these data that do not fit with our hypothesis. For example, the AVMA backgrounder[4] states that elastrator rubber ring techniques have been associated with chronic pain and should be discouraged, but six-day-old calves had the same duration of cortisol as two to four-month-old calves.

Growth and Performance

Recently, Dr. Dan Thomson, Director of the Beef Cattle Institute at Kansas State University, concluded a study to evaluate the effects of surgical and banding castration on behavioral responses and growth characteristics of postpubertal bulls.[15] Fifty mixed-breed bulls, weighing 660 to 880 lb (300-400 kg), were randomly assigned to one of five treatment groups as follows: 1) untreated control (CONT); 2) band (BAND); 3) band with local anesthesia (BANDL); 4) surgical castration with twisting of cord utilizing the Henderson tool (SURG); and 5) surgical castration with twisting of cord utilizing the Henderson tool with local anesthesia (SURGL). Behavioral assessment of the cattle was conducted the day before castration, the day of castration, and every day post-castration for 30 days. Bulls were weighed on days 0, 7, 14, 21, and 28 to determine average daily gain (ADG). Data are in the early stages of analysis but initial findings are reported herein. This study found no interactions between local anesthetic treatments and castration methods. Scrotal circumference was similar between treatment groups. Vocalization was higher in the surgically castrated animals than the banded animals ($P = 0.03$). There was no difference in vocalization at the chute with animals treated with local anesthetic prior to castration relative to animals that did not receive local anesthetic ($P = 0.65$). There was no difference in overall feed intake between banded and surgically castrated animals ($P = 0.84$). Cattle that were castrated surgically had lower feed intakes than cattle castrated with bands for the first seven days ($P = 0.02$). However,

at day 14 of the study the intakes were reversed. Cattle that were banded tended to have lower feed intakes than cattle castrated surgically from day 14 to the end of the study ($P = 0.16$). At this point, 50% of the cattle that were banded had lost their scrotum from banding. The other 50% still had their scrotum. There was a marked behavioral pain response noted in animals when necrotic testicles were sloughing after banding.

Castrated cattle had significantly lower rate of gain than control cattle over the course of the study ($P<0.05$). Cattle castrated surgically had overall higher ADG than cattle that were banded ($P = 0.08$). There was no difference in average daily gain due to castration method during the first week after processing ($P = 0.59$). Cattle surgically castrated had significantly higher ADG during the third week after processing ($P = 0.01$) relative to the banded cattle. This study shows the importance of observing animals for at least two weeks when doing castration studies. These preliminary data suggest that the effect of surgical castration is more pronounced over the first seven days after castration. Banding has a pronounced negative effect on performance during the later part of the feeding period. This coincides with the time when necrotic scrotums are sloughing. Due to the short study duration, the longer term relationship between surgical technique and ADG could not be determined in this study.

Production parameters are often too imprecise to reflect the pain experienced by animals following castration.[16] Furthermore, weight gain following castration may be negatively influenced by a decrease in testosterone following removal of the testes.[16] However, assessment of production parameters is critical if animal well-being research is to have relevance to livestock producers. These assessments may take the form of a cost-benefit analysis or a measure of animal performance. In some studies, Burdizzo or surgical castration had no effect on average daily gain (ADG) over a three-month period following castration.[5,11] The ADG of seven-week-old calves during the five weeks following castration using rubber rings, clamp or surgery have been reported to be lower than non-castrated calves, but similar between the different castration methods.[6] Rubber ring and surgical castration were reported to cause a decrease in ADG of 50% and 70%, respectively in cattle aged eight to nine months.[20] When eight, nine, and 14-month-old cattle were castrated surgically or using latex bands, cattle castrated later had poorer growth rates than those castrated at weaning. Cattle castrated with latex bands also had lower growth rates than those castrated surgically during the following four to eight weeks.[7,12] In a study conducted by Oklahoma State University, 162 bull calves were used to determine the effects of latex banding of the scrotum or surgical castration on growth rate. Bulls that were banded at weaning gained less weight than bulls that were banded or surgically castrated at 2 to 3 mo of age.[13] In a second study, 368 bull calves were used in two separate experiments to examine the effect of method of castration on receiving health and performance. In the first experiment, latex banding intact males shortly after arrival was found to decrease daily gain by 19% compared with purchasing steers, and by 14.9% compared with surgically castrating intact males shortly after arrival. In the second experiment purchased, castrated males gained 0.58 lb (0.26 kg) more and consumed 1.26 lb (0.57 kg) more feed per day than intact males surgically castrated shortly after arrival.[2]

