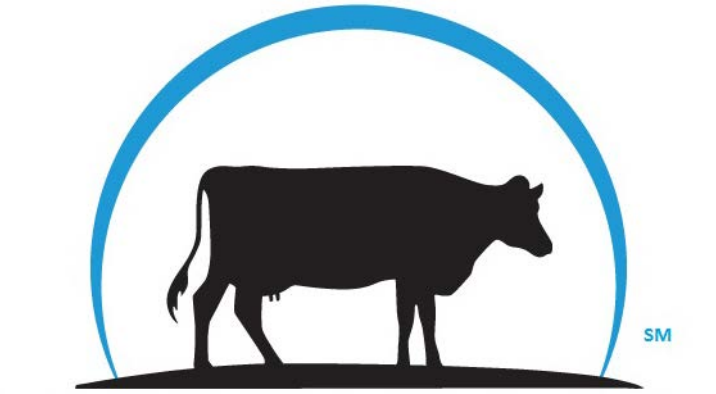

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The Dairy Well audit program was developed with the input of farmers, veterinarians, dairy processors and dairy supply chain customers. The Dairy Well audit program is driven by science, founded in compassion and dedicated to improving the welfare of dairy cattle one farm at a time. It is our belief that from a business and social perspective, animal welfare is the bedrock of a sustainable dairy farm and industry. The goal of the Dairy Well audit program is to provide a path and a goalpost to the dairy industry in providing for the welfare of dairy cattle. Unlike other industry audits, there is no score, no pass or fail. Instead we have chosen high standards asking that every farm make efforts to improve to meet the standards over time, giving every farm the opportunity succeed.

Dr. Walker would like to thank the farmers that graciously participated in the pilot program to test the program and the members of the scientific committee* for their extraordinary commitment and contribution to the development of the Dairy Well audit program. Their time, energy, expertise and above all patience, were without end and are reflected in the program in its depth, practicality and quality. Blair Downey is also deserving of special thanks for her efforts and diligence in developing the auditor training and helping further refine the program.

*Scientific Committee: Dr. Nigel Cook, Dr. Temple Grandin, Dr. Lana Kaiser, Dr. Jan Shearer, Dr. Carolyn Stull, Dr. Cassandra Tucker and Dr. Nina von Keyserlingk

Thank You

DAIRY WELL
Science Driven, Cow Centered

Dairy Cattle Animal Welfare Evaluation Instrument

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I. Animal Welfare Audit Overview

Guiding philosophy

The Dairy Well℠ audit program is based on scientific evidence, and is developed and refined through expert perspective and consensus among professionals, in response to further discovery and public perception. A sustainable animal welfare program must consider the vulnerability of the animal and adequately address the responsibility owed to the animal. A given farm practice can only be justified when there are ethically defensible reasons beyond the basic practicalities of animal use. Program policy must therefore be ethically grounded, reflecting current social norms, acknowledging our responsibility to the animal as well as the science, available data and expert opinion. In this document, we provide transparency about our rationale for key decision points within the Dairy Well℠ audit program about resources and environment, common painful procedures, animal-based measures and udder health. Also included is information about the public perspective, when available. Our hope is that this transparency will make these decisions relatively easy to revisit as further information becomes available and perspectives shift. The audit will be reviewed and updated every three years so that it will continue to reflect the most current science and social norms.

Auditing

Farmers and veterinarians are encouraged to incorporate the Dairy Well℠ audit as a regular self-assessment in their herd health program. Official Dairy Well audits must be done by a 2nd or 3rd party that is certified and in good standing with PAACO for dairy auditing. It is understood that at the initial publication of the Dairy Well audit, PAACO dairy auditor certification is not available. Until such time, Dairy Well℠ audits may only be done by a person with a bachelor's degree or above with a minimum of 5 years' experience in the handling, care and welfare of dairy cattle and trained by one of the audit authors.

The Dairy Well℠ audit program was written to serve as both a 2nd party process incorporating the feedback, guidance and follow-up necessary to drive meaningful continuous improvement, and a 3rd party process focused solely on evaluating conformance to the criteria. It is understood that 3rd party processes will not typically allow for follow-up, demonstration of corrective actions or re-evaluation. It is the responsibility of the party requesting the 3rd party audit to provide follow-up or guidance on the required actions based on the farms performance.

Accurately assessing the welfare of dairy cattle requires that auditors have close contact with the animals on the farm. Walking through pens of loose cattle or through confined housing areas can be dangerous for the cattle and personnel if the auditors are not trained in proper cattle behavior and stockmanship. It is therefore recommended that auditors have documented experience handling and working closely with dairy cattle prior to performing any dairy animal welfare audit.

Biosecurity

Auditors must always practice proper biosecurity, making sure to wear protective clothing and shoe covers that can be properly disinfected between farms. Care must be taken moving from groups of animals that are housed or managed separately to minimize the risk of spreading infectious agents from one group of animals to the next. Cattle should not be handled and if so, gloves should be worn and hands must be

washed. Auditors must also adhere to any additional biosecurity measures required/posted by the farm management.

A. Format

The Dairy Well℠ Program includes:

1. An introductory meeting* 90 days prior to the audit which includes:
    a. An overview of the program expectations, required documents and the audit process.
    b. A Pre-Audit checklist (Appendix C1) for the collection of specific information about animal numbers, milking schedule, employee duties, location of age-specific groups and facility design will be completed in advance and used to prepare for the farm audit.

> ***Direction for 3rd Party Auditors:** When the Dairy Well℠ program is used for a 3rd party audit, the introductory meeting may be eliminated. However, the pre-audit check list should be completed prior to the audit to allow for proper planning and execution of the audit.*

2. An on-farm audit which includes:
    a. Review and verification of animal caregiver training, health records, and Standard Operating Procedures (SOPs).
    b. Observation of animal handling
    c. An evaluation of the dairy cattle and their environment

3. A review and discussion of audit results⁎, including:
    a. Identifying areas of concern
    b. Identifying specific items for which corrective action plans will be developed

4. A plan for follow-up visits to document efforts made to effectively address areas of concern, thereby promoting the concept of continuous improvement⁎

> ⁎***Direction for 3rd Party Auditors:** If the Dairy Well℠ program is used for a 3rd party audit it is the responsibility of the party requesting the 3rd party audit to provide follow-up or guidance on the required actions based on the farms performance. Steps 3 and 4 may be carried out by the 3rd party audit provider's customer.*

The Dairy Well℠ audit is divided into three sections. Firstly, a listing of the Critical Criteria; namely practices necessary to meet critical animal care standards. Secondly, core competencies (Level 1 criteria), industry standard indicators of management that are associated with best practice and industry standard prohibitions (i.e. tail docking), and thirdly, measurable outcomes where continuous improvement may be required to improve the welfare of the cattle on the farm (Level 2 criteria).

Observations are limited to those that can be verified at the time of the audit and do not rely on self-reporting. The farm is expected to demonstrate that it is meeting each of the Critical Criteria, has completed or is practicing each of the Level 1 core competencies and that management strives to meet

these standards daily. *Regardless of the criteria outlined in the following audit, it is expected that the farm adheres to all federal and state laws regarding the care and use of animals*.

On the day of the audit, the necessary documents to evaluate sections B1, B3, C3, C4 and C5 must be made available for review and a knowledgeable individual such as the farm manager or herdsperson must be available at the time of the audit should questions arise or translation be necessary. *On the day of the audit, accommodation must be made to safely evaluate all cattle and facilities. For the audit to proceed in a safe manner all breeding bulls (if present in pens that will be entered for observations) MUST be removed to a separate area.*

B. Continuous Improvement:

Level 2 criteria are founded on the principle of continuous improvement, and focus on animal welfare outcome measures that will be tracked over time and benchmarked against available national data. There is no "PASS" or "FAIL" assigned to any Level 2 criteria. Benchmarking is used to measure performance using a specific indicator (outcome measure) which is then compared to available data from dairy farms. Benchmarking is a means for each farm to evaluate their current performance relative to others and promotes evidence based decision making, by identifying key areas requiring improvement.

In all cases, each Level 2 outcome is supported by science based evidence where available and in the few instances where there is a gap in science, outcomes considered to be generally accepted important indicators of an animal's health and welfare are used. It is recognized that in many instances a measure at a single point in time of an outcome is not necessarily indicative of a specific problem on a farm. Therefore, where the farm does not meet the goal for Level 2 outcomes the farm owner/manager will be required to prepare a corrective action plan for the specific outcome, identify the underlying cause of the problem and implement a plan aimed at correcting it.

C. Compliance & Verification:

3rd Party Process – Each farm will be audited to each criterion in the instrument and the outcome reported to the 3rd party audit client. Any critical non-conformance should be reported directly to the client. It is the responsibility of the client to coordinate and ensure any necessary follow-up.

Possible designations for 3rd party audit outcomes include:

1) Critical Non-Conformance
2) Non-Compliant – Level 1 Criteria are not complete
3) Dairy Well Assured – All Critical and Level 1 Criteria are met, Level 2 Goals not met
4) Dairy Well Elite- All Critical, Level 1 and Level 2 Criteria & Goals are met

2nd Party Process - Each farm is expected to meet all Critical Criteria and Level 1 criteria at the time of the initial animal welfare audit. An immediate corrective action will be required from any farm not compliant with Critical Criteria. When Critical Criteria are not met, the farm will be subject to a follow-up audit within 48 hours to determine if the problem has been corrected, automatically be placed on probation and ranked in the lowest benchmark requiring an audit in 6-9 months.

A farm failing to implement an immediate corrective action on a specific Critical Criteria during the initial audit or that does not demonstrate that the critical area has been satisfactorily addressed at the time of the follow-up will be designated as having a "**Critical Non-Conformance**".
A farm that fails to demonstrate compliance with the Level 1 criteria will be designated "**Non-Compliant**" and expected to make corrective actions within the subsequent 90 days.

A farm that has demonstrated completion of all Critical and Level 1 criteria will be designated as **"Dairy Well℠ Assured".**

Farms that do not meet the Level 2 goals set forth are expected to work with their veterinarian of record, nutritionist and herd health team to ***develop a detailed plan that must be submitted within 90 days, that also includes an implementation schedule and actions*** that will be taken to address the area(s) in need of improvement. A farm that fails to develop and submit such a plan within 90 days, or fails to begin implementation of the plan by the next audit will be designated as "**Non-Compliant**." A farm that has met all Critical Criteria, Level 1 criteria and achieves the current goals established in Level 2 will be designated **"Dairy Well℠ Elite".** At no time, will a "score" or "grade" be assigned to a single farm.

Possible designations for 2rd party audit outcomes include:

1) Critical Non-Conformance
2) Non-Compliant – Level 1 Criteria are not complete; or Corrective Action Plans have not been developed for Level 2 criteria at the 90-day follow-up
3) Dairy Well℠ Assured – All Critical and Level 1 Criteria are met, Level 2 Goals not Met
4) Dairy Well℠ Elite- All Critical, Level 1 and Level 2 Criteria & Goals are met

After the initial audit, a follow-up audit may be needed in 48 hours (in the case of a failure in a Critical Criterion), or more likely, in 6 to 30 months depending on their initial performance and ongoing efforts to improve. Farms non-compliant with Level 1 criteria must demonstrate they have completed the outstanding Level 1 criteria within 90 days. Depending on the item and the accessibility of paper work, the verification of criteria consisting solely of paperwork (completion of SOPs, confirmation of improved SCC, signed VCPR form and approved drug lists) may be submitted remotely. Other Level 1 items including evidence that tail-docking has stopped, training and record keeping will require an onsite visit to confirm actual practices are in place. Farms meeting all the Level 1 criteria, but not meeting one of the goals outlined for each outcome measure in Level 2, will be re-audited on a schedule based on their benchmarking performance for locomotion and severe hock injuries, as these are areas where national data are currently available. The re-audit interval will be the shortest period suggested across locomotion and severe hock injury benchmarked outcomes.

For example, in the case of severe lameness (as defined in section I), the farm will be compared to benchmark data from locomotion survey data collected across the U.S. (Section I2, Table 2). As shown in Figure 1, the data has been divided into benchmark groups (quartiles) for the bottom 25%, middle 50% and top 25% of farms, with thresholds between groups. The farm will be re-audited on the following benchmark schedule:

- Bottom 25% will be re-audited in 6-9 months
- Middle 50% will be re-audited in 12-16 months
- Upper 25% will be re-audited in 24-30 months

Supporting documentation and scientific justification for the specifications for each outcome measure (i.e. locomotion) are provided later in each section of the document**. Outcomes will be rounded to the nearest whole number.**

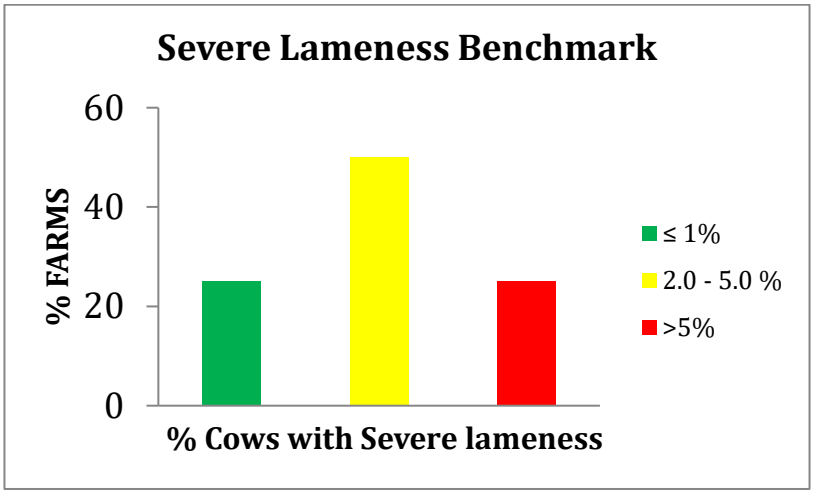

Figure 1. Benchmarking of the outcome measure 'severe locomotion' based on most recent available locomotion data. For example, if a farm had a total of 2.8% of the cows scored as severely lame, the number would be rounded to 3% placing the farm in the middle 50% of farms for severe locomotion and thus a re-audit will be required in 12-16 months.

D. Sample Methodology:

Auditors will observe animal handling and care, examining representative subsets of each life stage housed on the farm including calves (bulls and heifers), growing and breeding age heifers, dry cows, lactating cows and any pens for sick/injured animals. Animals housed off the primary farm site, but for which the farm is responsible for their daily care and feeding, will be included in the audit. General observations will be made of all pens and housing areas. Specific outcomes will be measured in specific pens as described below using a sample size calculator (Appendix F) to determine the minimum number of animals that must be scored in each group. The sample methodology presented is guided by three goals: 1) to determine a reasonably accurate value of the prevalence for each outcome 2) to limit the time required to conduct the audit to 4-6 hours and, 3) to minimize bias.

Sample group – On farms with less than 100 animals in a life-stage (heifers, dry cows or lactating cows) all the animals in that life-stage will be scored. On farms where there are more than 100 animals in a life-stage and/or more than one pen for each life-stage the Dairy Well℠ audit applies a select group sampling approach (Table 1). The election of a 100-animal cut-point was based purely on estimates of the time needed to complete an audit. While it would be ideal to score every cow on every farm this is not possible on large farms within the 4 to 6-hour limit. Current estimates would suggest that 70% of farms in the US have fewer than 100 cows and would have nearly every animal scored. The primary driver for this approach was making sure we can evaluate locomotion as accurately as possible given the goals described above. Evaluating locomotion requires that cows are observed while walking and preferably while being viewed in full view from the side. This view is best achieved on most farms by observing cows walking back

to their pen after milking. Practical limitations such as multiple pens and long milking times limit the ability to score all cattle in some herds during a single visit. Therefore, in herds with more than one lactating cow pen, lameness will be scored on the highest producing, oldest pen of cows or whichever pen represents the majority of those cows. All other outcomes will be scored using a single representative pen for heifers, lactating cows and dry cows. Hospital or sick pens, if present, will also be evaluated for all outcomes specific to the life-stage group of the pen. This approach allows for the inspection all pens for general condition and scoring of pens typically confined such that scoring for individual outcomes is manageable. Specific sample procedures for each outcome measure are described in Table 1, briefly, the following representative animal groups will be scored:

Milk-fed calves – Housing for milk fed calves may be individual, paired or group housing. Numbers may range from a few to several hundred or a thousand. If housed individually, in pairs or groups and there are *fewer than 100 calves present, all of the calves will be scored*. If greater than 100 calves are present the sample calculator will be used to determine the number of calves scored. If housed in groups, the sample calculator will be used to determine the minimum number to score in each milk-fed calf pen. Regardless of the housing system, a random sample will be taken *across the entire age range of milk-fed calves* to obtain the number determined by the sample size calculator.

Heifers – Heifers are commonly housed in groups and managed extensively with limited confinement, often in large pastures. *If there are fewer than 100 heifers present, ALL heifers (or the minimum number as defined by the sample size calculator) will be scored*. If more than 100 heifers, the oldest group/pen of bred heifers will be scored. The sample size calculator will be used to determine the minimum number of heifers that should be scored applying a random sampling procedure within the pen. On farms with several small pens of heifers, the number to be scored will based on the total number of heifers and then spread evenly across each pen. While it is not possible to keep track of each animal scored, efforts will be made not to score the same heifer twice.

Lactating Cows – The sampling approach is determined by the animal number and housing. In herds consisting of a single lactating group, **ALL** lactating cows will be scored for locomotion upon exiting the parlor. The remaining outcomes will be scored after milking in the pen. In large herds with multiple pens, ALL cows in the highest producing, oldest pen will be scored exiting the parlor and hocks and knees should be scored in the parlor in a different pen (mid to late lactation pens preferred). The sample size calculator will be used to determine the minimum number of cows to score for hocks and all other outcome measures. While it is not possible to keep track of each animal scored, efforts will be made not to score the same cow twice. Tie-stall barns typically allow for all cows to be scored while in the stalls during milking. If released from tie-stalls, locomotion should be evaluated upon release from the stall. We do not require that cows be released from tie-stalls if it is not the normal procedure for the farm. In robotic parlor herds (AMS) the sample calculator will be used and locomotion will be scored inside the pen along with other outcomes. It is recognized that it may not be possible to accurately assess locomotion in herds with AMS.

Dry Cows- Dry cows are commonly housed in groups and managed extensively with limited confinement in large pastures. *If there are fewer than 100 dry cows present, ALL (or the minimum number as defined by the sample size calculator) dry cows will be scored*. If more than 100 dry cows

and if multiple dry cow groups are present, the group of dry cows furthest into their dry period will be scored. The sample size calculator will be used to determine the minimum number of dry cows that should be scored applying a random sampling procedure within the pen. While it is not possible to keep track of each cow scored, efforts will be made not to score the same cow twice.

Hospital/Special Needs Pen- Where hospital pens or special needs pens exist, the sample size calculator will be used to determine the minimum number of cows to be scored.

Sample Size – It would be ideal to score every cow in each pen evaluated. However, except for locomotion where it is possible to score every cow as they exit the parlor, it is difficult to score every cow in a pen as many housing systems do not have lock-ups. To address this, a sample size calculator is used (applying a confidence interval of 95% and precision "e" of 5%) to determine the target for the minimum number of cows to sample for each life-stage group/pen. Determining sample size (n) is very important. Samples that are too large may waste time, resources and money and samples that are too small may lead to inaccurate results. To achieve the best representation of the population, the minimum sample size needed to estimate the population mean (μ) will be calculated for each group. A sample size decision tree is outlined in Figure 1 and sample calculation examples are provided in Table 2.

Sample size for a given life-stage to be scored in a pen or group is calculated using the formula:

$$n = N*X / (X + N - 1)$$

- Where $X = Z^2 *p*(1-p) / e^2 = 384.16$
- where "Z" = 1.96 for 95% CI
- "p" is expected true proportion= 50% (results in the largest sample size)
- "e" is desired precision (half desired CI width) =5%

Inputs are the assumed true value for the proportion, the desired level of confidence, the desired precision of the estimate and the size of the population. The desired precision of the estimate (acceptable error in the estimate) is half the width of the desired confidence interval. For example, if you would like the confidence interval width to be about 0.1 (10%) you would enter a precision of +/- 0.05 (5%). Auditors may use the table provided (Appendix F) or perform the calculation for each specific group/pen size. If using Appendix F table, round the group or pens size number UP to the nearest value in the table.

E. Audit Process: The audit was designed to allow for the most accurate assessment of lameness and is therefore dependent on the farm milking schedule. As a result, the order in which each outcome is measured/assessed may vary from farm to farm. It is ideal to score individual age groups at or around feeding to allow for assessment of cattle while standing, however, this may not be possible. Level 1 criteria may be evaluated at the beginning, middle or end of the audit, depending on the availability of management and employees. Critical criteria will be evaluated throughout the audit. It is best to coordinate with management prior to the audit to establish when, during the course of the audit they will be available to review paper work and treatment records.

Table 1. Ideal and minimum sampling required for each animal- and facility-based outcome measure. Ideal samples are taken if time and the housing system allows, minimum sampling is required regardless of time taken. *When calculating farm prevalence for each measure and life stage group, use the total of animals of that life stage group **observed** as the denominator.*

Measure	Ideal sampling	Minimum sampling
Animal-based outcomes		
Locomotion	One entire pen of lactating[1] cows scored as they leave the parlor. All cows in hospital[2] pen	# of lactating[1] cows in the pen scored determined by calculator
Hygiene, Neck & Other injuries	All calves[3] and one entire pen of lactating[1] cows, dry cows, heifers[6] and the hospital[2] pen (lactating and young stock)	# of animals in lactating[1], dry, heifer[6], calves[3] groups and hospital[2] determined by calculator
Body condition	All calves[3] and one entire pen of lactating[1] cows, heifers[6] and the hospital[2] pen (lactating and young stock)	# of animals in lactating[1], heifer[6], milk-fed calf groups and hospital[2] determined by calculator
Injuries[4]		
Hocks, Knees	One entire pen of lactating[1,4], dry cows and all cows in hospital[2] pen	# of animals in lactating[1], dry and hospital[2] determined by calculator
Broken tails[6]	One entire pen of lactating[1] cows, heifers[6]and cows in hospital[2]	# of animals in lactating[1], heifer[6] and hospital[2] determined by calculator
Tail docking	All calves[3] and one entire pen of animals representing first lactation cows (the pen/group with the majority of those cows)	# of calves[3] and first lactation cows determined by calculator
Facility-based outcomes		
Shade/protection	All pens will be evaluated for shade and additional protection	
Water troughs/bowls	Access: Check that all animals have access to water. Cleanliness: ***All troughs in the pens of each group scored for hygiene*** will be evaluated for cleanliness using the water score card (1 pen per life stage group)	
Trainers	When present, the placement of trainers will be evaluated on all cows during milking	
Space	Space will be evaluated for each calf scored for animal-based outcomes and for the hospital pen	
Lying Surface	Lying surface will be evaluated for calves and heifers	

[1]highest milk producing, oldest cows (which ever pen has the majority of these cows)
[2]Hospital includes any group of cows, calves or heifers being kept separate for treatment, aka. “sick pen”, “special needs pen”
[3]Calves include milk-fed calves are to be scored across all represented ages (e.g. if there are 200 calves housed individually, score 132 calves from youngest to oldest such that the sample measured represents the range of sizes of calf kept the housing system)
[4]best case scenario is that hock and knee injuries are scored in the milking parlor
[5]when possible, animals are scored with full visibility (both sides, front of knees); when this is not possible a single side of the animal may be scored and/or the knees only evaluated from behind for swelling only
[6]oldest group of heifers, or whichever pen has the majority of these heifers will be scored
[7]When completing repeated audits as a 2nd party, if broken tails have been documented previously, the auditor should look for evidence of new/recently broken tails in order to evaluate if the problem persists. This should be done by looking for broken tails in the first lactation heifers and for newly broken tails in the hospital pen.

Figure 1. Sample size decision tree.

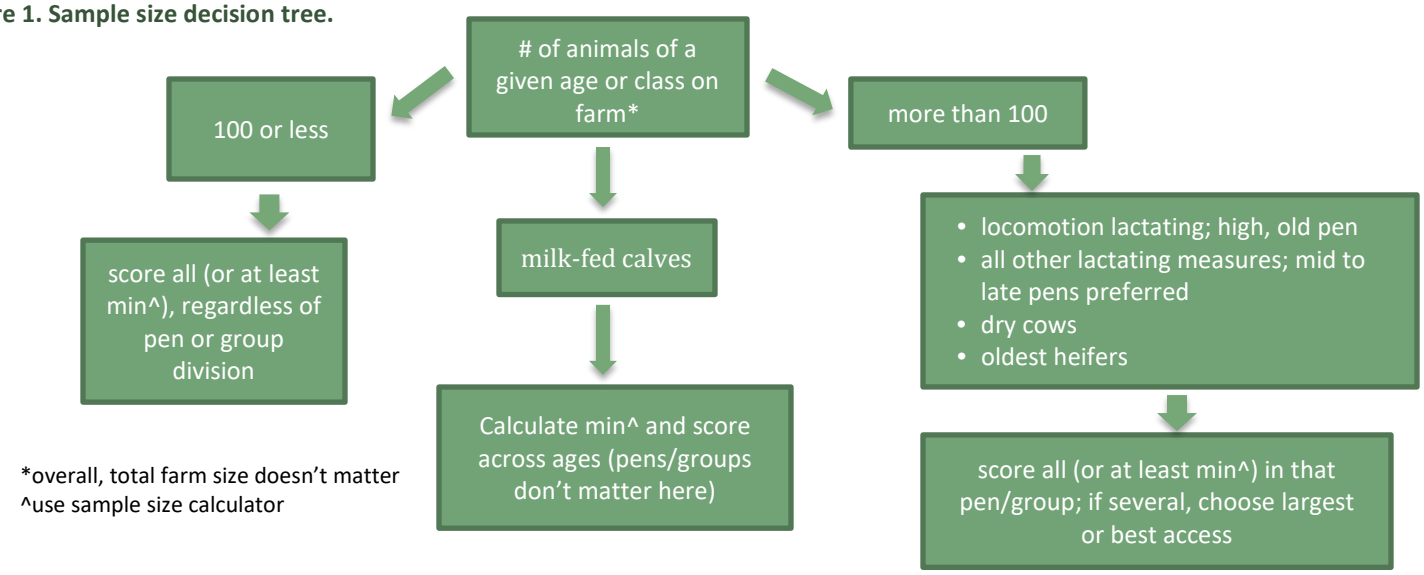

Table 2. Sample calculation examples. Two farms with similar animal numbers, 1 with fewer than 100 animals in a life-stage and another with over 100 animals in each life-stage.

Life-stage	Number	Pens	Ideal	Minimum	Notes
FARM A					
Lactating	90	2 equal pens 45 cows each, similar days in milk.	90 – Score every cow	42 in each pen (84 Total)	The sample calculator is applied at the PEN level; non-locomotion scoring is done in the pens
Dry	15	1	15	15	
Heifers	96	4 pens: 20,20, 20 and 36	96 – Score every heifer	20+20+20+33 = 93 total	The sample calculator is applied at the PEN level
Calves	28	Individual pens in a barn (heifer and bull calves mixed)	28 – score every calf	28	
FARM B					
Lactating	110	Tie-Stall Barn (1 "pen")	110 (all the cows in the "pen")	86	
Dry	18	1	18	18	
Heifers	105	3 pens (young to old): 20, 30, 55	55 - Score the oldest heifer pen	49	The sample calculator is applied at the PEN level
Calves	18	All in single calf hutches	18	18	

Critical Audit Criteria

A. Critical Criteria –

Evidence of non-compliance in the following 3 areas is considered a critical non-conformance. A corrective action must be made immediately if during a 2nd party audit. For 2nd or 3rd party audits, the audit may continue if the incident has not disrupted the audit process to the point at which it cannot be completed that day, otherwise the audit will be postponed. If a critical criteria is not met during a 2nd party audit the farm will be re-visited in 48 hours to complete the audit if it was postponed or to make sure a process has been established to prevent future recurrences and a follow-up visit will take place within 90 days to make sure the established process continues to address the issue.

A1. Access to water – All ages of cattle must have access to potable water.

Scientific evidence The water requirement for animals is affected by many factors, including environmental temperature, diet (particularly ration dry matter and sodium content), milk production level and age, (see review provided in NRC, 2001). Water intakes of adult dairy cattle are very variable, dependent in part on milk production, and typically average around 20 to 30 gallons (76 to 114 liters) per cow per day. Increases in ambient temperatures have been reported to increase water intake 1.2 kg/°C (West, 2003) to 50 to 60 gallons (189 to 227 liters) per cow per day. Feeding whole milk or milk replacer is not a substitute for water (Vasseur et al. 2010) and after weaning off milk, calves rapidly began to consume ~ 2 gallons (8 to 9 liters) of water per day. Calves require access to water beginning on the first day of life.

Since there is no sound scientifically proven requirement for waterer space and access, the Dairy Well audit requires that all cattle merely have access to water. Research does, however, support the provision that the water be clean, fresh and potable. Willms et al. (2002) reported that when cattle were provided a choice of freshwater or water contaminated with 0.005 % fresh manure by weight they avoided the contaminated water. Moreover, growing yearling heifers provided with clean drinking water gained more weight than heifers provided with water from a pond. If water contains compounds that diminish palatability, cattle will reduce their water consumption (Grout et al. 2006) or seek alternative water sources (Digesti and Weeth, 1976). These findings justify the additional assessment that the water available be clean and free of gross contamination.

There is no formal or agreed upon measure of gross contamination of water cleanliness. Thus, we developed a method to consistently evaluate the admittedly subjective general cleanliness of the water. We are not aware of any practical, on-farm method to measure the cleanliness of water that does not include chemical testing, therefore water cleanliness will be included as a Level 2 criterion.

Expert perspective and consensus among professionals Water is an essential nutrient for life and its constant availability to cattle of all ages is required. The OIE (2015) Terrestrial Animal Health Standards for Dairy Cattle states that: "*All cattle, including unweaned calves,*

need an adequate supply and access to palatable water that meets their physiological requirements and is free from contaminants hazardous to cattle health." In Canada the National Farm Animal Care Council's Code of Practice for the Care and Handling of Dairy cattle (2009) states that: *"Cattle must have access to palatable and clean water in quantities to meet their needs."*

Evaluation –
A1. Mark yes if water is available to ALL cattle including calves. Ponds, creeks and other natural water sources will be considered acceptable provided it is evident the water source is not temporary.

References

Digesti, R.D., H.J. Weeth. 1976. A defensible maximum for inorganic sulfate in drinking water of cattle. J Anim Sci 42:1498–1502.

Grout, A.S., D.M. Veira, D.M. Weary, M.A.G. von Keyserlingk, and D. Fraser. 2006. Differential effects of sodium and magnesium sulphate on water consumption by beef cattle. J. Anim. Sci. 84:1252-1258.

National Farm Animal Care Council. 2009. Code of Practice for the Care and Handling of Dairy Cattle, Copyright held jointly by Dairy Farmers of Canada and the National Farm Animal Care Council.

National Research Council: Nutrient Requirements of Dairy Cattle, 7th Ed. National Academy Press. 2001, pp. 178-183.

OIE. 2015. Chapter 7.11. Animal Welfare and Dairy Cattle Production Systems. World Organization for Animal Health (OIE). Terrestrial Animal Health Code, Volume 1, General Provisions. 24th Edition. pp 399-411.

Vasseur, E., F. Borderas, R.I. Cue, D. Lefebvre, D.Pellerin, J. Rushen, K.M. Wade, and A.M. de Passillé. 2010. A survey of dairy management practices in Canada that affect animal welfare. J. Dairy Sci. 93:1307-1315.

West, J. W. 2003. Effects of heat-stress on production in dairy cattle. J. Dairy Sci. 86: 2131-2144.

Willms, W.D., O.R. Kenzie, T.A. McAllister, D. Colwell, D. Veira, J.F. Wilmshurst, T. Entz, and M.E. Olson. 2002. Effects of water quality on cattle performance. J. Range Manag. 55:452–460.

A2. Acts of Abuse or Neglect – Willful acts of abuse or neglect are not tolerated.

Evidence of abuse or neglect during an audit, if not reprimanded (without evidence that there is a process in place to intervene and correct the problem) is considered a critical non-conformance. *Evidence includes, but is not limited to with-holding treatment for broken limbs, dragging a live animal, intentional application of a prod or sticks to sensitive parts of the animal, deliberate slamming of gates on animals, hitting[a] or kicking[b] or maliciously driving animals over another, repeated use of an electric prod on an individual animal, restraining a cow with nose tongs, moving cows with hip lifts [c], spraying cows with water in the face with a hose or twisting a tail beyond 90 degrees or in such a way that the tail breaks.*

[a]**Hitting defined:** when an arm swings back, behind the frontal plane of the body and then forward or is lifted above shoulder level and then down.
[b]**Kicking defined:** when the leg as swung back, behind the frontal plane of the body and then forward.
[c]**Moving with hip lifts defined:** when a cow is transported to another location within the pen or elsewhere in the facility. Hip lifts may be used to raise the cow from a laying position to facilitate the placement of a mat, sled or rope or to reposition the cow off the down side.

Evaluation –
A2. Caregivers will be observed continuously throughout the audit process for appropriate handling of all cattle wherever human-cattle interactions are occurring. As the audit is performed during the hours of milking there is opportunity to observe the general handling and movement of cattle to and from as well as within the parlor. Additional areas that should be given particular attention and observed if caregivers are present include the calving area, hospital pen and calf area. Mark yes if animals were handled and cared for properly during the audit and there was no evidence of neglect or abuse. Mark no if there was evidence of neglect or abuse.

A3. Non-Ambulatory Cattle Evaluation

Cattle that cannot rise without assistance or stand or walk normally unassisted are considered non-ambulatory. The failure to provide proper care and treatment of non-ambulatory cattle continues to serve as a major source of criticism of the dairy industry. While caring for non-ambulatory cattle can be a challenge, it should be considered a medical emergency and must be done humanely. This requires that every farm have an established procedure that provides both the initial steps and follow-up treatment for each cow.

Scientific evidence The AABP defines cows that are disabled, unable to rise, stand or walk normally unassisted to be non-ambulatory. Recent estimates from the USDA (National Animal Health Monitoring Survey) (NAHMS 2016) that approximately 234,000 dairy cows of the estimated 9 million lactating cows in the US became non-ambulatory in 2014, of which approximately 18% (42,000) died naturally on farm (i.e. were not euthanized) (UDSA 2016). The available science supports the notion that quality of nursing care can affect the recovery of non-ambulatory dairy cattle (Stojkov et al., 2016).

Expert perspective and consensus among professionals The AABP has established guidelines (Appendix D1) for the care of non-ambulatory cattle that must be incorporated into the SOP.

(a) Care – All non-ambulatory cattle must be provided overhead shade and shelter, fresh feed within reach (nose length) and soft, dry bedding (if not on pasture). Non-ambulatory cattle must be moved such that they remain beneath shade to protect them

from excessive heat such that their respiratory rate remains within normal limits (not greater than 60 to 70 breaths per minute). Water must be available and managed such that hydration is maintained. Hydration will be evaluated by using the "skin tent." Ideally water is provided continuously using low-profile troughs with a wide base to avoid tipping. (See Appendix A2 for direction on performing and interpreting the skin test test)

(b) Protection **-** Non-ambulatory cattle must be isolated from other ambulatory cattle to minimize risk of injury from other cows. Severely lame cows maybe housed with non-ambulatory cows as they are not likely to move fast enough to risk walking over/on other cattle in the pen.

(c) Timely Euthanasia **-** Cows or calves that are moribund or with a catastrophic injury (fractured limbs) must receive **immediate action which includes either prompt medical treatment by a veterinarian or euthanasia**. Moribund cattle are those which are near death and are often found lying flat on their sides, unable to maintain themselves in sternal recumbency (sitting upright with their head elevated).

Public Perspective The most commented characteristic reported by 491 US citizens when asked about the ideal characteristics of a dairy farm was in regard to concerns about cow treatment, specifically stating that the farmer or workers should treat cows well, humanely, and with kindness (Cardoso et al., 2016).

Evaluation- All non-ambulatory cattle on the farm will be evaluated on the day of the audit. If no non-ambulatory cattle are present, the area where such cattle are kept will be inspected for evidence that provisions are consistent with the requirements outlined above.

A3a.i. Shade - Mark yes if all non-ambulatory cattle are provided overhead shade such that respiratory rate remains within normal limits (not greater than 60 to 70 breaths per minute). Mark NA if there are no non-ambulatory cattle to observe the day of the audit.

A3a.ii. Water- Mark yes if all non-ambulatory cattle are provided water such that hydration is maintained. Hydration will be evaluated by using the "skin tent." (see Appendix A-2 for direction on performing skin test test). Mark NA if there are no non-ambulatory cattle to observe the day of the audit.

A3a.iii. Feed - Mark yes if all non-ambulatory cattle are provided fresh feed within reach (nose length). Mark NA if there are no non-ambulatory cattle to observe the day of the audit.

A3a.iv. Soft Bedding - Mark yes if all non-ambulatory cattle are provided soft dry bedding (if not on pasture). Bare rocks, wire, metal or concrete are not considered a soft lying area. Mark NA if there are no non-ambulatory cattle to observe the day of the audit.

A3b. Protection – Mark yes if the area designated for non-ambulatory cattle isolates non-ambulatory cows from other ambulatory cattle.

A3c. Timely Euthanasia - Mark yes if there was physical evidence that moribund cows and calves receive immediate action. Mark NA if there are if there are no non-ambulatory cattle to observe the day of the audit.

References

Burton, A.J., D.V. Nydam, T.L. Ollivett, and T.J. Divers. 2009. Prognostic indicators for nonambulatory cattle treated by use of a flotation tank system in a referral hospital: 51 cases (1997–2008). J. Am. Vet. Med. Assoc. 234: 1177-1182.

Cardoso, C. S., M. J. Hötzel, D. M. Weary, J. A. Robbins, and M. A. G. von Keyserlingk. 2016. Imagining the ideal dairy farm. J. Dairy Sci. 99:1663–1671.

Stojkov, J., D. M. Weary, and M.A.G. von Keyserlingk. 2016. Non-ambulatory cows: Duration of recumbency and nursing care affect flotation therapy outcome. J. Dairy Sci. 99:2076–2085.

USDA. 2016. Dairy 2014, "Dairy Cattle Management Practices in the United States, 2014" USDA–APHIS–VS–CEAH–NAHMS. Fort Collins, CO #692.0216

LEVEL 1 Audit Criteria – Animal Care & Handling

Any Level 1 criterion that is not been met on the day of a 2nd party audit will require a corrective action to be completed within 90 days (3 months).

B. Training – Training employees (including family members) on proper stockmanship is essential to protecting the health and welfare of all cattle on the farm. **A written log must be kept providing documentation of training**.

B1. Schedule - *Who should receive training and when?*

(a) New Hires - Before being allowed to independently care for or handle calves, heifers or cows, all newly hired caregivers must first work with staff knowledgeable about the animal care duties and proper stockmanship.

(b) Existing Employees - All caregivers and site management personnel receive refresher training for their specific duties at least annually (either by official training programs or during documented management meetings).

Evaluation- Records/training logs will be reviewed to determine if all current employees have received initial and annual refresher training by verifying current employee names with the log and date of training.
B1a. Mark yes if training log confirms that all new employees have received training. Mark NA if the farm does not have any new employees.

B1b. Mark yes if training log confirms that all existing employees receive refresher training annually. Mark NA if the farm does not have any employees.

B2. Delivery and Confirmation of Training - *What form of training is acceptable and how should it be conducted?*

(a) Training must be done in a language easily understood by the caregiver. Accepted forms of training include video, webinars, computer modules, hands-on and verbal.

Evaluation –
B2. 2 caregivers will be selected at random by the evaluator and asked <u>when</u>, <u>how</u> and <u>what</u> type of training was provided. (If necessary, the farm must be sure to have a person available who can translate for the auditor)
Mark yes if caregiver confirms that they have received training. Mark NA if the farm has no employees or if there were no employees available for interview.

B3. Content - Every individual who works with cattle (stockperson) must be trained on the proper care and handling of cattle.

(a) Cattle Care Agreement: All employees (including owners and managers) and service providers (including the herd veterinarian, nutritionist and hoof trimmers), who may come into contact with cattle on the farm must each review and sign a *Cattle Care Agreement (see Appendix C2 for the template) with a corresponding endorsement signature from the owner/manager*. By signing *The Cattle Care Agreement, each* person acknowledges that they understand the proper care and handling practices for all cattle on the farm.

(b) Stockmanship - Every stockperson must review the following Merck & Co. Dairy Care 365 Learning Modules: (1) Introduction to Dairy Stockmanship (2) Low Stress Handling of dairy calves and heifers (3) Handling Down cows and, (4) Newborn Care and Handling. Other forms of formal stockmanship training can be substituted* for 1 or all of the modules if training and content can be verified. Acceptable verification includes a letter from the provider and an agenda describing the material covered in the training.

*****PAACO certified auditors must make themselves familiar with the Merck modules so they may evaluate if substituted content is sufficient.

Evaluation –

B3a. Confirm that for each employee and service provider, the cattle care agreement has been signed within last 12 months. Mark yes if each employee and service provider has signed the Cattle Care Agreement.

B3b. Confirm that for each employee stockperson, there is a record (as described in B1) of stockmanship training in the training log within last 12 months.
Mark yes if the training log confirms that all employees have watched Merck Dairy Care Modules or have received equivalent training. Mark NA if the farm has no employees.

B4. Confirmation of Acceptable Stockmanship-

(a) Stockmanship – Caregivers will be evaluated to be sure that cows are moved calmly and quietly without excessive force. Excessive force includes directly forcing cows to move by repeatedly using physical tools (crowd gates, electric prods, and sticks), yelling, kicking, hitting, chasing, poking or prodding cows, forceful spraying of water in the face with a hose or excessive twisting of tails (greater than 90 degrees such that tails may break). It is unacceptable to move calves by dragging or by pulling their ears.

Evaluation-

B4a. Mark yes if cows are moved calmly and quietly without excessive force. Mark No if caregivers are heard yelling or whistling loudly or moving cows quickly such that it causes slips or falls. ***Hitting or kicking cattle, tossing calves, dragging calves or grabbing calves by the ears would also qualify as an act of abuse which results in a critical non-conformance (A2).***

Hitting defined: when an arm swings back, behind the frontal plane of the body and then forward or is lifted above shoulder level and then down.

Kicking defined: when the leg as swung back, behind the frontal plane of the body and then forward.

B4b. Slips and Falls – If slips or falls are noted during the audit make note of the number and situation. This data will be collected for future review.

C. On Farm Practices

C1. Tail Docking - Routine tail docking is prohibited.