Recently, a Canadian group conducted a large, pen-level study to investigate the effect of castration timing, technique and pain management on health and performance of young feedlot bulls in Alberta.[3] This study was conducted through close-out when cattle were harvested, therefore providing long-term comparison data between castration techniques are various attempts at pain control. A total of 956 feedlot bulls were assigned to eight castration groups receiving combinations of banding and surgical castration, epidural and systemic analgesia performed either on arrival or 70 days post-arrival. Bulls castrated on arrival tended to have a higher occurrence of undifferentiated fever ($P = 0.086$) and a higher proportion of Canadian yield grade 3 carcasses compared with calves castrated at 70 days. Bulls castrated with a band were found to have a lower occurrence of undifferentiated fever and improved ADG and carcass weight than bulls castrated surgically. There was no significant difference between animals receiving analgesia and anesthesia and those that did not. These findings suggest that band castration is superior to surgical castration and delayed castration is beneficial in bull calves at high risk of developing UF. This study failed to demonstrate any economic benefit to providing analgesia at the time of castration; however, it should be noted that the analgesic drugs used had a relatively short T ½ (< 12 hours).

Provision of Analgesia: Meloxicam

Meloxicam is a NSAID of the oxicam class that is approved in the European Union for adjunctive therapy of acute respiratory disease; diarrhea, and acute mastitis when administered at 0.23 mg/lb (0.5 mg/kg) IV or SC. Meloxicam is considered to bind preferentially to cyclooxygenase-2 (COX-2) inhibiting prostaglandin synthesis although definitive evidence of COX-selectivity in calves is deficient in the published literature. Heinrich *et al*[10] demonstrated that meloxicam IM (0.23 mg/lb) combined with a cornual nerve block reduced serum cortisol response for six hours in six to 12-week-old calves compared with calves receiving only local anesthesia prior to cautery dehorning. Furthermore, calves receiv-

ing meloxicam had lower heart rates and respiratory rates than placebo-treated control calves over 24 hours post-dehorning. Stewart *et al*[17] found that meloxicam administered IV at 0.23 mg/lb mitigated the onset of pain responses associated with hot-iron dehorning in 33 ± 3-day-old calves compared with administration of a cornual nerve block alone, as measured by heart-rate variability and eye temperature. These findings indicate that administration of meloxicam at 0.23 mg/lb IV or IM decreases physiological responses that may be linked to pain and distress associated with cautery dehorning in preweaning calves.

The purpose of this study was to investigate the pharmacokinetics and oral bioavailability of meloxicam in ruminant calves.[4] Six Holstein calves (319 to 374 lb or 145 to 170 kg) received either meloxicam IV at 0.23 mg/lb or oral meloxicam at 0.45 mg/lb (1 mg/kg) in a randomized cross-over design with a 10-day washout period. Plasma samples collected up to 96 hours post-administration were analyzed by LC-MS followed by noncompartmental pharmacokinetic analysis. A mean peak plasma concentration (Cmax) of 3.10 ug/mL (range: 2.64 – 3.79 ug/mL) was recorded at 11.64 hours (range: 10 – 12 hours) with a half-life (T ½ λz) of 27.54 hours (range: 19.97 – 43.29 hours) after oral meloxicam administration. The bioavailability (F) of oral meloxicam corrected for dose was 1.00 (range: 0.64 – 1.66). These findings indicate that oral meloxicam administration could be an effective and convenient means of providing long-lasting analgesia to ruminant calves.