Scientific evidence There is no evidence that tail docking provides any benefit to the cow through improved udder health or hygiene (reviewed by Sutherland and Tucker, 2011). Indeed, in the only national study looking at hygiene on 265 U.S. dairy farms, Lombard et al. (2010) reported that hygiene was better on farms that did not tail dock compared with those that did. The procedure appears to cause some acute pain, but chronic pain has not been evaluated beyond the presence of neuromas (Eicher et al., 2006). Docked cattle have more flies on their hind end (reviewed by Sutherland and Tucker, 2011). Although the consequences of increased flies on behavior is not well studied, increased fly load on beef cattle housed on rangeland has been reported to cause increased restlessness and tail swishing, and decreased feeding behavior (Harvey and Launchbaugh, 1982; see also review by Kamut and Jezierski, 2014). Worker comfort is often cited as a reason to dock, but there is no scientific evidence that has addressed this aspect of tail docking cattle. Trimming the switch alone is thought to provide benefit in terms of cleanliness and worker comfort, but, again, has not been evaluated by research.

Expert perspective and consensus among professionals Veterinary associations including the American Veterinary Medical Association (AVMA), Canadian Veterinary Medical Association (CVMA), American Association of Bovine Practitioners (AABP) along with the National Mastitis Council and National Milk Producers Federation (NMPF (2016)) have publicly stated that they do not support the practice.

Public perspective Four states (California, Ohio, Rhode Island and New Jersey) have banned the practice of tail docking. An online survey found that 79% of the 178 participants were opposed to the practice (Weary et al., 2011), for a variety of reasons including no evidence of benefit for the cow, that docking is painful for cows, that it is unnatural, and that tails are important for controlling flies.

Evaluation –
C1. Evidence of routine tail docking currently taking place will be evaluated by checking for freshly docked tails in the milk-fed calf and first lactation cow groups (or whichever group has the majority of first lactation cows). Mark yes if there is no evidence of routine tail docking currently taking place. *[To allow for the re-entry of heifers onto the farm that may have been tail docked beginning 2016, there can be no evidence of cattle entering the herd with docked tails as of Jan. 2018]*

References

Eicher, S. D., H. W. Cheng, A. D. Sorrells, and M. M. Schutz. 2006. Behavioral and physiological indicators of sensitivity or chronic pain following tail docking. J. Dairy Sci. 89:3047-3051.

Harvey, T. L., and J. L. Launchbaugh. 1982. Effect of horn flies on behavior of cattle. J. Econ. Entomology. 75:25-27.

Lombard, J. E., C. B. Tucker, M. A. G. von Keyserlingk, C. A. Kopral, and D. M. Weary. 2010. Associations between cow hygiene, hock injuries, and free stall usage on US dairy farms. J. Dairy Sci. 93:4668-4676.

Kamut, Michalina and Tadeusz Jezierski. 2014. Ecological, behavioural and economic effects of insects on grazing farm animals – a review. Anim Sci Papers & Reports 32:107-119.

Sutherland, M. A. and C. B. Tucker. 2011. The long and short of it: a review of tail docking in farm animals. (Special Issue: Pain in farm animals.). Appl. Anim. Behav. Sci. 135:179-191.

Weary, D. M., C. A. Schuppli, and M. A. G. von Keyserlingk. 2011. Tail docking dairy cattle: responses from an online engagement. J. Anim. Sci. 89:3831-3837.

C2. Udder Health – The average somatic cell count (SCC) for the previous 3 and 12-month period must be <400,000 cells/ml

Scientific Evidence Mastitis is an inflammatory response of the mammary gland typically caused by bacteria and has a negative impact on animal welfare, milk quality and production (Hillerton and Berry, 2005). Some infections are contagious in nature, therefore cows with subclinical infections, while not showing signs of infection, pose a risk to other cows in the herd (Hillerton and Berry, 2005). Management of mastitis should rely on the

use of cow level SCC testing in addition to health records tracking clinical disease (Ruegg and Pantoja, 2013) (Rhoda and Pantoja, 2012). Recent reports indicate that less than 50% of US dairy farmers perform regular cow level SCC testing (USDA, 2010b). While the SCC can vary between each individual quarter, an individual cow SCC of 200,000 cells/ml has been recognized universally as the threshold for subclinical mastitis, however, clinical infections may raise the SCC of an individual cow over 9 million cells/ml (Rhoda and Pantoja, 2012). Due to this wide variation in SCC it is difficult to estimate the prevalence of mastitis in the herd based on bulk tank SCC data (Schukken et al., 2003). Use of one or a few tests a month to evaluate the udder health presents obvious challenges, particularly in smaller herds where a single cow can have a dramatic influence on the results (Barkema et al., 1998). These latter authors also differentiated management practices between low (<150,000) and high (250-400,000) cell count herds and found that lower count herds paid stricter attention to hygiene (Barkema et al. 1998 b). While SCC is not a perfect indicator it is an easily accessible high-level indicator of overall management. Within this audit, the average SCC over 3 and 12 months is used as an indicator of overall management. As better record keeping is established as a requirement of the Dairy Well program, future versions will aim to incorporate reporting of clinical mastitis rates or prevalence.

Expert perspective and consensus among professionals The European Union, Canada, Australia, New Zealand, Norway and Switzerland have each established bulk tank milk (BTM) SCC limits of 400,000 cells/ml using a 3-month rolling geometric mean. The US limit remains at 750,000 cells/ml. While many dairy farms do not keep accurate clinical mastitis records or have access to cow level SCC data, US regulations require herd level reporting of SCC via monthly BTM testing. Looking at the average BTM SCC over a specified period likely provides a more accurate picture of the overall herd udder health while not allowing a single month or test to be overly influential.

Public Perspective Consumers today are concerned with the quality of their milk (Cardoso et al., 2016). Quality in the eye of the consumer includes aesthetic attributes as well as safety, concerns for how the food is made and the impact the production systems have on animal welfare as well as the environment (Mitchell, 2001).

Evaluation –

C2. Available SCC data will be evaluated. SCC data available from either the processor, official Dairy Herd Improvement Association (DHIA) testing, or official state tests may be used to evaluate this criterion. If more than 1 test is available for each month, each will be used in calculating the arithmetic mean for the previous 3 months and 12 months. Mark yes if both means are less than 400,000.

References

Barkema, H. W., Y. H. Schukken, T. J. Lam, M. L. Beiboer, H. Wilmink, G. Benedictus, and A. Brand. 1998. Incidence of clinical mastitis in dairy herds grouped in three categories by bulk milk somatic cell counts. J. Dairy Sci. 81:411-419.

Barkema, H. W., Y. H. Schukken, T. J. G. M. Lam, M. L. Beiboer, G. Benedictus and A. Brand 1998. Management practices associated with low, medium, and high somatic cell counts in bulk milk. J. Dairy Sci.81: 1917-1927.Cardoso, C. S., M. J. Hötzel, D. M. Weary, J. A. Robbins, and M. A. G. von Keyserlingk. 2016. Imagining the ideal dairy farm. J. Dairy Sci. 99:1663–1671.

Hillerton, J. and E. Berry. 2005. Treating mastitis in the cow–a tradition or an archaism. J. Appl. Microbiol. 98:1250-1255.

Mitchell, L. 2001. Impact of consumer demand for animal welfare on global trade. Changing Structure of Global Food Consumption and Trade. U.S. Department of Agriculture, Agriculture and Trade Report. Chap.9:80-89.

Rhoda, D. A. and J. C. Pantoja. 2012. Using mastitis records and somatic cell count data. Vet. Clin. North Am. Food Anim. Pract. 28:347-361.

Ruegg, P. L. and J.C. Pantoja. 2013. Understanding and using somatic cell counts to improve milk quality. Irish J Agric. Food Res. 52: 101-117

Schukken, Y. H., D. J. Wilson, F. Welcome, L. Garrison-Tikofsky, and R. N. Gonzalez. 2003. Monitoring udder health and milk quality using somatic cell counts. Vet. Res. 34:579-596.

USDA. 2010. Dairy 2007, Part I: Reference of Dairy Cattle Health and Management Practices in the United States, 2007. USDA-APHIS-VS, CEAH. Fort Collins, CO.

C3. Veterinarian Client Patient Relationship (VCPR) – Having an established VCPR is essential to the health and welfare of the cattle on the farm as it ensures oversight of health records and treatment. See Appendix D2 for AABP guidelines on establishing a VCPR.

(a) VCPR – A VCPR form (example provided, Appendix C3) must be signed by the veterinarian of record (VOR) and current within last 12 months

(b) Approved drug list – An approved drug list (example provided, Appendix C4) must be present and be signed by the veterinarian of record within the last 12 months – stating drug, indication, dose, route and with-hold (withdrawal) times.

Evaluation-

C3a. VCPR - A copy of a signed, current VCPR (example provided, Appendix C3) must be made available. Mark yes if a VCPR form has been signed by the veterinarian of record within the last 12 months.

C3b. **Approved Drug List** – The approved drug list must be made available. Three drugs present on the farm will be compared to the approved drug list. Of mature cattle and calves have separate storage areas, check 3 from each area. Mark yes if the approved drug list is complete and signed by the veterinarian of record within the last 12 months. Farms that can provide evidence of Food Armor® certification will be given credit for meeting both criteria. Third party auditors should take a picture of the drug list and submit it to their employer for review.

C4. Records – Maintaining identification of individual animals and health records in a herd setting are essential to ensuring animal health and welfare as they are necessary to monitor the health of the individual as well as the herd, evaluate if therapies are adequate, and identify areas in need of attention.

(a) Individual animal identification – To maintain adequate records animals must be individually identified in way that is easy to read. Calves (including bull calves), heifers, bulls and cows should each be identified by a unique, readable identification (ID) which can either be an ear tag or neck band. While some states require herd level brand ID, **hot iron or freeze branding for individual ID is prohibited**. Calves that are to be sold must have at a minimum, a metal or plastic ear tag/clip with the ID recorded.

(b) Health Records – Up to date health records, including disease, treatment and mortality must be kept for all animals at all life stages. Treatment records must include the animal ID, treatment date, reason for treatment, treatment dose, route and duration with appropriate milk and meat with-holds.

Evaluation –
C4a.i-.iii. Individual ID - Presence of individual animal ID will be confirmed on male and female calves, heifers and cows during the observations made for Level 2 criteria. Mark yes for each age life stage group that has some form of individual animal ID. It is recognized that newborn calves may not be tagged immediately. Mark yes, if there is evidence that calves are tagged within 24 hours.

C4b. Health Records - Health records, including treatment, morbidity (including injury), and mortality events for all animals will be confirmed for all age groups by comparing three calves and three lactating cows in the hospital/marked for treatment with current treatment lists (examples provided, Appendix C5). If there are fewer than three animals in either pen, evaluate all treatment for all animals in the pen. If there are no animals currently being treated, confirm that treatment

C5. Written Standard Operating Procedures (SOPs) – Establishing a minimum set of standard SOPs, detailing written instructions to achieve uniformity of the performance of a specific function, are essential to demonstrate a farm has a plan in place for promoting the health and welfare of the cattle. Having SOPs facilitates proper training of caretakers and ensures that processes have been established for critical areas on the farm, which can be easily referred to in cases of emergency. SOPs must be available in a language understood by the caretaker expected to complete the task. Templates are provided (Appendix B) for each SOP to allow for ease of use, but may be substituted with SOPs developed by the individual farm and their veterinarian of record. SOPs marked with an * have specific requirements that must be included regardless of the author of the SOP as there is clear professional guidance from the AVMA and/or AABP for what should be done. If the SOPs do not adhere to the AVMA and AABP guidelines the farm must

work with the VOR to update the SOP accordingly. To allow for consistency in the evaluation of SOPs, a SOP requirement summary sheet and templates have been provided highlighting specific items that must be included in each SOP. These are highlighted in *BLUE underlined italics* in each SOP template (see SOP requirement list Appendix B2). SOPs must be signed by the veterinarian of record. In lieu of signing each SOP, the VOR may complete and sign the Annual SOP Review Checklist affirming that each SOP has been reviewed and reflect current practices on the farm. As farms are allowed to create their own SOPs, which may include combined 1 or more topics, it is the responsibility of the auditor to become familiar with the SOP requirements and AVMA and AABP guidelines so that they may evaluate adequately whether all areas are addressed and if SOPs are consistent with the referenced guidelines.

(a) SOPs

1. Herd Health Plan – includes at a minimum an SOP for vaccine, parasite, hoof health, udder health and sick cow monitoring programs.
2. Non-Ambulatory Cattle Care*
3. Euthanasia*
4. Management of the living environment for each age group
5. Painful Procedures – Including disbudding/dehorning, castration, extra teat removal & branding.
6. Fitness for Transport*
7. Maternity Management
8. Emergency Response
9. Biosecurity
10. Personnel Training

Evaluation –
C5a. A copy of each SOP, signed by the veterinarian of record, must be available for review. In lieu of signing each SOP, the VOR may complete and sign the Annual SOP Review Checklist affirming that each SOP has been reviewed and reflect current practices on the farm. SOPs will be reviewed to ensure that they meet the guidelines set forth by the AVMA and AABP as listed in the SOP requirement list. Mark yes if ALL the SOPs are complete and meet the minimum requirements. SOPs are not required for procedures that are not done on the farm. If it is observed that farm practices are not consistent with the written SOP, the farm does not get credit for the written SOP.

C6. Confirmation of employee familiarity with the SOP – While SOPs are necessary to establish that farm management has identified practices on the farm essential to promote the health and welfare of the cattle, the presence of an SOP is no guarantee that practices have been shared, understood or being followed. It is critical to confirm that employees have been instructed on specific SOPs and are implementing the SOPs correctly.

Evaluation –
C6. One SOP will be chosen at random and one of the caregivers responsible for that SOP will be interviewed. Mark yes if the caregiver confirms knowledge of the SOP and demonstrates clear understanding of their duty in agreement with the SOP. Mark NA if the farm has no employees or there were no employees on the farm at the time of the audit.

LEVEL 2 Audit Criteria – For the purpose of 2nd party audits, any Level 2 criterion that is not met on the day of the audit will require a corrective action to be developed and submitted within 90 days. Corrective action plans (CAPs) can be mailed, faxed or emailed in lieu of an on-sight visit.

The Dairy Well audit has been designed to provide the best opportunity to evaluate various animal welfare outcome measures consistently and adequately. When possible, it is preferred to time the evaluation of each age group around feeding so that they are standing, making observations of injuries, body condition and hygiene possible. It is recognized that this is not always manageable. If groups of animals are lying down while operations are being recorded, it is recommended that the auditor walk amongst the animals, quietly, as this will often encourage them to stand. Cows believed to be non-ambulatory may be provided encouragement to stand (gentle knee to the rump) in an effort to evaluate their ability to stand. All other cattle should be left lying if they do not rise after a calm walking of the pen, and only cows standing will be evaluated. If the resulting number of cows scored is less than required by the minimum sample calculator, use the number scored and provide an explanation in the comment/notes section.

D. MILK FED CALVES - Resource Based - General Housing/Facility Design & Management:

D1. Environment – Facilities should be designed, constructed and maintained to provide and promote animal health and welfare, reduce the risk of injury, provide protection from extreme weather and prevent the development of injury.

(a) Pens/Housing Lying surface and Hygiene–All calf housing should be maintained in a manner to provide all calves' access to a soft, dry resting area which minimizes injury. The "dryness" of the resting areas is evaluated using the hygiene score card (Appendix A3). The comfort of the resting area is evaluated in animal based measures using neck and other injuries. Lying surface will be evaluated by the presence of floor covering if not housed on pasture or grass. Bare rocks, wire, wood, metal or concrete are not considered a soft lying area.

(b) Space - All calves should have enough space to allow them to groom all parts of their body and turn fully around. Tethers may be used provided the tether is long enough that a calf can turn fully around and access shade/shelter when needed.

(c) Shelter – All calves should be provided protection from inclement weather such that they are able to avoid drafts, heat stress and cold stress.

(d) Additional Protection or measures to address extreme weather – All calves should be provided additional protection from inclement hot and cold weather. This may include overhead shade, fans, deep bedding, heat, calf jackets, an increase in calories fed or tools such as temperature gauges to monitor calf housing for temperature.

(e) Water Cleanliness – All calves should have access to clean water free of gross contamination including feed or feces.

Scientific evidence Lying down is an important behavior for growing cattle. Dairy calves typically spend about 18 h/d lying down (Chua et al., 2002; Panivivat et al., 2004), occupying about 70 to 80% of the day (Panivivat et al., 2004; Hänninen et al., 2005). Data suggest that inadequate lying times reduce growth and welfare level of dairy calves (Hänninen et al., 2005). Dairy calves showed clear preference for drier sawdust bedding and aversion to concrete lying surfaces (Camiloti et al., 2012). Also, Ninomiya and Sato (2009) found that greater amounts and more frequent additions of bedding increased sleeping posture and lying time in calves. In conclusion, access to soft and dry bedding is very important for growing calves.

Calves groom diverse parts of the body beginning at a very young age (Chua et al., 2002). Restriction of movement, and especially the ability to turn around, decreases calves' possibility to perform natural behaviors, which start to occur at a space allowance below 16 sq ft (1.5 m^2) (Le Neindre, 1993).

The thermo-neutral zone in young milk fed calves is dependent on age, nutrient intake, amount of subcutaneous fat, and length and thickness of hair coat (NRC 2001). Extreme climatic conditions cannot be compensated by thermoregulatory mechanisms of calves and result in increased mortality and morbidity and reduced weight gain, performance, and long-term survival of dairy calves (Donovan et al., 1998; Snowder et al., 2006). Thermic stress has a negative impact on animal welfare level (Silanikove, 2000).

During winter, placement of wet calves in outdoor hutches is not recommended (Callan and Garry, 2002). Provision of sufficient dry bedding to reduce cold stress and drafts in calves is essential when housing calves, particularly during cold conditions (Lago et al., 2006). During summer, calves housed in hutches are susceptible to heat stress depending on the environmental temperature (Moore et al., 2012). Elevation of the rear side of the hutch by 8 inches (20 cm) has been reported to cause the internal hutch temperatures to be cooler than external temperatures, as well as lowering hutch carbon dioxide levels and calf respiratory rates (Moore et al., 2012).

Although there is a growing body of evidence indicating that weight gains and health are improved when calves are provided milk volumes in excess of 10% BW equivalent (see review by Khan et al., 2011) the available evidence suggesting that calves increase milk intake in response to cold temperatures is inconclusive (e.g. Scibila et al., 1987; Richard et al. 1988; Borderas et al. 2009).

The use of calf jackets to provide additional thermal comfort for young milk fed calves has gained popularity over the last decades. To our knowledge, the scientific work available on this topic is limited to a single study evaluating the efficacy of calf jackets on the immunocompetence and performance of calves over the first 60 days of life artificially

reared outdoors with and without jackets with that of calves reared indoors (Earley et al., 2004). This study found no benefits of calf jackets on these parameters.

Provision of a heat lamp for 24 hours has been found to be useful for resuscitating calves during the first 24 hours of life (Uystepruyst et al., 2002). Calves also show a preference for heated areas during the milk feeding period regardless of the milk feeding level and tend to be closest to the heat lamp during the coldest periods of the day when compared to warmer times of the day (Borderas et al., 2009).

To our knowledge no scientific work has looked at the effects of fans on reducing the impact of heat stress on milk fed calves. However, given the numerous beneficial effects known regarding adult cattle and the provision of cooling strategies, we speculate that calves would also benefit from cooling such as the use of fans in hot weather.

Being kept in muddy environments reduces growth rate in beef steers (Morrison et al., 1970), and decreased productivity may be mediated by additional energy requirements associated with walking in mud (Dijkman and Lawrence, 1997). Muddy and manure laden environments are thought to increase health problems such as lameness, as exposure to moisture can weaken the integrity of the hoof (Borderas et al., 2004).

The quality and management of housing and bedding is also reflected in the cattle's hygiene. The goal is for at least 75% of the animals to score less than a three using the hygiene score card (Appendix A3). There are methodological challenges associated with scoring hygiene (repeatability of scores, scoring individual animals in pens without restraint, for example), but we have opted to include such measures to give some estimate of the degree of extremely dirty animals within a group, based on an assessment of the degree of manure contamination of the upper leg and flank (areas in contact with the lying area). Based on Cook and Reinemann (2007), the top 25% of farms could achieve 92 and 83% cows with reasonably clean upper legs and flanks in free and tie-stall housing, respectively. As there is no available literature on the nature and frequency of calf-hood injuries, we will begin by collecting observations of neck and other injuries.

Expert perspective and consensus among professionals The National Farm Animal Care Council of Canada (2009) Code of Practice for the Care and Handling of Dairy Cattle requires the following for young unweaned calves: 1) Calves must have a bed that provides comfort, insulation, warmth, dryness and traction. 2) Bare concrete is not acceptable as a resting surface. 3) Housing must allow calves to easily stand up, lie down, turn around, adopt normal resting postures, and have visual contact with other calves, 4) The bedded area for group-housed calves must be large enough to allow all calves to rest comfortably at the same time and 5) calves should be given 25% BW equivalent of milk intake in cold weather. The OIE (2015) Terrestrial Animal Health Standards for Dairy Cattle state that 1) newborn calves are susceptible to hypothermia. The temperature and ventilation of the birthing area should consider the needs of the newborn calf. Soft, dry bedding and supplemental heat can help prevent cold stress and 2) young calves are at particular risk of thermal stress. Thus, special attention should be paid to management of the thermal environment (e.g.

provision of additional bedding, nutrition or protection to maintain warmth and appropriate growth).

The OIE (2015) Terrestrial Animal Health Standards for Dairy Cattle has come out with a clear standard in terms of ammonia levels stating that: “The ammonia level in enclosed housing should not exceed 25 ppm.” Given that this recommendation is based almost entirely on pig, laying hen and poultry meat studies and there is essentially no validated information on how best to measure this in dairy production systems the Dairy Well audit will not measure ammonia levels at this time.

Public perspective The first animal welfare policy documents published in the United Kingdom - The Brambell Report (1965) - stated that farm animals should have the freedom to "stand up, lie down, turn around, groom themselves and stretch their limbs". Within the United States the landmark passing of Proposition 2 in 2008 in California resulted in the following: “As of January 1, 2015: calves raised for veal, egg-laying hens and pregnant pigs be confined only in ways that allow these animals to lie down, stand up, fully extend their limbs and turn around freely.” The European Directive Section 2008/119/EC that housing calves individually is not allowed after 6 weeks of age. Although there is a growing body of evidence regarding the positive effects of providing social housing for young calves (see review by Costa et al., in press) the Dairy Well program will not audit this particular issue at this time.

Evaluation –
Evaluate hygiene and housing for all calves on milk using the appropriate sample methodology for the number of calves and housing type.

D1a.i. Hygiene - Using the hygiene score card descriptions (Appendix A3) mark yes if >75% of calves score a 1 or 2. Mark NA if there are no milk calves on the facility.

D1a. ii. Lying surface* –** Mark yes if ALL calves are provided a soft substrate to lie on. Mark NA if there are no milk calves on the facility. ***Bare concrete, rocks, wood, wire, metal are not considered a soft lying area.

D1b. Space - Mark yes if all calves scored have enough room to turn around and lie down. Evidence for this includes calves facing both directions in the pen/hutch during the evaluation, feces at both the front and rear of a pen/hutch. Mark NA if there are no milk calves on the facility.

D1c. Shelter - Mark yes if the pen/hutch provides calves the opportunity to access an area protected from inclement weather. Mark NA if there are no milk calves on the facility.

D1d. Additional Protection – Depending on the time of year observation of such provisions may not be possible. In such cases, mark which additional protections are currently in place in addition to any reported by the owner/manager. Mark yes if at least one additional measure is provided for heat and cold. Shade may include permanent shade structures (other than the hutch/pen itself), patches of trees or temporary cloth (raised seasonally). Rows of trees may be considered as a wind break but not shade. The area of shade provided will not be measured at this time. Mark NA if there are no milk calves on the facility.

D1e. Water Cleanliness - If large troughs are used, the 'clean water sheet' (Appendix A1) must be easily read while submerged 6-10 inches below the water surface in 3 areas. All troughs in calf pens scored will be checked. Individual water sources, including water buckets used for calves, should be free from manure or other gross contamination. It is recognized that small amounts of grain or feed may be present as a result of calves eating. Small amounts of feed, algae along the bottom or sides of bucket are acceptable. Algae floating on the surface, fecal contamination or large amounts of feed obstructing the surface of the water resource need to be addressed. All water troughs/buckets scored must be in acceptable condition to meet this criterion. Mark yes if ALL water troughs/buckets are clean.

References

Borderas, T. F., B. Pawluczuk, A. M. de Passillé, and J. Rushen. 2004. Claw hardness of dairy cows: Relationship to water content and claw lesions. J. Dairy Sci. 87:2085-2093.

Borderas F.T., A.M.B. de Passillé and J. Rushen. 2009. Temperature preferences and feed level of the newborn dairy calf. Appl. Anim. Behav. Sci. 120:56-61.

Callan, R. J. and F. B. Garry. 2002. Biosecurity and bovine respiratory disease. Vet. Clin. North Am. Food Anim. Pract. 18:57-77.

Camiloti, T. V., J. A. Fregonesi, M. A. G. von Keyserlingk, and D. M. Weary. 2012. Short communication: Effects of bedding quality on the lying behavior of dairy calves. J. Dairy Sci. 95:3380-3383.

Chua, B., E. Coenen, J. Van Delen, and D. M. Weary. 2002. Effects of pair versus individual housing on the behaviour and performance of dairy calves. J. Dairy Sci. 85:360-364.

Cook, N.B., and D. Reinemann. 2007. A toolbox for assessing cow, udder and teat hygiene. In: Proceedings of 46th Annual Meeting of the National Mastitis Council. San Antonio, TX. January 21-24, 2007.

Costa, J. H. C., M. A. G. von Keyserlingk, and D. M. Weary. In press. Effects of group housing of dairy calves on behavior, cognition, performance, and health. J. Dairy Sci.

Dijkman, J. T. and P. R. Lawrence. 1997. The energy expenditure of cattle and buffaloes walking and working in different soil conditions. J. Agric. Sci. 128:95-103.

Donovan, G. A., L. Badinga, R. J. Collier, C. J. Wilcox, and R. K. Braun. 1986. Factors influencing passive transfer in dairy calves. J. Dairy Sci. 69:754-759.

Earley, B., M. Murray, J.A. Farrell and M. Nolan. 2004. Rearing calves outdoors with and without calf jackets compared with indoor housing on calf health and live-weight performance. Irish J. Agric. Food Res. 43:59-67.

Hänninen, L., A. M. de Passillé, and J. Rushen. 2005. The effect of flooring type and social grouping on the rest and growth of dairy calves. Appl. Anim. Behav. Sci. 91:193-204.

Khan, M. A., D. M. Weary, and M. A. G. von Keyserlingk. Invited review: Effects of milk ration on solid feed intake, weaning, and performance in dairy heifers. Journal of Dairy Science 94(3):1071-1081.

Lago, A., S. M. McGuirk, T. B. Bennett, N. B. Cook, and K. V. Nordlund. 2006. Calf respiratory disease and pen microenvironments in naturally ventilated calf barns in winter. J. Dairy Sci. 89:4014-4025.

Le Neindre, P. 1993. Evaluating housing systems for veal calves. J. Anim. Sci. 71:1345-1354.

Moore, D.A., J. L. Duprau , and J. R. Wenz. 2012. Short communication: Effects of dairy calf hutch elevation on heat reduction, carbon dioxide concentration, air circulation, and respiratory rates. J. Dairy Sci. 95:4050–4054.

Morrison, S., R. Givens, W. Garrett, and T. Bond. 1970. Effects of mud-wind-rain on beef cattle performance in feed lot. Calif. Agric. 24:6-7.

National Farm Animal Care Council. 2009. Code of Practice for the Care and Handling of Dairy Cattle, Copyright held jointly by Dairy Farmers of Canada and the National Farm Animal Care Council.

Ninomiya, S., and S. Sato. 2009. Effects of 'Five freedoms' environmental enrichment on the welfare of calves reared indoors. Anim. Sci. J. 80:347-351.

OIE. 2015. Chapter 7.11. Animal Weflare and Dairy Cattle Production Systems. World Organization for Animal Health. Terrestrial Animal Health Code, Volume 1, General Provisions. 24th Edition. pp 399-411.

Panivivat, R., E. B. Kegley, J. A. Pennington, D. W. Kellogg, and S. L. Krumpelman. 2004. Growth performance and health of dairy calves bedded with different types of materials. J. Dairy Sci. 87:3736-3745.

Report of the Technical Committee to Enquire Into the Welfare of Animals Kept Under Intensive Livestock Husbandry Systems: Presented to Parliament by the Secretary of State for Scotland and the Minister of Agriculture, Fisheries and Food by Command of Her Majesty December, 1965. HM Stationery Office, 1965.

Richard, A.L., Muller, L.D., Heinrichs, A.J., 1988. Ad libitum or twice daily feeding of acidified milk replacer to calves housed individually in warm and cold environments. J. Dairy Sci. 71:2193-2202.

Scibila, L.S., Muller, L.D., Kensinger, R.S., Sweeney, T.F., Shellenberger, P.R., 1987. Effect of environmental temperature and dietary fat on growth and physiological responses of newborn calves. J. Dairy Sci. 70:1426-1433.

Silanikove, N. 2000. Effects of heat stress on the welfare of extensively managed domestic ruminants. Livestock Production Science 67:1-18.

Snowder, G. D., L. D. Van Vleck, L. V. Cundiff, and G. L. Bennett. 2006. Bovine respiratory disease in feedlot cattle: Environmental, genetic, and economic factors. J. Anim. Sci. 84:1999-2008.

Uystepruyst, Ch., J. Coghe, T. Dorts, N. Harmegnies, M. H. Delsemme, T. Art, and P. Lekeux. 2002. Effect of three resuscitation procedures on respiratory and metabolic adaptation to extra uterine life in newborn calves. Vet. J. 163:30-44.

E. Animal Based Welfare Measures - Milk fed calves

E1. Body Condition - Calf body condition will be used as a high-level indicator of the overall quality of calf care as it may be impacted by several critical management areas including: dry cow, calving, colostrum and feeding management and sanitation. If more than 3% of calves are noted as being emaciated it is a sign that one or more of the management areas need improvement and should be addressed.

(a). Condition – No more than 3% of calves should score a 3 (emaciated as evidenced by prominent ribs, spine, hooks and pins); no more that 15% of calves should score a 2 (poor condition). (Pictures available/described in Appendix A4)

(b) Care - No calves should be emaciated *without current records providing evidence of ongoing treatment.*

Scientific evidence Body weight alone is not a good indicator of body reserves, as cattle of a specific weight may vary in terms of height and fat covering (Roche et al., 2004). The scale used to measure body condition score (BCS) in cows differs between countries, but low values always reflect emaciation and high values reflect obesity (Roche et al., 2004). In the United States, BCS is most often evaluated using a 5-point scale where 1 and 2 reflect emaciation and 4 and 5 reflect obesity (Edmonson et al., 1989). Roche et al., (2009) conclude that thin cows are at risk for succumbing to lameness, dystocia and ill health. Work on sheep provides some evidence that emaciation can induce hunger. Verbeek et al., (2012) reported that ewes with a low BCS (=2) were prepared to work harder for access to food compared to ewes of higher BCS (3 or 4).

To our knowledge there is no validated BCS system for dairy calves. Some authors (e.g. Batemen et al., 2009) have used a scoring system initially developed for cows, which is based on a 1 to 5 system using 0.25-unit increments with 1 being emaciated and 5 being obese (Wildman et al., 1982). Given that emaciated animals are particularly susceptible to

cold stress and likely hunger, we assume that there are important benefits of preventing emaciation in all classes of dairy cattle (calves, heifers and adult cows). Given there is no data currently available that directly addresses this issue, current goals have been set using industry guidelines published by the Dairy Calf Heifer Association (2016). We will update this goal as necessary to reflect available data upon revision of the audit every 3 years.

Expert perspective and consensus among professionals The National Farm Animal Care Council of Canada (2009) Code of Practice for the Care and Handling of Dairy Cattle, in regard to BCS, states that animals with a body condition score indicating emaciation (as defined by Dairy Well as evidenced by prominent ribs, spine, hooks and pins) must not be transported. The OIE (2015) Terrestrial Animal Health Standards for Dairy Cattle, including lactating and non-lactating states that: 1) "…body condition score outside an acceptable range… may be [an] indicator of compromised welfare."

Evaluation - Evaluate body condition and housing for all calves on milk using the appropriate sample methodology for the number of calves and housing type.

E1a. i. Emaciated Body Condition - Use the calf body condition score card (Appendix A4) to evaluate for evidence of emaciation. Mark yes if ≤ 3% are observed to be emaciated. Mark NA if there are no milk calves on the facility.

E1a. ii. Poor Body Condition - Use the calf body condition score card (Appendix A4) to evaluate for evidence of calves with poor body condition. Mark yes if ≤15% of the calves are observed to have poor condition. Mark NA if there are no milk calves on the facility.

E1b. Care - Check treatment records to confirm treatment of emaciated calves if emaciated calves are observed. Mark yes, if treatment records confirm treatment of calves. Mark NA if there are no emaciated calves or if there are no milk calves on the facility.

References

Bateman II, H. G. , T. M. Hill, J. M. Aldrich, and R. L. Schlotterbeck. 2009. Effects of corn processing, particle size, and diet form on performance of calves in bedded pens. J. Dairy Sci. J. Dairy Sci. 92:782-789.

DCHA Gold Standards. Second Edition. Performance and [production standards for dairy calves and heifers, from birth to weaning. 2016.

Edmonson, A. J., I. J. Lean, L. D. Weaver, T. Farver, and G. Webster. 1989. A body condition scoring chart for Holstein Dairy Cows. J. Dairy Sci. 72:68-78.

National Farm Animal Care Council. 2009. Code of Practice for the Care and Handling of Dairy Cattle, Copyright held jointly by Dairy Farmers of Canada and the National Farm Animal Care Council.

OIE. 2015. Chapter 7.11. Animal Weflare and Dairy Cattle Production Systems. World Organization for Animal Health. Terrestrial Animal Health Code, Volume 1, General Provisions. 24th Edition. pp 399-411.

Roche, J. R. Roche , N. C. Friggens , J. K. Kay , M. W. Fisher , K. J. Stafford , and D. P. Berry. 2009. Invited review: Body condition score and its association with dairy cow productivity, health, and welfare. J. Dairy Sci. 92:5769-5801.

Roche, J. R., P. G. Dillon, C. R. Stockdale, L. H. Baumgard, and M. J. VanBaale. 2004. Relationships among international body condition scoring systems. J. Dairy Sci. 87:3076-3079.

Verbeek, E., J.R. Waasa, M.H. Oliver, L.M. McLeay, D.M. Fergusond, L.R. Matthews. 2012. Motivation to obtain a food reward of pregnant ewes in negative energy balance: Behavioural, metabolic and endocrine considerations. Horm. Behav. 62:162-172.

Wildman, E. E., G. M. Jones, P. E. Wagner, R. L. Bowman, H. F. Troutt Jr., and T. N. Lesch. 1982. A dairy cow body condition scoring system and its relationship to selected production characteristics. J. Dairy Sci. 65:495-501.

E2. Injuries – Housing and handling should be provided such that risk of injury is minimized.

Evaluation – Evaluate injuries on the same calves evaluated for body condition. If a hospital pen is present for milk fed calves, score the entire pen and record the total as a percent separately.

E2ai & ii. Count and note the % of moderate & severe injuries as described in the score sheet (Appendix A6). Specifically, in calves, wounds from caustic paste that may have smeared or run down the face/ear, or rubbed onto other calves in group pens should be noted. Specifically, in calves, wounds from caustic paste that may have smeared or run down the face/ear should be noted.

E3. Painful Procedures – SOPs will be reviewed for ***all painful procedures practiced on farm*** for use of pain mitigation and acceptable methods. Only disbudding/dehorning will be evaluated by examining calves during the audit as other painful procedures including castration, extra teat removal and branding are often done off site OR are difficult to confirm based on observation without handling the calves. SOPs must be signed by the veterinarian of record and describe the age at which the procedure is done, pain mitigation provided, method used and the person responsible.

Disbudding or dehorning

(a) Method - Paste or Cautery can be used.

(b) Age completed – should be completed before 8 weeks of age

(c) Analgesia – should always be provided

(d) Anesthesia – should always be provided

Scientific evidence

Age. The current convention is to disbud at or before 8 weeks of age (AVMA, 2008). To minimize the damage and invasiveness of the procedure, it should be carried out before this time.

Method and pain relief. Cautery methods are the most common (68% heifers, USDA, 2010a) and there is ample evidence that both a local nerve block and administration of a non-steroidal anti-inflammatory (NSAID) reduce the behavioral and physiological signs of pain (Stafford and Mellor, 2011). Use of paste to chemically destroy horn tissue is less common (9% operations, USDA, 2010a), but is also painful (Stafford and Mellor, 2011). The best way to alleviate this pain is unclear, as evidence about the efficacy of both local anesthesia and analgesia is mixed (Stafford and Mellor, 2011, Braz et al., 2012). Thus, both local anesthesia and analgesia are required as a precautionary measure. For chemical disbudding, however, use of a ring block as part of the local anesthesia is not recommended, as it may interact with the caustic paste and cause pain (Vickers et al., 2005).

Expert perspective and consensus among professionals The AVMA recognizes that "combined use of an anesthetic and analgesic appears to represent the most effective method for controlling pain associated with dehorning" (AVMA, 2008). The above decisions are more stringent than the recommendations outlined by AABP, in that we require disbudding at an earlier age while AABP recommends the procedure be before the horn base is less 1" in diameter, (AABP, 2014). The NMPF (2016) has similar guidelines in terms of age, but is broader in their recommendations about pain mitigation referring to consultation with herd veterinarian, rather than the multimodal approach required by Dairy Well.

Public perspective An online survey of 354 participants found that 90% thought pain relief should be provided for disbudding/dehorning (Robbins et al., 2015).

Evaluation – *Evaluate the same calves for disbudding/dehorning that were evaluated for body condition.*

E2a. **Method-** Calves will be observed for evidence of the method used to dehorn/disbud. Mark the box which best describes the method being used. If there are any injuries as the result of disbudding/dehorning, including burns (caustic or hot iron) beyond the cornual ring, these should be counted in the injury section.

E2b. Age- Calves will be observed for evidence of the age used to dehorn/disbud. Mark yes if calves the protocol indicates that calves are disbudded/dehorned <8 weeks of age and there is evidence that it is being carried out at the time specified in the protocol.

E2c.NSAID provided – Mark yes if the protocol indicates an NSAID is provided and there is evidence that NSAID are being used (i.e. NSAID on approved drug list, in drug cabinet and or employee describes proper use).

E2d.Local provided- Mark yes if the protocol indicates a local is provided and there is evidence that a local is being given (i.e. Local anesthetic on approved drug list, in the drug cabinet, employee describes use and lack of excessive burn margins.)

References

American Association of Bovine Practitioners. 2014. Castration and dehorning guidelines, http://www.aabp.org/resources/AABP_Guidelines/Castration_and_Dehorning_Guidelines_app3.2014_03.17.2014.pdf.

American Veterinary Medical Association. 2008. Castration and dehorning of cattle. In AVMA Policies, https://www.avma.org/KB/Resources/LiteratureReviews/Pages/Welfare-Implications-of-Dehorning-and-Disbudding-Cattle.aspx Vol. 2013.

Braz, M., M. Carreira, N. Carolino, T. Rodrigues, and G. Stilwell. 2012. Effect of rectal or intravenous tramadol on the incidence of pain-related behaviour after disbudding calves with caustic paste. Appl. Anim. Behav. Sci. 136:20-25.

Robbins, J. A., D. M. Weary, C. A. Schuppli, and M. A. G. von Keyserlingk. 2015. Stakeholder views on treating pain due to dehorning dairy calves. Anim. Welf. 24:399-406.

Stafford, K. J. and D. J. Mellor. 2011. Addressing the pain associated with disbudding and dehorning in cattle. Appl. Anim. Behav. Sci. 135:226-231.

USDA. 2010. Dairy 2007, Heifer calf health and management practices on U.S. dairy operations. Vol. #550.0110, Fort Collins, CO.

Vickers, K. J., L. Niel, L. M. Kiehlbauch, and D. M. Weary. 2005. Calf response to caustic paste and hot-iron dehorning using sedation with and without local anesthetic. J. Dairy Sci. 88:1454-1459.

Castration - Both local and NSAID should be provided at the time of castration and the procedure completed as young as possible. Use of bands or rubber rings at all ages are discouraged.

Scientific evidence

Method. Castration by banding is known to cause lasting pain (Thuer et al., 2007, Marti et al., 2010, Becker et al., 2012), more than either crushing or surgical removal. This pattern of chronic pain is apparent in older animals, but also those castrated with bands or rings at 5-7 days of age (up to at least 48 days afterward) (Molony et al., 1995). Thus, because use of bands or rings cause pain over a longer period than other methods, and this pain is not easily controlled by local anesthetic or NSAIDs, their use is discouraged.

Age. Comparisons among ages are fraught with challenge, as the physiology and behavior change with time. There are several arguments supporting the idea that performing castration at a younger age is beneficial. Firstly, castrating smaller animals results in less tissue damage because the testes are also smaller. Secondly, it has been proposed that younger animals heal quicker (and therefore are assumed to experience pain for a shorter length time) than older animals. There is preliminary evidence suggesting that this is the case of surgical castration (less than 1 wk vs 10 to 11 wk) (Norring et al., preliminary data). Despite these benefits, painful procedures earlier in life make animals more sensitive to pain at a later age. For example, lambs castrated at 1 day of age are more responsive to tail docking several weeks later than lambs castrated at 10 days of age (McCracken et al., 2010). At the time of writing, it is unknown if castrating calves early in life has this type of sensitizing effect.

Pain relief. Both local anesthesia and NSAID provide immediate benefit, when provided in combination, in young dairy calves (Webster et al., 2013). Neither likely address long-term pain, over days and weeks of healing (Mintline et al., 2014).

Expert perspective and consensus among professionals The AVMA discourages use of banding/rings as a method of castration (American Veterinary Medical Association, 2012) because of the long-term pain associated with this method. The above decisions are more stringent than the recommendations outlined by American Association of Bovine Practitioners, in that we require pain relief at any age and discourage the use of band/rings (American Association of Bovine Practitioners, 2014).

Evaluation – This is addressed in section B5a. As confirmation of this would require handling of individual calves, the presence of an SOP will be considered sufficient. There are no additional questions in the audit tool regarding castration beyond the presence of an SOP.

References

American Association of Bovine Practitioners. 2014. Castration and dehorning guidelines, http://www.aabp.org/resources/AABP_Guidelines/Castration_and_Dehorning_Guidelines_app3.2014_03.17.2014.pdf.

American Veterinary Medical Association (AVMA). 2014. Welfare implications of castration of cattle. https://www.avma.org/KB/Resources/LiteratureReviews/Documents/castration-cattle-bgnd.pdf

Becker, J., M. G. Doherr, R. M. Bruckmaier, M. Bodmer, P. Zanolari, and A. Steiner. 2012. Acute and chronic pain in calves after different methods of rubber-ring castration. Vet. J. 194:380-385.

Marti, S., A. Velarde, J. L. de la Torre, A. Bach, A. Aris, A. Serrano, X. Manteca, and M. Devant. 2010. Effects of ring castration with local anesthesia and analgesia in Holstein calves at 3 months of age on welfare indicators. J. Anim. Sci. 88:2789-2796.

McCracken, L., N. Waran, S. Mitchinson, and C. B. Johnson. 2010. Effect of age at castration on behavioural response to subsequent tail docking in lambs. Vet. Anaesth. Analg. 37:375-381.

Mintline, E. M., A. Varga, J. Banuelos, K. A. Walker, B. Hoar, D. Drake, D. M. Weary, J. F. Coetzee, M. L. Stock, and C. B. Tucker. 2014. Healing of surgical castration wounds: a description and an evaluation of flunixin. J Anim Sci 92:5659-5665.

Molony, V., J. E. Kent, and I. S. Robertson. 1995. Assessment of acute and chronic pain after different methods of castration of calves. Appl. Anim. Behav. Sci. 46:33-48.

Norring, M., E. M. Mintline, and C. B. Tucker. preliminary data. The age of surgical castration affects wound healing in beef calves.

Thuer, S., S. Mellema, M. G. Doherr, B. Wechsler, K. Nuss, and A. Steiner. 2007. Effect of local anaesthesia on short- and long-term pain induced by two bloodless castration methods in calves. Vet. J. 173:333-342.

Webster, H. B., D. Morin, V. Jarrell, C. Shipley, L. Brown, A. Green, R. Wallace, and P. D. Constable. 2013. Effects of local anesthesia and flunixin meglumine on the acute cortisol response, behavior, and performance of young dairy calves undergoing surgical castration. J. Dairy Sci. 96:6285-6300.

Extra Teat Removal and Branding Extra teats should be removed at a young age, before 12 weeks and farmers should work with their veterinarians to mitigate the pain associated with the procedure or elect to avoid the procedure all together. Pain mitigation is required for branding. Branding should only be done to meet state or export requirements. Branding for individual identification and face branding is prohibited.

Scientific evidence Hot-iron and freeze branding are painful at the time of the procedure (Schwartzkopf-Genswein et al., 1998). Hot-iron brands remain more sensitive than unbranded tissue throughout the healing process (Tucker et al., 2014). Little is known about how to control either the immediate or long-term pain associated with this procedure, thus branding should be limited to meet state or export requirements, is not allowed to be used for individual identification and never done on the face.

Similarly, extra teat removal has not been studied, nor is any information available about how to mitigate pain associated with the process. Early removal is recommended to minimize the amount of tissue damage associated with the process.

The decision points in both cases were to err on the side of caution, in the absence of scientific evidence.

Expert perspective and consensus among professionals National Milk Producers Federation (NMPF, 2016) recommends that branding be done concurrently with dehorning and castration to take advantage of pain relief provided for these procedures. They also recommend consultation with the herd veterinarian to evaluate the necessity of branding

instead of other forms of identification. National Farm Animal Care Council of Canada (NFACC) (2009) Canadian Code of Practice for the Care and Handling of Dairy Cattle requires pain control if branding is necessary. The OIE (2015) Terrestrial Animal Health Standards for Dairy Cattle state that the least invasive approach to animal identification should be adopted and that freeze and hot-iron branding avoided.

National Milk Producers Federation recommends extra teat removal at the earliest age possible and to consult the herd veterinarian about pain mitigation during this process. NFACC (2009) Canadian Code of Practice for the Care and Handling of Dairy Cattle requires that teat removal must be performed by trained personnel and recommends pain control.

Evaluation -
This is addressed in section B5a. As confirmation of this would require handling of individual calves, the presence of an SOP will be considered sufficient. There are no additional questions in the audit tool regarding castration beyond the presence of an SOP.

References

National Farm Animal Care Council. 2009. Code of Practice for the Care and Handling of Dairy Cattle, Copyright held jointly by Dairy Farmers of Canada and the National Farm Animal Care Council.

Schwartzkopf-Genswein, K. S., J. M. Stookey, T. G. Crowe, and B. M. A. Genswein. 1998. Comparison of image analysis, exertion force and behavior measurements for use in the assessment of beef cattle responses to hot-iron and freeze branding. J. Anim. Sci. 76:972-979.

Tucker, C. B., E. M. Mintline, J. Banuelos, K. A. Walker, B. Hoar, A. Varga, D. Drake, and D. M. Weary. 2014. Pain sensitivity and healing of hot-iron cattle brands. J. Anim. Sci. 92:5674-5682.

F. Growing Heifers Resource Based - General Housing/Facility Design & Management

F1. Environment - Facilities should be designed and maintained to provide and promote animal health and welfare, reduce risk of injury and provide protection from extreme weather.

(a) Housing - Growing heifers should be provided with a soft and dry resting area - designed to limit injury. The “dryness” of the resting areas is evaluated using the hygiene score card (Appendix A3). Lying surface will be evaluated based on the presence of ground cover if not housed on pasture/grass/dry lot. Bare rocks, wire, metal or concrete are not considered a soft laying area.

(b) Shade - Overhead shade should be available to provide protection from heat stress and inclement weather.

(c) Additional protection from inclement weather - Additional protection from inclement weather should be provided. Such provision may be in the form of one or more of the following: overhead shade at the feed bunk, fans, soakers, wind breaks or other.

(d) Water Cleanliness – All heifers should have access to clean, fresh water free from gross contamination including feed, algae or feces.

Scientific evidence

(a) Housing. Cattle show clear preferences for soft and dry lying areas (Tucker et al., 2003, Fregonesi et al., 2007) and lying time is reduced when surfaces are hard (Haley et al., 2000) or wet (Haley et al., 2000, Fregonesi et al., 2007). Unyielding and poorly bedded lying surfaces are the key risk factor for leg injuries, namely swelling, open wounds and hair loss on the hock and knees (Barrientos et al., 2013, Zaffino Heyerhoff et al., 2014).

The goal is for at least 75% of the animals to be reasonably clean on the upper leg and flank. There are methodological challenges associated with scoring hygiene (repeatability of scores, scoring individual animals in pens without restraint, for example), but we have opted to include such measures to give some estimate of the degree of extremely dirty animals within a group, based on an assessment of the degree of manure contamination of the upper leg and flank (areas in contact with the lying area). Based on Cook and Reinemann (2007), the top 25% of farms could achieve 92 and 83% cows with reasonably clean upper legs and flanks in free and tie-stall housing, respectively. As there is no available literature on the nature and frequency of injuries in weaned heifers, we will begin by collecting observations of broken tails, neck and other injuries.

(b) Shade. There are lines of evidence that dairy cattle are motivated to seek shade in warm ambient conditions. They will chose shade over other important behaviors, such as rest (Schütz et al., 2008) and show preferences for shade that provides relatively more protection from solar radiation (Schütz et al., 2009). Shade seeking is one of the first responses to solar radiation and mitigates increases in physiological responses to heat, such as respiration rate and body temperature (West, 2003).

(c) Additional protection from inclement weather: fans, soakers, wind breaks. When dairy cows accumulate heat load, production and welfare problems result, including increased body temperature, decreased milk yield (Wheelock et al., 2010) and fertility (De Rensis and Scaramuzzi, 2003), and in extreme cases, mortality (Stull et al., 2008, Morignat et al., 2014). Compared to shade alone, soakers reduce body temperature, respiration rate, and localized air temperature (Kendall et al., 2007, Chen et al., 2013). If given a choice, cows prefer to feed from bunks with soakers; they spend more time at the bunk with them than those without (Chen et al., 2013). Fans improve heat loss and are often provided in combination with soakers (West, 2003). In winter, cattle will use man-made windbreaks (Olson and Wallander, 2002) and shelters that provide protection from rain (Vandenheede et al., 1995). In addition to use of windbreaks, cattle also use conspecifics for protection (Graunke et al., 2011) and will orient towards the sun in cold winter weather (Gonyou and Stricklin, 1981). Although most of the evidence about the use of wind breaks and response to cold weather comes from literature with beef cattle, we assume that benefits of protection also apply to dairy animals.

(d) Water Cleanliness - See section A1.

Expert perspective and consensus among professionals The NFACC (2009) Code of Practice for the Care and Handling of Dairy Cattle requires that lying areas minimize hock and knee injuries and deems that bare concrete and hard rubber mats without bedding are unacceptable. The NMPF (2016) recommends that protection from heat and cold be provided to animals of all age classes. Both NMPF (2016) and European-wide Welfare Quality use a hygiene scoring system to assess the cleanliness of the environment. Although the OIE (2015) Terrestrial Animal Health Standards for Dairy Cattle recognizes shade, water cooling and fans as appropriate for heat abatement, they only clearly require that sick or non-ambulatory cattle should be provided shade. To our knowledge, few other organizations directly address the ability to groom and exercise untethered.

Public perspective Some European countries (e.g. Switzerland) require exercise for tethered cattle and within the US there have been numerous state laws passed banning tethering or restricting the movement of other species, namely sows and veal calves. The continued use of tie stall housing is being questioned in some European countries. For example, building new tie stall housing in Norway was outlawed in 2004, with a complete ban of this housing type scheduled for 2023 (Barkema et al., 2015). Within the US, some animal welfare labels, such as Certified Humane and Animal Welfare Approved, will not allow tethered cattle into their dairy programs, presumably because they place emphasis on the animals' ability to perform natural behaviors such as walking, grooming and social contact. Regarding hygiene and housing, a recent on line survey of 491 US citizens reported that participants placed great value on dairy cows being clean, healthy and free of disease equating these characteristics to improved milk quality (Cardoso et al., 2016).

Evaluation – Evaluate hygiene and housing for heifers using the appropriate sample methodology for the number of heifers.

F1a.i. Hygiene - Using the hygiene score card descriptions (Appendix A3), mark yes if >75% of heifers score a 1 or 2. Mark NA if heifers are not raised on the farm.

F1a.ii. Lying Surface – Mark yes if the ALL heifers are provided additional substrate to lay on (sawdust, straw, compost or other bedding acceptable). Bare mattresses, concrete or water beds do not count as a substrate. Mark NA if heifers are not raised on the farm.

F1b. Shade- Evaluate all heifer pens for shade. Shade may include permanent shade structures, patches of trees or temporary cloth (raised seasonally). Rows of trees may be considered a wind break but not shade. The area of shade provided will not be measured at this time. Mark yes if shade is provided to every group of heifers. Mark NA if heifers are not raised on the farm.

F1c. Additional Protection- Evaluate all heifer pens for additional protection. Depending on the time of year observation of such provisions may not be possible. In such cases mark which additional protections are currently in place in addition to any reported by the owner/manager. Mark yes if at least one additional measure is provided for heat and cold. Mark NA if heifers are not raised on the farm.

F1d. Water Cleanliness - If large troughs are used, the 'clean water sheet' (Appendix A1) must be easily read while submerged 6-10 inches below the water surface in 3 areas. All troughs in the heifer pens scored for hygiene will be evaluated. Individual water sources should be free from manure or other gross contamination. It is recognized that small amounts of grain or feed may be present because of cattle eating. Small amounts of feed- or algae along the bottom or sides of troughs/waterers are acceptable. Algae floating on the surface, feces or large amounts of feed obstructing the entire surface of the water resource need to be addressed. All water troughs scored must be in acceptable condition to meet this criterion. Mark yes if ALL the troughs/buckets are clean.

References

Barrientos, A. K., N. Chapinal, D. M. Weary, E. Galo, and M. A. G. von Keyserlingk. 2013. Herd-level risk factors for hock injuries in freestall-housed dairy cows in the northeastern United States and California. J. Dairy Sci. 96:3758-3765.

Borderas, T. F., B. Pawluczuk, A. M. de Passillé, and J. Rushen. 2004. Claw hardness of dairy cows: Relationship to water content and claw lesions. J. Dairy Sci. 87:2085-2093.

Cardoso, C. S., M. J. Hötzel, D. M. Weary, J. A. Robbins, and M. A. G. von Keyserlingk. 2016. Imagining the ideal dairy farm. J. Dairy Sci. 99:1663-1671.

Cardozo, L. L., A. Thaler Neto, G. N. Souza, L. C. A. Picinin, N. C. Felipus, N. L. M. Reche, F. A. Schmidt, D. Werncke, and E. E. Simon. 2015. Risk factors for the occurrence of new and chronic cases of subclinical mastitis in dairy herds in southern Brazil. J. Dairy Sci. 98:7675-7685.

Chen, J. M., K. E. Schutz, and C. B. Tucker. 2013. Dairy cows use and prefer feed bunks fitted with sprinklers. J. Dairy Sci. 96:5035–5045.

Cook, N.B., and D. Reinemann. 2007. A toolbox for assessing cow, udder and teat hygiene. In: Proceedings of 46th Annual Meeting of the National Mastitis Council. San Antonio, TX. January 21-24, 2007.

De Rensis, F. and R. J. Scaramuzzi. 2003. Heat stress and seasonal effects on reproduction in the dairy cow - a review. Theriogenology 60:1139-1151.

Dijkman, J. T. and P. R. Lawrence. 1997. The energy expenditure of cattle and buffaloes walking and working in different soil conditions. J. Agric. Sci. 128:95-103.

Fregonesi, J. A., D. M. Veira, M. A. G. von Keyserlingk, and D. M. Weary. 2007. Effects of bedding quality on lying behavior of dairy cows. J. Dairy Sci. 90:5468-5472.

Gonyou, H. W. and W. R. Stricklin. 1981. Orientation of feedlot bulls with respect to the sun during periods of high solar radiation in winter. Can. J. Anim. Sci. 61:809-816.

Graunke, K. L., T. Schuster, and L. M. Lidfors. 2011. Influence of weather on the behaviour of outdoor-wintered beef cattle in Scandinavia. Livest. Sci. 136:247-255.

Haley, D. B., J. Rushen, and A. M. de Passillé. 2000. Behavioural indicators of cow comfort: activity and resting behaviour of dairy cows in two types of housing. Can. J. Anim. Sci. 80:257-263.

Kendall, P. E., G. A. Verkerk, J. R. Webster, and C. B. Tucker. 2007. Sprinklers and shade cool cows and reduce insect-avoidance behavior in pasture-based dairy systems. J. Dairy Sci. 90:3671-3680.

Morignat, E., J.-B. Perrin, E. Gay, J.-L. Vinard, D. Calavas, and V. Henaux. 2014. Assessment of the impact of the 2003 and 2006 heat waves on cattle mortality in France. PLoS One 9:e93176.

Morrison, S., R. Givens, W. Garrett, and T. Bond. 1970. Effects of mud-wind-rain on beef cattle performance in feed lot. Calif. Agric. 24:6-7.

OIE. 2015. Chapter 7.11. Animal Welfare and Dairy Cattle Production Systems. World Organization for Animal Health (OIE). Terrestrial Animal Health Code, Volume 1, General Provisions. 24th Edition. pp 399-411.

Olson, B. E. and R. T. Wallander. 2002. Influence of winter weather and shelter on activity patterns of beef cows. Can. J. Anim. Sci. 82:491-501.

Schütz, K. E., N. R. Cox, and L. R. Matthews. 2008. How important is shade to dairy cattle? Choice between shade or lying following different levels of lying deprivation. Appl. Anim. Behav. Sci. 114:307-318.

Schütz, K. E., A. R. Rogers, N. R. Cox, and C. B. Tucker. 2009. Dairy cows prefer shade that offers greater protection against solar radiation in summer: Shade use, behaviour, and body temperature. Appl. Anim. Behav. Sci. 116:28-34.

Stull, C. L., L. L. Messam, C. A. Collar, N. G. Peterson, A. R. Castillo, B. A. Reed, K. L. Andersen, and W. R. VerBoort. 2008. Precipitation and temperature effects on mortality and lactation parameters of dairy cattle in California. J. Dairy Sci. 91:4579-4591.

Tucker, C. B., D. M. Weary, and D. Fraser. 2003. Effects of three types of free-stall surfaces on preferences and stall usage by dairy cows. J. Dairy Sci. 86:521-529.

Vandenheede, M., B. Nicks, R. Shehi, B. Canart, I. Dufrasne, R. Biston, and P. Lecomte. 1995. Use of a shelter by grazing fattening bulls: Effect of climatic factors. Anim Sci 60:81-85.

West, J. W. 2003. Effects of heat-stress on production in dairy cattle. J. Dairy Sci. 86:2131-2144.

Wheelock, J. B., R. P. Rhoads, M. J. VanBaale, S. R. Sanders, and L. H. Baumgard. 2010. Effects of heat stress on energetic metabolism in lactating Holstein cows. J. Dairy Sci. 93:644-655.

Zaffino Heyerhoff, J. C., S. J. LeBlanc, T. J. DeVries, C. G. R. Nash, J. Gibbons, K. Orsel, H. W. Barkema, L. Solano, J. Rushen, A. M. de Passillé, and D. B. Haley. 2014. Prevalence of and factors associated with hock, knee, and neck injuries on dairy cows in freestall housing in Canada. J. Dairy Sci. 97:173-184.

G. Growing Heifers - Animal Based Welfare Measures -

G1. Body Condition

(a) There should be no emaciated (saw toothed spine, prominent ribs, hooks and pins) heifers

(b) If present, emaciated heifers should be receiving treatment.

Scientific evidence Body weight alone is not a good indicator of body reserves, as cattle of a specific weight may vary in terms of height and fat covering (Roche et al., 2004). The scale used to measure BCS in cows differs between countries, but low values always reflect emaciation and high values reflect obesity (Roche et al., 2004). In the United States BCS is most often evaluated using a 5-point scale where 1 and 2 reflect emaciation and 4 and 5 reflect obesity (Edmonson et al., 1989). Roche et al., (2009) conclude that thin cows are at risk for succumbing to lameness, dystocia and ill health. Work on sheep provides some evidence that emaciation can induce hunger. Verbeek et al., (2012) reported that ewes with a low BCS (=2) were prepared to work harder for access to food compared to ewes of higher BCS (3 or 4).

Given that emaciated animals are particularly susceptible to cold stress and likely hunger, we assume that there are important benefits of preventing emaciation in all classes of dairy cattle (calves, heifers and adult cows).

Expert perspective and consensus among professionals The National Farm Animal Care Council of Canada (2009) Code of Practice for the Care and Handling of Dairy Cattle, in regards to BCS, states that animals with a body condition score indicating emaciation (as defined by Dairy Well as cattle with a saw-toothed spine, prominent ribs, hooks and pins) must not be transported. The OIE (2015) Terrestrial Animal Health Standards for Dairy Cattle, including lactating and non-lactating states that: "…body condition score outside an acceptable range… may be [an] indicator of compromised welfare."

Evaluation – Evaluate body condition (using the cow body condition score card, Appendix A5) on the same heifers scored for hygiene. If a hospital or chronic pen is present for heifers, score the entire pen and record the total as a percent separately.

G1a. Mark yes if there were no emaciated heifers observed. Mark NA if heifers are not raised on the farm.

G1b. Check treatment records to confirm treatment if emaciated heifers are noted. Mark yes emaciated heifers are receiving treatment. Mark NA if there were no emaciated heifers noted or heifers are not raised on the farm.

References

Edmonson, A. J., I. J. Lean, L. D. Weaver, T. Farver, and G. Webster. 1989. A body condition scoring chart for Holstein Dairy Cows. J. Dairy Sci. 72:68-78.

National Farm Animal Care Council. 2009. Code of Practice for the Care and Handling of Dairy Cattle, Copyright held jointly by Dairy Farmers of Canada and the National Farm Animal Care Council.

OIE. 2015. Chapter 7.11. Animal Weflare and Dairy Cattle Production Systems. World Organization for Animal Health. Terrestrial Animal Health Code, Volume 1, General Provisions. 24th Edition. pp 399-411.

Roche, J. R. Roche , N. C. Friggens , J. K. Kay , M. W. Fisher , K. J. Stafford , and D. P. Berry. 2009. Invited review: Body condition score and its association with dairy cow productivity, health, and welfare. J. Dairy Sci. 92:5769-5801.

Roche, J. R., P. G. Dillon, C. R. Stockdale, L. H. Baumgard, and M. J. VanBaale. 2004. Relationships among international body condition scoring systems. J. Dairy Sci. 87:3076-3079.

Verbeek, E., J.R. Waasa, M.H. Oliver, L.M. McLeay, D.M. Fergusond, L.R. Matthews. 2012. Motivation to obtain a food reward of pregnant ewes in negative energy balance: Behavioural, metabolic and endocrine considerations. Horm. Behav. 62:162-172.

G2. Injuries – Housing and handling should be provided such that risk of injury is minimized.

Evaluation – Evaluate injuries on the same heifers evaluated for body condition and hygiene using the neck and other injury scorecard (Appendix A6). If a hospital or chronic pen is present for heifers, score the entire pen and record the total as a percent separately.

G2a. Broken tails - Count and note the % of broken tails as described in the broken tail score card (Appendix A9).

G2bi & ii. Neck & Other Injuries - Count and note the % of moderate and severe neck and other injuries as described in the score sheet.

H. LACTATING COWS Resource Based - General Housing/Facility Design & Management:

H1. Environment - Facilities should be designed and maintained to provide and promote animal health and welfare, reduce risk of injury and provide protection from extreme weather. The quality of the space provided regarding comfort will be further evaluated using locomotion and injury scores.

(a) Housing- Cows should be provided a soft and dry resting area designed to limit injury. The "dryness" of the resting areas is evaluated using the hygiene score card (Appendix A3). The "softness" of the resting area is evaluated in animal based measures using hock and knee scores.

(b) Shade - Overhead shade should provide protection from heat stress.

(c) Protection - Additional protection from inclement weather should be provided. Such provision may be in the form of one or more of the following: overhead shade at the feed bunk, fans, soakers, wind breaks or other.

(d) Water Cleanliness – All lactating should have access to clean, fresh water free from gross contamination including feed, algae or feces.

(e) Tie Stalls & Stanchion Barns –

1. For tie-stall and stanchion barns, cows should be released daily from stalls, and allowed to groom and move freely (untethered).

2. Trainers –Trainers should not touch the cows while standing in a normal position in the stall.

Scientific evidence

a) Housing - Soft and dry resting area. Cattle show clear preferences for soft and dry lying areas (Tucker et al., 2003, Fregonesi et al., 2007) and lying time is reduced when surfaces are hard (Haley et al., 2000) or wet (Haley et al., 2000, Fregonesi et al., 2007). Unyielding and poorly bedded lying surfaces are the key risk factor for leg injuries, namely swelling, open wounds and hair loss on the hock and knees (Barrientos et al., 2013, Zaffino Heyerhoff et al., 2014).

The goal is for at least 75% of the animals to score <3 using the hygiene score card. There are methodological challenges associated with scoring hygiene (repeatability of scores, scoring individual animals in pens without restraint, for example), but we have opted to include such measures to give some estimate of the degree of extremely dirty animals within a group, based on an assessment of the degree of manure contamination of the upper leg and flank (areas in contact with the lying area). Based on Cook and Reinemann (2007), the top 25% of farms could achieve 92 and 83% cows with reasonably clean upper legs and flanks in free and tie-stall housing, respectively.

b) Shade. There are lines of evidence that dairy cattle are motivated to seek shade in warm ambient conditions. They will chose shade over other important behaviors, such as rest (Schütz et al., 2008) and show preferences for shade that provides relatively more protection from solar radiation (Schütz et al., 2009). Shade seeking is one of the first responses to solar radiation and mitigates increases in physiological responses to heat, such as respiration rate and body temperature (West, 2003).

c) Additional protection from inclement weather: fans, soakers, wind breaks. When dairy cows accumulate heat load, production and welfare problems result, including increased body temperature, decreased milk yield (Wheelock et al., 2010) and fertility (De Rensis and Scaramuzzi, 2003), and in extreme cases, mortality (Stull et al., 2008, Morignat et al., 2014). Compared to shade alone, soakers reduce body temperature, respiration rate, and localized air temperature (Kendall et al., 2007, Chen et al., 2013). If given a choice, cows prefer to feed from bunks with soakers; they spend more time at the bunk with them than those without (Chen et al., 2013). Fans improve heat loss and are often provided in combination with soakers (West, 2003). In winter, cattle will use man-made windbreaks (Olson and Wallander, 2002) and shelters that provide protection from rain (Vandenheede et al., 1995). In addition to use of windbreaks, cattle also use conspecifics for protection (Graunke et al., 2011) and will orient towards the sun in cold winter weather (Gonyou and Stricklin, 1981). Although most of the evidence about the use of wind breaks and response to cold weather comes from literature with beef cattle, we assume that benefits of protection also apply to dairy animals.

d) Water Cleanliness - See section A1.

e1) Tie-Stalls - Cows are released daily from stalls, allowed to groom and move freely (untethered). When untethered, cattle use this time to groom parts of the body that they cannot reach while tied (Krohn, 1994, Loberg et al., 2004), interact with other cows and to move (Loberg et al., 2004, Veissier et al., 2008). Tie-stall farms that provide outdoor access have lower levels of lameness (Popescu et al., 2013) and reduced risk of hock injuries (Keil et al., 2006) than those that do not. Cattle with daily exercise have fewer illnesses requiring veterinary attention and had fewer hock injuries (Gustafson et al., 1993) than those with no exercise. We speculate that weather and cleanliness of the environment may mediate some of the health benefits of outdoor access, in part, because of discrepancies within the literature. For example, year-round exposure increased risk for common hoof disorders in one study (Cramer et al., 2009), but not in another (Regula et al., 2004). Finally, longer intervals between periods of exercise has shown to increase aggression when cattle are released into a group, at least in some breeds (Castro et al., 2011). The importance of allowing tied cattle opportunities for social interaction, both positive and negative, has received relatively little attention from the scientific community. Indeed, little is known about the timing and amount of outdoor access needed to provide benefits. Studies vary in the level of detail provided, from asking farmers to categorize outdoor access as “never, seasonally or year-round” (Cramer et al., 2009) to controlling the distance walked (2-3 km/d for 6 mo/year and 400 to 800 m/d for 6 mo/year vs. tied without any exercise; Gustafson et al., 1993). In summary, the literature overall indicates that being released from tie stalls/stanchions is beneficial from an animal welfare perspective compared to being tied

without this opportunity. However, many questions remain about the optimal environment (pasture vs. outdoor yard vs. indoor open area) and release frequency (number of days, spacing between days) and duration (number of hours/d, distance walked). We framed this decision point in terms of daily access as a best guess based on this uncertainty.

e2) Electric cow trainers do not touch animals in a standing position. Cattle find electric shock aversive (Pajor et al., 2000). Electric cow trainers reduce the amount of manure in the back of the stall and moisture in the sole horn (Bergsten and Pettersson, 1992). Moreover, their use is positively associated with the prevalence of dirty cows on tie-stall farms (Zurbrigg et al., 2005b) and is a risk factor for mastitis (Oltenacu et al., 1998), possibly because they are seen as a way to improve hygiene and thus used on farms with this challenge. In addition, their use is also a risk factor for hock (Zurbrigg et al., 2005b) and soft tissue injuries (Busato et al., 2000).

Expert perspective and consensus among professionals The National Farm Animal Care Council of Canada (2009) Code of Practice for the Care and Handling of Dairy Cattle requires that lying areas minimize hock and knee injuries and deems that bare concrete and hard rubber mats without bedding are unacceptable. They also require correct placement of electric cow trainers. The NMPF (2016) recommends that protection from heat and cold be provided to animals of all age classes. Both NMPF (2016) and European-wide Welfare Quality use a hygiene scoring system to assess the cleanliness of the environment. Although the OIE (2015) Terrestrial Animal Health Standards for Dairy Cattle recognizes shade, water cooling and fans as appropriate for heat abatement, they only clearly require that sick or non-ambulatory cattle should be provided shade. To our knowledge, few other organizations directly address the ability to groom and exercise untethered.

The OIE (2015) Terrestrial Animal Health Standards for Dairy Cattle has come out with a clear standard in terms of ammonia levels stating that: “The ammonia level in enclosed housing should not exceed 25 ppm.” Given that this recommendation is based almost entirely on pig, laying hen and poultry meat studies and there is essential no validated information on how best to measure this in dairy production systems the Dairy Well audit will not measure ammonia levels at this time.

Public perspective Some European countries (e.g. Switzerland) require exercise for tethered cattle and within the US there have been numerous state laws passed banning tethering or restricting the movement of other species, namely sows and veal calves. The continued use of tie stall housing is being questioned in some European countries. For example, building new tie stall housing in Norway was outlawed in 2004, with a complete ban of this housing type scheduled for 2023 (see review Barkema et al., 2015). Within the US, some animal welfare labels, such as Certified Humane and Animal Welfare Approved, will not allow tethered cattle into their dairy programs, presumably because they place emphasis on the animals’ ability to perform natural behaviors such as walking, grooming and social contact. Lastly, a recent on line survey of 491 US citizens reported that participants placed great value on dairy cows being clean, healthy and free of disease equating these characteristics to improved milk quality (Cardoso et al., 2016).

Evaluation – Evaluate hygiene and housing for lactating cows using the appropriate sample methodology for the number of cows in the pen/group being scored.

H1a. Hygiene- Using the hygiene score card descriptions (Appendix A3), mark yes if >75% of cows score a 1 or 2.

H1b. Shade – Evaluate ALL lactating cow pens for shade. Shade may include permanent shade structures, patches of trees or temporary cloth (raised seasonally). Rows of trees may be considered a wind break but not as shade. The area of shade provided will not be measured at this time. Mark yes if shade is provided to **every** group of lactating cows.

H1c. Additional Protection- Evaluate all lactating cow pens for additional protection. Rows of trees may be considered a wind break but not as shade. Mark yes if at least one additional measure is provided for heat and cold to **every** group of lactating cows.

HF1d. Water Cleanliness - If large troughs are used, the 'clean water sheet' (Appendix A1) must be easily read while submerged 6-10 inches below the water surface. The troughs in the pen scored for hygiene will be evaluated. Individual water sources should be free from manure or other gross contamination. It is recognized that small amounts of grain or feed may be present as a result of cattle eating. Small amounts of feed, algae along the bottom or sides of troughs/waterers are acceptable. Algae floating on the surface, feces or large amounts of feed obstructing the surface of the water resource need to be addressed. All water troughs scored must be in acceptable condition to meet this criterion. Mark yes if ALL the troughs/buckets are clean.

H1e.i. Tie-Stall Release – Mark yes of the owner reports that cows are released from tie-stalls or if you observe that the practice is in place. Check the boxes that best describe the area to and period for which cows are released.

H1e.ii. Tie-Stall Trainers - Mark yes if trainers do not touch any of the observed cows while standing in a normal position.

References

Anonymous. 2001. Housing Design of Cattle - Danish Recommendations. 1438 The Danish Agricultural Advisory Center. Translated into English and issued in 2002.

Busato, A., P. Trachsel, and J. W. Blum. 2000. Frequency of traumatic cow injuries in relation to housing systems in Swiss organic dairy herds. J. Vet. Med. A. Physiol. Pathol. Clin. Med. 47:221-229.

Barkema, H.W., M. A. G. von Keyserlingk, J. P. Kastelic, T. J. G. M. Lam, C. Luby, J.-P. Roy, S.J. LeBlanc, G.P. Keefe and D. F. Kelton. 2015. Invited review: Changes in the dairy industry affecting dairy cattle health and welfare. J. Dairy Sci. 98:7426-7445.

Barrientos, A. K., N. Chapinal, D. M. Weary, E. Galo, and M. A. G. von Keyserlingk. 2013. Herd-level risk factors for hock injuries in freestall-housed dairy cows in the northeastern United States and California. J. Dairy Sci. 96:3758-3765.

Bergsten, C. and B. Pettersson. 1992. The cleanliness of cows tied in stalls and the health of their hooves as influenced by the use of electric trainers. Prev. Vet. Med. 13:229-238.

Borderas, T. F., B. Pawluczuk, A. M. de Passillé, and J. Rushen. 2004. Claw hardness of dairy cows: Relationship to water content and claw lesions. J. Dairy Sci. 87:2085-2093.

Cardoso, C. S., M. J. Hötzel, D. M. Weary, J. A. Robbins, and M. A. G. von Keyserlingk. 2016. Imagining the ideal dairy farm. J. Dairy Sci. 99:1663-1671.

Cardozo, L. L., A. Thaler Neto, G. N. Souza, L. C. A. Picinin, N. C. Felipus, N. L. M. Reche, F. A. Schmidt, D. Werncke, and E. E. Simon. 2015. Risk factors for the occurrence of new and chronic cases of subclinical mastitis in dairy herds in southern Brazil. J. Dairy Sci. 98:7675-7685.

Castro, I. M. L., L. Gygax, B. Wechsler, and R. Hauser. 2011. Increasing the interval between winter outdoor exercise aggravates agonistic interactions in Herens cows kept in tie-stalls. Appl. Anim. Behav. Sci. 129:59-66.

Chen, J. M., K. E. Schutz, and C. B. Tucker. 2013. Dairy cows use and prefer feed bunks fitted with sprinklers. J. Dairy Sci. 96:5035–5045.

Cook, N.B., and D. Reinemann. 2007. A toolbox for assessing cow, udder and teat hygiene. In: Proceedings of 46th Annual Meeting of the National Mastitis Council. San Antonio, TX. January 21-24, 2007.

Cramer, G., K. D. Lissemore, C. L. Guard, K. E. Leslie, and D. F. Kelton. 2009. Herd-level risk factors for seven different foot lesions in ontario Holstein cattle housed in tie stalls or free stalls. J. Dairy Sci. 92:1404-1411.

De Rensis, F. and R. J. Scaramuzzi. 2003. Heat stress and seasonal effects on reproduction in the dairy cow - a review. Theriogenology 60:1139-1151.

Dijkman, J. T. and P. R. Lawrence. 1997. The energy expenditure of cattle and buffaloes walking and working in different soil conditions. J. Agric. Sci. 128:95-103.

Fregonesi, J. A., D. M. Veira, M. A. G. von Keyserlingk, and D. M. Weary. 2007. Effects of bedding quality on lying behavior of dairy cows. J. Dairy Sci. 90:5468-5472.

Gonyou, H. W. and W. R. Stricklin. 1981. Orientation of feedlot bulls with respect to the sun during periods of high solar radiation in winter. Can. J. Anim. Sci. 61:809-816.

Graunke, K. L., T. Schuster, and L. M. Lidfors. 2011. Influence of weather on the behaviour of outdoor-wintered beef cattle in Scandinavia. Livest. Sci. 136:247-255.

Gustafson, G. M., J. Luthman, and E. Burstedt. 1993. Effect of daily exercise on performance, feed efficiency and energy balance of tied dairy cows. Acta Agric. Scand. A Anim. Sci. 43:219-227.

Haley, D. B., J. Rushen, and A. M. de Passillé. 2000. Behavioural indicators of cow comfort: activity and resting behaviour of dairy cows in two types of housing. Can. J. Anim. Sci. 80:257-263.

Keil, N. M., T. U. Wiederkehr, K. Friedli, and B. Wechsler. 2006. Effects of frequency and duration of outdoor exercise on the prevalence of hock lesions in tied Swiss dairy cows. Prev. Vet. Med. 74:142-153.

Kendall, P. E., G. A. Verkerk, J. R. Webster, and C. B. Tucker. 2007. Sprinklers and shade cool cows and reduce insect-avoidance behavior in pasture-based dairy systems. J. Dairy Sci. 90:3671-3680.

Krohn, C. C. 1994. Behaviour of dairy cows kept in extensive (loose housing/pasture) or intensive (tie stall) environments. III. Grooming, exploration and abnormal behaviour. Appl. Anim. Behav. Sci. 42:73-86.

Loberg, J., E. Telezhenko, C. Bergsten, and L. Lidfors. 2004. Behaviour and claw health in tied dairy cows with varying access to exercise in an outdoor paddock. Appl. Anim. Behav. Sci. 89:1-16.

Morignat, E., J.-B. Perrin, E. Gay, J.-L. Vinard, D. Calavas, and V. Henaux. 2014. Assessment of the impact of the 2003 and 2006 heat waves on cattle mortality in France. PLoS One 9:e93176.

Morrison, S., R. Givens, W. Garrett, and T. Bond. 1970. Effects of mud-wind-rain on beef cattle performance in feed lot. Calif. Agric. 24:6-7.

OIE. 2015. Chapter 7.11. Animal Welfare and Dairy Cattle Production Systems. World Organization for Animal Health (OIE). Terrestrial Animal Health Code, Volume 1, General Provisions. 24th Edition. pp 399-411.

Olson, B. E. and R. T. Wallander. 2002. Influence of winter weather and shelter on activity patterns of beef cows. Can. J. Anim. Sci. 82:491-501.

Oltenacu, P. A., J. Hultgren, and B. Algers. 1998. Associations between use of electric cow-trainers and clinical diseases, reproductive performance and culling in Swedish dairy cattle. Prev. Vet. Med. 37:77-90.

Pajor, E. A., J. Rushen, and A. M. B. de Passillé. 2000. Aversion learning techniques to evaluate dairy cattle handling practices. Appl. Anim. Behav. Sci 69:89-102.

Popescu, S., C. Borda, E. A. Diugan, M. Spinu, I. S. Groza, and C. D. Sandru. 2013. Dairy cows welfare quality in tie-stall housing system with or without access to exercise. Acta Vet. Scand. 55:1089-1091.

Regula, G., J. Danuser, B. Spycher, and B. Wechsler. 2004. Health and welfare of dairy cows in different husbandry systems in Switzerland. Prev. Vet. Med. 66:247-264.

Schütz, K. E., N. R. Cox, and L. R. Matthews. 2008. How important is shade to dairy cattle? Choice between shade or lying following different levels of lying deprivation. Appl. Anim. Behav. Sci. 114:307-318.

Schütz, K. E., A. R. Rogers, N. R. Cox, and C. B. Tucker. 2009. Dairy cows prefer shade that offers greater protection against solar radiation in summer: Shade use, behaviour, and body temperature. Appl. Anim. Behav. Sci. 116:28-34.

Stull, C. L., L. L. Messam, C. A. Collar, N. G. Peterson, A. R. Castillo, B. A. Reed, K. L. Andersen, and W. R. VerBoort. 2008. Precipitation and temperature effects on mortality and lactation parameters of dairy cattle in California. J. Dairy Sci. 91:4579-4591.

Tucker, C. B., D. M. Weary, and D. Fraser. 2003. Effects of three types of free-stall surfaces on preferences and stall usage by dairy cows. J. Dairy Sci. 86:521-529.

Vandenheede, M., B. Nicks, R. Shehi, B. Canart, I. Dufrasne, R. Biston, and P. Lecomte. 1995. Use of a shelter by grazing fattening bulls: Effect of climatic factors. Anim Sci 60:81-85.

Veissier, I., S. Andanson, H. Dubroeucq, and D. Pomies. 2008. The motivation of cows to walk as thwarted by tethering. J. Anim. Sci. 86:2723-2729.

West, J. W. 2003. Effects of heat-stress on production in dairy cattle. J. Dairy Sci. 86:2131-2144.

Wheelock, J. B., R. P. Rhoads, M. J. VanBaale, S. R. Sanders, and L. H. Baumgard. 2010. Effects of heat stress on energetic metabolism in lactating Holstein cows. J. Dairy Sci. 93:644-655.

Zaffino Heyerhoff, J. C., S. J. LeBlanc, T. J. DeVries, C. G. R. Nash, J. Gibbons, K. Orsel, H. W. Barkema, L. Solano, J. Rushen, A. M. de Passillé, and D. B. Haley. 2014. Prevalence of and factors associated with hock, knee, and neck injuries on dairy cows in freestall housing in Canada. J. Dairy Sci. 97:173-184.

Zurbrigg, K., D. Kelton, N. Anderson, and S. Millman. 2005b. Tie-stall design and its relationship to lameness, injury, and cleanliness on 317 Ontario dairy farms. J. Dairy Sci. 88:3201-3210.

I. Lactating Cows Animal Based Welfare Measures

I1. Body Condition

(a) Emaciated cows; as defined by a saw-toothed spine, prominent ribs, hooks and pins (illustrated in Appendix A5), should not be present in the lactating herd and if so noted there should be records providing evidence of ongoing diagnosis and treatment.

Scientific evidence Body weight alone is not a good indicator of body reserves, as cattle of a specific weight may vary in terms of height and fat covering (Roche et al., 2004). The scale used to measure BCS in cows differs between countries, but low values always reflect emaciation and high values reflect obesity (Roche et al., 2004). In the United States BCS is most often evaluated using a 5-point scale where 1 and 2 reflect emaciation and 4 and 5 reflect obesity (Edmonson et al., 1989). Roche et al., (2009) conclude that thin cows are at risk for succumbing to lameness, dystocia and ill health. Work on sheep provides some evidence that emaciation can induce hunger. Verbeek et al., (2012) reported that ewes with a low BCS (=2) were prepared to work harder for access to food compared to ewes of higher BCS (3 or 4).

Given that emaciated animals are particularly susceptible to cold stress and likely hunger, and are at greater risk for disease, we assume that there are important benefits of preventing emaciation in all classes of dairy cattle (calves, heifers and adult cows).

Expert perspective and consensus among professionals The NFACC (2009) Code of Practice for the Care and Handling of Dairy Cattle, in regards to BCS, states that animals with a body condition score indicating emaciation (as defined by Dairy Well to be saw toothed spine, prominent ribs, hooks and pins) must not be transported. The OIE (2015) Terrestrial Animal Health Standards for Dairy Cattle, including lactating and non-lactating states that: 1) "…body condition score outside an acceptable range… may be [an] indicator of compromised welfare."

Evaluation - Evaluate body condition using the cow body condition score card (Appendix A5) and the appropriate sample methodology for the number of cows in the pen/group being scored.

I1a. Count and record the number and percent of emaciated cows. The hospital/sick or lame pens will also be evaluated for the presence of emaciated cows and to document if they are receiving treatment. Record separately, both the percent total of emaciated cows in the scored lactating pen and sick pen. Mark yes if there were no emaciated cows.

I1b. If emaciated cows are noted, treatment records will be checked to confirm the cow(s) are receiving treatment. Mark yes if all emaciated cows were receiving treatment. Mark N/A if there were no emaciated cow on the day of the audit.