In the United States, meloxicam administered to cattle by any route constitutes extra-label drug use (ELDU). Under the Animal Medicinal Drug Use Clarification Act (AMDUCA), ELDU is permitted for relief of suffering in cattle provided specific conditions are met. These conditions include that 1) ELDU is permitted only by or under the supervision of a veterinarian, 2) ELDU is allowed only for FDA-approved animal and human drugs, 3) ELDU is only permitted when the health of the animal is threatened and not for production purposes, 4) ELDU in feed is prohibited, and 5) ELDU is not permitted if it results in a violative food residue. Therefore, use of oral meloxicam to alleviate suffering associated with dehorning and castration in calves in the United States would be required by law to comply with these regulations. Currently, the only NSAID approved for use in cattle in the United States is flunixin meglumine. The plasma elimination half-life of flunixin is reported to be three to eight hours, therefore requiring once-daily administration. Although this drug class is recognized as having analgesic properties, flunixin is only indicated for control of fever associated with respiratory disease or mastitis, and fever and inflammation associated with endotoxemia, rather than for control of pain. Studies demonstrating the analgesic effects of flunixin at the approved dose of 1.0 mg/lb (2.2 mg/kg) are deficient in the published literature. Use of flunixin meglumine is further complicated by the requirement for intravenous administration, which is more stressful on the animal and involves more skill and training on the part of the operator. Several reports have suggested that the IM administration of flunixin may result in significant myonecrosis and tissue residues. In the absence of data demonstrating that flunixin reduces signs of pain and distress associated with dehorning and castration in calves, it could be argued that use of oral meloxicam for this purpose can be justified under AMDUCA. Meloxicam (20 mg/mL) is approved for use in cattle in several European countries with a 15-day meat withdrawal time and a five-day milk withdrawal time following administration of 0.23 mg/lb IM or SC. An oral meloxicam suspension (1.5 mg/mL) and injectable formulation (5 mg/mL) are approved in the United States for the control of pain and inflammation associated with osteoarthritis in dogs. Furthermore, an injectable formulation (5 mg/mL) is approved for the control of post-operative pain and inflammation in cats. Several generic tablet formulations containing meloxicam (7.5 and 15 mg) have recently been approved for relief of signs and symptoms of osteoarthritis in human medicine. The cost of administering IV meloxicam to calves in the present study was approximately US $58.00/220 lb (100 kg) bodyweight and the cost of administering oral meloxicam was US $0.30/220 lb bodyweight.

Conclusions

Pain associated with routine husbandry procedures such as dehorning and castration is increasingly being scrutinized by the public. The results of a survey of AABP and AVC members suggest that surgical castration with a scalpel followed by emasculator (>200 lb or 90 kg) or twisting (<200 lb or 90 kg) is the most common castration method used by practitioners in the United States. One in five veterinarians currently report using anesthesia or analgesia at the time of castration. Results of studies that use plasma cortisol or weight gain to determine the optimal timing and method of castration and use of analgesia are often equivocal or conflicting. The preliminary findings of a study using electroencephalography to examine the effect of age at the time of castration on brainwave activity show a more prominent shift toward high-frequency, low-amplitude brain activity in older calves compared with six-week-old calves. Meloxicam tablets administered orally at 0.45 mg/lb (1 mg/kg) may provide a convenient and cost-effective means of providing analgesia in cattle. A mean peak plasma concentration (Cmax) of 3.10 ug/mL (Range: 2.64 – 3.79 ug/mL) was recorded at 11.64 hours (Range: 10 – 12 hours) with a half-life (T ½ λz) of 27.54

hours (Range: 19.97 – 43.29 hours) after oral meloxicam administration. In recent studies we found that meloxicam administered prior to dehorning at 0.23 mg/lb (0.5 mg/kg) IV significantly increased average daily weight gain in calves after dehorning. A second study found that calves receiving oral meloxicam 24 hours prior to surgical castration tended to have a lower incidence of bovine respiratory disease.