References

Edmonson, A. J., I. J. Lean, L. D. Weaver, T. Farver, and G. Webster. 1989. A body condition scoring chart for Holstein Dairy Cows. J. Dairy Sci. 72:68-78.

National Farm Animal Care Council. 2009. Code of Practice for the Care and Handling of Dairy Cattle, Copyright held jointly by Dairy Farmers of Canada and the National Farm Animal Care Council.

OIE. 2015. Chapter 7.11. Animal Weflare and Dairy Cattle Production Systems. World Organization for Animal Health. Terrestrial Animal Health Code, Volume 1, General Provisions. 24th Edition. pp 399-411.

Roche, J. R. Roche , N. C. Friggens , J. K. Kay , M. W. Fisher , K. J. Stafford , and D. P. Berry. 2009. Invited review: Body condition score and its association with dairy cow productivity, health, and welfare. J. Dairy Sci. 92:5769-5801.

Roche, J. R., P. G. Dillon, C. R. Stockdale, L. H. Baumgard, and M. J. VanBaale. 2004. Relationships among international body condition scoring systems. J. Dairy Sci. 87:3076-3079.

Verbeek, E., J.R. Waasa, M.H. Oliver, L.M. McLeay, D.M. Fergusond, L.R. Matthews. 2012. Motivation to obtain a food reward of pregnant ewes in negative energy balance: Behavioural, metabolic and endocrine considerations. Horm. Behav. 62:162-172.

I2. Locomotion – See Appendix A8 for descriptions of locomotion scoring.

(a) Lame – No more than 15 % of the scored lactating cows should be “lame”

(b) Severely Lame – No more than 1% of the scored lactating cows should be “severely lame”
(i) Severely lame cows should be kept separate from the lactating group and be receiving treatment. Treatment will be verified by comparing current treatment records with cows currently identified as severely lame.

(c). Locomotion Performance Benchmark: The timing of a follow-up audit to confirm that corrective actions have been implemented and to evaluate progress will be determined based on the poorest performing outcome benchmark across locomotion and hocks.

Locomotion Performance Benchmark:

Top 76-100% (≤15% moderate lameness, ≤1% severe lameness)	**Follow up audit in 24-30 months**
Middle 26-75% (16-32% moderate lameness, 2-5 % severe lameness)	**Follow up audit in 12-16 months**
Bottom 25% (>32% moderate lameness, >5% severe lameness)	**Follow up audit in 6-9 months**

Scientific evidence -The worldwide prevalence of lameness (cows showing noticeable weight transfer off the affected limb) in dairy herds is ~ 25% across studies based in Austria, Canada, China, Finland, Germany, Italy, Netherlands, New Zealand, Norway, UK and the US (eg. Amory et al., 2006; Barker et al., 2010; Chapinal et al., 2014; Dippel et al., 2009; Fabian et al., 2014; Kielland et al., 2009; Popescu et al., 2014; Sarjokari et al., 2013; von Keyserlingk et al. 2012), with a trend toward lower prevalence in grazing systems (e.g. 8%, New Zealand; Fabian et al. 2014), and a higher prevalence in confinement housed freestall herds.

Dairy producers tend to underestimate the amount of lameness in their herds (Espejo et al, 2006; Fabian et al., 2014), and it is clear from recent reports in the US that interventions to reduce the risk for lameness are lagging (e.g. von Keyserlingk et al. 2012). However, there exists enormous variation between and within countries and production systems, suggesting that lameness is not an inevitable consequence of current dairy management and housing practices.

By setting goals that match the achievable levels of lameness observed in the upper quartile of dairy herds, and using the degree of non-conformance to determine the interval between re-evaluations, it is hoped that Dairy Well locomotion assessments will drive the motivation required to substantially reduce lameness risk in our dairy industry.

Benchmarks were set based on review of the available peer reviewed literature since 2003 summarized in Table 3, and access to individual herd data from recent surveys of US dairy herds (von Keyserlingk et al., 2012; Cook et al., 2016). The cut-points will be evaluated and adjustments incorporated every three years when the audit is updated taking into consideration new published literature.

Expert perspective and consensus among professionals Lameness – an abnormal gait caused by a painful lesion to one or more limbs – is a serious, debilitating condition affecting dairy cattle, which impacts an individual cow's ability to eat, rest, milk, reproduce and survive in the herd. It is a painful condition causing obvious suffering during life, and creates significant challenges for the humane handling of cattle at slaughter.

Table 3. Estimates of lameness and severe lameness in peer reviewed studies worldwide since 2003 (Cook, in press)

First Author	*Date*	*Reference*	*Country*	*# herds*	*Mean Lameness %*	*Range Lameness %*	*Mean Severe Lameness %*	*Range Severe Lameness %*
Barberg	2007	JDS 90:1575-1583	USA (MN)	12	7.8	0 to 22.4		
Richert	2013	JDS 96:5018-5026	USA (NY, OR, WI)	282	8	0 to 54		
Fabian	2014	VetJ 201:31-38	NZ	59	8.3	1.2 to 36	1.8	0 to 20.2
Cook	2016	JDS 99:5879-5891	USA (WI)	66	13.2	2.8 to 36.1	2.5	0 to 15.7
Westin	2016	JDS 99:3732-3743	Canada and US	36	15	2.5 to 46	4	
Amory	2006	JDS 89:1509-1515	Netherlands	19	16.5	3.8 to 30.8		
Kielland	2009	JDS 92:5487-5496	Norway	232	16.9		4.7	
Husfeldt	2012	JDS 95:5626-5075	USA (MN)	34	17.1		4.8	
Rutherford	2009	VetJ 180:95-105	UK	80	17.2			
Popescu	2013	Acta Vet Scand 2013, 55:43	Romania	80	19			
Solano	2015	JDS 98:6978-6991	Canada	141	20.8	0 to 69		
Cook	2003	JAVMA 223:1324-1328	USA (WI)	30	22.5	7.3 to 51.9	3.1	0 to 16.7
Sarjokari	2013	Live Sci 156:44-52	Finland	87	23		6	
Nash	2016	JDS 99:6494-6506	Canada	100	24			
Huxley	2004	Vet Rec 155:237-239	UK	15	24.2	6.8 to 55.6		
Espejo	2006	JDS 89:3052-3058	USA (MN)	50	24.6	2 to 62	6.1	0 to 20.6
King	2016	JDS 99:9069-9079	Canada	41	26.2	2.5 to 57.5	2.2	0 to 12.2
Popescu	2014	Italian J An Sci 13:2940	Italy	60	26.7			
von Keyserlingk	2012	JDS 95:7399-7408	Canada	42	27.9		7.1	
von Keyserlingk	2012	JDS 95:7399-7408	USA (CA)	39	30.8		3.6	
Dippel	2009	PrevVetMed 90:102-112	Austria	30	31		12	
Chapinal	2014	JDS 97:4309-4316	China	34	31	7 to 51	10	0 to 27
Dippel	2009	JDS 92:5476-5486	Germany/Austria	103	33	0 to 81	16	
Barker	2010	JDS 93:932-941	UK	205	36.8	0 to 79	5.3	0 to 31.2
von Keyserlingk	2012	JDS 95:7399-7408	USA (NY, PA)	40	54.8		8.2	

While score 2 and 3 cows will be recorded where possible, it is understood that scoring is difficult to achieve in tie-stalls as evaluating locomotion in a standing position has proven to be inadequate. Therefore, in situations where cows are not released from their stalls the locomotion evaluation will be judged on severely lame cow thresholds alone. Where cows in tie-stalls are released daily, locomotion scores will be observed after milking when cows are released from the barn.

Evaluation – Evaluate locomotion using the locomotion score card (Appendix A8) and the appropriate sample methodology for the number of lactating cows in the pen/group being scored. The hospital/sick or lame cow pens will also be evaluated to ensure that severely lame cows are receiving treatment and have not become emaciated. Record the total percent of cows scoring a 2 and 3 separately. The hospital/sick cow pen will be scored as well, the total percent recorded separately.

I2a. Moderate Lameness -Record the % of cows with a locomotion score of 2 (moderately lame) Mark yes if ≤15% of the cows score a 2

I2b. Severe Lameness - Record the % of cows with a locomotion score of 3 (severely lame). Mark yes if ≤1% of the cows score a 3.
I2b.i – Mark yes if severely lame cows are kept separate from the lactating group and are receiving treatment as verified by treatment records. If severely lame cows are not removed from the milking string for treatment, this is a non-conformance.

I2c. Lameness Benchmark - Mark the appropriate quartile benchmark by selecting the poorest performing outcome between moderate and severe lameness.

References

Amory, J. R., P. Kloosterman, Z. E. Barker, J. L. Wright, R. W. Blowey, and L. E. Green. 2006. Risk factors for reduced locomotion in dairy cattle on nineteen farms in The Netherlands. J. Dairy Sci. 89:1509-1515.

Barker, Z. E., K. A. Leach, H. R. Whay, N. J. Bell, and D. C. J. Main. 2010. Assessment of lameness prevalence and associated risk factors in dairy herds in England and Wales. J. Dairy Sci. 93:932-941.

Chapinal, N., Y. Liang, D. M. Weary, Y. Wang, and M. A. G. von Keyserlingk. 2014. Risk factors for lameness and hock injuries in Holstein herds in China. J. Dairy Sci. 97:4309-4316.

Cook, NB. In press. A comparison of measurable objective outcomes used to assess cattle welfare. In Advances in Cattle Welfare, Tucker, CB (ed). Elsevier. Amsterdam, Netherlands

Dippel, S., M. Dolezal., C. Brenninkmeyer, J. Brinkmann, S. March, U. Knierim, and C. Winckler. 2009. Risk factors for lameness in freestall-housed dairy cows across two breeds, farming systems, and countries. J. Dairy Sci. 92:5476-5486.

Espejo, L. A., M. I. Endres, and J. A. Salfer. 2006. Prevalence of lameness in high-producing Holstein cows housed in freestall barns in Minnesota. J. Dairy Sci. 89:3052-3058.

Fabian, J., R. A. laven, and H. R. Whay. 2014. The prevalence of lameness on New Zealand dairy farms: A comparison of farmer estimate and locomotion scoring. Vet J. 201:31-38.

Kielland, C., L. E. Ruud, A. J. Zanella, and O. Osteras. 2009. Prevalence and risk factors for skin lesions on legs of dairy cattle housed in freestalls in Norway. J. Dairy Sci. 92:5487-5496.

Popescu, S., C. Borda, E. A. Diugan, M. Niculae, R. Stefan and C. D. Sandru. 2014. The effect of the housing system on the welfare quality of dairy cows. Italian J. of Anim. Sci. 13:2940.

Sarjokari, K., K. O. Kaustell, T. Hurme, T. Kivinen, O. A. T. Peltoniemi, H. Saloniemi, and P. J. Rajala-Schultz. 2013. Prevalence and risk factors for lameness in insulated freestall barns in Finland. Liv. Sci. 156:44-52.

von Keyserlingk, M. A. G., A. Barrientos, K. Ito, E. Galo, and D. M. Weary. 2012. Benchmarking cow comfort on North American freestall dairies: Lameness, leg injuries, lying time, facility design, and management for high-producing Holstein dairy cows. J. Dairy Sci. 95:7399–7408.

I3. Injuries – will be evaluated using the scores described in appendix A.

(a) Hocks (Appendix A7)**:** No more than 1% of lactating cows should have severe hock lesions

(b) Severe Hock Performance Benchmark: The timing of a follow-up audit to confirm that corrective actions have been implemented and to evaluate progress will be determined based on the poorest performing outcome benchmark across locomotion and hocks.

Severe Hock Performance Benchmark:

Top 76-100% (≤1% severe hocks)	**Follow up audit in 24-30 months**
Middle 26-75% (2-7% severe hocks)	**Follow up audit in 12-16 months**
Bottom 25% (>7% severe hocks)	**Follow up audit in 6-9 months**

(c) Knees (Appendix A10): No more than 1% of lactating cows should have severe knee scores

(d) Neck & Other Injuries (Appendix A6): No more than 2% of lactating cows should have severe neck injuries.

(e) Tail (Appendix A9): 0% of the lactating cows should have tail injuries

Scientific evidence

Hock injuries

There is considerable variation in the degree of hock injuries reported for dairy cattle worldwide and the available data are summarized in Table 4. The range between herds is 0 to 100% with an overall mean ~ 54%.

Table 4. Summary of hock injuries in peer reviewed studies worldwide since 2000 (Cook, in press)

First Author	*Date*	*Journal Reference*	*Country*	*# herds*	*All lesions (hair loss and abrasion/swelling) %*	*All lesion range*	*Severe lesions (abrasion/swelling) %*	*Severe range*
Lombard	2010	JDS 93:4668-4676	USA	297	23.5		3.4	
Barberg	2007	JDS 90:1575-1583	USA (MN)	12	25.1	2 to 43.9	1	0 to 3.3
Chapinal	2014	JDS 97:4309-4316	China	34	40	6 to 95	5	0 to 50
Potterton	2011	JDS 94:2952-2963	UK	63	40.1		9.2 ulcer 25.3 swelling	
von Keyserlingk	2012	JDS 95:7399-7408	Canada	42	42.3		3.7	
Brenninkmeyer	2013	PrevVetMed 109:236-245	Germany/Austria	105	50	0 to 100		
Cook	2016	JDS 99:5879-5891	USA (WI)	66	50.3	3.7 to 97.2	12.2	0 to 80.9
von Keyserlingk	2013	JDS 95:7399-7409	USA (CA)	39	56.2		1.8	
Kielland	2009	JDS 92:5487-5496	Norway	232	60.5		7.1	
Zaffino-Heyerhoff	2014	JDS 97:173-184	Canada	87	62		47	
Nash	2016	JDS 99:6494-6506	Canada	100	72		52	
Weary	2000	JDS 83:697-702	Canada	20	72.6			
Huxley	2004	Vet Rec 155:237-239	UK	15	78.6	0 to 90	58.3	0 to 100
von Keyserlingk	2014	JDS 95:7399-7410	USA (NY, PA)	40	81.2		5.4	
Rutherford	2008	JDS 91:2265-2274	UK	80	37.2 to 49.6		6.5	
Zurbrigg	2005	JDS 88:3201-3210	Canada	317	Not reported		Not reported	

Hock injuries are multifactorial, but the most common risk factor is the hardness or abrasiveness of the lying surface. Hock injuries have received more attention than alterations on other parts of the body, and there is no consistent scoring system used. Many scoring systems treat hock injuries as a progression: hairless patch to hairless patch and/or swelling or ulceration. However, little work has evaluated if etiology progresses in this manner, nor what the effect of scoring system has on estimates of prevalence. For example, the size of the hairless patch is often scored with a threshold (10 and 25 mm are most common), but no work has determined the biological importance of these injuries (nor these thresholds) to the animals. As a result, while mild hock injuries provide valuable information about the quality of the lying surface, because of difficulty setting a benchmark with the available information, we have opted to emphasize severe injury, involving swelling and/or ulceration in the timeline for re-evaluation and continuous improvement. There are reports of dramatic improvements in hock injuries corresponding with benchmarking exercises on commercial dairies (Chapinal et al., 2014).

Benchmarks were set based on review of the available peer reviewed literature since 2000 summarized in Table 3, and access to individual herd data from recent surveys of US dairy herds (von Keyserlingk et al., 2012; Cook et al., 2016). The cut-points will be evaluated and adjustments incorporated every three years when the audit is updated taking into consideration new published literature.

Knee injuries

Knee injuries, such as hair loss and swelling, are more pronounced when cows are kept on hard or abrasive surfaces (Rushen et al., 2007, Zaffino Heyerhoff et al., 2014). Straw yards have fewer knee injuries than freestalls (Haskell et al., 2006) and they are anecdotally less common on farms that use less abrasive sand bedding (Fulwider et al., 2007). Knee injuries are also more common on farms where cows have been observed slipping or falling when moved to milking compared to farms where no slipping was observed (Zaffino Heyerhoff et al., 2014). Similarly, knee injuries are less likely to be seen on farms with rubber in front of the feed bunk, compared to those with bare concrete floors (Zaffino Heyerhoff et al., 2014).

There is considerable variation in the degree of knee injuries reported for dairy cattle worldwide and the available data are summarized in Table 5.

Table 5. Knee injuries in dairy cattle in peer reviewed studies since 2004. (Cook, in press)

First Author	*Date*	*Journal Reference*	*Country*	*# herds*	*All lesions (hairloss and abrasion/swelling) %*	*All Lesion Range*	*Severe lesions (abrasion/swelling) %*	*Severe range*
Kielland	2009	JDS 92:5487-5496	Norway	232	35.3		6	
Zaffino-Heyerhoff	2014	JDS 97:173-184	Canada	87	37		24	
Huxley	2004	Vet Rec 155:237-239	UK	15	50	0 to 83.3		
Cook	2016	JDS 99:5879-5891	USA (WI)	66	53	7.0 to 100.0	6.2	0 to 35.1
Nash	2016	JDS 99:6494-6506	Canada	100	65		43	
von Keyserlingk	2012	JDS 95:7399-7408	USA (CA)	39			0.3	
von Keyserlingk	2013	JDS 95:7399-7409	USA (NY, PA)	40			23.1	

Benchmarks were set based on review of the available peer reviewed literature since 2004 summarized in Table 4, and access to individual herd data from recent surveys of US dairy herds (von Keyserlingk et al., 2012; Cook et al., 2016). The cut-points will be evaluated and adjustments incorporated every three years when the audit is updated taking into consideration new published literature.

Neck Injuries and other parts of the body

Injuries occur on other parts of the body, most commonly on the neck. Feed rail height is a risk factor for neck injuries (Zurbrigg et al., 2005b, Kielland et al., 2010, Zaffino Heyerhoff et al., 2014).

In general, farms with lower rails have higher odds of being affected, compared to farms with higher feed rails. This pattern is most evident in herds with 1) post-and-rail systems and 2) taller cows (Kielland et al., 2010). Cows kept on farms with functional cow trainers also have a higher risk of soft tissue injury, most commonly on the trunk (Busato et al., 2000). The '≤ 2% with severe neck, and "other injury" goal is based on the top 25% of Wisconsin free-stall farms reported in Cook et al. (2016).

Prevalence information for neck injuries reported in the literature:

- 1.3% hair loss, swollen or broken skin (Busato et al., 2000)
- 3.8% hair loss, broken skin or scabs (Zurbrigg et al., 2005a)
- 6% swollen (Kielland et al., 2010)
- 6.6 % hair loss, 2% swollen or ulcerated (Cook et al., 2016)
- 9% (Zaffino Heyerhoff et al., 2014)
- 15% hair loss (Kielland et al., 2010)
- 50% median value includes 'mild to severe' injury (median, mild to severe) (Huxley et al., 2004)

Trunk injuries reported in the literature:

- 6.5% (Busato et al., 2000)

Ribs and back injuries reported in the literature:

- 20% median value includes 'mild to severe' injury (median, mild to severe) (Huxley et al., 2004)

Back, hook or pin injury reported in the literature:

- 3.6% (Cook et al., 2016)

Broken Tails

Broken tails are a potential sign of poor stockmanship and rough handling. Zurbrigg et al. (2005a) reported a prevalence of 3.3% of cattle in tie-stall farms. Tails can be broken through interaction with the environment, by being stepped on by other cows, or through rough handling.

Expert perspective and consensus among professionals

Injuries are undesirable and are thought to be painful for cows. It is common to include injury assessment in welfare programs, as in the NMPF (2016) Dairy F.A.R.M. program (hocks and knees) and in the European-wide Welfare Quality (injuries on the entire body). The NMPF (2016) states that broken tails are a sign of inhumane handling.

Evaluation - Evaluate injuries using the appropriate sample methodology for the number of cows in the pen/group being scored. [See Appendix A for score descriptions]. The final number for each outcome will be the total % out of the total number of cows in the scored lactating pen.

I3a. i. Moderate Hock Lesions – Count and record the percent of cows with moderate (score=2) hock lesions.

I3a. ii. Severe Hock Lesions – Count and record the percent of cows with severe (score=3) hock lesions.

I2b. Severe Hock Benchmark - Mark the appropriate quartile benchmark for the percent of severe hocks.

I3c. i. Moderate Knee Lesions - Moderate knee lesions will not be scored during audits as it is typically not possible to visualize the front of the knee to allow proper evaluation.

I3c. ii. Severe Knee Lesions - Count and record the percent of cows with severe (score=3) knee lesions. Mark yes if the percent of severe knee lesions is ≤1%.

I3d. i. Moderate Neck & Other Injuries - Count and record the percent of cows with moderate (score=2) injuries.

I3d. ii. Severe Neck & Other Injuries - Count and record the percent of cows with severe (score=3) injuries. Mark yes if is ≤2%.

I3e.Tails - Count and record the percent of cows with broken tails. Mark yes if there were no observed broken tails. If this evaluation is done as a follow-up having confirmed broken tails previously look for evidence of new/recently broken tails.

References

Busato, A., P. Trachsel, and J. W. Blum. 2000. Frequency of traumatic cow injuries in relation to housing systems in Swiss organic dairy herds. J. Vet. Med. A. Physiol. Pathol. Clin. Med. 47:221-229.

Chapinal, N., D. M. Weary, L. Collings, and M. A. G. von Keyserlingk. 2014. Lameness and hock injuries improve on farms participating in an assessment program. Vet. J. 202:646-648.Cook, N.B., Hess, J.P., Foy, M.R., Bennett, T.B., and R. L. Brotzman. 2016. Management characteristics, lameness and body

injuries of dairy cattle housed in high performance dairy herds in Wisconsin. J. Dairy Sci. 99: 5879-5891.

Cook, NB. In press. A comparison of measurable objective outcomes used to assess cattle welfare. In Advances in Cattle Welfare, Tucker, CB (ed). Elsevier. Amsterdam, Netherlands

Fuldwider, W. K., T. Grandin, D. J. Garrick, T. E. Engle, W. D. Lamm, N. L. Dalsted, and B. E. Rollin. 2007. Influence of free-stall base on tarsal join lesions and hygiene in dairy cows. J. Dairy Sci. 90:3559-3566.

Haskell, M. J., L. J. Rennie, V. A. Bowell, M. J. Bell, and A. B. Lawrence. 2006. Housing system, milk production, and zero-grazing effects on lameness and leg injury in dairy cows. J. Dairy Sci. 89:4259-4266.

Huxley, J. N., J. Burke, S. Roderick, D. C. J. Main, and H. R. Whay. 2004. Animal welfare assessment benchmarking as a tool for health and welfare planning in organic dairy herds. Vet. Rec. 155:237-239.

Kester, E., M. Holzhauer, and K. Frankena. 2014. A descriptive review of the prevalence and risk factors of hock lesions in dairy cows. Vet. J. 202:222-228.

Kielland, C., K. E. Boe, A. J. Zanella, and O. Osteras. 2010. Risk factors for skin lesions on the necks of Norwegian dairy cows. J. Dairy Sci. 93:3979-3989.

Kielland, C., L. E. Ruud, A. J. Zanella, and O. Østerås. 2009. Prevalence and risk factors for skin lesions on legs of dairy cattle housed in freestalls in Norway. J. Dairy Sci. 92:5487-5496.

Rushen, J., D. Haley, and A. M. de Passillé. 2007. Effect of softer flooring in tie stalls on resting behavior and leg injuries of lactating cows. J. Dairy Sci. 90:3647-3651.

von Keyserlingk, M.A.G., A. Barrientos, K. Ito, E. Galo, and D.M. Weary. 2012. Benchmarking cow comfort on North American freestall dairies: Lameness, leg injuries, lying time, facility design, and management for high-producing Holstein dairy cows. J. Dairy Sci. 95:7399–7408.

Zaffino Heyerhoff, J. C., S. J. LeBlanc, T. J. Devries, C. G. R. Nash, J. Gibbons, K. Orsel, H. W. Barkema, L. Solano, J. Rushen, A. M. de Passillé, and D. B. Haley. 2014. Prevalence of and factors associated with hock, knee, and neck injuries on dairy cows in freestall housing in Canada. J. Dairy Sci. 97:173-184.

Zurbrigg, K., D. Kelton, N. Anderson, and S. Millman. 2005a. Stall dimensions and the prevalence of lameness, injury, and cleanliness on 317 tie-stall dairy farms in Ontario. Can. Vet. J. 46:902-909.

Zurbrigg, K., D. Kelton, N. Anderson, and S. Millman. 2005b. Tie-stall design and its relationship to lameness, injury, and cleanliness on 317 Ontario dairy farms. J. Dairy Sci. 88:3201-3210.

J. SICK COWS Resource Based - General Housing/Facility Design & Management:

J1. Environment - Facilities should be designed and maintained to provide and promote animal health and welfare, reduce risk of injury and provide protection from extreme weather.

(a) Housing - There should be a dedicated pen, exclusively for cows that are sick. Cows should be provided a soft and dry resting area designed to limit injury. The “dryness” of the resting areas is evaluated using the hygiene score card. The “softness” of the resting area is evaluated in animal based measures using hock scores.

(b) Shade - Overhead shade should be provided for protection from heat stress.

(c) Protection from inclement weather - Additional protection from inclement weather should be provided. Such provision may be in the form of one or more of the following: overhead shade at the feed bunk, fans, soakers, wind breaks or other.

(d) Lying Space - Bedded area should provide 100 sq. ft. /cow (9.2 m^2/cow) or one stall per cow. Space allocation for bedded areas has received little attention in adult dairy cows.

(e) Bunk Space - Feeding area should provide 30" (75cm) of accessible bunk space per cow.

(f) Water Cleanliness – All sick cows/calves should have access to clean, fresh water free from gross contamination including feed, algae or feces.

Scientific evidence

a) **Housing.** Cows will seek isolation (e.g. lying in a corner of covered pen) if given the opportunity when ill (Proudfoot et al., 2014). In addition to their motivation to avoid other cows during this vulnerable time, dedicated sick pens provide the opportunity for caregivers to frequently monitor at-risk animals and those undergoing treatment. See Section H for justification of hygiene.

b) **Shade** – See Section H for justification

c) **Protection from inclement weather** – See Section H for justification

d) **Lying Space -** Space allocation for bedded areas has received little attention in adult dairy cows. Lying times on rubber mats are highest (13.8 h/24 h) and lowest at 113 sq. ft. (10.5 m^2) and 32 sq. ft. (3.0 m^2), respectively; intermediate stocking densities also result in an intermediate amount of rest (Schütz et al., 2015). Aggressive behavior and interruptions of lying behavior decline when more space is provided, particularly once each cow has 65 sq. ft. (6.0 m^2) (Schütz et al., 2015). Experimental studies show that providing 1 stall/cow allows higher lying times and less competition than overstocking (e.g. Winckler et al., 2015).

e) **Bunk Space/Feeding Area-** Reducing the space available for cows to eat increases competition (Mentink and Cook, 2006; Huzzey et al., 2006). For example, DeVries et al. (2004) showed that doubling feeding space from 0.5 m to 1.0 m per cow reduced by half the number of aggressive interactions while feeding; and these effects were greatest for subordinate cows. During peak feeding times sick cows spend less time eating than do cows that are healthy (Huzzey et al., 2007; Goldhawk et al., 2009). Providing a head lock feed barrier mitigates the effects of aggression, particularly for subordinate cows (Huzzey et al., 2006).

f) **Water Cleanliness -** See section A1.

Expert perspective and consensus among professionals Segregating sick animals is recommended by the NFACC (2009) Canadian Code of Practice for the Care and Handling of Dairy Cattle. The Danish Agricultural Advisory Center recommends 6.5 m^2/cow in bedded areas for large breeds (8.5 m2/cow total, Anonymous, 2001). The NMPF (2016) recommends 90 to 120 ft^2/cow in the bedded area for large cows. The NFACC (2009) Code of Practice for

the Care and Handling of Dairy Cattle requires 120 ft^2 (11 m^2)/cow in bedded pack systems; they recommend 160 ft^2 (15 m^2) in maternity areas. The range of values reflects the lack of scientific study in this area; the requirement of this program is an informed guess that errs on the side of giving cows more space. Although there is no research that has directly identified the minimum amount of feed bunk space required per sick cow, general industry consensus is that 24" (60 cm) is the minimum required for each healthy cow; thus, this program requires 30" (76 cm) of feed bunk space per sick or compromised cow.

Public perspective US citizens, not involved in the dairy industry (n=491), participating in an online survey on dairy farming (Cardoso et al., 2016) showed concern for the health of cows, stating that cows must be healthy, without disease, and must receive veterinarian care. Some participants also commented on the facilities specifying that they should be good, safe and clean for the cows.

Evaluation - If there is a dedicated pen for sick or injured animals evaluate it for the following items. If there is no such pen, mark "No" for J1a.i and NA for the remainder of section J. Evaluate hygiene using the appropriate sample methodology for the number of cows in the pen/group being scored.

J1a.i. Dedicated Pen - Mark yes if there is a dedicated sick pen for sick or injured animals.

J1a.ii Hygiene – Count and record the percent of cows that score a 1 or 2. Mark yes if >75% of cows score a 1 or 2.

J1b. Shade – Evaluate the hospital pen for shade. Shade may include permanent shade structures, patches of trees or temporary cloth (raised seasonally). Rows of trees may be considered a wind break but not as shade. The area of shade provided will not be measured at this time. Mark yes if the hospital pen provides shade.

J1c. Additional Protection - Evaluate the hospital pen for additional protection. Mark yes is at least 1 additional protection is present for both heat and cold stress.

J1d. Lying Space – Measure the area provided for the hospital pen. Mark yes if the area provides at least 100 sq. ft per cow. (9.2m^2/cow).

J1e. Bunk Space/Feeding Area – Mark yes if the feeding area provides at least 30" (75 cm) of accessible bunk space per cow.

J1f. Water Cleanliness - If large troughs are used, the 'clean water sheet' (Appendix A1) must be easily read while submerged 6-10 inches below the water surface in three areas. All troughs in the sick pens scored will be checked. Individual water sources should be free from manure or other gross contamination. It is recognized that small amounts of grain or feed may be present as a result of cattle eating. Small amounts of feed, algae along the bottom or sides of troughs/waterers are acceptable. Algae floating on the surface, feces or large amounts of feed obstructing the entire surface of the water resource need to be addressed. All water troughs scored must be in acceptable condition to meet this criterion. Mark yes if ALL the troughs/buckets are clean.

References

Anonymous. 2001. Housing Design of Cattle - Danish Recommendations. 1438 The Danish Agricultural Advisory Center. Translated into English and issued in 2002.

Cardoso, C. S., M. J. Hötzel, D. M. Weary, J. A. Robbins, and M. A. G. von Keyserlingk. 2016. Imagining the ideal dairy farm. J. Dairy Sci. 99:1663-1671.

De Rensis, F. and R. J. Scaramuzzi. 2003. Heat stress and seasonal effects on reproduction in the dairy cow - a review. Theriogenology 60:1139-1151.

DeVries, T. J., M.A.G. von Keyserlingk and D.M. Weary. 2004. Effect of feeding space on the inter-cow distance, aggression, and feeding behavior of free-stall housed lactating dairy cows. J. Dairy Sci. 87: 1432-1438.

Goldhawk, C., N. Chapinal, N., D. M. Veira, D. M. Weary, M. A. G. and von Keyserlingk. 2009. Prepartum feeding behavior is an early indicator of subclinical ketosis. J. Dairy Sci. 92: 4971-4977.

Huzzey, J. M., T. J. DeVries, P. Valois, P. and M. A. G. von Keyserlingk. 2006. Stocking density and feed barrier design affect the feeding and social behavior of dairy cattle. J. Dairy Sci. 89:126-133.

Huzzey, J. M., D.M. Veira, D. M. Weary, and M. A. G. von Keyserlingk. 2007. Prepartum behavior and DMI identify dairy cows at risk for metritis. J. Dairy Sci. 90:3220-3233.

Mentink, R. L. and N.B. and Cook. 2006. Feed bunk utilization in dairy cows housed with either two or three rows of free stalls. J. Dairy Sci. 89: 134-138.

Proudfoot, K. L., M. B. Jensen, D. M. Weary, and M. A. G. von Keyserlingk. 2014. Dairy cows seek isolation at calving and when ill. J. Dairy Sci. 97:2731-2739.

Schütz, K. E., F. J. Huddart, M. A. Sutherland, M. Stewart, and N. R. Cox. 2015. Effects of space allowance on the behavior and physiology of cattle temporarily managed on rubber mats. J. Dairy Sci. 98:6226-6235.

Winckler, C., C. B. Tucker, and D. M. Weary. 2015. Effects of under- and overstocking freestalls on dairy cattle beahviour. Appl. Anim. Behav. Sci. 170:14-19.

K. Sick Cows Animal Based Welfare Measures: *(see Lactating cows section H and I for justification)*

K1. Body Condition – No emaciated (saw toothed spine, prominent ribs, hooks and pins) cows should be present without current records providing evidence of ongoing treatment.

K2. Lame Cow Care – The sick/hospital/special needs or lame pens will be evaluated to count lame cows and to ensure that severely lame cows are receiving treatment and have not become emaciated.

K3. Hocks and Knees & Injuries – Cows with severe lesions or injuries should be receiving treatment.

Evaluation – Evaluate locomotion, body condition and injuries using the appropriate sample methodology for the number of cows in the sick/hospital pen. It is recognized that some cows in this pen may not be able to be evaluated for locomotion if they are not willing (although able) to rise. The auditor should make a gentle attempt to make cows rise, but should not force any cow to get up. Data from sick/hospital pen scoring will be used to inform development of benchmarks in future revisions.

K1. Body Condition – Count the number of emaciated cows. Confirm that any emaciated cow in the pen is receiving treatment by examining current treatment records. Mark yes if emaciated cows are receiving treatment.

K2a. i. Moderately Lame – Count the number of cows with a locomotion score of 2 and record the percent based on the total number scored, not the total number in the pen.
K2a. ii. Severely Lame - Count the number of cows with a locomotion score of 3 and record the percent based on the total number scored, not the total number in the pen.

K2b. Care – Confirm that severely lame cows are receiving treatment by checking treatment records. Mark yes if severely lames cows are receiving treatment.

K3a. i. Moderate Hocks – Count and record the number of cows with moderate (score=2) hock lesions and record the percent based on the total number scored, not the total number in the pen.
K3a. ii. Severe Hocks – Count and record the number of cows with severe (score=3) hock lesions and record the percent based on the total number scored, not the total number in the pen.

K3b. i. Severe Knees - Count and record the number of cows with severe (score=3) knee lesions and record the percent based on the total number scored, not the total number in the pen.

K3c. i. Moderate Neck & Other Injuries- Count and record the number of cows with moderate (score=2) injuries and record the percent based on the total number scored, not the total number in the pen.

K3c. ii. Severe Neck & Other Injures - Count and record the number of cows with severe (score=3) injuries and record the percent based on the total number scored, not the total number in the pen.

K3d. Broken Tails - Count and record the number of cows with broken tails paying particular attention for evidence of newly broken tails.

L. DRY COWS – Resource Based - General Housing/Facility Design & Management *(see lactating cows section H and I for justification as dry cow needs are similar to lactating cows)*

L1. Environment - Facilities should be designed and maintained to provide and promote animal health and welfare, reduce risk of injury and provide protection from extreme weather.

(a) Housing - Cows should be provided a soft and dry resting area designed to limit injury. The "dryness" of the resting areas is evaluated using the hygiene score card. The "softness" of the resting area is evaluated in animal based measures using hock scores. At least 75% of cows should be reasonably clean on the upper leg and flank.

(b) Shade - Overhead shade should be present to provide protection from heat stress

(c) Protection - Additional protection from inclement weather should be provided. Such provision may be in the form of one or more of the following: overhead shade at the feed bunk, fans, soakers, wind breaks or other.

(d) Water Cleanliness – All dry cows should have access to clean, fresh water free from gross contamination including feed, algae or feces.

Evaluation - Evaluate hygiene using the appropriate sample methodology for the number of cows in the pen/group being scored.

L1a. Hygiene- –Using the hygiene score card descriptions (Appendix A3), mark yes if >75% of dry cows score a 1 or 2.

L1b. Shade – Evaluate all dry cow pens for shade. Shade may include permanent shade structures, patches of trees or temporary cloth (raised seasonally). Rows of trees may be considered a wind break but not as shade. The area of shade provided will not be measured at this time. Mark yes if ALL dry cows are provided shade.

L1c. Additional Protection-Evaluate all dry cow pens for additional protection. Mark yes is at least 1 additional protection is present for both heat and cold stress.

L1d. Water Cleanliness - If troughs are used, the 'clean water sheet' (Appendix A1) must be easily read while submerged 6-10 inches below the water surface in three areas. The troughs in the pens scored for hygiene will be evaluated. Individual water sources should be free from manure or other gross contamination. It is recognized that small amounts of grain or feed may be present as a result of cattle eating. Small amounts of feed, algae along the bottom or sides of troughs/waterers are acceptable. Algae floating on the surface, feces or large amounts of feed obstructing the entire surface of the water resource need to be addressed. All water troughs scored must be in acceptable condition to meet this criterion. Mark yes if ALL the troughs/buckets are clean.

M. Dry Cows Animal Based Welfare Measures: *(see Lactating cows section H and I for justification)*

M1. Hocks and Knees & Injuries– Cows with severe lesions or injuries should be receiving treatment. Results from dry cow evaluations will be used to inform future revisions of the Dairy Well audit program.

Evaluation – Evaluate injuries using the appropriate sample methodology for the number of cows in the pen/group being scored.

M3. Injuries -
M3a. i. Moderate Hocks –Count and record the number of cows with moderate (score=2) hock lesions and record the percent based on the total number scored, not the total number in the pen.

M3a. ii. Severe Hocks – Count and record the number of cows with severe (score=3) hock lesions and record the percent based on the total number scored, not the total number in the pen.

M3b. i. Severe Knees - Count and record the number of cows with severe (score=3) knee lesions and record the percent based on the total number scored, not the total number in the pen.

M3ci and ii. Neck and Other Injuries– Count and record the number of cows with neck and other injuries on any other part of their body (hips, flank, face etc.) and record the percent based on the total number scored, not the total number in the pen.

DAIRY WELL
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Appendix A

Score Cards

Water Trough Score Card 36

Hold 6-10” below the water surface 28

If you can read easily all of these directions 24

The trough cleanliness is acceptable 18

In large troughs select 3 separate/distinct areas to check. If all 3 are readable it is acceptable.

Water Trough Score Card 36

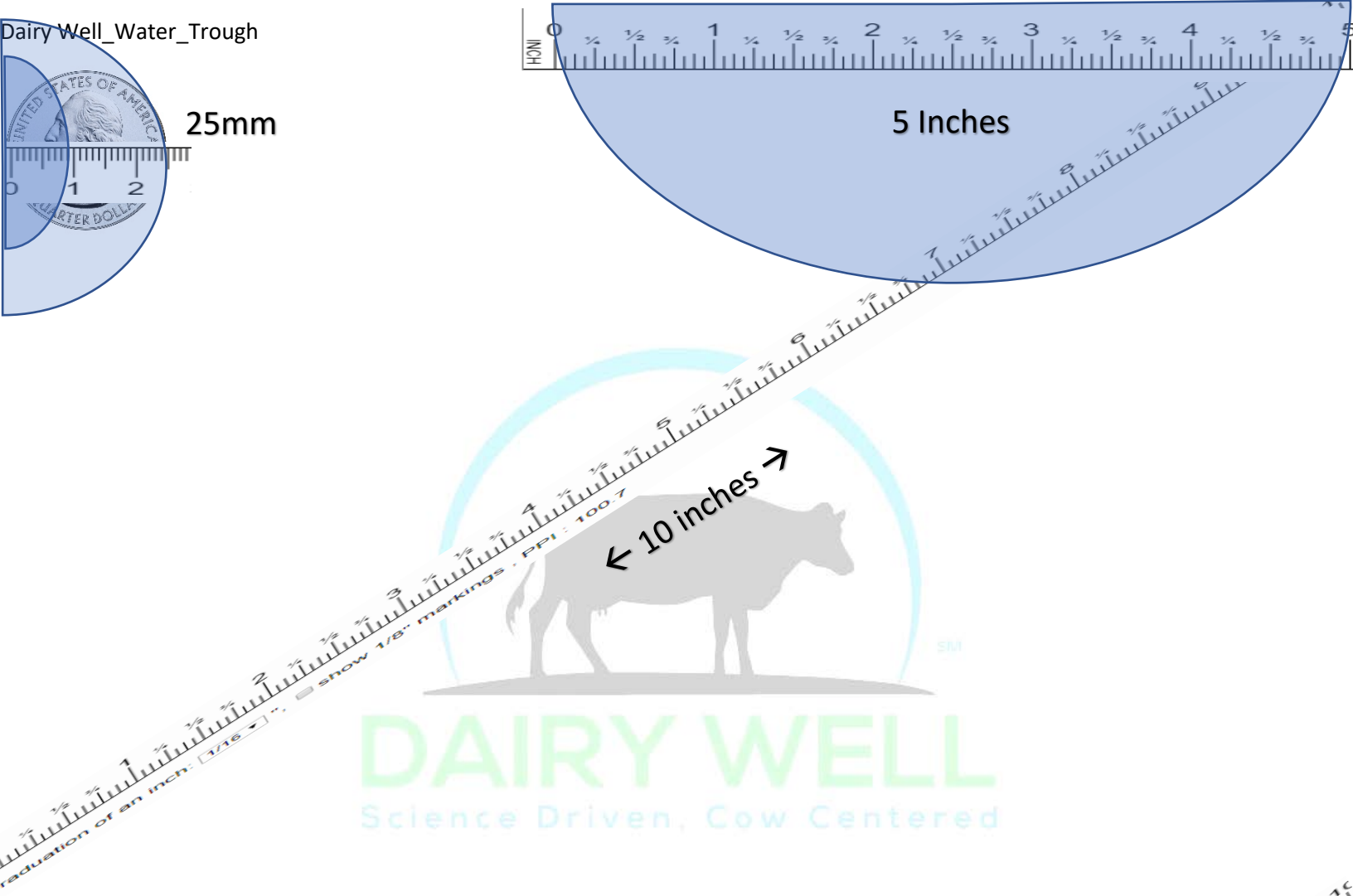
Hold 6-10” below the water surface 28

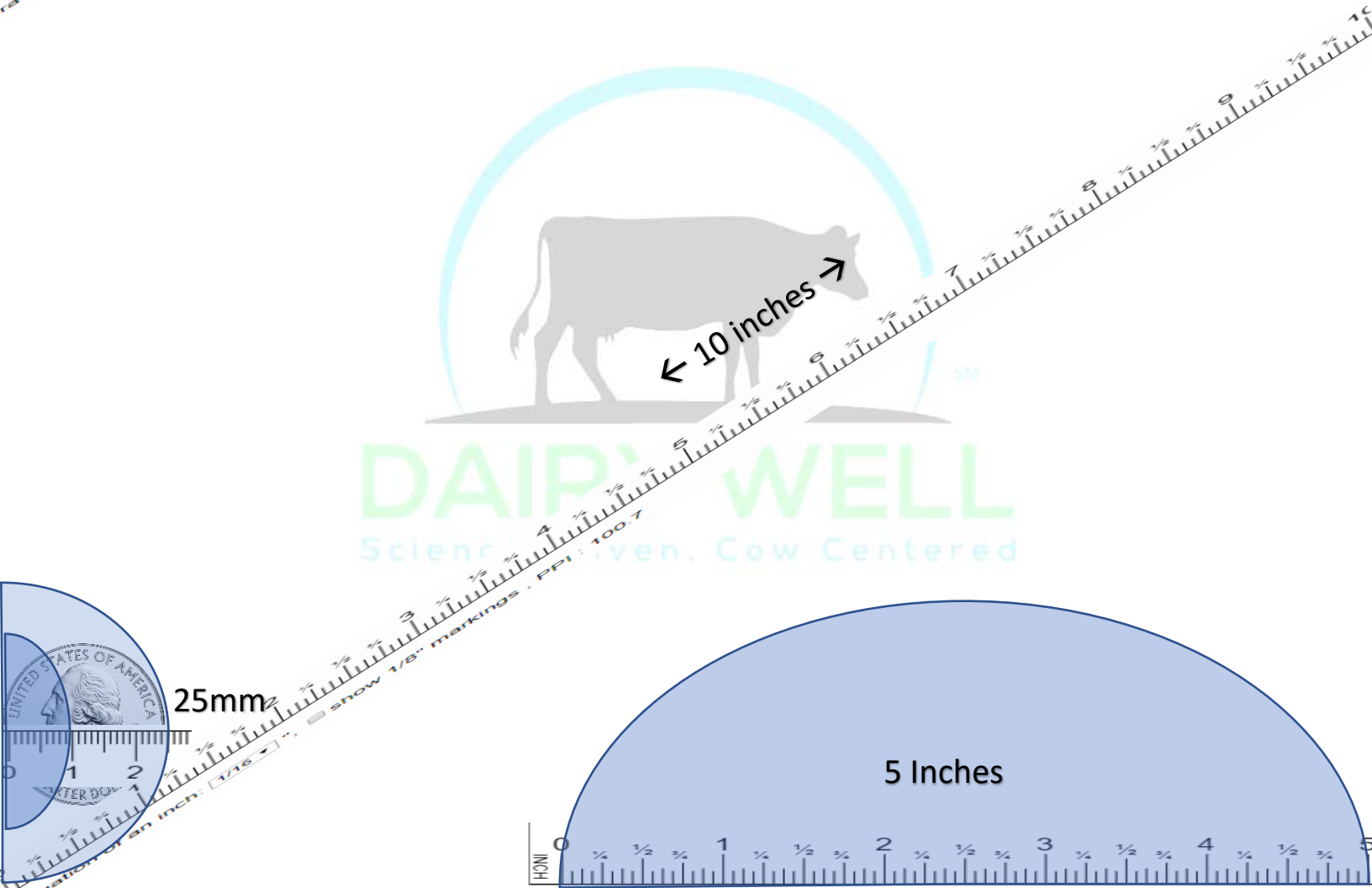
If you can read easily all of these directions 24

The trough cleanliness is acceptable 18

In large troughs select 3 separate/distinct areas to check. If all 3 are readable it is acceptable.

Dairy Well_Water_Trough





Performing the Skin Tent Test

Non-Ambulatory cows will be checked to see that they have been provided adequate food, water and shelter. Non-Ambulatory cows without sufficient access to water will become dehydrated. Hydration Status will be checked usuing the "Skin Tent" test. **This should only be done if safe and when cows can be approached without causing distress or struggling.**

Score Description

Step 1 - Pinch the skin of the neck, pulling up gently	
Step 2- Release the Skin.The skin of cows that are well hydrated will quickly return to a normal, smooth position on the neck once the pinch is released.	 **NORMAL Hydration**
The skin of cows that are dehydrated will remain pinched, raised or wrinkled after releasing the pinched skin. A fresh bucket of water may also be offered to the cow. When a cow consumes large amounts of water when presented it is indicative that the cow has not been provided sufficient access to water. **THIS IS A CRITICAL NON-CONFORMANCE**	 **DEHYDRATION**

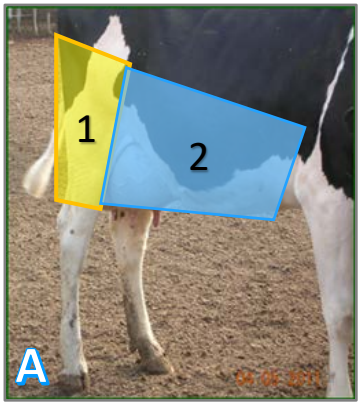
Hygiene Scoring

Hygiene scoring evaluates if cattle have a comfortable space to lay that is clean and dry. The areas of the body that contact the lying area will be evaluated and are divided into two areas: belly (including udder on mature cattle) and thigh (highlighted in figure "A"). The tail head, top-line and lower legs are not evaluated as part of lying space cleanliness. Using the sample guidelines score calves, heifers, lactating cows & dry cows and hospital pens. If both sides are visible, score the worst side.

Score Description

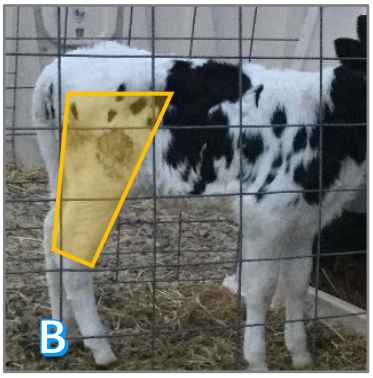
SCORE 1: Acceptable

Manure or mud (may be dried) on flank or hind leg is less than 10" (adults, heifers) or 5" (milk fed calves) in diameter.



A. Areas 1 and 2 to evaluate for hygiene

B. Single area of manure ≤5" in diameter (Note how all other contact areas are clean)



Score 1 : Acceptable Hygiene

SCORE 2: Moderate

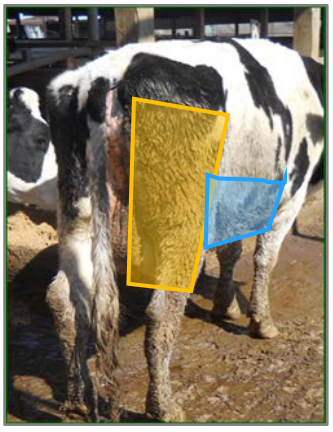
Area of manure/mud (may be dried) greater than 10" in diameter (adults, heifers) or 5" in diameter (calves) in 1 of 2 scored areas. Current hygiene goals are set for severe hygiene only. For future evaluation of hygiene metrics please record the occurrence of score 2's where possible making note if score 2's were not tracked specifically.

Score 2: Moderate Hygiene

SCORE 3: Poor

Area of mud or manure greater than 10" in diameter (adults, heifers), greater than 5" in diameter (calves) in 2 of 2 scored areas

In some pens it may not be possible to score animals effectively as individuals. In those cases, record an estimate of the number of cattle that score a 3.



Score 3: Poor Hygiene

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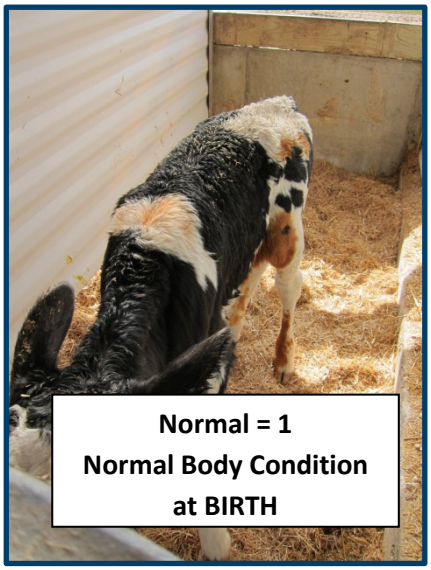
Evaluating Calf Body Condition

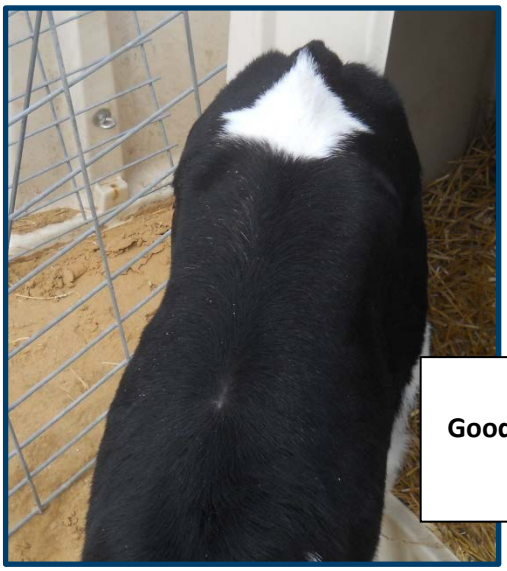
Examples of Good Body Condition at various ages



Normal = 1
Normal Body Condition at BIRTH

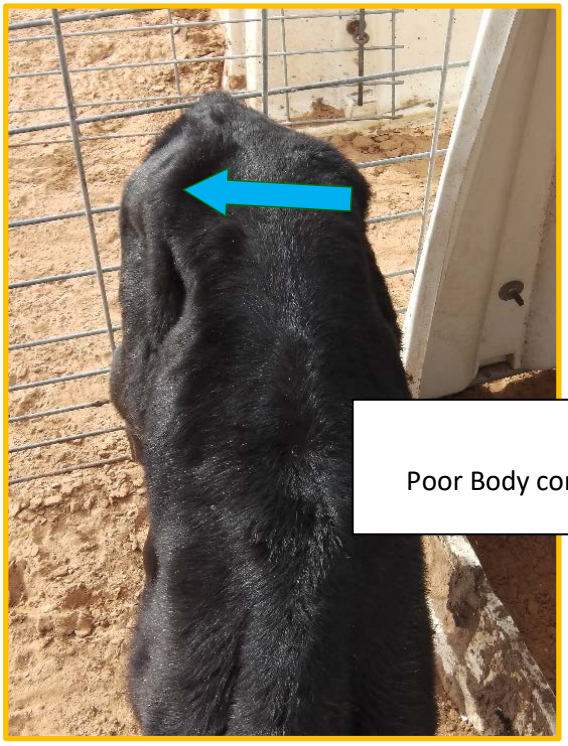
Normal = 1
Good Body Condition maintained at 1 week

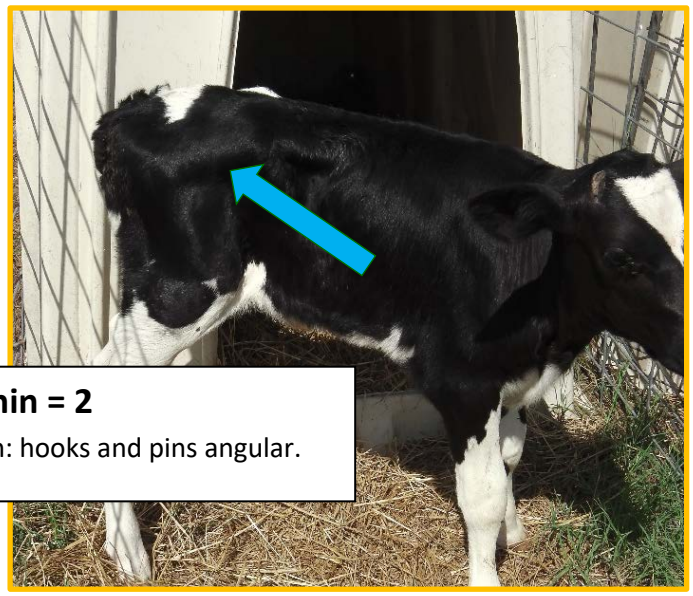
Be sure to evaluate calves from both the front and sides. Calves scored in between feeding may have a sunken paralumbar fossa, creating a "shelf" with the short ribs. This is normal.



Normal = 1
Good Body Condition at 1 month

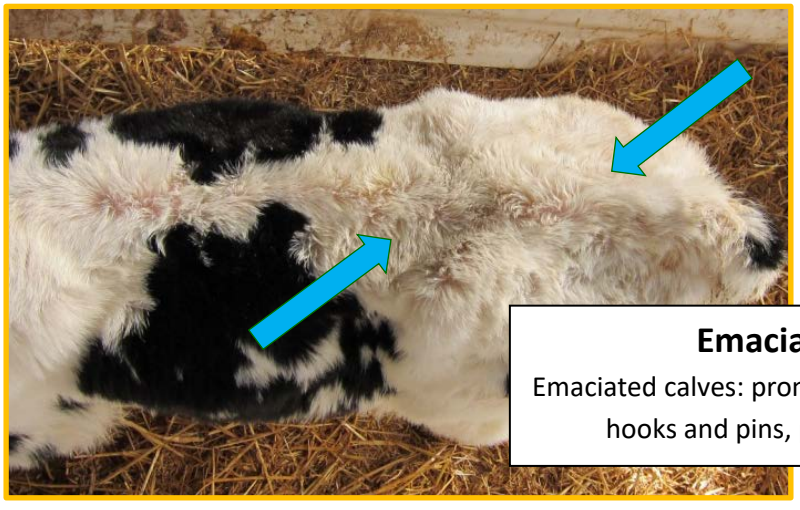
Score calves on a scale of 1-3
1 = Normal body condition
2 = Thin
3= Emaciated

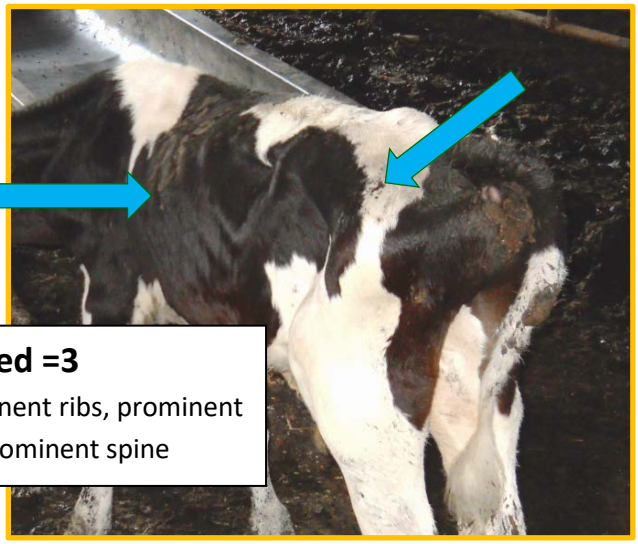




Thin = 2

Poor Body condition: hooks and pins angular.





Emaciated =3

Emaciated calves: prominent ribs, prominent hooks and pins, prominent spine

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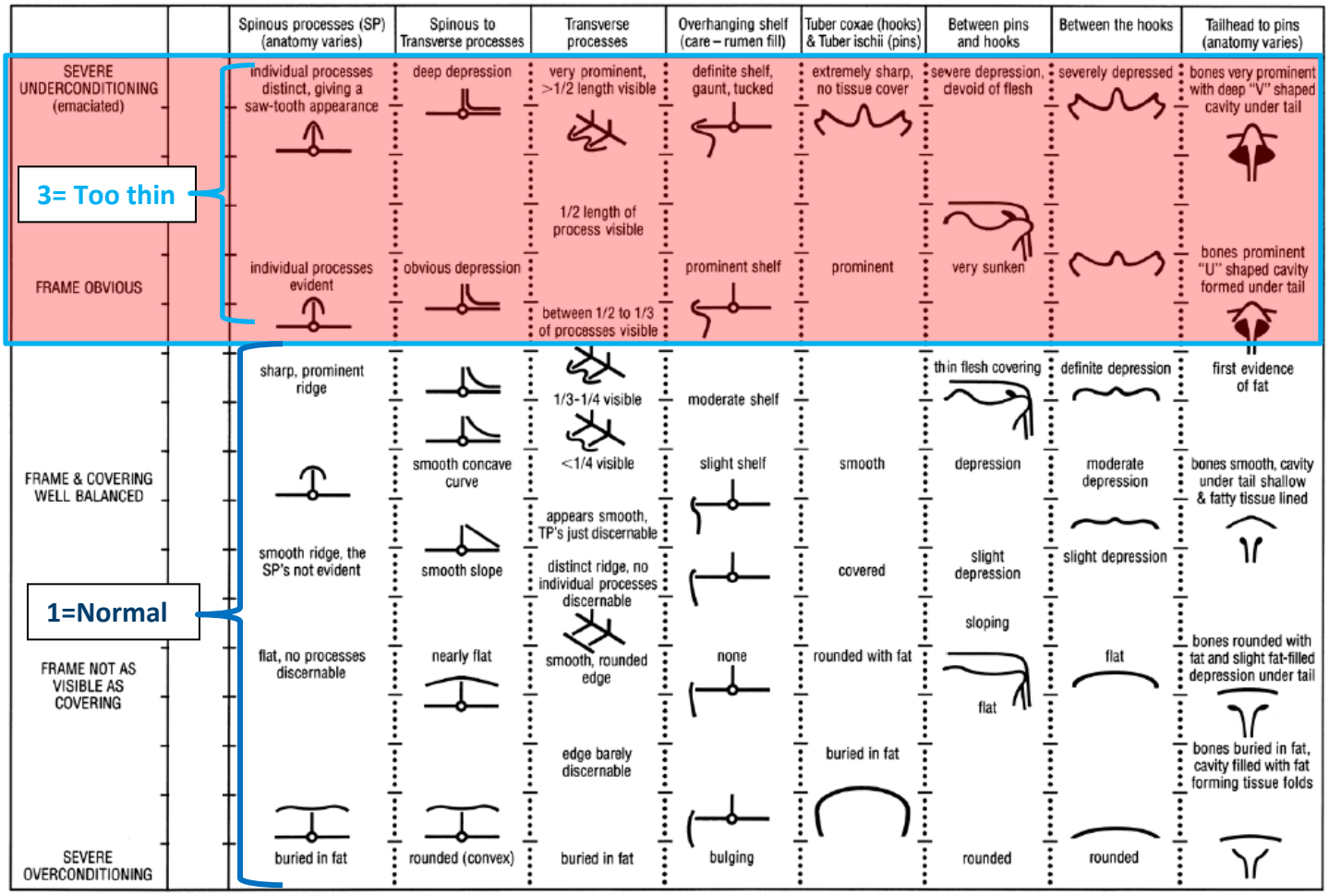
Evaluating Cow Body Condition



This chart was developed by A.J. Edmondson, I.J. Lean, L.D. Weaver, T. Farver, and G. Webster. It is reproduced courtesy of the *Journal of Dairy Science (JDS 72:70, 1989, Figure 1).*

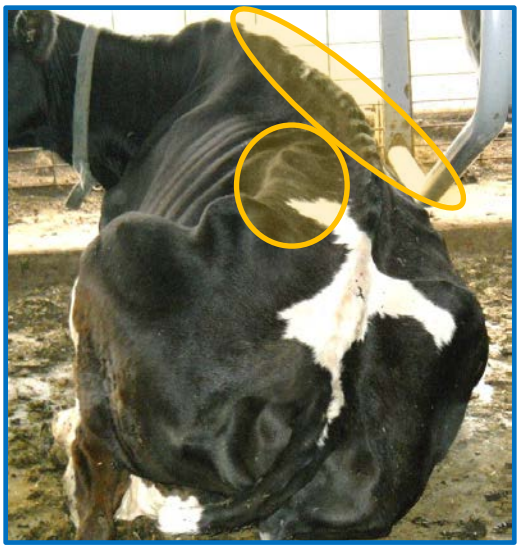
Evaluate the condition of cows and heifers using the chart above. Cows or heifers represented by the descriptions within red shaded box are considered "Too Thin" or emaciated. An actual body condition score will NOT be assigned to cows. For the purposes of tabulating the total % of cows that are too thin:

1 = cows in normal/acceptable body condition

3= cows that are too thin/emaciated (and not fit for transport)

Score 3: Cows with prominent short-ribs, a saw-toothed spine and extremely sharp hooks and pins are considered emaciated, not fit for transport and should either be receiving treatment and care to improve condition or be euthanized.

Be sure to evaluate body condition from the front and sides as cattle can appear thin when viewed at limited angles.



Neck & Other Injury Scoring

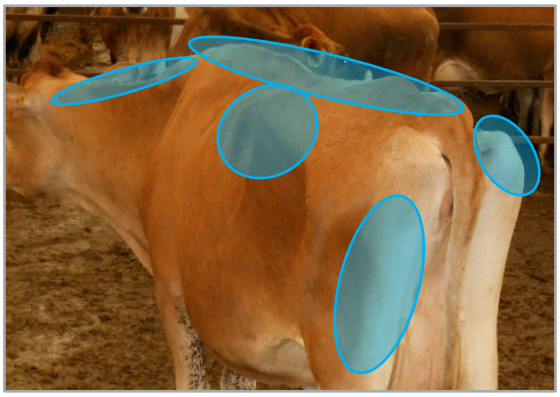
Using the sample guidelines score calves, heifers, lactating, dry and hospital cows. Skin conditions including warts, ring worm, rain-scald or mites and udder edema should not be counted as they are not the result of an injury. If you are having difficulty discerning if it is a skin condition or injury, mark it as an injury and record your thoughts in the comments section. Neck injuries are most easily scored from the front of the feed bunk while cows are eating.

Score Description

SCORE 1: Normal

Minimal hair loss, an area of complete hair loss ≤25 mm (1") in length or width. No swelling.

Examine the sides, back, legs and necks of cattle, scoring the worst lesion on each cow. Common areas for injuries are highlighted. Broken tails will be tracked separately.



Score 1 : Normal

SCORE 2: Moderate Injury

Complete hair loss >25mm (1") in length or width, with no open wounds/abrasions as evidenced by ulceration, blood, serous discharge or scab OR swelling less than or equal to 25mm in length, width or height.

Score 2: Moderate Neck or Other Injury

SCORE 3: Severe Injury

Wounds/abrasions as evidenced by any ulceration, blood, serous discharge or scab. May be superficial, partial or full thickness

OR

Swelling > 25mm (1") in length, height or width.

Score 3: Severe Neck or Other Injury

Tarsus ("Hock") Scoring

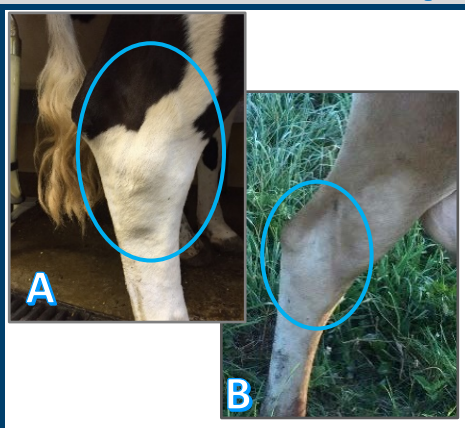
Using the sample guidelines, score lactating, dry and hospital pens, tracking the scores separately. Count only the WORST hock of every cow in the group.

Score Description

SCORE 1: Normal

Minimal hair loss, an area of complete hair loss ≤25 mm (1") in length or width. No to mild (≤10 mm in height) swelling.

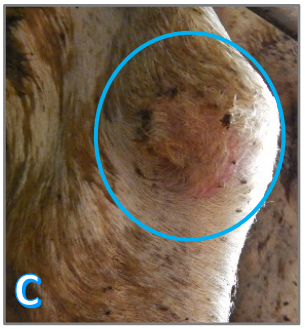
Note: 25mm is approximately the width of a quarter



A. No hair loss, mild swelling

B. Normal - no hairloss or swelling

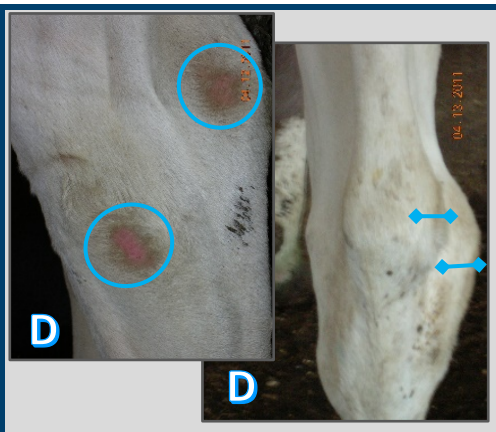
C. Minimal hair loss, hair is broken/thin, but area not bald, no swelling



Score 1 : Normal Hocks

SCORE 2: Moderate Hock

Complete hair loss >25mm (1") in length or width, or a dried scab **or** moderate swelling, 11mm to 25mm in height



D. Hair loss ≤ 25mm, **moderate swelling (11 to 25 mm)**

E. Hair loss **>25mm in length**, with mild swelling

Score 2: Moderate Hocks

SCORE 3: Severe Hock

Any open wound/abrasion as evidenced by ulceration, blood, or serous discharge . May be superficial, partial or full thickness OR Swelling > 25mm (1") in height

F. Swelling >25 mm in height, no hairlloss

G. Swelling <25 mm in height with serous discharge

H. Swelling >25 mm

Score 3: Severe Hocks

***A flashlight with a 25mm diameter may be used to consistently evaluate the size of any hairless area.**

Locomotion Scoring

Score every cow in the highest producing, multiparous lactating pen while exiting from the parlor. If there is only one group of cows score the entire group. If cows are not grouped by age and days in milk, score the highest producing pen. Cows kept in tie stall barns and not normally released after milking will be scored standing in the tie stalls recognizing that only cows with a score of 3 can accurately be identified. If there is a designated hospital pen it will be evaluated as well and the scores tracked separately.

Score Description

SCORE 1: Normal

Walks without obvious gait asymmetry or weight transfer between limbs and cannot discern which leg is lame after a few strides. Steps may be slightly uneven and may have a flat or subtle arch to the back.

Score 1 : Normal

SCORE 2: Moderate Lameness

Asymmetric gait with obvious weight transfer and shortening of the stride of the affected limb altering cadence of movement. May also show a head bob, back arch and joint stiffness leading to abduction of the limb.

Score 2: Moderate Lameness

SCORE 3: Severe Lameness

Able to walk only with extreme difficulty, almost unable to bear weight on the affected limb, may not keep up with normal cows in the herd. May have a pronounced back arch with rear limb lameness.

Score 3: Severe Lameness

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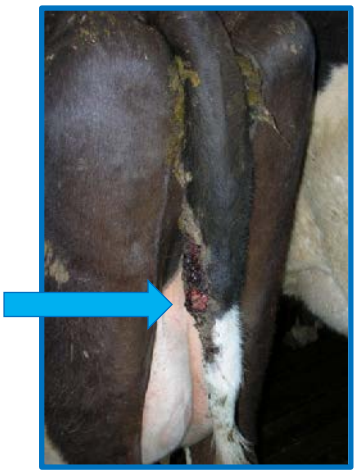
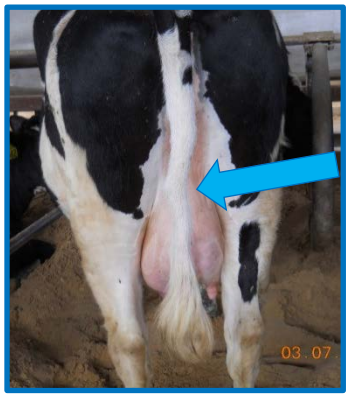
Evaluating Broken Tails

Examples of Recently Broken Tails



Tails that have been recently broken will be swollen, may have abrasions and or crusted blood around the broken vertebrae, or the tip of the tail may have necrosed and fallen off. Breaks may be present near the base of the tail due to extreme force when applying a tail jack for restraint. Breaks that appear mid length or near the tip and are often the result of bending the tail over pipes or other structures in an attempt to restrain the cow.

Examples of Healed, Broken Tails



Tails broken and healed will often present with permanent crooks or bends in the tail.
Score the heifer, lactating and hospital pens according to the sample guidelines. If scoring cows on a 2nd party follow-up when there is history of broken tails, score the first lactation heifer pen (or pen with the majority of these cows) and look for evidence of recently broken tails.

Carpus ("Knee") Scoring

Using the sample guidelines, score lactating, dry and hospital pens tracking the scores separately. Count only the WORST knee of every cow in the group. SCORE 2's will not be evaluated as it is difficult to evaluate in the lock-ups or parlor.

Score Description

SCORE 1: Normal

Minimal hair loss, an area of complete hair loss ≤25 mm (1") in length or width. No to mild (≤10 mm in height) swelling.

A. In this knee, hair is broken/thin, but area not bald and there is no swelling

Score 1 : Normal Knee

SCORE 2: Moderate Knee

Complete hair loss >25mm (1") in length or width, with no open wounds/abrasions. There may be moderate swelling, 11 to 25mm in height, length or width. Score 2's will not be recorded due to the limitations assessing the front of the hock. Score 2 is included in this sheet to provide farmers and veterinarians a tool to I.D. potential causes and monitor improvement should severe knee lesions be noted.

B. Hair loss **>25mm in length**, with mild swelling (≤10 mm)

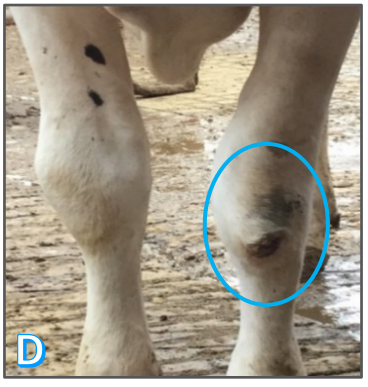
Score 2: Moderate Knees

SCORE 3: Severe Knee

Wounds/abrasions as evidenced by any ulceration, blood, serous discharge or scab. May be superficial, partial or full thickness OR
Swelling > 25mm (1") in height

C. Severe Swelling >25 mm in height

D. Abrasion with moderate swelling



Score 3: Severe Knees

Outcome	Score	Calves	Heifers	Lactating	Dry	Hosp/Sick
Locomotion	1					
	2					
	3					
Hocks	1					
	2					
	3					
Knees	1					
	2					
	3					
Neck & Other Injuries	1					
	2					
	3					
Body Condition	1					
	2					
	3					
Hygiene	1					
	2					
	3					
Broken Tails	1					
	3					

Observations	YES/NO					Notes
	Cows	Calves	Hfr	Dry	Sick	
Critical Criteria						
Water						
Abuse						
Down - H20, shade, soft, dry, iso						
Level 1						
Training - New	YES	NO	NA			
Training- Exist	YES	NO	NA			
Interview						
CCA	YES	NO				
D Care video	calf	Stock	down	Low Stress		
Stockmanship Obs						
Slips/Falls						
Tail Dock	Not Docking		Docking			
SCC <400: 3 & 12	3mo.		12 mo.			
Perm ID						
Tx Records						
Records Check3 IDs						
1)						
2)						
3)						
VCPR						
Drug List - check 3						
SOPs - use check list						
SOP interview	Confirmed		Not Confirmed			
Level 2						
	Cows	**Calves**	**Hfr**	**Dry**	**Sick**	
Environment						
Shade						
Other heat						
Other cold						
Clean H2O						
Calves- space						
Bedding?						
Tie-Stall released						
Tie-Stall trainers						
Sick Cows						
100 sq'/cow						
30" bunk space						
Dehorn						
Method			Polled?			
<8 weeks	YES	NO				
Local	YES	NO				
NSAID	YES	NO				

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Appendix B

SOP Templates – Templates have been provided and may be used as is, adapted for each individual farm or replaced with an SOP created by the farm. *Acceptable SOPs must include, at a minimum, the language highlighted in underlined, blue italics in each SOP*. If it is observed that the farm practice does not match what is written in the SOP, the farm does not get credit for the SOP. Either the SOP must be updated or the farm practice changed to match the written SOP.

ANNUAL SOP REVIEW CHECKLIST

Farm:

SOPs must be reviewed annually to ensure that they reflect current farm practices.

The Veterinarian of Record should work with the farm to establish SOPs that promote the health and welfare of all cattle on the farm, adopting practices than minimize disease, pain while ensuring a safe food supply through proper drug use.

SOP's Reviewed (Check the box for each SOP that was reviewed by the VOR)

1. Herd Health Plan: (including frequency and nature of observations)

- *Vaccine Schedule for all age groups* ☐
- *Parasite Prevention* ☐
- *Hoof Health* ☐
- *Sick Cattle Monitoring* ☐
- *Udder Health* ☐

2. Non-Ambulatory Cattle (Consistent with AABP guidelines) ☐

3. Euthanasia (Consistent with AVMA & AABP guidelines) ☐

4. Management of the living Environment for each age group ☐

5. Painful Procedures:

- *Dehorning* ☐
- *Castration (mark NA if not done)* ☐
- *Branding (mark NA if not done)* ☐
- *Extra Teat Removal (mark NA if not done)* ☐

6. Fitness for Transport (Consistent with AABP guidelines) ☐

7. Maternity Management ☐

8. Emergency Response ☐

9. Biosecurity ☐

10. Personnel Training *(mark NA if no employees)* ☐

_____ **Veterinarian of Record Name:**

Veterinarian of Record Signature **Date:**

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Dairy Well Paperwork & SOP Minimum Requirement Check List

*All paperwork must be signed by the VOR and dated *elements highlighted by an asterisk may be referenced within a separate SOP if there is NO deviation from the referenced SOP/drug list or protocol. ǂ If a farm does not have employees, vaccinate, do painful procedures or need parasite prevention mark the SOP N/A.*

Paperwork	Required Element	Complete	Comment
Cow Care Agreement	Must define and state clearly that abuse and neglect are not tolerated and that employees must report problems.	☐	
Health Records	Drug, Indication*, Route*, Dose*, With-hold*, Date, Person	☐	
Approved Drug List	Drug, Indication, Route, Dose, With-hold, Date	☐	
SOP	**Required Element**	**Complete**	**Comment**
Vaccination ǂ	Age	☐	
	Vaccine type	☐	
	Route	☐	
	Withdrawal times	☐	
	BQA guideline methods	☐	
Parasite Prevention ǂ	Age/Group	☐	
	Product/Practice	☐	
	Withdrawal times	☐	
Hoof Health	Routine Trimming Schedule	☐	
	Locomotion/Lesion Scoring Sched	☐	
	Action at re-check within 30 days	☐	
	Action if not better at re-check within 90 days	☐	
Udder Health	*Prevention – Maintenance of clean, dry, comfortable environment (describe what is done, schedule, may refer to other SOP)	☐	
	Milking Procedure – Udder prep (dip, wipe, fore strip)	☐	
	Equipment Maintenance – Service, Replace, Sanitize	☐	
	Control/Manage Mastitis – Detection & Treatment Records	☐	
Sick Cow Monitoring	For all age groups	☐	
	Monitoring Schedule	☐	
	*Actions taken - may refer to other SOP	☐	
	*Emergency Contact List – may be represented in other SOP	☐	
Humane Euthanasia	Consistent with AVMA/AABP guidelines	☐	
	Method – gun, captive bolt or approved solution (primary and secondary if different)	☐	
	Confirmation of death – if signs of life repeat	☐	

SOP	Required Element	Complete	Comment
Environmental Management (these may be captured in other SOPs)	Calves – bedding, clean feed equip, water cleaned, pens cleaned	☐	
	Heifers/Dry cows – bedding or pen grooming, water cleaned	☐	
	Lactating Cows – bedding or pen grooming, floors cleaned, water cleaned	☐	
	Maternity Pens – bedding groomed, water cleaned	☐	
	Hospital Pens - bedding groomed, water cleaned	☐	
Disbudding‡	Age	☐	
	Method	☐	
	Pain Mitigation used	☐	
Painful Procedures‡	Age	☐	
	Procedure/Method	☐	
	Pain Mitigation Used >8 weeks	☐	
Fitness for Transport	Specify Conditions Not Fit: cancer eye, fever, down, severe lame, prolapse, calving, udder cond., wounds/bleeding, neuro, emaciated	☐	
	Check records for residue	☐	
Maternity Pen	*Emergency Contact – may refer to other SOP	☐	
	*Cleaning Schedule – may refer to other SOP	☐	
	Monitoring Schedule	☐	
	Colostrum Management – when and how much	☐	
Non-Ambulatory Cows	AABP approved method – sled, stone boat, loader	☐	
	No strike/hit/kick/beat	☐	
	No dragging	☐	
	Move ambulatory cows out/Down cows are isolated	☐	
	Euthanize if catastrophic injury or moribund	☐	
	Care – feed, water, bedding, shade, treatment	☐	
Emergency Response	Emergency Contact List – Owner, manager, VOR, Local Fire	☐	
	Fire Extinguisher	☐	
	*Animal ID (permanent) – may be in another SOP	☐	
Biosecurity	Herd Health Plan (may be separate SOPs for vaccine, parasite, hoof health, udder health, sick cow monitoring)	☐	
	Biosecurity Signs	☐	
	Don't cross contaminate Feed & Manure equipment	☐	
	*Animal ID (permanent) – May be in another SOP	☐	
	Health Records	☐	
	*Emergency contact list posted – may refer to other SOP	☐	
Employee Training‡	Merck DC365 (or equivalent)	☐	
	Cow Care Agreement signed – employees & service providers	☐	
	Schedule – prior to working independently; annual refresh; refresh as needed if not compliant	☐	

Vaccination Schedule

Work with your veterinarian to develop a vaccination schedule appropriate for each stage of production on your farm.
Review the plan annually with your veterinarian and employees responsible for giving the vaccinations.

✓ *All Vaccines will be given according to Beef Quality Assurance guidelines (see last page), using clean, sharp needles.* Using 1 needle per cow is best practice and minimizes the risk of disease transmission.

Farm:					
Herd Health Veterinarian:					
Age	***Type of vaccine OR therapy.*** (check all that apply or list after other)	***Route of admin.***	***Withdrawal Time***		**Responsible Person(s)**
			Milk hours	***Meat days***	
YOUNG STOCK					
Birth to < 1 week	Colostrum ☐		N/A		
	E coli ☐		N/A		
	Other:		N/A		
4 to 6 weeks	IBR/PI3/BRSV/BVD ☐		N/A		
	Lepto ☐		N/A		
	Clostridial ☐		N/A		
	Other:		N/A		
4 to 5 months	IBR/PI3/BRSV/BVD ☐		N/A		
	Brucellosis ☐		N/A		
	Lepto ☐		N/A		
	Clostridial ☐		N/A		
	Other:		N/A		
6 months	IBR/PI3/BRSV/BVD ☐		N/A		
	Lepto ☐		N/A		
	Clostridial ☐		N/A		
	Other:		N/A		

Veterinarian of Record Signature: _____ Date: _____

Age	Type of vaccine OR therapy. (check all that apply or list after other)	Route of admin.	Withdrawal Time		Responsible Person(s)
			Milk hours	Meat days	
Breeding Heifers & Dry Cows					
10 months / Pre-breeding	IBR/PI3/BRSV/BVD ☐				
	Lepto ☐				
	Other:				
@ pregnancy diagnosis	Lepto ☐				
	Other:				
Dry off / 40-60 days prior to calving	IBR/PI3/BRSV/BVD ☐				
	Lepto ☐				
	E.Coli ☐ Clost. P type C&D ☐				
	Rota/Corona ☐				
	Other:				
Pre-Fresh / Close-Up (3 weeks prior to calving)	E.Coli ☐ Clost. P type C&D ☐				
	Rota/Corona ☐				
	Clostridial ☐				
	Other:				
Other group:					

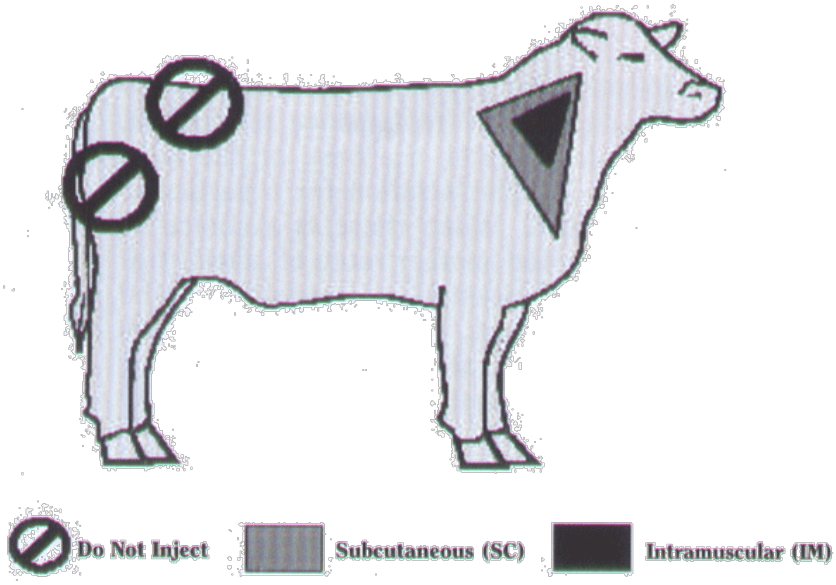
Veterinarian of Record Signature: _____ Date: _____

Age	Type of vaccine OR therapy. (check all that apply or list after other)	Route of admin.	Withdrawal Time		Responsible Person(s)
			Milk Hours	Meat Days	
Lactating Cows					
21 to 40 days post calving	IBR/PI3/BRSV/BVD ☐				
	Lepto ☐				
	E coli ☐ Clost. P type C&D ☐				
	Other:				
@ Pregnancy Diagnosis	Lepto ☐				
	Other:				
Other group:					

Age	Type of vaccine OR therapy. (check all that apply or list after other)	Route of admin.	Withdrawal Time		Responsible Person(s)
			Milk Hours	Meat Days	
Herd Bulls					
Annually	IBR/PI3/BRSV/BVD ☐				
	Lepto ☐				
	Vibriosis ☐				
	Other:				
Other group:					

Veterinarian of Record Signature: _____ Date: _____

Proper Injection Site for vaccinations



* University of Nebraska-Lincoln. "698-1351 Proper injection procedures for cattle."

✓ Steps in Administering Injections Properly

1. Select the right product
2. Read the label
3. Don't combine vaccines
4. Use transfer needles
5. Don't mix too many products
6. Keep shaking
7. Mark and separate syringes
8. Don't use disinfectants with modified live vaccines
9. Get air out of syringes
10. Restrain animals properly
11. Select best route of administration
12. Choose best site of administration
13. Choose the right needle
14. Use proper injection technique
15. Practice good sanitation

Veterinarian of Record Signature: _____ Date: _____

Vaccination Schedule

Work with your veterinarian to develop a vaccination schedule appropriate for each stage of production on your farm. Review the plan annually with your veterinarian and employees responsible for giving vaccinations.