Endnotes

[a]Burdizzo castration
[b]Elastrator rubber ring
[c]Callicrate Bander, No Bull Enterprises LLC, St. Francis, KS
[d]AVMA Policy, 2008: *"Elastrator rubber banding techniques have been associated with increased chronic pain and should be discouraged."*

References

1. American Veterinary Medical Association: *Welfare implications of castration of cattle* (June 26, 2009). Available at: http://www.avma.org/reference/backgrounders/castration_cattle_bgnd.pdf. Accessed Aug 19, 2009.
2. Berry BA, Choat WT, Gill DR, Krehbiel CR, Smith RA, Ball RL: *Effect of castration on health and performance of newly received stressed feedlot calves*. 2001 Oklahoma State University Animal Science Research Report. Available at http://www.ansi.okstate.edu/research/2001rr/21/21.htm. Accessed 28 November 2005.
3. Booker CW, Abutarbush SM, Schunicht OC, Pollock CM, Perrett T, Wildman BK, Hannon SJ, Pittman TJ, Jones CW, Jim GJ, Morley PS: Effect of castration timing, technique and pain management on health and performance of young feedlot bulls in Alberta. Bov Pract 43:1-11, 2009.
4. Coetzee JF, KuKanich B, Mosher R, Allen PS: Pharmacokinetics of intravenous and oral meloxicam in ruminant calves. *Vet Ther* 10:E1 – E8, 2009.
5. Cohen RDH, King BD, Thomas LR, Janzen ED: Efficacy and stress of chemical versus surgical castration of cattle. *Can J Anim Sci* 70:1063-1072, 1990.
6. Fenton BK, Elliot J, Campbell RC: The effects of different castration methods on the growth and well-being of calves. *Vet Rec* 70:101-102, 1958.
7. Fisher AD, Knight TW, Cosgrove GP, Death AF, Anderson CB, Duganzich DM, Matthews LR: Effects of surgical or banding castration on stress responses and behavior of bulls. *Aust Vet J* 79:279-284, 2001.
8. Fulwider WK, Grandin T, Rollin BE, Engle TE, Dalsted NL, Lamm WD: Survey of dairy management practices on one hundred thirteen northcentral and northeastern United States dairies. *J Dairy Sci* 91:1686-1692, 2007.
9. Goodrich R, Stricklin R: Animal welfare issues: beef. *USDA Animal Welfare Issues Compendium*, 1997, www.nalusda.gov/awic/pubs/97issues.htm). Accessed Aug 19, 2009.
10. Heinrich A, Duffield TF, Lissemore KD, Squires EJ, Millman ST: The impact of meloxicam on postsurgical stress associated with cautery dehorning. *J Dairy Sci* 92:540-547, 2009.
11. King BD, Cohen RDH, Guenther CL, Janzen ED: The effect of age and method of castration on plasma cortisol in beef calves. *Can J Anim Sci* 71:257-263, 1991.
12. Knight TW, Cosgrove GP, Lambert MG, Death AF: Effects of method and age at castration on growth rate and meat quality of bulls. *New Zealand J Agric Res* 42:255-268, 1999.
13. Lents CA, White FJ, Floyd LN, Wettemann RP, Gay DL: *Method and timing of castration influences performance of bull calves*. 2001 Oklahoma State University Animal Science Research Report. Available at http://www.ansi.okstate.edu/research/2001rr/48/48.htm. Accessed 28 November 2005.
14. Rollin BE: Annual meeting keynote address: Animal agriculture and emerging social ethics for animals. *J Anim Sci* 82:955-964, 2004.
15. Rust RL, Thomson DU, Lonergan GH, Apley MD, Swanson JC: Effect of different castration methods on growth performance and behavioral responses of post pubertal beef bulls. *Bov Pract* 41:111-118, 2007.
16. Stafford KJ, Mellor DJ: The welfare significance of the castration of cattle: a review. *N Z Vet J* 53:271-278, 2005.
17. Stewart M, Stookey JM, Stafford KJ, Tucker CB, Rogers AR, Dowling SK, Verkerk GA, Schaefer AL, Webster JR: Effects of local anesthetic and nonsteroidal anti-inflammatory drug on pain responses of dairy calves to hot-iron dehorning. *J Dairy Sci* 92:1512-1519, 2009.
18. Tarrant PV: The occurrence, cause and economic consequences of dark cutting in beef–a survey of current information, in Hood DE, Tarrant PV (eds): The problem of dark cutting in beef. *Current Topics in Veterinary Medicine and Animal Science*, Vol 10. The Hague, Netherlands, Martinus Nijhoff, 1981, pp 3-35.
19. US Department of Agriculture National Agricultural Statistics Service. *Agricultural Statistics 2009*: Available at http://usda.mannlib.cornell.edu/usda/current/Catt/Catt-07-24-2009.pdf. Accessed Aug 19, 2009.
20. ZoBell DR, Goonewardene LA, Ziegler K: Evaluation of the bloodless castration procedure for feedlot bulls. *Can J Anim Sci* 73:967-970, 1993.