✓ ***All Vaccines will be given according to Beef Quality Assurance guidelines (see last page), using clean, sharp needles.*** Using 1 needle per cow is best practice and minimizes the risk of disease transmission.

Farm:							
Veterinarian of Record:							
Name of Vaccine	***Route of administration***	***Age when given***	**Booster given?**	**When is booster given?**	***Milk Withhold***	***Meat Withhold***	**Person responsible**
Calves and Heifers (0 days-breeding age)							
	☐ SubQ ☐ Intranasal ☐ Other		☐ Yes ☐ No		N/A		
	☐ SubQ ☐ Intranasal ☐ Other		☐ Yes ☐ No		N/A		
	☐ SubQ ☐ Intranasal ☐ Other		☐ Yes ☐ No		N/A		
	☐ SubQ ☐ Intranasal ☐ Other		☐ Yes ☐ No		N/A		
	☐ SubQ ☐ Intranasal ☐ Other		☐ Yes ☐ No		N/A		
	☐ SubQ ☐ Intranasal ☐ Other		☐ Yes ☐ No		N/A		

Veterinarian of Record Signature: ______________________________ Date: __________

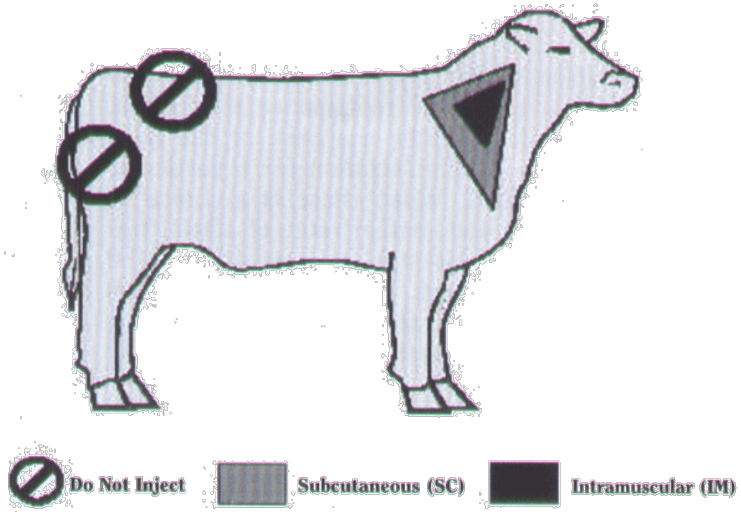
Farm:							
Veterinarian of Record:							
Name of Vaccine	***Route of administration***	***Stage when given***	***Booster given?***	**When is booster given?**	***Milk Withhold***	***Meat withhold***	**Person responsible**
Breeding heifers							
	☐ SubQ ☐ Intranasal ☐ Other		☐ Yes ☐ No		N/A		
	☐ SubQ ☐ Intranasal ☐ Other		☐ Yes ☐ No		N/A		
	☐ SubQ ☐ Intranasal ☐ Other		☐ Yes ☐ No		N/A		
	☐ SubQ ☐ Intranasal ☐ Other		☐ Yes ☐ No		N/A		
Dry Cows							
	☐ SubQ ☐ Intranasal ☐ Other		☐ Yes ☐ No				
	☐ SubQ ☐ Intranasal ☐ Other		☐ Yes ☐ No				
	☐ SubQ ☐ Intranasal ☐ Other		☐ Yes ☐ No				
	☐ SubQ ☐ Intranasal ☐ Other		☐ Yes ☐ No				

Veterinarian of Record Signature: _____ Date: _____

Farm:							
Veterinarian of Record:							
Name of Vaccine	***Route of administration***	***Stage when given***	**Booster given?**	**When is booster given?**	***Milk Withhold***	***Meat withhold***	**Person responsible**
Lactating Cows							
	☐ SubQ ☐ Intranasal ☐ Other		☐ Yes ☐ No				
	☐ SubQ ☐ Intranasal ☐ Other		☐ Yes ☐ No				
	☐ SubQ ☐ Intranasal ☐ Other		☐ Yes ☐ No				
	☐ SubQ ☐ Intranasal ☐ Other		☐ Yes ☐ No				
	☐ SubQ ☐ Intranasal ☐ Other		☐ Yes ☐ No				
Other/Bulls							
	☐ SubQ ☐ Intranasal ☐ Other		☐ Yes ☐ No				
	☐ SubQ ☐ Intranasal ☐ Other		☐ Yes ☐ No				

Veterinarian of Record Signature: _____ Date: _____

Proper Injection Site for vaccinations



* University of Nebraska-Lincoln. “698-1351 Proper injection procedures for cattle.”

✓ Steps in Administering Injections Properly

1. Select the right product
2. Read the label
3. Don't combine vaccines
4. Use transfer needles
5. Don't mix too many products
6. Keep shaking
7. Mark and separate syringes
8. Don't use disinfectants with modified live vaccines
9. Get air out of syringes
10. Restrain animals properly
11. Select best route of administration
12. Choose best site of administration
13. Choose the right needle
14. Use proper injection technique
15. Practice good sanitation

Veterinarian of Record Signature: _____ Date: _____

Parasite Prevention SOP

Work with your veterinarian to develop a parasite prevention program to control both internal and external parasites. Review the plan annually with your veterinarian and the employee(s) responsible for the program.

Farm:							
Age / Management Group	**Risk for parasites**	*Treatment: Product and Application or Practice* (based on fecal exam)	*Internal Parasite Products Withdrawal time*		*External Parasite Products Withdrawal time*		**Responsible Person(s)**
			Milk hours	**Meat days**	**Milk hours**	**Meat days**	
YOUNG-STOCK & HIEFERS							
Calves 0-60 days	High for coccidia						
Calves 2-5 months	High coccidia High internal						
Calves 6-13 months	High coccidia High internal						
Pregnant heifers	Moderate coccidia High to Mod. internal						

- Industry guidelines suggest fecal exams should be performed yearly, preferably in late fall, at/or prior to freshening, or when a problem is noted (e.g. diarrhea, low body condition score etc…..).
- To get a representative picture of a group one should obtain 8 to 10 samples per 100 animals in a group. Sample all categories (e.g. cows, yearlings, replacement heifers, calves….).
- If the fecal sample can't be examined fresh, then refrigerate or put in a cooler with freezer packs. DO NOT freeze or leave in heat.

Veterinarian of Record Signature: _____ Date: _____

Age / Management Group	Risk for parasites	Treatment: Product and Application or Practice (based on fecal exam)	Internal Parasite Products Withdrawal time		External Parasite Products Withdrawal time		Responsible Person(s)
			Milk hours	Meat days	Milk hours	Meat days	
Adult & Lactating Cattle							
Cows grazing in lactation	High internal						
Rotational grazing cows	High internal						
Cows grazing when dry	Moderate to high internal						
Cows with exercise lot access	Moderate internal						
Cows with dirt lot access	Moderate to low						
Cows on concrete or totally confined	Low to none						

*Source D .Bliss and G.H. Myers, "Parasite control strategies for dairy cattle in the 1990's." Hoeschst-Roussel Agri-vet
*Source D. Bliss and W.G. Kvasnicka, "The fecal examination: A Missing Link in Food Animal Practice." The Compendium April 1997

Veterinarian of Record Signature: _____ Date: _____

Hoof Health Care SOP

Work with your veterinarian to develop a program to prevent, quickly identify, treat and control lameness.

Review the plan and associated protocols annually with your veterinarian and the employee(s) responsible for lameness evaluation.

Objective: To develop and practice a hoof health program that minimizes the incidence of lameness, quickly identifies cows in need of treatment or culling and establishes a record keeping system that allows for the effective management of hoof health on the farm.

Principle: Lameness is a painful condition that is bad for the health and welfare of the cow and for the business. Lame cows should be prevented, treated quickly when they are found and receive timely follow-up.

Farm:

GOALS:

1. Moderate Lameness: ≤15% in the lactating herd
2. Severe Lameness: ≤1 % in the lactating herd
3. Severely lame cows should be in a separate pen, close to the parlor, evaluated daily and have a record of an established treatment plan

Prevention and Control Practices			Person(s) Responsible
Routine Hoof Trimming Cows trimmed in the last 4 months should not be trimmed to avoid over trimming.	Heifers:	Prior to calving ☐	
	Lactating Cows:	@ 150 DIM ☐	
		Prior to Dry Off ☐	
Regular Lameness & Lesion Scoring Persons responsible should be trained on how to identify lameness.	Heifers:	Every weeks	
	Dry & Lactating Cows:	Every weeks	
Record Keeping & Follow-Up	All claw lesions will be recorded and reviewed with the veterinarian every weeks		
	All cows treated for lameness will be re-evaluated in 30 days. *When lameness has become severe and is not responsive, with no further treatment options the cow should be euthanized.		
	Cows that have been treated 3 times or are still lame after 90 days will be evaluated for culling (severely lame cows are not fit for transport and should be euthanized).		

Veterinarian of Record Signature: _____ Date: _____

Prevention and Control Practices		Person(s) Responsible:
Cow Comfort:	Deeply Bedded Stalls ☐	
	Pasture or Soft, Dirt Pen Access ☐	
	Stall Standing Index (SSI) – measured 2 hrs. before milking every weeks. **Goal <20%** ☐ If >20% locomotion scoring of the herd should be done.	
	Milking Time **- Goal: < 1 hr** spent away from the pen for each milking ☐	
	Heat Stress Abatement:	
	Fans over STALLS ☐	
	Sprinklers/Soakers/Fans at feed bunks ☐	
Walking Surfaces:	Sufficient Grooving to avoid slips & falls, but avoid excessive wear ☐	
	Manure removed times/day ☐	
	Rubber on walk ways & Holding Areas ☐	
Nutrition / Feeding Practices:	Avoid Overcrowding – Target: 24-34" bunk space, 1 stall/cow ☐	
	Fresh feed, ad lib, at least 2X daily ☐	
	Monitor feed refusals and feed sorting every weeks	
	Ration balanced for trace minerals ☐	
Leg Hygiene Scoring Goal: < 25% Moderate to very dirty.	Every weeks. ☐	
Foot Bathing Lactating Cows Schedule determined by leg hygiene score.	Early Lactation: Days /Week ☐ Late Lactation: Days /Week ☐	
	Close-Up Cows – Once a week ☐	
	Breeding Age Heifers – based on evaluation every weeks ☐	

Veterinarian of Record Signature: _____ Date: _____

Lame Cow Monitoring & Treatment Strategy

The goal is to identify lame cows for treatment as quickly as possible, ideally EVERY DAY, and monitor them for recovery.

Regular monitoring should minimize the number of cows that become severely lame and ensure that severely lame cows are not sent to market/slaughter.

Identification of Lameness	Schedule & Action	Person(s) Responsible
Heifers		
Dry Cows		
Lactating Cows		
Treatment of Lameness	**Schedule & Action (ideally within 24 hrs)**	
Heifers		
Dry Cows		
Lactating Cows		
Follow up evaluation	**Schedule & Action (ideally 30 days)**	
Heifers		
Dry Cows		
Lactating Cows		
If Not Better @ 30 days		
If not Better in at most 90 days: ACTION		
If Moderately Lame	**Cull**	
If Severely Lame	**Humanely Euthanize**	

Veterinarian of Record Signature: _____ Date: _____

Sick Cattle Monitoring

Work with your veterinarian to develop a program to detect sick cows, do physical examinations, and to treat individual animals for disease.
Review the plan annually with your veterinarian and the employee(s) responsible for monitoring the sick cattle.

Farm:	
Veterinarian:	
Goal:	

All cattle on the farm will be monitored for sickness on a deliberate schedule observing for the following signs.

1. Appetite – decreased or not eating	8. Diarrhea/Manure consistency
2. Attitude – depressed, dull, lethargic	9. Posture – An arched back, elbows out or a raised tail may indicate pain associated with underlying disease or trauma
3. Ears – droopy or cold	10. Lameness
5. Nose - discharge	12. Belly – A sunken or bloated belly
6. Cough – or difficulty breathing	13. Discharge or odor– from the vulva or any wound
7. Body Condition- Is the animal too thin?	14. Injuries on the body, legs, head and neck.

Age Group	**Employee(s) Responsible**	***Monitoring Schedule***	***Action***
Milk Fed Calves			
Growing Heifers			
Breeding Age Heifers			
Fresh Pen			
Lactating Cows			
Dry Cows			
Close up Cows			
Maternity Cows			
Hospital/Sick Cows			
Other:			

Person(s) to contact for additional care or for further evaluation:	
After Hours/Emergency Contact:	

✓ **Communication:** Proper marking, indications, and record keeping on each animal will help every worker understand each animal's individual status and treatment.

Veterinarian of Record Signature: _____ Date: _____

Udder Health SOP

Work with your veterinarian to develop an udder health program that meets the needs of your dairy, minimizes the occurrence of mastitis and produces quality milk.
Review the plan with your veterinarian and the employees responsible for the procedures annually.

Objective: To produce high quality milk and promote the health and welfare of our cattle by minimizing mastitis.
Principles: Mastitis is bad for the health and welfare of the cow and our business. The challenge is to find the balance between excellent cow comfort and manageable cow cleanliness to promote udder health. Mastitis can be painful, has a negative effect on milk quality and should therefore be prevented and identified quickly when it occurs.

Farm:

Goals:
BTSCC : (recommended <200,000)
New infections: (recommended <2%)
Chronic Infections: (recommended <2%)
Fresh Infections: (recommended <5%)

Prevention: Maintenance of a Clean, Dry, Comfortable Environment

Area of Interest	What needs to be done	Employee Responsible	Schedule
Housing (All ages)	Stalls and all lying areas are maintained so that they are clean, dry and comfortable through good management of bedding ☐		
Ventilation	The system is maintained and functions properly ☐		
Stocking Density	Overstocking is not practiced ☐		
Fly control	The environment is maintained such that fly breeding and resting habitats are minimized ☐ Additional fly control strategies in place as needed:		
Heat Abatement	Fans ☐ Soakers ☐ Shade ☐		
Feed Bunk Management	Fresh feed and water is available after milking so that cows remain standing immediately after milking ☐		

Veterinarian of Record Signature: _____ **Date:** _____

Prevention: Proper Milking Procedures			
Step	**What needs to be done**	**Employee Responsible**	**Schedule**
Cow Movement	Cows will be brought into the parlor quietly and calmly to allow for proper milk let down ☐		
Minimize Spread of Infection	All milkers wear clean gloves during milking ☐ Use Back-Flush ☐ Milk known infected cows LAST ☐		
Mastitis Detection & Stimulation of Milk Let Down	All cows are stripped to examine foremilk for signs of mastitis. ☐		
Udder Prep	Clean & Disinfect teats ☐ Dry teats with single use towel ☐		
Ensure Proper Milk Out	Attached teat cups squarely w/in 90 seconds of udder prep ☐ Adjust cluster to avoid or correct liner slips ☐ Avoid over milking ☐ Shut off vacuum to claw before removing cluster ☐		
Waste Milk	Unpasteurized waste milk will not be fed to calves ☐		

Prevention: Maintenance of Equipment			
Step	**What needs to be done**	**Employee Responsible**	**Schedule**
Service	All equipment will be regularly evaluated and serviced to maintain proper function ☐		
Replace	Replace Inflations ☐ Replace Milk Tubes ☐ Replace other rubber or plastic parts ☐		
Sanitize	Sanitize all equipment prior to each milking ☐ Thoroughly wash and sanitize equipment after each milking ☐		

Veterinarian of Record Signature: _____ **Date:** _____

Control: Management of Mastitis			
Step	**What needs to be done**	**Employee Responsible**	**Schedule**
Detection	DHIA records – results evaluated monthly, new and chronic infections identified and addressed according to protocol ☐ Fore-stripping – each quarter checked daily for signs of mastitis and treated according to protocol ☐		
Record Keeping	Records will be kept including ID, quarter, treatment, and outcome for every case of mastitis even if it is not treated ☐		
Identification	Samples will be collected from every clinical quarter, frozen and saved for culture ☐		
Treatment	A treatment protocol will be established based on herd history and culture results ☐		
Dry Cow Therapy	A dry cow therapy protocol based on the judicious use of antibiotics will be developed with the herd veterinarian ☐		
Vaccination	Vaccinate with a gram-negative type vaccine to minimize the severity of coliform infections ☐		
Segregation	Cows with mastitis will be segregated from the herd and/or milked last ☐ Cows with a contagious pathogen will be segregated from the herd and/or milked last if not SOLD ☐ Newly purchased cows are tested prior to arrival and milked last until confirmed clean ☐		

Veterinarian of Record Signature: _____ **Date:** _____

Disbudding Protocol

Work with your veterinarian to develop a protocol that is appropriate and consistent with AABP guidelines for calves of different ages on your farm.
Review the plan with your veterinarian and the employees responsible for the procedures annually.

Objective: To disrupt the growth of horns using proper, humane handling while causing the least amount of stress and discomfort.
Principles: Calves will dehorned at an early age and be given medication &/or treatments to minimize the pain associated with the procedure regardless of the procedure used and age of the calf.

**The use of anti-inflammatories for pain mitigation associated with dehorning is considered extra label drug use. However, it is acceptable when done within the context of a VCPR with the veterinarian of record.*

FARM:				
Age of Cattle	***Method***	***Pain Mitigation(s) Used****	**Responsible Person(s)**	**Required Equipment**
< 7days Goal: <48 hours	Disbudding with PASTE	☐ ***Anti-Inflammatory*** ☐ ***Local Anesthetic***		
<8 weeks	Disbudding with Hot Iron or cautery	☐ ***Local Anesthetic*** ☐ ***Anti-Inflammatory***		
>8 weeks should not be standard practice	Dehorning	☐ ***Local Anesthetic*** ☐ ***Anti-Inflammatory***		

Disbudding:

a) Restraint -

b) Procedure -

Dehorning:

a) Restraint -

b) Procedure -

Veterinarian of Record Signature: _____ **Date:** _____

Non-Ambulatory Animal SOP

Work with your veterinarian to develop a procedure consistent with AABP guidelines for identifying, transporting, and managing non-ambulatory animals.

Review the plan annually with your veterinarian and the employee(s) responsible for dealing with non-ambulatory animals.

Objectives: (1) To safely and humanely move and handle non-ambulatory cattle (2) To increase the chances of recovery of a non-ambulatory animal (3)To minimize the pain and suffering of non-ambulatory cattle

Definition: Any animal (including calves) that cannot stand or walk is to be considered non-ambulatory. If the animal will not rise, or is unable to rise due to a slippery surface, it is considered non-ambulatory.

Farm: _____

Down Cow Team - Individuals responsible for non-ambulatory cattle:

1. _____

2. _____

3. _____

Standards of Care:

- All employees not affiliated with the Down Cow Team will be made to leave the immediate area.
- Members of the Down Cow Team will not verbally insult or swear at the cow.
- Members of the Down Cow Team *will not strike the down cow with any object.*
- Members of the Down Cow Team *will not drag the down cow by the head or any limb with heavy equipment* except in extreme circumstances when the animal is physically trapped and with the consent of the owner or manager.
- Members of the Down Cow Team will treat the cow with dignity and respect at all times.
- Members of the Down Cow Team will acknowledge that the reason for this team is to safely and humanely move the down cow to an area where she can be given the proper care to facilitate her return to production.

Handling and Movement*: Cows will be moved in accordance with AABP guidelines*

- When a non-ambulatory animal is identified, the above listed individuals are notified.
- *All ambulatory animals are removed from the immediate area.*
- *Non-ambulatory animals that are severely suffering or deemed unsalvageable are to be euthanized immediately.*
- Once identified, non-ambulatory animals will be moved to a well bedded pen within hour(s) (suggested 2 hours or less).
- Before movement the animal will be restrained to prevent injury to itself and employees. A halter will be placed on the head which will be tied to the rear leg. The front legs should be tied together and rear legs should be tied together to prevent kicking.
- If necessary, and safe for the animal, chemical sedation/restraint can be administered. This may be done by your veterinarian of record.

Veterinarian of Record Signature: _____ Date: _____

Adapted from: Animart Down Cow Example SOP

Praedium Non-ambulatory Care Standard Operating Procedure

Method for Moving Non-Ambulatory Animals: (Check all boxes that apply)

- ☐ The farm will utilize a sled for animal movement.
    1. Position the sled as close as possible behind the animal and in a way that the animal will travel headfirst, if possible.
    2. Roll the animal on its side, onto the sled.
    3. Heavy equipment will be used to pull the sled at a speed no faster than a walking pace. At least one person should walk with the sled to ensure the animal stays in place.
    4. Once at the desired location, the animal will be rolled upright and off of the sled.
    5. The restraints will be removed from the animal's front and rear legs and the halter will be removed.

- ☐ The farm will utilize a loader large enough such that the entire body rests within the bucket for animal movement.
    1. Position a loader bucket at least 6 feet long behind the restrained animal. Ensure that the bucket is flush with the ground and that the inside of the bucket is cushioned with bedding or rubber mats.
    2. Manually roll the cow into the bucket, do not use the machinery to scoop the animal.
    3. Rotate the bucket slowly so that the animal is not at risk of falling out and raise the bucket 2 feet off the ground. Ensure that none of the animal's limbs are touching the ground.
    4. Travel with the animal in the bucket at a speed no faster than a walking pace. Again ensure that no body parts are dragging on the ground.
    5. Once at the desired location, slowly lower the bucket to the ground and rotate so that it is flush. Ensure that no body parts are trapped between the bucket and the ground.
    6. Manually roll the animal out of the bucket and onto her belly. Do not use the bucket to dump the animal.
    7. The restraints will be removed from the animal's front and rear legs and the halter will be removed.

Care & Treatment:

- will be responsible for daily care of non-ambulatory animals.
- All non-ambulatory animals will be rolled from side to side every hours (recommended 2-3 hours), *will be offered fresh feed times a day, and will be offered fresh water throughout the day.*
- *The pen or area the animal is in will be bedded frequently to ensure cleanliness and comfort.*
- *If the animal is outdoors it will be provided shade from the sun and shelter from inclement weather.*
- Animals will be evaluated by the veterinarian or manager daily.
    1. Animals that are severely suffering or that have irreversible damage shall be euthanized promptly.
    2. *Animals that are treatable will be treated according to farm protocols.*
    3. If the area where the non-ambulatory animal is being kept is not able to be kept in a dry and comfortable condition to encourage recovery, the animal will be humanely euthanized.
- Non-ambulatory animals can be assisted to stand with the help of an appropriate sling that supports the weight of the animal over a broad area of its belly and chest. Additionally, a cow float can be used to raise an animal providing that the cow is strong enough to stand in the water. Hip lifts, if used, must be used with care. Hip lifts may be used only to help a cow into a standing position and should never be used to move cows over a distance or suspend them off the ground.
- Employee(s) working with a non-ambulatory animal will notify a manager or veterinarian if the animal's condition worsens or if the animal has been down for 2 days. The manager or veterinarian will make a decision whether euthanasia or additional treatments are necessary.

Veterinarian of Record Signature: _____ Date: _____

Adapted from: Animart Down Cow Example SOP
Praedium Non-ambulatory Care Standard Operating Procedure

Humane Euthanasia SOP

Work with your veterinarian to develop a euthanasia action plan for each stage of production on your farm that is *consistent with AVMA and AABP guidelines on humane euthanasia*.

This plan should be kept in an obvious location in the barn. Review the plan annually with your veterinarian, existing staff, and any new employees when hired.

Objective: To minimize pain and suffering by providing a humane and timely death to animals on the farm when necessary

FARM:				
Phase of Production	***Euthanasia Method***	**Alternative Method**	**Responsible person(s)**	**Req. Equipment***
Mark the appropriate box (select all that may apply) and fill in the name of the trained individual responsible				
Calves	Gun-shot (GS)	☐Captive Bolt Gun (CBG) ☐Veterinarian	GS - CBG – DVM -	✓ Halter ✓ Safety Glasses ✓ Ear Plugs
Heifers and Steers	Gun-shot (GS)	☐Captive Bolt Gun (CBG) ☐Veterinarian	GS - CBG – DVM -	✓ Halter ✓ Safety Glasses ✓ Ear Plugs
Mature Cows	Gun-shot (GS)	☐Captive Bolt Gun (CBG) ☐Veterinarian	GS - CBG – DVM-	✓ Halter ✓ Safety Glasses ✓ Ear Plugs
Bulls	Gun-shot (GS)	☐Captive Bolt Gun (CBG) ☐Veterinarian	GS - CBG – DVM-	✓ Halter ✓ Safety Glasses ✓ Ear Plugs

***** Required equipment includes use of either fire-arm or captive bolt gun

Required Skills:

- ✓ Specific Training by herd veterinarian or Dairy Manager in use and care of equipment
- ✓ Proper animal handling & Ability to correctly apply halter and proper restraint

Important Telephone Numbers:

1. Veterinarian (DVM):

DVM Phone # _____

After hours emergency # _____

2. Deadstock Removal (consistent with local regulations): _____

Phone # _____

Adapted from: NYSCHAP
Gerrit Rietveld - Animal Care Specialist/OMAF
Iowa State University Extension- Procedures for Humane Euthanasia

Veterinarian of Record Signature _____ Date: _____

- **The captive bolt or gunshot should penetrate the skull at the intersection of lines extending from the lower base of each side of the horn bed to the outside corner of the opposite eye as shown in Figure 1**.

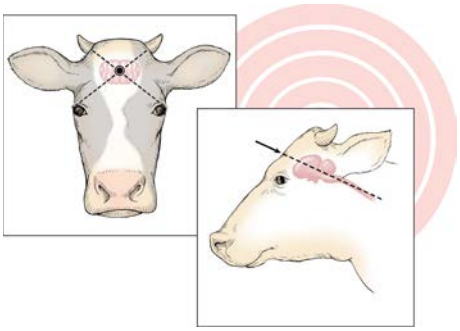


Figure 1. Target site and penetration angle for euthanasia of cattle (from http://vetmed.iastate.edu/HumaneEuthanasia)

Euthanasia

1. Once an animal has been identified for euthanasia, _____ (person responsible for performing euthanasia) will be notified.

2. Apply a halter and secure head restraint to prevent movement of the cow or calf.

3. Choose the appropriate method of euthanasia for the animal according to age and size. A .22 caliber hollow or soft point bullet may be used on young animals. Adult animals require a .22 magnum or larger caliber firearm with a solid point bullet. Alternately, 12, 16, or 20 gauge shotguns loaded with slugs or 2, 4, or 6 birdshot can be used.

4. Ensure all personnel and other animals are out of trajectory areas behind and beside the animal.

5. Aim for the area identified by the "**X**" in Figure 1.

    a. Hold a rifle within 2-3 feet of the target and a shotgun within 1-2 yards of the target animal. **Never place the muzzle of the firearm directly on the skull**. Pull the trigger.

    b. Hold a captive bolt gun directly against the skull of the animal and pull the trigger. Follow up with a secondary step (injection of KCl, pithing or second shot).

6. Confirm death and repeat the procedure if the cow is not immediately rendered unconscious or if death is not confirmed within 5 minutes.

Confirmation of Death

- It is essential that you confirm the animal's death directly following euthanasia.

- A standing animal should immediately collapse. Its muscles may involuntarily contract, usually for no longer than 20 seconds. After this, it may show some poorly coordinated kicking or paddling movements before the muscles completely relax.

- Check the animal for breathing, heartbeat and blinking response (corneal reflex). There should be none. The eyes should be fixed and dilated. To check the blinking response, touch the surface of the animal's eye (the cornea). Any eye movement or blinking shows sustained or recovering brain activity.

- *If there is any sign of breathing, heartbeat or blinking, repeat the euthanasia method.*

Veterinarian of Record Signature _____ Date: _____

Environmental Management

Proper environmental management ensures the health and well-being of cattle of all ages.

Review environmental management protocols annually with all responsible employees.

Objectives: To promote the animal's health & welfare and the production of quality milk by providing every animal a clean, dry and comfortable place to lay

Principles: All animals should be provided an area to lay and eat that is clean dry and comfortable which promotes their health and welfare.

FARM:

Calves

Calves should be protected from inclement weather and given shelter that provides ample space to allow grooming of all body parts and room to turn around fully

☐	Individual Pen/Hutch	☐	California Hutch	☐	Group Housing

Calf Management Team	1.
	2.
	3.

Management Practice	Management Schedule
1. *Provide clean, dry, soft bedding*	
2. *Milk feeding equipment cleaned*	
3. *Water and food containers cleaned*	
4. *Pen/Hutch walls cleaned*	

Heifers & Dry Cows

Animals housed outside should be provided with windbreaks, shade and other forms of heat abatement.

☐	Pasture	☐	Outside Pens/Dry Lot	☐	Bedded Pack
☐	Free Stalls	☐	Other		

Management Team	1.
	2.
	3.

Management Practice	Management Schedule
1. *Grooming of Pens to keep clean and dry*	
2. *Water supply/tanks cleaned*	

Veterinarian of Record Signature: _____ Date: _____

Lactating Cows

- Facilities should be well ventilated and allow cows to easily stand, lie down in a normal resting posture and visualize other cows.
- Bedding should be kept clean, dry and comfortable.
- Heat Abatement should be provided (shade, fans, and soakers)
- Slip resistant flooring and walking surfaces are a necessity.

☐	Pasture	☐	Outside Pens/Dry Lot	☐	Bedded Pack
☐	Free Stalls	☐	Tie Stall	☐	Saudi

Management Team	1.
	2.
	3.

Management Practice	**Management Schedule**
1. *Lying surfaces groomed*	
2. *Bedding changed or added*	
3. *Floors scraped/cleaned*	
4. *Water supply/tanks cleaned*	

Maternity Pens

- Pens should be kept clean dry and comfortable, allow at least 175 SQFT/cow of resting space and provide shade, shelter and other heat abatement when necessary.
- Facilities should be well lit for monitoring and should provide a place to safely restrain the cow
- Extra bedding should be provided for calves and individual calving pens should be cleaned in between calving

☐	Pasture	☐	Outside Pens/Dry Lot	☐	Bedded Pack
☐	Free Stalls	☐	Tie Stall	☐	Saudi

Management Team	1.
	2.
	3.

Management Practice	**Management Schedule**
1. *Pens bedded/ groomed*	
2. *Water supply/tanks cleaned*	

Veterinarian of Record Signature: _____ Date: _____

Hospital Pens

- Pens should be kept clean dry and comfortable, allow at least 100 SQFT/cow of resting space and provide shelter, shade and other heat abatement as necessary.
- Facilities should be well lit for monitoring and should provide a place to safely restrain the cow.
- Cows should be provided at least 30’ of bunk space and free access to fresh, clean water.

☐	Individual Pen	☐	Outside Pens/Dry Lot	☐	Bedded Pack
☐	Free Stalls	☐	Tie Stall	☐	Saudi

Management Team	1.
	2.
	3.

Management Practice	**Management Schedule**
1. *Pens bedded/ groomed*	
2. *Water supply/tanks cleaned*	

Herd Bulls

- All previous environmental practices include herd bulls, dependent on the type of housing.
- Employee safety is of the utmost priority when grooming pens housing dairy bulls as they represent a threat to employee safety.

Veterinarian of Record Signature: _____ Date: _____

Painful Procedures SOP

Work with your veterinarian to develop a protocol that is appropriate and consistent with AABP guidelines for calves of different ages on your farm.

Review the plan with your veterinarian and the employees responsible for the procedures annually.

Objective: To minimize the pain and stress and discomfort associated with necessary, but painful procedures by using proper, humane handling and appropriate analgesia.

Principles: Painful procedures should be carried out only when necessary and at early age. Cattle should always be given medication &/or treatments to minimize the pain associated with the procedure.

Farm:					
Veterinarian:					
Procedure	***Age***	***Pain Mitigation****	**Responsible Person(s)**	**Restraint**	***Method*** **& Required Equipment**
Castration The use of a local and systemic anti-inflammatory is proven to mitigate the pre and post-procedural pain associated with the procedure and should always be used	**< 1 week**	☐ Anti-Inflammatory ☐ Local			
	1-8 weeks	☐ Anti-Inflammatory ☐ Local			
	> 8 weeks (should be avoided)	☐ *Anti-Inflammatory* ☐ *Local*			
	Adult Cattle	**Should only be performed by a licensed veterinarian & with proper pain mitigation**			

**The use of anti-inflammatories for pain mitigation for castration and branding is considered extra label drug use. However, it is acceptable when done within the context of a VCPR with the veterinarian of record.*

Veterinarian of record Signature: _____ Date: _____

Farm:					
Veterinarian:					
Procedure	***Age***	***Pain Mitigation***	**Responsible Person(s)**	**Restraint**	**Method & Required Equipment**
Extra Teat Removal There is no available data that demonstrates the effectiveness of a local or anti-inflammatory in mitigating the pain of the procedure. Until there is evidence to suggest that it does NOT help, it is recommend that it is used.	**< 1 week**	☐ Anti-Inflammatory ☐ Local			
	1 to 8 weeks	☐ Anti-Inflammatory ☐ Local			
	> 8 weeks (should be avoided)	☐ *Anti-Inflammatory* ☐ *Local*			
	Adult Cattle	**Should only be performed by a licensed veterinarian & with proper pain mitigation**			
Branding (Should only be done to meet state or export requirements) *Branding for Individual animal ID & Face branding is prohibited		☐ Anti-Inflammatory			☐ Hot branding iron ☐ Freeze branding/ Liquid Nitrogen

Veterinarian of record Signature: _____ Date: _____

Fitness for Travel SOP

Work with your veterinarian to develop a standard operating procedure to determine an animal's ability to be transported.

Review this procedure annually with your veterinarian and the responsible employees.

Objectives: (1) To ensure the animal's welfare and a safe food supply by helping producers and employees determine whether or not an animal is suitable for transport. **(2)** Identify conditions that automatically disqualify an animal for transport.

Principles: It is not good for the welfare of the cow or the business of the farm to ship animals not fit for transport or the food supply.

Farm: _____

Herd Veterinarian: _____

- The following individual(s) will be responsible for determining an animal's fitness for transport:

1. _____
2. _____

Cattle NOT Fit for Transport:

- ***The responsible individual(s) will evaluate the animal to verify that none of the following conditions are present*:**
    1. *Advanced Cancer eye in either eye or complete blindness (blind in both eyes)*
    2. *Fever greater than 103°F*
    3. *Non-ambulatory/down animals*
    4. *Severe lameness (non-weight bearing, 3-legged lameness or obvious fracture or dislocation of leg or hip)*
    5. *Uterine prolapse*
    6. *Active calving or likely to calve during transport*
    7. *Distended or dropped udders that affect mobility*
    8. *Open wounds, active bleeding*
    9. *Central nervous system/neurologic symptoms*
    10. *Emaciated (saw toothed spine and all ribs easily seen)*

If any of the above conditions are present the animal will not be transported and will either be treated appropriately or euthanized according to farm protocols.

Adapted from: AABP Transportation Recommendations for Cattle
Practical Guidelines to Assess Fitness for Transport of Adult Bovines-FASFC

Cattle that require Special Consideration

- Conditions that may disqualify an animal for transport and require thorough assessment include, but are not limited to:
    1. Surgical wounds
    2. Skin problems
    3. Abnormal discharge
    4. Abnormal swelling
    5. Difficulty breathing
    6. Diarrhea
    7. Dangerous/fractious animals

- Animals with any of the above conditions must be evaluated thoroughly to ensure that the animal will not suffer unnecessarily, become injured, or present a threat to other animals or humans during transport.

✓ ***Once an animal has been cleared physically for transport the medical records will be checked to ensure that no milk or meat withholds are present. If a withhold is found or suspected the animal is not to be transported.***

✓ **Once cleared for transport the animal will be given food and water up until the time it leaves the premises. Additionally, lactating cows will be milked within 2 hours of leaving the premises.**

Veterinarian of Record Signature: _____

Date: _____

Adapted from: AABP Transportation Recommendations for Cattle
Practical Guidelines to Assess Fitness for Transport of Adult Bovines-FASFC

Maternity Pen Management SOP

Work with your veterinarian to provide protocols for maternity management and to reduce the prevalence of still births, neonatal disease and metritis.

Review the plan annually with your veterinarian and the employees responsible for maternity management.

Objectives: (1) To ensure calf survival and cow health by providing proper assistance during calving in a timely manner (2) To promote the welfare of all calves by feeding colostrum in a timely manner

Principles: All calves, regardless of sex, will be provided proper care including adequate colostrum and feed to promote good health and welfare

Farm:			
Veterinarian:			
Person to call if additional assistance is needed:			
After Hours Emergency Contact:			
Signs of Calving: Maternity Management Team members will be instructed on the signs of calving and how to respond, either by assisting with the calving themselves or by contacting the appropriate person. *** Signs of active labor**			
1.	Tail is sunken/Relaxation of ligaments	**6.**	Abdominal Pushing*
2.	"Strutting of teats" – Tight bag, full udder	**7.**	Cow is uncomfortable/gets up and down
3.	Solitude – cow is off by herself	**8.**	Water bag is showing*
4.	Mucus plug passed	**9.**	Water bag has broke*
5.	Vulva is loose and swollen +/-discharge	**10.**	Feet and/or nose showing from vulva*

- ✓ After rupture of the water bag, heifers should calve in 1 to 4 hours and cows in ½ to 2 hours.
- ✓ For safety of the cow and calf, it is best to call the veterinarian if a heifer goes past 2 hours and cows past 1 hour and assistance on the farm has failed.

Maternity Management Team			
1.		Shift:	
2.		Shift:	
3.		Shift:	
Each member of the team will be provided training on how to monitor, respond and assist with calving prior to working without direct supervision.			

Close-Up & Maternity Pen Management Procedures	
1.	*Close-Up and maternity pens are maintained so that they are clean, dry and well bedded.*
2.	Each pen will be checked twice daily for proper feed and clean water.
3.	*Close-Up cow pen is monitored throughout the day*, every hours at a minimum. Once a cow is in active labor she is moved to a clean maternity pen if used/available.
4.	Once water bag appears/active labor moved to the maternity pen the cow/heifer will be checked every 1-2 hours
5.	Calf delivery protocols include proper sanitation of the cow and equipment prior to assisting. Employees will be trained on identifying when the veterinarian should be called for assistance.
6.	Monitor the expulsion of fetal membranes and their removal from the area.
7.	All calving related events will be recording in the calf health record book

Veterinarian of Record Signature: _____ Date: _____

New Born Calf Team			
1.		Shift:	
2.		Shift:	
3.		Shift:	
Each member of the team will be provided training on how to care for newborn calves, including feeding, handling and transporting.			

Newborn Calf Management Procedures	
1.	If calf does not breathe readily, rub the calf with dry towel to stimulate breathing, wipe nose and mouth clean.
2.	Treat/dip the umbilical cord with iodine.
3.	*Calves of both sexes will be fed ___ qts. of quality colostrum within ___ hours of birth.* Best practice is to feed colostrum within 1-4 hours. No calf should exceed 6 hours without colostrum.
4.	All heifers and bull calves will be identified with an ear tag or ear clip.
5.	All data will be recorded in the calf health record book, including any health products that may have been administered according to farm and/or veterinarian protocols.
6.	**Moving Calves:** • Calves will be moved to a clean, warm, dry, and heavily bedded calf specific area. If the temperature is below 32 F°, an external heat source will be provided. • If the calf can walk, it will be moved to its pen using gentle pressure on its rump while guiding the calf by its head with one hand under its jaw. • A calf will never be moved by the pulling on tail or by the ear, or by dragging. • If not walking easily, the calf will be moved by carrying it with both hands, supporting the calf with both arms around the chest and rump or by placing it gently in a clean calf transport vehicle (sled, wheel barrow or cart) to its home pen.
7.	All calving related events will be recording in the calf health record book

Veterinarian of Record Signature: _____ Date: _____

Emergency Response SOP

Emergency Response protocols are important for the safety of your employees and your cattle.

Work with your veterinarian to develop an emergency protocol that will serve your farm effectively.

Review protocols annually with the employee(s) responsible for emergency response.

Objective: To protect the health and welfare of all cattle in the herd by (1) identifying when an emergency situation may be likely (2) ensure quick and effective responses to an emergency (3) minimize the impact of an emergency wherever possible

Principles: Emergency situations may not all be preventable but we can prepare our employees to respond effectively to minimize the impact of emergencies on our business and the health and welfare of our cattle.

Farm:		
Veterinarian of Record:		
Emergency Response/Planning	**Employee(s) responsible:**	**Check if Process in Place**
1. ***Emergency Contact List:*** Posted in a prominent area in a language(s) that can be read by all employees. ***Persons listed at minimum:*** ✓ ***Farm Owner*** ✓ ***Farm Manager*** ✓ ***Veterinarian of Record*** ✓ ***Local Fire Department***		☐
2. ***Fire Extinguishers:*** Charged and placed for immediate control of small fires, particularly where livestock are confined indoors.		☐
3. Back Up Power - Independent generator available for emergencies. Check monthly for functioning and immediately when an emergency event is foreseen. *? Does the generator provide enough power to supply:* ✓ Milking Equipment ✓ Bulk Tank Milk Cooling ✓ Pumps for water supply to livestock		☐
4. Back Up Fuel: 2 -3 day supply for generators and other equipment.		☐
5. Insurance: Up to date coverage for buildings and livestock		☐
6. ***Animal Identification*****:** Each animal has an easily recognizable form of identification.		☐
7. Water Supply: Available for 2-3 days in power outage.		☐
8. Feed Supply: Available for 2-3 days without restocking.		☐
9. First Aid Supplies: Animal and human first aid kits stocked and readily available.		☐
10. Equipment /Tractors and Machinery: Fueled and ready for access.		☐
11. Employee Feed and Housing: Is there… ✓ An area designated where employees can stay/sleep ✓ Food available to feed employees for 2-3 days ✓ Spare clothing for employees		☐

*Adapted from :Cornell University Cooperative Extension Ontario County "Dairy and Livestock Farm Disaster Preparedness and Recovery Guidelines."

Veterinarian of Record: _____ Date: _____

Biosecurity SOP

Work with your veterinarian to develop a biosecurity protocol that will protect your cattle effectively.

Review protocols annually with all employee(s) responsible for biosecurity measures.

Objective: To protect the health and welfare of all cattle in the herd by (1) preventing the introduction of pathogens to this farm (2) preventing the spread of disease on the farm and (3) contain the spread of pathogen from this farm to another

Principles: All animals and humans working on and visiting the farm present a risk as they may spread disease from one animal to another or bring disease onto the farm. This risk will be minimized wherever possible.