Pain Management in Calves and Cattle

JK Shearer DVM, MS

Professor and Extension Veterinarian
Iowa State University
Ames, Iowa 50011-1250
JKS@iastate.edu

Castration and dehorning are painful, but necessary husbandry procedures. Castration is necessary to reduce injuries in cattle associated with aggression and mounting behavior in males. It is also necessary to prevent mis-mating by genetically inferior males. Dehorning is required to avoid injury to animals and humans. Not all cattle have horns, but those that do quickly learn that they have a distinct advantage over their polled counterparts in battles over dominance. So, the question regarding castration and dehorning is not should we perform these procedures; but how should we perform them in a way that minimizes pain and distress to the animals?

Careful adherence to the procedures outlined in the Beef, Dairy and Young Dairy Beef standards will minimize the pain and discomfort associated with these important management practices. However, when conditions arise that make it necessary to implement pain management beyond local anesthesia, participants of the Certified Humane program should be cognizant of the following.

At the present time there are no drugs labeled for the control of pain in cattle. For example, Flunixin Meglumine (Banamine) is a non-steroidal drug labeled as having anti-pyretic (fever reducing) and anti-inflammatory activity in cattle, but it is not an analgesic (capable of providing pain relief). Furthermore, according to the label directions, Banamine is for intravenous use only. To use it for pain in cattle or by any other route than intravenously constitutes extra-label use of this drug (ELDU) which until passage of the Animal Medicinal Drug Use Clarification Act (AMDUCA) in 1996 was illegal. AMDUCA amended the Federal Food, Drug, and Cosmetic Act, legalizing extra-label drug use by and under the order of a licensed veterinarian within the context of a valid veterinarian-client-patient relationship. So, what does this mean? In short, it means that the use of Banamine or Meloxicam or any other drug used for pain that is not specifically labeled for use in cattle or for this purpose (i.e. ELDU) in the United States requires strict adherence to the provisions of AMDUCA which include the following:

Extra-label drug use (ELDU):

- Is permitted only by or under the supervision of a veterinarian.
- Is allowed only for FDA approved animal and human drugs.
- Requires a valid Veterinarian/Client/Patient Relationship as a prerequisite for all ELDU.
- Is for therapeutic purposes only (when the animal's health is threatened). It does not apply to drugs for production use.
- Rules apply to dosage form drugs and drugs administered in water. ELDU in feed is prohibited.
- Is not permitted if it results in a violative food residue, or any residue which may present a risk to public health.
- FDA prohibition of a specific ELDU precludes such use

When and if these conditions can be met, ELDU is permissible provided that the accurate records of the animals treated are maintained according to the following:

In addition, strict record-keeping of ELDU is required:

- Identify the animals, either as individuals or a group.
- Animal species treated.
- Numbers of animals treated.
- Conditions being treated.

- The established name of the drug and active ingredient.
- Dosage prescribed or used.
- Duration of treatment.
- Specified withdrawal, withholding, or discard time(s), if applicable, for meat, milk, eggs, or animal-derived food.
- Keep records for 2 years.
- FDA may have access to these records to estimate risk to public health.

Finally, whenever drugs are used in an ELDU manner, the bottle or drug container must include the following information on the label:

- Name and address of the prescribing veterinarian.
- Established name of the drug.
- Any specified directions for use including the class/species or identification of the animal or herd, flock, pen, lot, or other group; the dosage frequency, and route of administration; and the duration of therapy.
- Any cautionary statements.
- Your specified withdrawal, withholding, or discard time for meat, milk, eggs, or any other food.

In summary, castration and dehorning are health management procedures that cause discomfort in cattle. Conducting them at the earliest age practicable should be a primary objective. In those infrequent situations where these procedures may need to be conducted in older calves, pain management options should be considered keeping in mind that use of unapproved drugs must follow the AMDUCA regulations. Meloxicam tablets administered orally at the rate of 0.45 mg/lb (1 mg/kg) are reported to be a cost-effective means of providing analgesia in cattle. In European countries where Meloxicam is approved a 15-day meat and 5-day withdrawal time for milk is recommended. Flunixin meglumine used as an anti-inflammatory in post-surgical conditions provides limited analgesia. It is important that if used for reducing inflammation that it be administered intravenously, otherwise it constitutes ELDU. The use of Flunixin meglumine by the intramuscular route causes significant damage to tissues at the injection site and may significantly alter withdrawal times for meat and milk. Persons considering ELDU should work closely with their veterinarians for appropriate guidance in the safe and proper use of drugs in livestock.

Coetzee JF. Recommendations for Castration and Dehorning of Cattle. Proceedings of the American Association of Bovine Practitioners, 2010, 43:40-45.

Coetzee JF, KuKanich B, Mosher R, Allen PS. Pharmacokinetics of intravenous and oral meloxicam in ruminant calves. 2009. Vet Ther 10:E1-E8.

Heinrich A, Duffield TF, Lissemore KD, Squires EJ, Millman ST. The impact of meloxicam on postsurgical stress associated with cautery dehorning. 2009. J Dairy Sci, 92:540-547.

CODE OF PRACTICE FOR THE CARE AND HANDLING OF DAIRY CATTLE:
Review of Scientific Research on Priority Issues
March 2009

PAIN RELIEF DURING AND AFTER SURGICAL PROCEDURES
Conclusions:
1. All surgeries are likely to be painful.
2. A combination of treatments, including analgesics and anesthetics can greatly reduce this pain.

The use of analgesics on farm animals is low for reasons that include fear of residues, legislation, cost, tradition, and lack of knowledge about their use (Stafford et al. 2006).

Pre-emptive analgesia is preferable to reactive analgesia when conducting surgical procedures, reducing or preventing hyperalgesia, allodynia, or wind-up. The most effective analgesia is often provided using a combination of agents that act on different pathways. For example, the use of an epidural containing local anaesthetic and xylazine, combined with a systemic nonsteroidal anti-inflammatory drug (NSAID), provides appropriate analgesia in cases of dystocia (Hudson et al. 2008).

Non-steroidal anti-inflammatory drugs (NSAIDs) such as flunixin, meglumine, tolfenamic acid, ketoprofen, carprofen, and meloxicam are indicated for diseases likely to be associated with pain in cattle include respiratory disease, mastitis, periparturiem inflammatory conditions such as metritis, and inflammatory limb lesions such as joint ill, sole ulceration, and white line disease (Barrett 2004). Traumatic insults and physiological states such as parturition may also be expected to result in the animal experiencing pain, as will surgical procedures such as laparotomy, foot surgery, castration, disbudding, and dehorning.

References

Barrett, D. C. (2004). Non-steroidal anti-inflammatory drugs in cattle - Should we use them more? *Cattle Practice, 12,* 69-73.

Hudson, C., Whay, H., & Huxley, J. (2008). Recognition and management of pain in cattle. *In Practice, 30,* 126-134.

Stafford, K. J., Chambers, J. P., & Mellor, D. J. (2006). The alleviation of pain in cattle: A review. *CAB Reviews: Perspectives in Agriculture, Veterinary Science, Nutrition and Natural Resources, 1,* 1-7.

REFERENCES

Agriculture Canada. 2009. *Recommended code of practice for the care and handling of dairy cattle: review of scientific research on priority issues.* Communication Branch, Agriculture and Agri-Food Canada, Ottawa, Ontario.

Agriculture Canada. 1991. *Recommended code of practice for the care and handling of beef cattle*. Communication Branch, Agriculture Canada, Ottawa, Ontario.