Farm:		
Veterinarian of Record:		
Biosecurity Measures	**Employee(s) responsible:**	**Check if Process in Place**
1. ***A Herd Health Plan (HHP)*** **is in place with the Veterinarian of Record**: The health of all livestock will be assessed and all livestock will be vaccinated according to the herd vaccination protocol prior to arrival to minimize the risk of disease introduction.		☐
2. All new livestock will be segregated and observed for 14 days upon arrival and vaccinated according to the HHP if they had not been prior.		☐
3. ***Biosecurity signs*** are posted at the farm entrance and at the farm office.		☐
4. Signs are posted instructing all visitors to check in with the farm management upon arrival.		☐
5. All employees will direct any unexpected visitors immediately to the management office or to management personnel.		☐
6. Visitors that have traveled abroad may not be on premises for 14 days after returning to the US/Canada.		☐
7. All visitors will wear disposable shoe-covers or wear shoes/shoe covers that have been disinfected prior to entering the farm.		☐
8. Where possible the farm boundaries will be secured by fences which are clearly marked with biosecurity signs.		☐
9. All service providers including nutritionists, veterinarians, hoof trimmers, and AI technicians will wear clean clothes and will clean and disinfect all equipment prior to use including but not limited to boots, trimming chutes and hoof trimming tools.		☐
10. Semen and embryos will be purchased through a reputable source that has documented protocols in place for the control of infectious organisms and that practice proper on-farm biosecurity.		☐

Veterinarian of Record: _____ Date: _____

Preventing the Spread of Disease on the Farm		
Biosecurity Measures	**Employee(s) responsible:**	**Check if Process in Place**
1. Employees are provided an area where they can wash their hands and disinfect their footwear when moving from one job to the next.		☐
2. Employees will follow all posted sanitation and biosecurity protocols.		☐
3. The farm has implemented and follows a pest control program.		☐
4. All manure, waste and deadstock is stored and disposed of in such a way that the risk of disease spread is minimized, avoiding potential contact with livestock.		☐
5. ***Equipment used for feeding is cleaned and disinfected after other uses OR equipment used for feeding will not be used for any other tasks that may result in manure contamination.***		☐
6. Calves are born in a clean environment and moved to a calf area away from potential adult cow manure contamination as soon as possible.		☐
7. Cows diagnosed with the following diseases or with clinical signs of the disease will be culled from the herd **or segregated** and handled appropriately to minimize the risk of spreading disease: ✓ Johne's ✓ BVD (Bovine Viral Diarrhea) ✓ Staph aureus , mycoplasma or other contagious mastitis ✓ Pneumonia ✓ Salmonella ✓ BLV (Bovine Leukosis)		☐
8. ***A permanent ID*** will be given to all livestock so that adequate records of disease and treatments can be kept.		☐
9. Sick animals will be isolated from the healthy herd and should not be kept with fresh cows as they are the most susceptible to disease.		☐
10. ***Health records will be kept for all life stages and for all health events.***		☐

Containing Disease		
Biosecurity Measures	**Employee(s) responsible:**	**Check if Process in Place**
1. All employees will be trained to report sick animals, suspicious activity or people to management		☐
2. ***All employees will have access to the Veterinarian of Record's phone number and Emergency contact information***		☐

Veterinarian of Record: _____ Date: _____

Employee Training

Objective: To ensure that all employees have the training and knowledge to handle all animals on this farm with CARE, PATIENCE and COMPASSION.

Principles: All employees (or family members who are regularly responsible for the daily care and treatment of cattle) will recieve basic stockmanship training and refresher training in a language they understand.

Training to be completed by all employees includes:

1. *Each employee will review and sign the Cattle Care Agreement (or equivalent) prior to working with any cattle.*

2. *The Merck Dairy Care 365 training modules (or equivalent) will be completed by each employee prior to working independently with cattle* – modules can be accessed on line at http://training.dairycare365
    a. Dairy Stockmanship – Introduction to Dairy Stockmanship
    b. Handling Down Cows
    c. Low Stress Handling of Dairy Calves and Heifers
    d. Newborn Care and Handling

✓ If a printer is available, each employee will have the certificate of completion printed and signed.

✓ The signed certificate will be kept with the employee training log.

✓ Regardless of the type of training, the event will be recorded in the Employee Training Log.

New Employees:

1. *Must complete all training before working independently with animals on the farm.*

2. Will work with experienced employees to learn job specific farm procedures that are not covered in the training modules (or equivalent training) before working independently.

All Employees:

1. *Will be retrained immediately when evidence indicates that animals are not being handled properly or other farm procedures are not being followed.*

2. *Will complete Job/Duty specific and basic stockmanship refresher training during the year either by informal on the job sessions, by organized meetings, or as a part of regularly scheduled management meetings.*

Veterinarian of Record Signature: _____ Date: _____

DAIRY WELL
Science Driven, Cow Centered

Appendix C

Form Templates

Dairy Well Pre-Evaluation Check List

A. Farm Information

Farm:		Farm Owner:			
		Farm Manager:			
Address:					
City:		State:		Zip:	
Phone:		Email:			
# of Employees:					
Veterinarian of Record (VOR) :		VOR Phone:			
		VOR email:			

# of Lactating Cows:			
Lactating Cow Housing Type:		Lock-ups?	
# of Pens:		Are there bulls in any pens? If yes which pens?	
Which Pen # represents the OLDEST, HIGH producing cows?			
What time is that pen milked? (If <100 Cows, when does milking start?)		What pen and what time is the pen before & after that milked?	
How long does it take to milk the Old/High string OR all cows if <100?			

# of Heifers on site		# of Dry Cows:	
Heifer Housing Type:		Dry Housing Type:	
# of Heifer Pens:		# of Pens:	

# of Milk Fed Calves:			
Milk Fed Calf Housing Type:		What time are calves fed?	

Internet Available?				
Will they need a loaner dvd player?				
Is it OK to Take Pictures (signed Photo release)?	For documentation only	☐	For Documentation & Teaching/Training	☐

Dairy:

Cattle Care Agreement

Our success is dependent on the health and welfare of cattle.

As owners of dairy, the contract we have with our cattle requires that at all times all cattle are treated humanely with patience, dignity and respect. We make every effort to avoid undue pain and suffering and we do not and will not tolerate neglect or willful abuse of any animal on our farm. *We expect that all employees will adhere to our cattle handling farm policies and procedures. This includes proper treatment of cattle as well as providing adequate food, water and shelter in addition to reporting immediately any observed act of neglect or willful abuse to a supervisor.*

Prior to working with our cattle employees will be trained on proper stockmanship, the low stress animal handling skills for working with cattle on a day to day basis. Low stress handling will be used so that cattle are moved in a way that minimizes stress and injury. *Excessive force with any blunt object, stick or other object will not be used when handling cattle. Electric prods may never be used on calves and may only be used on adult cattle in a single event when other efforts have failed. Willful abuse includes but is not limited to repeated use of a prod, using a prod in the face or other sensitive areas, kicking, hitting, or beating cattle and is unacceptable on our farm.*

All live calves will be handled and moved gently. *Calves will not be moved by dragging. Ears and tails are not handles to move or lift calves. Willful abuse of calves includes, but is not limited to, kicking, hitting, beating, dragging or dropping calves and is unacceptable on our dairy.*

Cattle that are seriously injured, with little or no chance of recovery, obviously suffering, and/or not fit for market, will be euthanized. Euthanasia will be conducted using methods approved by the American Association of Bovine Practitioners. Down cattle will be evaluated as soon as possible to determine if they are likely to recover and will be re-evaluated at least every 12 hours. Down cattle must have access to feed, water, and shelter. Posted protocols for movement and care of down and/or injured cattle will always be followed.

The welfare and care of the dairy's animal population is every employee's shared responsibility. Open discussion of the dairy's stated welfare expectations and our results is invited and encouraged.

I, _____, as an employee of _____ dairy, recognize the importance of animal welfare and agree I have a responsibility to care for animals in accordance with the farm's stated policies.

☐ I have read this cattle care agreement and I am committed to providing optimal care and respect for all animals

☐ I understand that it is my obligation to immediately report any situation where it appears that animals are being mistreated and that I will not be retaliated against by management or other employees.

☐ I understand that I may be dismissed immediately if I fail to report any situation where it appears that animals are being mistreated.

_____Employee/Date **_____Supervisor/Date**

Veterinarian Client Patient Relationship (VCPR) Agreement

A Valid VCPR requires the following:

- ✓ The farm owner consents to entering into this VCPR
- ✓ The Veterinarian of Record (VOR) has sufficient knowledge of the farm and animals
- ✓ The VOR takes responsibility for making medical judgments regarding the health and welfare of cattle on the farm
- ✓ The farm owner and farm management/workers each agree to follow the VOR's instructions
- ✓ The VOR is available for follow up and agrees on a schedule for timely visits
- ✓ *If farm owners, managers or workers use or administer drugs contrary to the VOR's instructions, it is a violation of the VCPR, making this agreement null and void.*

Farm Information

Owner Name: _____ Date: _____

Mailing Address: _____ City: _____ State: _____

Farm Name: _____

Farm Address (if different from above): _____

Primary Phone: _____ Fax: _____ Email: _____

Animal Groups covered in this VCPR:					
Lactating cows	☐	Breeding Age Heifers	☐	Dry Cows	☐
Weaned calves	☐	Milk fed calves	☐		

Veterinarian of Record Information: *The **veterinarian of record** takes responsibility for making medical judgments on the farm regarding the health and welfare of animals and is the responsible party for providing appropriate oversight of drug use on the farm. Such oversight is critical in establishing and maintaining a VCPR. This oversight should include establishment of treatment protocols, training of personnel, review of treatment records, monitoring use of all drugs regardless of where or from whom the drugs are distributed.*

Name: _____ Clinic Name: _____

Mailing Address: _____ City: _____ State: _____

Primary Phone: _____ Email: _____

State Licensed in _____ Other: _____

Before signing this agreement, the following must be completed:

- ☐ VOR documents and reviews annually an Approved Drug List, noting condition to be treated, proper dose, route and withdrawal times
- ☐ Farm management develops and commit to maintaining a Treatment Record System (written or computer based)
- ☐ VOR reviews SOPs and treatment protocols (original documents must be signed by VOR, annual SOP review check list can be signed for SOPs that have not changed)

I hereby certify that a valid VCPR is established for the above listed farm and veterinarian and will remain in force until canceled by either party, or 1 year from the signature date below.

Farmer/Owner Signature: _____ **Date:** _____

Veterinarian of Record Signature: _____ **Date:** _____

Veterinarian of Record: ____________________ Date: __________ VOR Signature: __________

Calf & Heifer Approved Drug List

(These are the only drugs to be used on my farm)

Drug (Active Ingredient)	Company Product Name	Source /Prescribing DVM	Animal Condition & Production Class	Dose	Route	Duration	Meat w/hold

Veterinarian of Record: _____ **Date:** _____ **VOR Signature:** _____

Lactating Cow Approved Drug List

(These are the only drugs to be used on my farm)

Drug (Active Ingredient)	Company Product Name	Source /Prescribing DVM	Animal Condition & Production Class	Dose	Route	Duration	Milk w/hold	Meat w/hold

CALF & HEIFER DAILY HEALTH RECORD

*** All health events should be recorded including deaths, euthanasia and sickness even if not treated with medication**

FARM:_____ **Start Date:**_____ **End Date:**_____

ID	PEN	Days/Time OF TREATMENT				Problem	TREATMENT USED (including method of euthanasia)	DOSE & Route (SQ, IM, IV, Oral)	Initials of Person Treating	MEAT Withhold (days)	DATE MEAT W/HOLD PERIOD EXPIRES	Date if SOLD	REMARKS
		First Day	Last Day	AM	PM								
1234	1	1/16/17		X		Pneu	RF	12 ml SQ	JW	38 d	2/23/17	…….	fever 105, no eat. Better 1/18

COW DAILY HEALTH RECORD

*** All health events should be recorded including deaths, euthanasia and sickness even if not treated with medication**

FARM:____________________ **Start Date:** ____________________ **End Date:** ______________________________

COW ID	PEN	Days/Time OF TREATMENT				Problem	Qtr. Tx'd	TREATMENT USED (including method of Euthanasia)	DOSE & ROUTE (SQ, IM, IV, Oral, IMM)	WITHHOLD TIME		CALCULATED WITHHOLD PERIOD EXPIRES	DATE MILK IN TANK or COW SOLD	Initials of person treating & REMARKS (including residue test results)
		First Day	Last Day	AM	PM					MILK (hrs)	MEAT (days)			
1234	2	2/16/17	2/16/17	X	X	MAST	~~LF~~ RF LR RR	Today	1 tube IMM	96	4	Milk: 2/21 AM Meat: 2/21 AM	21-Feb	JW - Hard quarter, clear on 2/21
5678	4	2/16/17		X		Dry	~~LF~~ ~~RF~~ ~~LR~~ ~~RR~~	Qmaster	1 tube ea IMM	96	60	Milk: Meat: 4/16/17		JW - leg bands
1234	1	3/2/17		X		Lame-Hwart RR	LF RF LR RR	Tet Wrap	2gm-wrap	24	1	Milk: 3/3 PM Meat: 3/3 PM	3/3 PM	JW - needs hoof trim, recheck 3/21
							LF RF LR RR					Milk: Meat:		
							LF RF LR RR					Milk: Meat:		
							LF RF LR RR					Milk: Meat:		
							LF RF LR RR					Milk: Meat:		
							LF RF LR RR					Milk: Meat:		
							LF RF LR RR					Milk: Meat:		
							LF RF LR RR					Milk: Meat:		
							LF RF LR RR					Milk: Meat:		
							LF RF LR RR					Milk: Meat:		
							LF RF LR RR					Milk: Meat:		
							LF RF LR RR					Milk: Meat:		

Dairy: _____

Date: _____

3rd Party Audit Summary

Critical Criteria	
Critical Non-Conformance – requires immediate corrective action ☐	
Non-ambulatory Cattle Evaluation Acceptable ☐	**Adult Cattle:** **Calves:**
No Observed Acts of Abuse ☐	
All Cattle have Water ☐	**Adult Cattle:** **Young stock:**
Level 1 Dairy Well Assured ☐	
Non-Complaint Level 1 ☐	
Documentation & Confirmation of Training ☐	**Cattle care agreement:** **Stockmanship Training:**
Tail Docking Not Practiced ☐	
Udder Health ☐	SCC for previous 3 months: < 400,000 ☐ SCC for previous 12 months: <400,000 ☐
VCPR ☐	
Records ☐	**Individual animal ID:** **Health records:**
Written SOP's & Confirmation of Employee Knowledge ☐	

Level 2 Dairy Well Elite ☐	
Calves	**Environment:** **Body Condition:** **Painful Procedures:**
Growing Heifers	**Environment:** **Body Condition:**
Lactating Cattle **Top 76-100%** ☐ **Middle 26-75%** ☐ **Bottom 25%** ☐	**Environment:** **Body Condition:** **Goals** **Hygiene: ≤ 25% Score 3** *Results -* **Lameness: ≤15% lame; ≤ 1 % score severely lame** *Results -* **Hocks: ≤1% severe** *Results -* **Knees: ≤1% severe** *Results-* **Injuries: ≤2%** *Results -* **Broken Tails: 0%** *Results -*
Sick Cows/Hospital Pen	**Environment:** **Body Condition:** **Care:**
Dry Cows	**Environment:**

General Overview

Notes:

Auditor Name & Signature: _____

Farm Representative Name & Signature: _____

3rd Party Process – Each farm will be audited to each criterion in the instrument and the outcome reported to the 3rd party audit client. Any critical non-conformance should be reported directly to the client. It is the responsibility of the client to coordinate and ensure any necessary follow-up.

Possible designations for 3rd party audit outcomes include:

1) Critical Non-Conformance
2) Non-Complaint – Level 1 Criteria are not complete
3) Dairy Well Assured – All Critical and Level 1 Criteria are met, Level 2 Goals not Met
4) Dairy Well Elite- All Critical, Level 1 and Level 2 Criteria & Goals are met

Locomotion Performance Benchmark:

Top 76-100% (≤15% moderate lameness, ≤1% severe lameness)
Middle 26-75% (16-32% moderate lameness, 2-5 % severe lameness)
Bottom 25% (>32% moderate lameness, >5% severe lameness)

Severe Hock Performance Benchmark:

Top 76-100% (≤1% severe hocks)
Middle 26-75% (2-7% severe hocks)
Bottom 25% (>7% severe hocks)

Appendix D

AVMA Guidelines – Humane Euthanasia

AABP Guidelines – Humane Euthanasia, Non-Ambulatory Cattle, VCPR and Transportation

AVMA Guidelines for the Euthanasia of Animals: 2013 Edition

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Aquatics—Craig Harms, DVM, PhD, DACZM; Helen Roberts, DVM; Nick Saint-Erne, DVM; Michael Stoskopf, DVM, PhD, DACZM
Avian—Laurel Degernes, DVM, MPH, DABVP; Laurie Hess, DVM, DABVP; Kemba Marshall, DVM, DABVP; James Morrisey, DVM, DABVP; Joanne Paul-Murphy, DVM, DACZM, DACAW
Companion Animals—Kathleen Cooney, MS, DVM; Stacey Frick, DVM; John Mays; Rebecca Rhoades, DVM
Equids—Fairfield Bain, DVM, MBA, DACVIM, DACVP, DACVECC; Midge Leitch, VMD, DACVS; Thomas R. Lenz, DVM, MS, DACT; Nathaniel Messer, DVM, DABVP; Hayden Sears, DVM; Stuart Shoemaker, DVM, ACVS
Food and Fiber Animals—Eric Benson, PhD; C. Scanlon Daniels, DVM, MBA; John Deen, DVM, PhD, DABVP, DACAW; Robert Evans, PhD, DVM, DACPV; Jerome Geiger, DVM, MS; Dee Griffin, DVM, MS; Christa Goodell, DVM; Glen Johnson, DVM; Richard Reynnells, PhD; James Reynolds, DVM, MVPM, DACAW; Bruce Webster, PhD
Laboratory Animals—James Artwhol, MS, DVM, DACLAM; Larry Carbone, DVM, PhD, DACLAM; Paul Flecknell, VetMB, MRCVS, PhD, DECVA, DECLAM, DACLAM, FRCVS; David P. Friedman, PhD; Kathleen Pritchett-Corning, DVM, DACLAM, MRCVS
Reptiles, Zoo and Wild Animals—Scott Citino, DVM, DACZM; Mark Drew, DVM; Julie Goldstein, DVM; Barry Hartup, DVM, PhD; Gregory Lewbart, MS, VMD, DACZM; Douglas Mader, MS, DVM, DABVP, FRSM; Patrick Morris, DVM, DACZM

mals already under anesthesia may be euthanized by an overdose of anesthetic.

Carbon dioxide—While CO_2 is an effective method of euthanasia, its use as the sole agent in rabbits results in apparent distress to the rabbit. Premedication with sedative agents will allow for the administration of CO_2 for euthanasia.

S2.4.3.2 Physical Methods

Cervical dislocation—Cervical dislocation is acceptable with conditions for rabbits when performed by individuals with a demonstrated high degree of technical proficiency. The need for technical competency is great in heavy or mature rabbits in which the large muscle mass in the cervical region makes manual cervical dislocation more difficult. Commercial devices designed to aid in rabbit cervical dislocation are available and should be evaluated for their effectiveness.

Penetrating captive bolt—The use of rabbit-sized penetrating captive bolts to euthanize rabbits in laboratory or production facilities is acceptable with conditions. The captive bolt must be maintained in clean working order, positioned correctly, and operated safely by trained personnel.

S2.4.4 Special Cases

When rabbits to be euthanized are in a surgical plane of anesthesia, adjunctive methods such as delivery of potassium chloride, exsanguination, or bilateral thoracotomy are acceptable.

S2.5 LABORATORY FINFISH, AQUATIC INVERTEBRATES, AMPHIBIANS, AND REPTILES

Recommending euthanasia methods for finfish, aquatic invertebrates, amphibians, and reptiles used in biomedical research is challenging due to the enormous number of species and variations in biological and physiologic characteristics. Methods for euthanizing species commonly used in research are discussed in detail in the relevant sections of the Guidelines. See these sections for additional information.

As described in the aquatics section it is acceptable for zebrafish (*Danio rerio*) to be euthanized by rapid chilling (2° to 4°C) until loss of orientation and operculum movements and subsequent holding times in ice-chilled water, specific to finfish size and age.[316,461,462] Adult zebrafish should be exposed for a minimum of 10 minutes and fry 4 to 7 days after fertilization (dpf) for at least 20 minutes following loss of operculum movement. Rapid chilling (as well as MS 222) has been shown to be an unreliable euthanasia method for embryos < 3 dpf. To ensure embryonic lethality these methods should be followed with another agent such as diluted sodium or calcium hypochlorite solution.[462] If necessary to ensure death of other life stages, rapid chilling may be followed by either an approved adjunctive euthanasia method or a humane killing method. Until further research is conducted, rapid chilling is acceptable with conditions for other small-bodied tropical and subtropical stenothermic species.

Amphibian species commonly used in research include the African clawed frog (*X laevis*) and leopard and bull (*Rana* spp) frogs. These species are best euthanized via a physical method while fully anesthetized.

S3. ANIMALS FARMED FOR FOOD AND FIBER

Methods acceptable with conditions are equivalent to acceptable methods when all criteria for application of a method are met.

3.1 GENERAL CONSIDERATIONS

While some methods of slaughter and depopulation might meet the criteria for euthanasia identified by the POE, others will not and comments in this document are limited to methods used for euthanasia. The following section relates to species of animals domesticated for agricultural purposes, specifically cattle, sheep, goats, swine, and poultry, regardless of the context in which that animal is being kept or the basis for the decision to euthanize it.

Handling of animals prior to euthanasia should be as stress free as possible. This is facilitated by ensuring that facilities are well designed, appropriate equipment is available, and animal handlers are properly trained and their performance monitored.[101,105–108]

Regardless of the method of euthanasia used, death must be confirmed before disposal of the animal's remains. The most important indicator of death is lack of a heartbeat. However, because this may be difficult to evaluate or confirm in some situations, animals can be observed for secondary indicators of death, which might include lack of movement over a period of time (30 minutes beyond detection of a heart beat) or the presence of rigor mortis.

S3.2 BOVIDS AND SMALL RUMINANTS

S3.2.1 Cattle

S3.2.1.1 Acceptable Methods

S3.2.1.1.1 Noninhaled Agents

Barbiturates and barbituric acid derivatives—Barbiturates act rapidly and normally induce a smooth transition from consciousness to unconsciousness and death—a desirable outcome for the operator and observers. Although cost may be a deterrent to the use of barbiturates for euthanasia of large and large numbers of animals, these agents tend to be less expensive than other injectable pharmaceuticals. Drawbacks to the use of barbiturates are that their administration requires adequate restraint of the animal, personnel who are registered with the US DEA (and other appropriate state authority where required), use by under the supervision of a veterinarian (because their use in food is extralabel), strict control over the drug with accounting of the amount used,[463] and fewer options for disposal of animal remains because of potential residues.

S3.2.1.2 Acceptable With Conditions Methods

S3.2.1.2.1 Physical Methods

Gunshot—Gunshot is the most common method used for on-farm euthanasia of cattle.[464] Death is caused

by destruction of brain tissue and the degree of brain damage inflicted by the bullet is dependent on the firearm, type of bullet (or shotshell for shotguns), and accuracy of aim.

Handguns—Handguns or pistols are short-barreled firearms that may be fired with one hand. For euthanasia, use of handguns is limited to close-range shooting (within 1 to 2 feet or 30 to 60 cm) of the intended target. Calibers ranging from .32 to .45 are recommended for euthanasia of cattle.[351] Solid-point lead bullets are preferable to hollow-point bullets because they are more likely to traverse the skull. Hollow-point bullets are designed to expand and fragment on impact with their targets, which reduces the depth of penetration. Under ideal conditions and good penetration of the skull, hollow-point bullets are able to cause extensive damage to neural tissues; however, because penetration of the skull is the first criterion in euthanasia, a solid lead bullet is preferred. The .22 caliber handgun is generally not recommended for routine euthanasia of adult cattle regardless of bullet used, because of the inability to consistently achieve desirable muzzle energies with standard commercial loads.[351]

Rifles—A rifle is a long-barreled firearm that is usually fired from the shoulder. Unlike the barrel of a shotgun, which has a smooth bore for shot shells, the bore of a rifle barrel contains a series of helical grooves (called rifling) that cause the bullet to spin as it travels through the barrel. Rifling imparts stability to the bullet and improves accuracy. For this reason, rifles are the preferred firearm for euthanasia when it is necessary to shoot from a distance.

Rifles are capable of delivering bullets at much higher muzzle velocities and energies and thus are not the ideal choice for euthanasia of animals in indoor or short-range conditions. General recommendations on rifle selection for use in euthanasia of cattle include .22, .223, .243, .270, .308, and others.[130,350,351] Results of at least one study[350] suggest that the .22 LR may not be the best selection of a firearm for euthanasia of adult cattle because of poor penetration, deflection, and fragmentation of the bullet. Standard- and high-velocity bullets fired from a .22 caliber rifle at a range of 25 m failed to penetrate skulls of steers and heifers studied. On the other hand, the .223 and .30-06 performed satisfactorily (eg, traversed the skull and caused sufficient brain damage to cause death) when fired from a distance of 25 m.[350] This is in agreement with similar information indicating that .22 Magnum or larger-caliber firearms provide higher muzzle energies and more consistent results when delivered to the proper anatomic site.[130]

When the most appropriate firearm is being chosen for the purpose of euthanasia, there are several factors to be considered, including caliber of the firearm, type of bullet or shotshell, distance from the target, age of the animal (aged animals have harder skulls), sex of the animal (bull or cow), and accuracy of aim. Based upon available information, if a .22 LR is to be used the following conditions apply: (1) the firearm of choice is a rifle, (2) a solid-point bullet should be used, (3) it must be fired within close range of the skull (within 1 to 3 feet), and (4) the bullet must be directed so that proper anatomic placement on the skull is assured.[347]

Shotguns—Shotguns loaded with birdshot (lead or steel BBs) or slugs (solid lead projectiles specifically designed for shotguns) are appropriate from a distance of 1 to 2 yards (1 to 2 m). Although all shotguns are lethal at close range, the preferred gauges for euthanasia of cattle are 20, 16, or 12. Number 6 or larger birdshot or shotgun slugs are the best choices for euthanasia of cattle.[351] Birdshot begins to disperse as it leaves the end of the gun barrel; however, if the operator stays within short range of the intended anatomic site, the birdshot will strike the skull as a compact bolus or mass of BBs with ballistic characteristics on entry that are similar to a solid lead bullet. At close range, penetration of the skull is assured with massive destruction of brain tissue from the dispersion of birdshot into the brain that results in immediate loss of consciousness and rapid death.

The Canadian study[350] cited previously evaluated several firearms, including the .410 and 12-gauge shotguns. The .410 loaded with either number 4 or number 6 birdshot fired from a distance of 1 m was very effective and had the advantage of less recoil compared with other firearms used. The 12-gauge shotgun loaded with number 7 1/2 birdshot fired from a distance of 2 m from its target was effective but considered to be more powerful than necessary. Results of a 1-oz rifled slug fired from a 12-gauge shotgun at a distance of 25 m failed to penetrate the brain not because it lacked power, rather because of faulty shot placement. Researchers concluded that the rail sighting system on the shotgun was not sufficient for accurate shot placement if it was necessary to shoot from a distance. They also believed that recoil from this firearm would likely make it unpleasant to use if it were necessary to euthanize a large number of animals.[350]

One advantage of euthanasia using a shotgun is that when properly directed the birdshot will have sufficient energy to penetrate the skull but is unlikely to exit the skull. In the case of a free bullet or shotgun slug there is always the possibility of the bullet or slug exiting the skull, creating an injury risk for operators and observers. For operator and bystander safety, the muzzle of a shotgun (or any other firearm) should never be held directly against the animal's head. Discharge of the firearm results in development of enormous pressure within the barrel that can result in explosion of the barrel if the muzzle end is obstructed or blocked.

Penetrating captive bolt—Penetrating captive bolts are used for euthanasia of mature cattle in field situations. Styles include in-line (cylindrical) and pistol grip (resembling a handgun) versions. Pneumatic captive bolt guns (air powered) are limited to use in slaughter plant environments. Models using gunpowder charges are more often used in farm environments. They consist of a steel bolt and piston at one end, housed within a barrel. Upon firing, the rapid expansion of gas within the breech and barrel propels the piston forward driving the bolt through the muzzle. A series of cushions are strategically located within the barrel to dissipate

excess energy of the bolt. Depending upon model, the bolt may automatically retract or require manual placement back into the barrel through the muzzle. Accurate placement over the ideal anatomic site, energy (ie, bolt velocity), and depth of penetration of the bolt determine effectiveness of the device to cause a loss of consciousness and death. Bolt velocity is dependent on maintenance of the captive bolt gun (cleaning and replacement of worn parts), as well as proper storage of the cartridge charges. Bolt velocities of 55 to 58 m/s are desirable for effective captive bolt use in slaughter plants.[332,333,465,466] Recommended minimum bolt velocities proposed for shooting bulls are as high as 70 m/s. In slaughter plants where bolt velocity is of particular concern, bolt velocity is routinely monitored to assure proper function of these devices.[467]

In general, captive bolt guns, whether penetrating or nonpenetrating, induce immediate loss of consciousness, but death is not always assured with the use of this device alone. In a study of 1,826 fed steers and heifers only 3 (0.16%) had signs of a return to sensibility or consciousness.[336] Results were similar in observations of 692 bulls and cows where 8 (1.2%) animals had signs consistent with a return to consciousness.[336] Failure to achieve a 100% loss of consciousness with no return to a conscious mental state was attributed to storage of the captive bolt charges in a damp location, poor maintenance of firing pins, inexperienced personnel operating the captive bolt (use of the incorrect anatomic site), misfires associated with a dirty trigger on the captive bolt, and use of the device on cows and bulls with thick, heavy skulls.[336]

At the present time, an adjunctive method such as exsanguination, pithing, or the IV injection of a saturated solution of potassium chloride is recommended to ensure death when penetrating captive bolt is used.[347] A newer version of penetrating captive bolt has emerged in recent years.[130] This device is equipped with an extended bolt with sufficient length and cartridge power to increase damage to the brain, including the brainstem. This device is being studied at the present time and may offer a euthanasia option with the penetrating captive bolt that does not require the need for an adjunctive method.

Captive bolt guns are attractive options for euthanasia because they offer a greater degree of safety to the operator and bystanders; but they should only be used by trained people. The muzzle should always be pointed toward the ground and away from the body or bystanders in case of accidental discharge. Protective gear for both ears and eyes is strongly recommended.

Unlike techniques described for gunshot, the animal must be restrained for accurate placement of the captive bolt. And, unlike use of a firearm, proper use of the captive bolt requires that the muzzle of the device be held firmly against the animal's head. Once the animal is restrained, discharge of the captive bolt should occur with little or no delay so that animal distress is minimized. Adjunctive methods should be implemented as soon as the animal is rendered unconscious to avoid a possible return to sensibility. Thus, when conducting euthanasia by captive bolt, preplanning and preparation improves the likelihood of a successful outcome.

Visual indicators that an animal has been rendered unconscious from captive bolt or gunshot include the following: immediate collapse; brief tetanic spasms followed by uncoordinated hind limb movements; immediate and sustained cessation of rhythmic breathing; lack of coordinated attempts to rise; absence of vocalization; glazed or glassy appearance to the eyes; and absence of eye reflexes.[101] Nervous system control of the blink or corneal reflex is located in the brainstem; therefore, the presence of a corneal reflex is highly suggestive that an animal is still conscious.

Anatomic landmarks for use of the penetrating captive bolt and gunshot—In cattle, the point of entry of the projectile should be at the intersection of two imaginary lines, each drawn from the outside corner of the eye to the center of the base of the opposite horn, or an equivalent position in polled animals (Figure 10).[342]

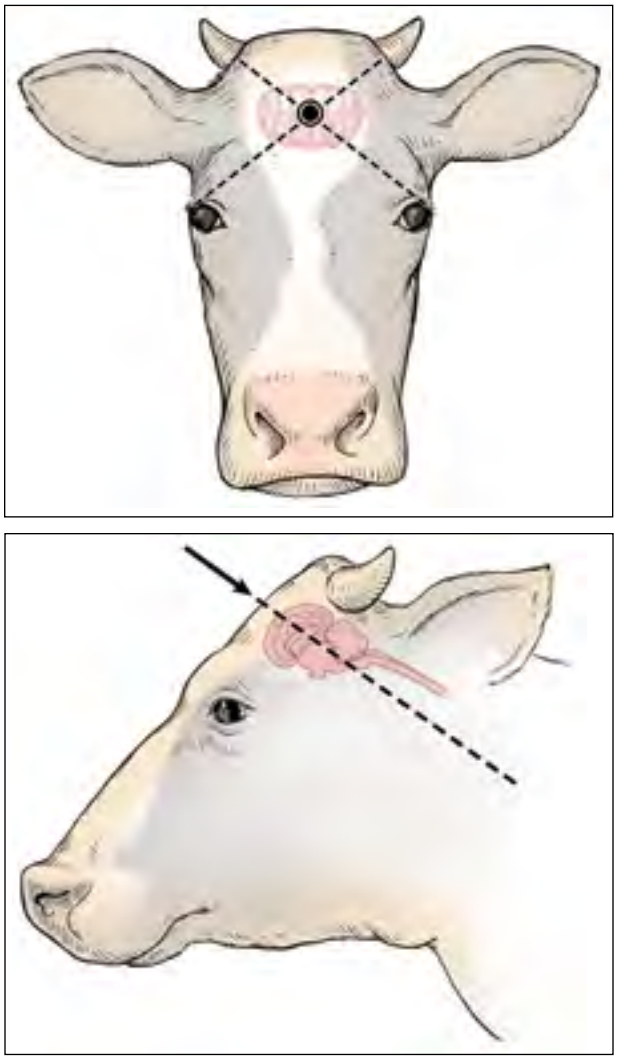


Figure 10—Anatomic site for gunshot or placement of a captive bolt and desired path of the projectile in cattle. The point of entry of the projectile should be at the intersection of two imaginary lines, each drawn from the outside corner of the eye to the center of the base of the opposite horn, or an equivalent position in polled animals. (Adapted with permission from Shearer JK, Nicoletti P. Anatomical landmarks. Available at: www.vetmed.iastate.edu/vdpam/extension/dairy/programs/humane-euthanasia/anatomical-landmarks. Accessed Jun 24, 2011.)

Firearms should be positioned so that the muzzle is perpendicular to the skull to avoid ricochet. Proper positioning of the firearm or penetrating captive bolt is necessary to achieve the desired results.

Use of the poll (bony protuberance on the top of the skull) for application of the penetrating captive bolt in slaughter plants is not allowed by regulations in the European Union because the depth of concussion in this region is less than that observed in frontal sites.[468] Conversely, for large bulls and water buffalo use of the frontal site for administration of a captive bolt is not always effective because of the thickness of the hide and skull in this region. Use of the poll position can be effective if the appropriate captive bolt gun is used and when the muzzle is directed so that the discharged bolt will enter the brain;[469] however, in most cases the poll position is not preferred. Research has demonstrated that use of the penetrating captive bolt at the poll is prone to operator error and misdirection of the bolt into the spinal cord instead of the brain.[469] More animals were not properly rendered unconscious (ie, depth of concussion was shallow) using the poll position as compared with frontal sites.

Placement of the captive bolt is critical to ensure that the bolt enters the brain and not the spinal cord. Shots from the poll should be directed toward the base of the tongue unless brainstem tissues are needed for diagnostic reasons. Whether poll shooting is conducted by penetrating captive bolt or gunshot, there is substantial potential for misdirection of the bullet or bolt and damage to the brain to achieve unconsciousness or death is not assured. This will result in delays in loss of consciousness and a greater likelihood of variable periods of extreme distress.

S3.2.1.3 Adjunctive Methods

S3.2.1.3.1 Noninhaled Agents

Potassium chloride and magnesium sulfate—While not acceptable as a sole method of euthanasia, rapid IV injection of potassium chloride may assist in ensuring death after cattle have been rendered unconscious by penetrating captive bolt, gunshot, or administration of general anesthetics (α-2-adrenergic agents such as xylazine alone are insufficient; see comments under Unacceptable methods). Normally, injection of 120 to 250 mL of a saturated solution of potassium chloride is sufficient to cause death; however, the potassium chloride solution should be administered until death is assured. When conducting euthanasia of cattle that may require subsequent administration of potassium chloride, the operator should prepare at least 3 to four 60-mL syringes of solution (equipped with 14- or 16-gauge needles) in advance. This will facilitate rapid administration and ensure the animal does not regain consciousness. Any available vein may be used; however, it is important to position oneself out of the reach of limbs and hooves that may cause injury during periods of involuntary movement. In most cases, it is safest to kneel down near the animal's back and close to the animal's head where one can reach over the neck to administer the injection into the jugular vein. Once the needle is in the vein, the injection should be delivered rapidly.

Magnesium sulfate may be administered similarly to potassium chloride. Death may not occur as rapidly, but similar to administration of potassium chloride, residue risks for predators and scavengers are low (see Noninhaled Agents).

S3.2.1.3.2 Physical Methods

Second shot—Although one well-placed bullet or shot from a penetrating captive bolt usually results in immediate loss of consciousness with little likelihood of return to consciousness, one should always be prepared to deliver a second or even a third shot if necessary. The additional injury to brain tissue along with increased hemorrhage and edema creates substantial intracranial pressure. Compression resulting from this increase in pressure interrupts centers in the brain that control respiratory and cardiac functions and leads to death.

Exsanguination—Exsanguination may be performed as an adjunctive measure to ensure death when necessary in an unconscious animal. Exsanguination is usually accomplished via an incision of the ventral aspect of the throat or neck transecting skin, muscle, trachea, esophagus, carotid arteries, jugular veins, and a multitude of sensory and motor nerves and other vessels. This procedure is not recommended as a sole method of euthanasia; rather it is reserved for use as an adjunctive method to ensure death since information in the literature is inconsistent as to the length of time between the neck cut and loss of consciousness. Some studies[418,470] demonstrate a rapid loss of brain activity (measured by EEG) with little variation between individual animals. In contrast, direct observation of time to collapse and EEG data indicate that the time from ventral-neck incision to unconsciousness is variable and may be quite prolonged in animals killed by exsanguination.[417,471–474]

Uncertainty in the time from the neck incision to loss of consciousness raises obvious questions: Does the animal feel pain during the neck cut? Does the drop in blood pressure cause discomfort or distress? Opinions on these questions remain divided. Some hold the view that when the knife (*sakin* in Hebrew) is of appropriate size, exceptionally sharp, completely free of blemishes or imperfections, and used in such manner as to create a rapid clean incision (such as performed by a shochet), exsanguination is relatively painless.[475] Others contend that tissues of the neck are well innervated with nocioceptive nerve fibers such that transection leads to significant pain and distress sufficient to cause shock at the time of incision.[476–478]

In recognition that this issue remains controversial and that people conducting these procedures for the purposes of euthanasia are not likely to have a sakin or the skills of a shochet, the recommendation is that exsanguination only be used in unconscious animals as an adjunctive method to assure death. It should be performed with a pointed, very sharp knife with a rigid blade at least 6 inches long and conducted as soon as the loss of consciousness is confirmed.

Exsanguination can be disturbing to observe due to the large volume of blood loss; this also raises biosecurity concerns. When only the carotid arteries and jugular

Glossary

Acceptable: A method considered to reliably meet the requirements of euthanasia. See EUTHANASIA.

Acceptable With Conditions: A method considered to reliably meet the requirements of euthanasia when specified conditions are met. See EUTHANASIA.

Adjunctive Method: A method of assuring death that may be used after an animal has been made unconscious.

Affect: The external expression of emotion.

Altricial: Immobile, blind, naked young animals (including but not limited to birds and some rodents) requiring parental care and feeding.

Anesthesia, General: A method used to produce unconsciousness. See UNCONCIOUSNESS.

Animal: Any nonhuman animal (Kingdom: Animalia).

Aversion: A desire to avoid or retreat from a stimulus.

Avian: Relating to birds.

Captive Bolt: A device used to kill or stun animals where a tethered metal rod is discharged into the brain of the animal.

Chick: A young bird.

Cremation: To incinerate a dead body. See INCINERATION.

Depopulation: The killing of animals in large numbers in response to an animal health emergency (eg, catastrophic infectious disease, mass intoxication, natural disaster) where all due consideration is given to the terminal experience of the animal, but the circumstances surrounding the event are understood to be exigent and extenuating. Depopulation may not meet the requirements of euthanasia due to situational constraints.

Distress: The effect of stimuli that initiate adaptive responses that are not beneficial to the animal—thus, the animal's response to stimuli interferes with its welfare and comfort.

Ectotherm: An organism that is dependent on environmental heat sources for regulating its body temperature.

Eustress: The effect of stimuli that initiate adaptive responses that are beneficial to the animal.

Euthanasia: A method of killing that minimizes pain, distress, and anxiety experienced by the animal prior to loss of consciousness, and causes rapid loss of consciousness followed by cardiac or respiratory arrest and death (see sections I3, I5, I6).

Exsanguination: The action of draining an animal of blood.

Fear: An unpleasant emotional experience caused by an awareness of a threat of danger.

Feral: A free-roaming, unowned animal of a domestic species that has reverted to wild behavior.

Field Conditions: Any situation outside of a controlled or clinical environment.

Finfish: a term used to describe true (vertebrate) fish as opposed to other non-fish aquatic animals such as the invertebrates "starfish" and "cuttlefish"

Good Death: see EUTHANASIA.

Harvest: The act or process of killing an animal for food or other products.

Humane Killing: Killing performed in a manner that minimizes animal distress, but may not meet the requirements of euthanasia due to situational constraints.

Incineration: To burn completely, to ashes.

Insensible: See UNCONSCIOUS.

Livestock: Domestic animals raised for use, consumption, or profit, typically on a farm.

Mass euthanasia: see DEPOPULATION.

Nociception: Neuronal impulses generated by noxious stimuli, which threaten to, or actually do, destroy tissue. Nociception can occur without consequential pain perception.

Pain: A sensation (perception) that results from nociceptive nerve impulses reaching areas of the brain capable of conscious perception via ascending neural pathways.

Pithing: Physical destruction of the brain with a wire, air jet, or rod.

Poikilotherm: An animal with a variable internal temperature. These animals are generally ectothermic.

Poult: A young fowl.

Poultry: Domestic fowl raised for meat or eggs, such as chickens, turkeys, ducks, or geese.

Precocious: Capable of a high degree of independent activity (ie, mobility, feeding) from birth.