American Association of Bovine Practitioners, Animal Welfare Committee. 1999. *Practical Euthanasia in Cattle, Considerations for the Producer, Livestock Market Operator, Livestock Transporter, and Veterinarian.* Am. Assoc. Bovine Practitioners. Rome, GA. (http://www.aabp.org/resources/euth.pdf)

American Veterinary Medical Association. 2011. *Welfare implications of dehorning and disbudding of cattle.* Pps. 1- 7. (http://www.avma.org/reference/backgrounders/dehorning_cattle_bgnd.pdf).

American Veterinary Medical Association. 2011. *Welfare implications of castration of cattle.* Pps. 1- 8. (http://www.avma.org/reference/backgrounders/castration_cattle_bgnd.pdf).

Animal Behavior and the Design of Livestock and Poultry Systems. Proceedings from the Animal Behavior and the Design of Livestock and Poultry Systems International Conference, Indianapolis, IN. Pub. NRAES (Northeast Regional Agric. Eng. Service) April 1995.

Animal Care Series: Beef Care Practices. University of California Cooperative Extension Beef and Range Workgroup. June 1996.

Animal Welfare Approved Standards for Beef Cattle and Calves. Animal Welfare Approved. 2011.

Coetzee, H. 2010. *Recommendations for castration and dehorning of cattle*. The Am. Assoc. Bovine Practitioners Proceedings. Pps. 40-45.

Dairy Housing and Equipment Systems. Proceedings from the Conference on: Dairy Housing and Equipment Systems: Managing and Planning for Profitability; Camp Hill, PA. February 2000. Pub. NRAES (Northeast Regional Agric. Eng. Service).

Federation of Animal Science Societies. 2010. *Guide for the Care and Use of Agricultural Animals in Agricultural Research and Teaching.* Pps. 74-85.

Grandin, T. 1988 and 1992. *Livestock Trucking Guide.* National Institute for Animal Agriculture, Bowling Green, KY.

Grandin, T. 1993. *Livestock Handling and Transport*. CABI, Wallingford, UK.

Grandin, T., Editor. 2009. *Improving Animal Welfare: A Practical Approach*. CAB Int., Wallington, Oxon, UK.

Guidelines For The Care And Use Of Animals In Production Agriculture. Nebraska Food Animal Care Coalition.

Livestock Handling Guide. Livestock Conservation Institute. 1988

Lowman, B.G., N. Scott and S. Somerville. 1976. "Condition scoring of cattle." East of Scotland College of Agric. Bulletin 6. The Edinburgh School of Agriculture, Edinburgh.

Nutrient Requirements of Beef Cattle 7th ed. National Research Council Publication. 2000. National Academy Press, Washington, DC.

Reynolds, J., Casas, J., Rossitto, P.V., and J. Cullor. 2004. On Farm Euthanasia CD. Veterinary Medicine Teaching and Research Center, University of California, Davis; 18830 Road 112, Tulare, CA 93274. (559-688-1731). (http://www.vmtrc.ucdavis.edu/laboratories/DFSL/euth/index.htm).

RSPCA Welfare Standards for Beef Cattle. RSPCA West Sussex, United Kingdom. March 2010.

RSPCA Veterinary Health Plan: Beef Cattle Guidance notes. RSPCA West Sussex, United Kingdom. Summer 2001.

Shearer, J. K. and P. Nicolette. 2002. *Procedures for Humane Euthanasia, Humane Euthanasia for Sick, Injured, and/or Debilitated Livestock.* College of Veterinary Medicine, Iowa State University, Ames, Iowa. (http://vetmed.iastate.edu/HumaneEuthanasia).

SPCA Certified Standards for the Raising and Handling of Beef Cattle. British Columbia Society for the Prevention of Cruelty to Animals. 2011.

Stull, C.L. and J.P. Reynolds. 2008. *Calf Welfare*. Vet. Clinics N Amer Food Animal Practice. 24(1):191-203.

Young, B.A. 1981. Cold Stress as it affects animal production. J. Anim. Sci. 52-154-163.

Humane Farm Animal Care
Animal Care Standards
January 2014

PO Box 82, Middleburg, VA 20118