Secondary Method: A euthanasia method employed subsequent to a primary method to ensure death of an unconscious animal before it can recover consciousness. See ADJUNCTIVE METHOD.

Sedation: A state of CNS depression in which the animal is awake but calm, and with sufficient stimuli may be aroused.

Slaughter: Killing animals for the purposes of harvesting commodities such as meat or hides.

Stress: The effect of physical, physiologic, or emotional factors (stressors) that induce an alteration in an animal's homeostasis or adaptive state.

Stunning: Rendering an animal unconscious by use of a physical, gas, or electrical method.

Suffocate: To kill by preventing access to air or oxygen.

Unacceptable: A method that does not meet the requirements of euthanasia. See EUTHANASIA.

Unconsciousness: Unconsciousness, defined as loss of individual awareness. This occurs when the brain's ability to integrate information is blocked or disrupted. Onset of unconsciousness is associated with loss of the righting reflex. An unconscious animal is therefore recumbent and, by definition, unable to perceive pain; however, unconscious animals may respond to noxious stimulation with spinally mediated involuntary movements depending on the degree of CNS depression present.

Wild: A free-roaming animal of a nondomestic species.

Appendix 1

Agents and methods of euthanasia by species.

Methods	Acceptable	Acceptable With Conditions (for Adjunctive Methods, see text)
Aquatic invertebrates	S6.3: Immersion in anesthetic solution (magnesium salts, clove oil, eugenol, ethanol)	S6.3: Adjunctive methods (second step) include 70% alcohol and neutral-buffered 10% formalin, pithing, freezing, boiling
Amphibians	S7.3: As appropriate by species—Injected barbiturates, dissociative agents and anesthetics as specified, topical buffered tricaine methanesulfonate or benzocaine hydrochloride	S7.3: As appropriate by species—Inhaled anesthetics as specified, CO_2, penetrating captive bolt or firearm, manually applied blunt force trauma to the head, rapid freezing
Avians (See also Poultry)	S5: Intravenous barbiturates	S5: Inhaled anesthetics, CO_2, CO, N_2, Ar, cervical dislocation (small birds and poultry), decapitation (small birds) S7.5: Gunshot (free-ranging birds)
Cats	S1: Intravenous barbiturates, injected anesthetic overdose, Tributame, T-61	S1: Barbiturates (alternate routes of administration), inhaled anesthetic overdose, CO,* CO_2,* gunshot*
Cattle	S3.2: Intravenous barbiturates	S3.2: Gunshot, penetrating captive bolt
Dogs	S1: Intravenous barbiturates, injected anesthetic overdose, Tributame, T-61	S1: Barbiturates (alternate routes of administration), inhaled anesthetic overdose, CO,* CO_2,* gunshot*
Finfish	S6.2: Immersion in buffered benzocaine or benzocaine hydrochloride, isoflurane, sevoflurane, quinaldine sulfate, buffered tricaine methanesulfonate, 2-phenoxyethanol, injected pentobarbital, rapid chilling (appropriate zebrafish/research setting)	S6.2: Eugenol, isoeugenol, clove oil, CO_2-saturated water (aquarium-fish facilities/fisheries), decapitation/cervical transection/manually applied blunt force trauma followed by pithing, rapid chilling followed by adjunctive method (aquarium-fish facilities), maceration (research setting)
Equids	S4: Intravenous barbiturates	S4: Penetrating captive bolt, gunshot
Marine mammals	S7.5 (captive): Injected barbiturates S7.7 (free ranging): Injected barbiturates or anesthetic overdose	S7.5 (captive): Inhaled anesthetics S7.7 (free ranging): Gunshot, manually applied blunt force trauma, implosive decerebration
Nonhuman primates	S2.3, S7.4: Injected barbiturates or anesthetic overdose	S2.3, S7.4 (as appropriate by species): Inhaled anesthetic, CO, CO_2
Poultry	S3.4: Injected barbiturates and anesthetic overdose	S3.4: CO_2, CO, N_2, Ar, cervical dislocation (as anatomically appropriate), decapitation, manual blunt force trauma, electrocution, gunshot, captive bolt
Rabbits	S2.4: Intravenous barbiturates	S2.4: Inhaled anesthetic overdose, CO_2, cervical dislocation (as anatomically appropriate), penetrating captive bolt
Reptiles	S7.3: As appropriate by species—Injected barbiturates, dissociative agents and anesthetics as specified	S7.3: As appropriate by species—Inhaled anesthetics as specified, CO_2, penetrating captive bolt or firearm, manually applied blunt force trauma to the head, rapid freezing for animals < 4 g
Rodents	S2.2: Injected barbiturates and barbiturate combinations, dissociative agent combinations	S2.2: Inhaled anesthetics, CO_2, CO, tribromoethanol, ethanol, cervical dislocation, decapitation, focused beam microwave irradiation
Small ruminants	S3.2: Injected barbiturates	S3.2: Gunshot, penetrating captive bolt
Swine	S3.3: Injected barbiturates	S3.3: CO_2, CO, N_2, Ar, gunshot, electrocution, nonpenetrating captive bolt, manually applied blunt force trauma

*Not recommended for routine use.

Appendix 2

Some acceptable* agents and methods of euthanasia.

Agent	Classification	Mode of action	Rapidity†	Ease of performance	Safety for personnel	Species suitability	Efficacy and comments	Conditions
Barbiturates	Hypoxia and cardiac arrest attributable to depression of the CNS	Depression of the CNS in descending order; loss of consciousness progressing to anesthesia, apnea, and cardiac arrest	Rapid onset of anesthesia	IV injection is necessary for best results and requires trained personnel; each animal must be appropriately restrained	Safe except human abuse potential; DEA-controlled substance	Most species, excluding aquatic invertebrates	Highly effective when appropriately administered; when an IV injection would be distressful, dangerous, or difficult due to small patient size, barbituates may be administered intraperitoneal or intracoelomic (pentobarbitalal combination products have only been approved for IV and intracardiac administration)	Apply to the use of non-IV routes (see text)
Benzocaine hydrochloride	Hypoxia attributable to depression of vital centers	Depression of CNS and heart	Rapid, depending on dose	Easily used	Safe	Smaller finfish and amphibians	Effective but expensive	
Carbon dioxide	Respiratory acidosis and produces a reversible anesthetic state followed by hypoxia attributable to depression of vital centers	Direct depression of cerebral cortex, subcortical structures, and vital centers; direct depression of heart muscle	Moderately rapid, depending on protocol	Easily with appropriate equipment, closed container, gas source, and once protocol are established	Minimal hazard with adequate ventilation	Most birds and mammals, excluding companion animals	Effective, but time required may be prolonged in immature and neonatal animals	May be used only with those species where aversion or distress can be minimized; gradual fill method must be used; must be supplied in a precisely regulated and purified form without contaminants or adulterants, typically from a commercially supplied cylinder or tank; an appropriate pressure-reducing regulator and flow meter or equivalent equipment must be used
Carbon monoxide	Hypoxemia	Combines with hemoglobin and blocks uptake of O_2	Moderate onset time, but insidious so that most animal species are unaware of onset	Requires appropriately maintained equipment	Extremely hazardous, toxic, explosive in high concentrations, and difficult to detect	Most small species, excluding companion animals	Effective	Acceptable only when equipment is properly designed and operated
Cervical dislocation	Hypoxia	Direct depression of brain and cardiac fibrillation	Variable	Personnel must be skilled	Safe	Small birds, poultry, mice, immature rats (< 200 g), and rabbits	Variable	Must meet a performance standard of luxation of the cervical vertebrae without primary crushing of the vertebrae and spinal cord—inducing very rapid unconsciousness
Decapitation	Hypoxia due to disruption of vital centers	Direct depression of brain	Rapid	Requires training and skill	Guillotine poses potential employee-injury hazard	Laboratory rodents; small rabbits; poultry and birds; and some finfish, amphibians, and reptiles	Irreversible; violent muscle contraction can occur after decapitation	A commercially available guillotine should be used if available for the species and application. In lieu of this, a sharp knife and accurate placement are required.
Electrocution	Hypoxia	Direct depression of brain and cardiac fibrillation	Can be rapid	Not easily performed in all instances; requires specialist equipment and skilled application	May be hazardous to personnel	Used primarily in sheep, swine, ruminants, and other animals > 5 kg		Current must pass through the brain, and cardiac fibrillation must never occur before the animal is rendered unconscious; electroimmobilization is unacceptable; use of household electrical cords is unacceptable
Gunshot	Physical damage to brain	Direct concussion of brain tissue	Immediate	Requires skill and appropriate firearm	May be dangerous; aesthetically unpleasant for many	Large domestic and selected nondomestic species	Instant loss of consciousness, but motor activity may continue	Personnel must be trained in the use of firearms; only in jurisdictions that allow for legal firearm use; safety of personnel, the public, and other animals that are nearby should be considered

Appendix 2 (continued)

Some acceptable* agents and methods of euthanasia.

Agent	Classification	Mode of action	Rapidity†	Ease of performance	Safety for personnel	Species suitability	Efficacy and comments	Conditions
Inhalant anesthetics	Hypoxia attributable to depression of vital centers	Direct depression of cerebral cortex, subcortical structures, and vital centers	Moderately rapid onset of anesthesia, excitation may develop during induction	Easily performed with closed container (including topical or immersion as appropriate by species); can be administered to large animals by means of a mask	Effective procedures should be in place to reduce animal worker exposure to anesthetic vapors	Most animals excluding livestock, finfish, and many amphibians and reptiles	Highly effective provided that subject is sufficiently exposed	
Maceration	Physical damage to brain	Direct concussion of brain tissue	Immediate	Easily performed with properly designed, commercially available equipment and trained personnel	Generally safe; macerated tissues may present biosecurity risks	Newly hatched chicks and poults, and pipped eggs only	Effective	Specialized equipment in excellent working order must be used
Focused beam microwave irradiation	Brain enzyme inactivation	Direct inactivation of brain enzymes by rapid heating of brain	Very rapid	Requires training and highly specialized equipment	Safe	Mice and rats	Highly effective for special needs	Only instruments that are designed for this use and have appropriate power and microwave distribution can be used
Nitrogen, argon	Hypoxia	Reduces partial pressure of oxygen available to blood	Rapid	Used in closed chamber with rapid filling	Safe if used with ventilation	Chickens, turkeys, and swine	Effective except in young and neonates; an effective agent, but other methods are preferable in species where aversion is noted	These gases must be supplied in a precisely regulated and purified form without contaminants or adulterants; an appropriate pressure-reducing regulator and flow meter combination or equivalent equipment must be used
Potassium chloride	Cardiotoxic	Direct depression of cerebral cortex, subcortical structures, and vital centers secondary to cardiac arrest	Rapid	Requires training and ability to give IV injection of potassium chloride	Anesthetics may be hazardous with accidental human exposure	Most species	Highly effective, some clonic muscle spasms may be observed	Intracardially or IV with an animal that is unconscious or under general anesthesia only; unacceptable when used in conscious vertebrate animals
Penetrating captive bolt	Physical damage to brain	Direct concussion of brain tissue	Immediate	Requires skill, adequate restraint, and proper placement of captive bolt; can be aesthetically displeasing	Safe	Horses, ruminants, swine and nondomestic species, as appropriate	Instant loss of consciousness, but motor activity may continue	Animals be immediately exsanguinated or pithed unless a powerful captive bolt gun designed for euthanasia is used; captive bolt guns used for larger species must have an extended bolt
Tricaine methane sulfonate (TMS, MS 222)	Hypoxia attributable to decreased nervous and cardiovascular function	Depression of CNS	Rapid, depending on dose	Easily used	Associated with retinal toxicity in humans	Finfish, some reptiles, amphibians, and cold-blooded aquatics	Effective but expensive	The solution should be buffered with sodium bicarbonate; a secondary method of euthanasia is recommended in some finfish and amphibians
2-phenoxyethanol	Hypoxia attributable to depression of vital centers	Depression of CNS	Rapid, depending on dose	Easily used	Safe	Finfish	There are probably more efficient immersion agents available	There are species variations in dosage levels and duration of exposure required for euthanasia. Finfish should be kept in the 2-phenoxyethanol solution for at least 10 minutes after cessation of opercular movement

*Acceptable, acceptable with conditions, and adjunctive methods have been included in this appendix, with the appropriate qualifications.
†Immediate = Upon application. Very rapid = Typically within seconds. Rapid = Typically within a few minutes.
DEA = Drug Enforcement Agency.

Appendix 3

Some agents and methods that are unacceptable as primary methods of euthanasia.

Agent or method	Comments
Air embolism	Air embolism may be accompanied by convulsions, opisthotonos, and vocalization. If used, it should be done only in anesthetized animals.
Burning	Chemical or thermal burning of an animal is not an acceptable method of euthanasia.
Chloral hydrate	Unacceptable in dogs, cats, and small mammals.
Chloroform	Chloroform is a known hepatotoxin and suspected carcinogen and, therefore, is extremely hazardous to personnel.
Cyanide	Cyanide poses an extreme danger to personnel and the manner of death is aesthetically objectionable.
Decompression (excluding low-atmospheric-pressure stunning when it can be demonstrated that it achieves euthanasia)	Decompression is unacceptable for euthanasia because of numerous disadvantages. (1) Many chambers are designed to produce decompression at a rate 15–60 times as fast as the recommended optimum for animals, resulting in pain and distress attributable to expanding gases trapped in body cavities. (2) Immature animals are tolerant of hypoxia, and longer periods of decompression are required before respiration ceases. (3) Accidental recompression, with recovery of injured animals, can occur. (4) Bleeding, vomiting, convulsions, urination, and defecation, which are aesthetically unpleasant, may develop in unconscious animals.
Diethyl ether	Diethyl ether is irritating, flammable, and explosive. Explosions have occurred when animals, euthanatized with ether, were placed in a non-explosion-proof refrigerator or freezer and when bagged animals were placed in an incinerator.
Drowning	Drowning is not a means of euthanasia and is inhumane.
Exsanguination	Because of the anxiety associated with extreme hypovolemia, exsanguination as a sole method of killing should be used only on unconscious animals.
Formaldehyde	Direct immersion of an animal into formalin, as a means of euthanasia, is inhumane with the exception of Porifera.
Household products and solvents	Acetone, cleaning agents, quaternary compounds (including CCl4), laxatives, pesticides, dimethylketone, quaternary ammonium products, antacids, and other toxicants not specifically designed for therapeutic or euthanasia use are not acceptable.
Hypothermia	Hypothermia is not an appropriate method of euthanasia.
Magnesium sulfate, potassium chloride, and neuromuscular blocking agents	Unacceptable for use as euthanasia agents in conscious vertebrate animals.
Manually applied blunt force trauma to the head	Generally unacceptable for most species excluding piglets and small laboratory animals. Replace, as much as possible, manually applied blunt force trauma to the head with alternate methods.
Nonpenetrating captive bolt	Unacceptable excluding purpose-built pneumatic nonpenetrating captive bolt guns used on suckling pigs, neonatal ruminants, and turkeys.
Neuromuscular blocking agents (nicotine, magnesium sulfate, potassium chloride, and all curariform agents)	When used alone, these drugs all cause respiratory arrest before loss of consciousness, so the animal may perceive pain and distress after it is immobilized.
Rapid freezing	Rapid freezing as a sole means of euthanasia is not considered to be humane with the exception of reptiles and amphibians and < 5-day-old altricial rodents. In all other cases animals should be rendered dead or unconscious prior to freezing. (Rapid chilling of finfish is not considered to be rapid freezing.)
Smothering	Smothering of chicks or poults in bags or containers is not acceptable.
Strychnine	Strychnine causes violent convulsions and painful muscle contractions.
Thoracic compression	Not acceptable for use on a conscious animal.

PRACTICAL EUTHANASIA OF CATTLE

IN THIS ISSUE

OVERVIEW

Livestock caretakers have an obligation to ensure the welfare of animals under their care. Euthanasia of an animal that is suffering from irreversible disease or injury is a primary responsibility caretakers assume. As per the "AVMA Guidelines for the Euthanasia of Animals (2013)" euthanasia is defined as: "A method of killing that minimizes pain, distress, and anxiety experienced by the animal prior to loss of consciousness, and causes rapid loss of consciousness followed by cardiac or respiratory arrest and death". The contents of this pamphlet are intended to aid caretakers, animal owners, livestock market operators, animal transporters, and veterinarians in choosing effective euthanasia methods.

The "AVMA Guidelines for the Euthanasia of Animals (2013)" recognizes and accepts three primary methods (two have conditions) of euthanasia for cattle:

- Intravenous (IV) administration of a lethal dose of a barbiturate or barbituric acid derivative to induce a transition from consciousness to unconsciousness and then death.
- Gunshot using an appropriate firearm and ammunition to cause physical disruption of brain activity by direct destruction of brain tissue.
- Penetrating captive bolt to induce unconsciousness in combination with an adjunctive step such as exsanguination, administration of IV potassium chloride, or pithing (increasing destruction of brain and spinal cord tissue) to ensure death.

When properly applied, the above euthanasia methods can cause rapid loss of consciousness and death with no detectable distress to the animal.

Cover photos: Top left, Adams Ranch by Bud Adams; top right, Donson breeding heifers by Leo Timms, DVM; bottom, Renee Dewell.

CONSIDERATIONS FOR SELECTION OF METHOD OF EUTHANASIA

When euthanasia is the most reasonable option for a compromised animal, the following elements should be considered to aid in the selection of the appropriate method:

1. HUMAN SAFETY: The first consideration in the choice of euthanasia method is human safety. For example, the use of a firearm carries greater safety risks when compared to other methods.

2. ANIMAL WELFARE: All methods of euthanasia should produce a rapid death with no detectable pain and distress. Select a euthanasia technique that considers human safety as well as animal welfare and is appropriate for the specific situation.

3. RESTRAINT: When performing euthanasia procedures, appropriate methods of restraint should be used. Some methods, such as captive bolt, require excellent restraint of the animal. Quality and availability of cattle chutes, halters, gates or other forms of restraint make certain forms of euthanasia more practical than others.

4. PRACTICALITY: An appropriate euthanasia technique must also be practical to use. For example, not all individuals responsible for carrying out euthanasia procedures have access to pharmaceuticals or firearms.

5. SKILL: Certain techniques require skill and training to accomplish correctly. Individuals responsible for conducting euthanasia should be trained in proper euthanasia protocol and should have access to appropriate, well-maintained equipment and/or medications.

6. COST: Euthanasia options vary in cost. Certain techniques, such as the use of firearms or captive bolt, require a larger initial investment, which may be defrayed over time if used often.

7. AESTHETICS: Certain euthanasia techniques, such as use of a barbiturate overdose, may appear more humane to the general public when compared to other techniques. Some methods, such as a penetrating captive bolt, may cause significant involuntary movements by the animal that may be misinterpreted as a voluntary painful response to those inexperienced in bovine euthanasia. When selecting a euthanasia method, potential negative reactions by the animal or observer should be considered.

8. DIAGNOSTICS: The selected euthanasia method should not compromise diagnostic sample collection.

9. CARCASS DISPOSAL: Carcass disposal is a critical consideration when selecting a euthanasia technique. Carcasses must be handled and disposed of in accordance with state and federal regulations. Options may include rendering, burial, composting, incineration and potentially landfills. Cattle euthanized using a barbiturate overdose may not be accepted at rendering facilities since the drug persists in residual material following the rendering process. In some regions, regulations require animals euthanized with barbiturates to either be incinerated or buried. Appropriate disposal of the carcass prevents scavenging and potential toxicity issues among wildlife. Gunshot or captive bolt is often a viable option that may facilitate ease of disposal.

DECISION MAKING

Actions involving compromised cattle include treatment, slaughter or euthanasia. The following criteria should be considered when making a decision:

1. Pain and distress of animal
2. Likelihood of recovery
3. Ability to get to feed and water
4. Drug withdrawal time
5. Economic considerations
6. Condemnation potential
7. Diagnostic information

INDICATIONS FOR EUTHANASIA

The following conditions or situations may lead to an animal being compromised to such an extent that euthanasia is indicated:

- Fracture, trauma or disease of the limbs, hips or spine resulting in immobility or inability to stand
- Loss of production and quality of life (advanced age, severe mastitis, etc.)
- Disease conditions for which no effective treatment is known (i.e. Johne's disease, lymphoma)
- Diseases that involve a significant threat to human health (i.e. rabies)
- Advanced ocular neoplastic conditions ("cancer eye")
- Disease conditions that produce a level of pain and distress that cannot be managed adequately
- Emaciation and/or debilitation from disease, age or injury that resulting in an animal being too compromised to be transported or marketed
- Disease conditions for which treatment is cost prohibitive
- Extended drug withdrawal time for clearance of tissue residue
- Poor prognosis or prolonged expected recovery

Bud Adams, Adams Ranch

MECHANISMS OF EUTHANASIA

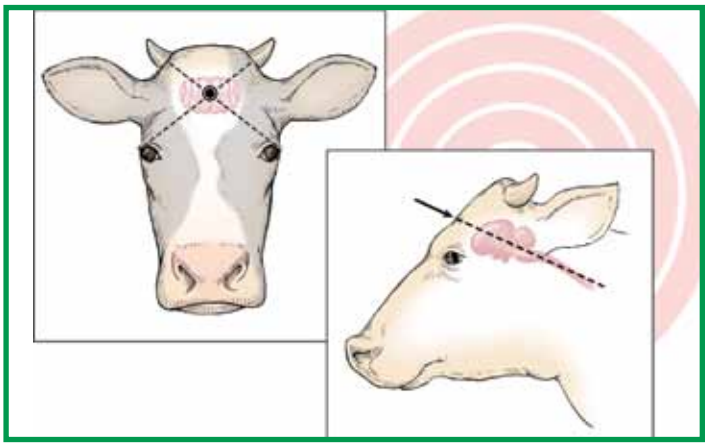
The agents of primary or adjunct euthanasia cause death by one of the three following mechanisms:

1. Direct depression of the central nervous system or organs necessary for life function (barbiturate overdose, intravenous administration of saturated potassium chloride or magnesium sulfate).
2. Hypoxia associated with agents or procedures that displace or block the uptake of oxygen (such as that caused by exsanguination).
3. Physical disruption of brain activity (such as that caused by gunshot, penetrating captive bolt, or pithing).

TABLE 1: APPROVED METHODS FOR PRACTICAL EUTHANASIA

Method	Risk to Human Safety	Skill Required	Potential Public Perception Issues	Adjunctive Method Required
Gunshot	High	Moderate*	Moderate: Some blood and motion	No
Penetrating Captive Bolt	Moderate	Moderate*	Moderate: Some blood and motion	Yes
Barbiturate Overdose	Low	Moderate*	Perceived well	No

* Operator training required



J.K. Shearer

Figure 1. Optimal point of entry for bovine euthanasia with gunshot or captive bolt described as on the intersection of two lines each drawn from the lateral canthus (outer corner) of the eye to the center of the base of the opposite horn (or where horn would be).

ACCEPTED PRIMARY EUTHANASIA METHODS

1. GUNSHOT: When properly executed, gunshot induces instantaneous unconsciousness and death, is inexpensive and does not require close contact with the animal. It should be emphasized that this method should only be attempted by individuals trained in the use firearms and who understand the potential associated dangers. Firearm options include handguns (pistols), rifles or shotguns. Current recommendations suggest that the .22 caliber handgun or rifle loaded with a solid point bullet is sufficient for calves, but may not be the best choice for consistent use on adult animals.

The "AVMA Guidelines for the Euthanasia of Animals (2013)" recommends the use of solid-point bullets. Muzzle energy available from a .22 LR is in the range of 100 to 150 ft./ lb. (135 to 216.8 joules), whereas larger calibers such as the .38 Special, .357 magnum or 9 mm will push muzzle energies well above the 300 lb. (407 joules or greater) range. Rifles are capable of higher muzzle energies compared with handguns and are often a better choice in situations where a fractious animal must be shot from a distance. Finally, shotguns are very lethal at close range (less than 2 feet from point of intended entry) whether loaded with shot-shells or slugs. The 12-, 16-, and 20-gauge shotguns are a good choice for euthanasia of adult cattle.

The 28 or .410 gauge shotgun is an excellent choice for use in calf euthanasia. If using a shotgun loaded with shot shells the operator should be very conscious of the distance from the gun barrel to the animal as projectiles will spread out into a larger pattern that can greatly increase the risk of ricochet and operator and bystander injury. The firearm should be held within 1 to 2 feet from the intended target and the bullet should be directed perpendicular to the front of the skull to minimize the likelihood of ricochet. In cattle, the point of entry of the projectile should be at the intersection of two imaginary lines, each drawn from the outside corner of the eye to the base of the opposite horn as shown in Figure 1.

2. PENETRATING CAPTIVE BOLT: Captive bolt devices ("guns" or "stunners") are either penetrating or non-penetrating. Only penetrating captive bolt devices are approved for euthanasia of mature bovines and, according to "AVMA Guidelines for Euthanasia of Animals (2013)", must not be used as the sole method of euthanasia. The bolt gun must be placed firmly against the skull at the same entry point previously described for a gunshot. Since use of the captive bolt gun requires close proximity to the animal, adequate restraint and prior sedation or tranquilization may be required. It is critical to maintain and clean the

Rachel Tendal


Grant Dewell, DVM

bolt gun as described by the manufacturer. Additionally, selection of cartridge strength may vary among manufacturers and the appropriate type and strength for the size of the animal must be used. The optimal point of entry for the penetrating captive bolt is depicted in Figure 1.

3. BARBITURATE AND BARBITURIC ACID DERIVATIVES: When properly administered by the intravenous route, barbiturate overdose (60-80 mg/kg sodium pentobarbital IV) produces rapid unconsciousness and anesthesia followed by respiratory depression, hypoxia, and cardiac arrest. The barbiturate selected should be potent, long acting, and stable in solution. The carcass of barbiturate treated animals is considered unfit for human or animal consumption. Ingestion by wildlife or other animals can induce toxicities. (FDA-CVM 2003 http://www.fda.gov/AnimalVeterinary/NewsEvents/CVMUpdates/ucm119205.htm).

Finally, as mentioned previously, the use of pharmaceuticals limits carcass disposal options as renderers are less likely to accept animals euthanized by these methods.

DETERMINATION OF UNCONSCIOUSNESS

A state of apparent unconsciousness must be established immediately following the initial euthanasia procedure. In the field, the surrogate to unconsciousness is "lack of response" described below, as true unconsciousness can only be determined by EEG. The person performing euthanasia must be prepared to immediately apply an accepted euthanasia technique if any sign of consciousness is detected by the observer or demonstrated by the animal.

SIGNS OF UNCONSCIOUSNESS

- Absence of corneal reflex
- Absence of vocalization
- Absence of gag reflex (no voluntary tongue movements or swallowing)
- Lack of rhythmic respiration
- No coordinated attempt to rise or right itself

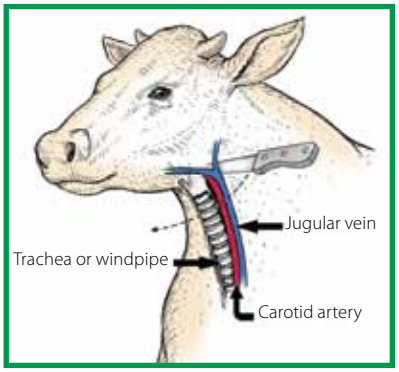
Secondary or adjunct euthanasia methods must not be performed until the animal has been determined to be unconscious.

SECONDARY OR ADJUNCT EUTHANASIA METHODS

A second shot, exsanguination, pithing and rapid intravenous injection of a concentrated solution of potassium chloride or magnesium sulfate may serve as adjunct methods to ensure death following use of an acceptable primary euthanasia method.

EXSANGUINATION

This method can be used to ensure death subsequent to stunning, anesthesia, or unconsciousness. It must not be used as the sole method for euthanasia. The most common exsanguination method in the bovine is to lacerate both the jugular vein and carotid artery. A 6-inch long sharp knife is fully inserted behind the point of the jaw and directed downwards until blood is freely flowing. Brachial vasculature can be lacerated by lifting a forelimb, inserting the knife deeply at the point of the elbow and cutting skin and vasculature until the limb can be laid back against the thorax of the animal. The aorta can be transected via the rectum, by a trained individual, so that blood pools within the abdominal cavity.



J.K. Shearer

Figure 3. Exsanguination technique

PITHING

Pithing is an adjunctive technique designed to cause death by increasing the destruction of brain and spinal cord tissue. It is performed by inserting a pithing rod or similar tool through the entry site produced in the skull by a bullet or penetrating captive bolt device. The operator manipulates the pithing tool to destroy both brain stem and spinal cord tissue, which results in death.


Dr. Dee Griffin

POTASSIUM CHLORIDE (KCL)

Rapid IV administration of a saturated solution potassium chloride (KCl) induces cardiac arrest. Cattle must be anesthetized or unconscious prior to administration. The injection of xylazine or any other alpha-2 agonist has not been shown to induce anesthesia and must not be used alone. The use of a captive bolt is also acceptable if a state of unconsciousness is achieved. The specific dose of KCl will vary according to the size of the animal, but an injection of 250 ml of a saturated KCl solution is appropriate for most mature cows. The KCl solution should always be given to effect (i.e., until death).

MAGNESIUM SULFATE

Similar to potassium chloride (KCl), magnesium sulfate is approved for use only in anesthetized animals. Compared to the use of IV KCl, death is usually much slower.

CONFIRMATION OF DEATH

Confirmation of death following a euthanasia procedure is absolutely essential regardless of what method of euthanasia is chosen. Keep personal safety in mind when confirming death because animals can make sudden involuntary movements.

The following combination of criteria recommended by the AVMA includes: "…lack of pulse, breathing, corneal

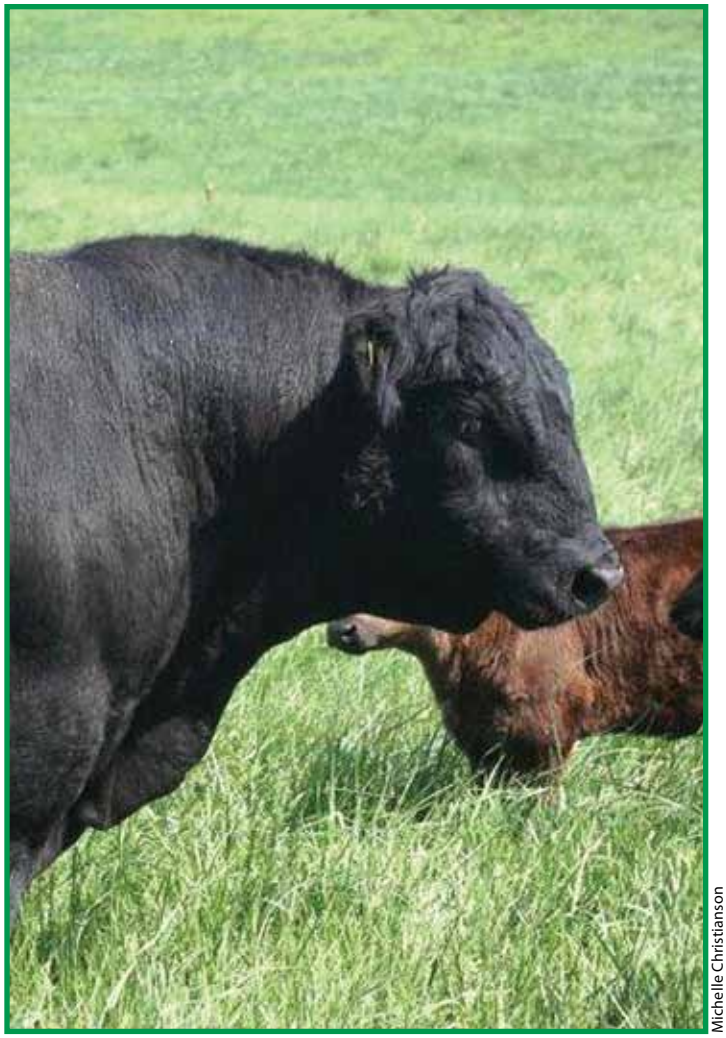
Renee Dewell

reflex and response to firm toe pinch, inability to hear respiratory sounds and heartbeat by use of a stethoscope, graying of the mucous membranes and rigor mortis. None of these signs alone, except rigor mortis, confirms death."

The presence of a heartbeat can be best evaluated with a stethoscope placed under the left elbow. Observation for movement of the chest indicates respiration. However, respiration rates may be very erratic in unconscious animals; therefore, one must be cautious in the interpretation of respiration for confirmation of death. Lack of heartbeat and respiration for three to five minutes should be used to confirm death. The corneal reflex may be tested by touching the surface of the eye. Normal or conscious animals will blink when the eye's surface is touched. Lack of a corneal reflex alone is not sufficient for confirmation of death. Continued monitoring of animals for a period of 20 to 30 minutes after euthanasia has been performed is also good advice to livestock owners and managers.

CONSIDERATION FOR EUTHANASIA OF CALVES AND BULLS

Calves and bulls require special consideration in selecting the proper method of euthanasia. Ethical considerations do not change for the calf because it is small or more easily handled. Blunt trauma by physical blow to the head is not acceptable for euthanasia of calves because the skull is too hard to consistently achieve immediate and lethal destruction of brain tissue. This method is also difficult to apply



Michelle Christianson

consistently because of restraint and complications in positioning the calf for effective use of blunt trauma methods. In addition to the methods outlined in Table 1 for mature bovines, the use of a purpose-built non-penetrating captive bolt stunner is an acceptable (with conditions) method of euthanasia for calves.

Euthanasia of bulls presents unique challenges because of their size, temperament, and thickness of their skull. Operator safety is of primary concern in euthanasia of bulls, and for certain techniques such as barbiturate overdose or captive bolt, proper restraint is critical. Bulls may be euthanized with specialized heavy-duty captive bolt guns or firearms capable of muzzle energies of 1000 ft. / lb., or by barbiturate overdose.

UNACCEPTABLE METHODS OF EUTHANASIA

Based on ethical and humane considerations, the "AVMA Guidelines for the Euthanasia of Animals (2013)" considers the following methods unacceptable techniques:

- Manually applied blunt trauma to the head of calves or mature cattle
- Injection of unapproved chemical agents or substances (e.g. disinfectants, non-anesthetic pharmaceutical agents)
- Sedation with alpha-2 agonist such as xylazine followed by potassium chloride, magnesium sulfate,
or any other euthanasia method that requires the animal to be unconscious prior to its use
- Air injection into the vein
- Electrocution with a 120-volt electrical cord
- Drowning
- Exsanguination of conscious animals

CONCLUSION

Personnel at sites that routinely handle cattle should be prepared with the knowledge, necessary skills, and well-maintained equipment to conduct euthanasia. Penetrating captive bolt and gunshot are the only two acceptable methods typically available to non-veterinarians for emergency euthanasia of cattle. Animal transporters should also be properly trained in euthanasia techniques and should have contact information for appropriate personnel in case of an emergency. An action plan for routine and emergency euthanasia should be developed and followed wherever animals are handled. Persons who perform this task must be technically proficient, mentally capable and possess a basic understanding of the anatomical landmarks and equipment used for humane euthanasia of animals. If there is any degree of question or discomfort with a proposed euthanasia procedure, a veterinarian should be consulted.

Livestock markets and sale yards should have written euthanasia protocols to follow and trained personnel should be available for emergency euthanasia during all shifts. When practical, select a location where the carcass can be easily reached by removal equipment.

Dead animals should be disposed of promptly and in accordance with all federal, state, and local regulations.

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ESTABLISHING AND MAINTAINING THE VETERINARIAN-CLIENT-PATIENT RELATIONSHIP IN BOVINE PRACTICE

The veterinarian-client-patient relationship (VCPR) is an integral part of proper drug use on cattle operations. State and federal codified VCPRs regulate the practice of veterinary medicine legislatively. This document describes non-regulatory management practices endorsed by the American Association of Bovine Practitioners (AABP) as general guidelines for its members to refer to during their course of practice.

THE AABP IDENTIFIES THE FOLLOWING AREAS THAT ARE CRITICAL COMPONENTS FOR ESTABLISHING AND MAINTAINING A VCPR:

■ WRITTEN AGREEMENT

Maintain written agreements for working relationships

A veterinary practice or individual should establish a written agreement with the client that identifies the farm veterinarian who is accountable for drug use and treatments administered to the cattle on the farm operation. If more than one veterinarian or veterinary practice has a working relationship on the operation, then the agreement should establish which one has the overall responsibility for treatment protocols, drug inventories, prescriptions, personnel training, oversight and drug use on the operation. The identified veterinarian is referred to as the Veterinarian of Record.

■ VETERINARY OVERSIGHT

Have a Veterinarian of Record

The Veterinarian of Record is the responsible party for providing appropriate oversight of drug use on the farm operation. Such oversight is a critical component of establishing, maintaining and validating a VCPR. This oversight should include, but may not be limited to, establishment of treatment protocols, training of personnel, review of treatment records, monitoring drug inventories, and assuring appropriate labeling of drugs. Veterinary oversight of drug use should include all drugs used on the farm regardless of the distribution of the drugs to the farm. Regular farm visits are an essential component to providing such oversight, however this can be supplemented through laboratory data evaluation, records evaluation, telephonic and electronic communication. The timeliness of farm visits should be determined by the Veterinarian of Record based on the type and size of the operation.

■ RELATIONSHIP WITH CONSULTANTS AND OTHER VETERINARIANS

Clarify any and all relationships with consultants and other veterinarians

If a veterinarian who is not the Veterinarian of Record provides professional services in any type of consultative or advisory capacity, then it is incumbent on that veterinarian to ensure that the Veterinarian of Record is contacted and informed of their findings and recommendations. No protocols or procedures that have been established by the Veterinarian of Record should be changed unless or until there is an agreement by all parties about such changes. The agreement between the Veterinarian of Record and the client should establish which management groups of the farm operation are covered in the agreement. For instance, reproduction, milk quality, youngstock/replacement, feedlot, cow-calf, and sick animal treatments are possible identifiable areas.

■ TREATMENT PROTOCOLS

Provide written protocols

Protocols and treatment guidelines for commonly occurring, easily recognizable conditions should be established in writing and agreed upon by all parties involved, signed and dated. Training of personnel authorized to use drugs on the operation should be

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ESTABLISHING AND MAINTAINING THE VETERINARIAN-CLIENT-PATIENT RELATIONSHIP IN BOVINE PRACTICE

undertaken and periodically reviewed. The frequency of such training and review should be determined by the size and type of the operation, the rate of personnel turnover, and the changes in protocols and procedures. The treatment protocols and procedures should include all drugs used on the operation (over-the-counter, prescription, extralabel, Veterinary Feed Directive, water soluble). All protocols should clearly define when to quit treating and seek professional help (poor response, increase in severity of signs).

■ WRITTEN/ELECTRONIC TREATMENT RECORDS

Ensure written or electronic treatment records are maintained

Written/electronic treatment records of all animals or groups of animals treated are an essential component of maintaining and establishing the VCPR and to decrease the risk of violative drug residues. Such records should include, at a minimum, the date, identification of animal(s), drug(s) used, frequency, duration, dose, route, appropriate meat/milk withdrawal intervals, and the person administering the treatment. Periodic and timely review of the treatment records, drug inventories and usage is an important part of oversight by the Veterinarian of Record.

■ PRESCRIPTION DRUGS

Provide drugs or prescriptions for specific time frames and for specific protocols

Provision of drugs or drug prescriptions should be for specific time frames appropriate to the scope and type of operation involved and only for the management groups within the operation that the Veterinarian of Record has direct involvement and oversight. Additionally, failure to follow agreed upon protocols and procedures should be grounds for denial of provision of drugs or prescriptions except for an individual patient needing treatment at the time of examination. Routine examination of drug inventories on farm and product purchase records (pricing information is unnecessary) review are recommended. Cooperation with distributors is encouraged. Establishment of a VCPR for the sole purpose of the sale of drugs or increased sales of a particular brand of drug product is not a valid or ethical reason for having a VCPR.

TRANSPORTATION RECOMMENDATIONS FOR CATTLE

The American Association of Bovine Practitioners believes that all cattle or calves being considered for transportation should be healthy, walk easily on their own, have no drug residue potential or disease conditions that would cause them to not pass pre-slaughter inspection, and should have a body condition score of 2.0 or more for dairy (on a 5-point scale) and 3.0 or more for beef (on a 9-point scale).

GENERAL GUIDELINES FOR HANDLING ALL CATTLE CLASSES

Prior to loading into a trailer, a load plan should be formulated based on the animal weight, frame size and type of transportation equipment being used. Consideration should also be given to the environmental conditions, and adjustments in loading plan made accordingly.

- All personnel handling or transporting cattle or calves should have documented training sufficient to ensure that the health, safety, and welfare of animals can be assessed and an appropriate plan followed.
- All handling of cattle and/or calves should be performed using low-stress cattle handling methods.
- Verify through records that cattle being transported for slaughter that have or may have been treated meet the appropriate withdrawal time.
- Facilities and equipment used for loading cattle and/or calves onto transport vehicles should be designed to minimize stress and injury. Assure that transportation vehicles are clean, safe, and provide adequate space for each animal. Emergency contact numbers and contingency plans for handling unexpected situations like mechanical breakdowns or severe weather should be available to drivers.
- Delay or cancel transport of an animal that appears to be exhausted or dehydrated until the animal is rested, fed and rehydrated in a safe area.
- Do not mingle animals with large variations in size and weight in an open trailer.
- Cattle being transported should be unloaded, fed and watered at least every 28 hours as specified under U.S. federal regulation (U.S. Code Title 49 > Subtitle X > Chapter 805 > § 80502). This would not pertain to air and sea transportation methods that supply feed, water and enough room for the cattle to rest during transportation.

DEFINITIONS

BOVINE: Any beef or dairy animal including cow, steer, bull, calf, heifer.
CALF: A bovine that is nursing or receiving a milk supplement.
CATTLE: Any beef or dairy animal including cow, steer, bull, calf, heifer.
CULL/MARKET CATTLE: There are two classes of cattle in this category. Cull/market cows and bulls are cattle being removed from the beef or dairy operation because they are no longer deemed as being productive. Market finished cattle are cattle leaving a feedlot and moving to slaughter.
FEEDER: Weaned cattle entering or located in a feedlot.
INJURED AMBULATORY: A bovine that is otherwise healthy (free from systemic, metabolic or infectious disease) that as a result of injury is unable to walk normally.
NON-AMBULATORY: A disabled animal unable to rise, stand or walk without assistance (often referred to as a "downer").
NON-TERMINAL MARKET: A market where bovines are bought and sold, also called sale barns or auction markets (not a slaughter facility).
SAFE AREA: A pen or grass paddock or other space that provides protection from the elements, predators, and other animals, where a non-ambulatory bovine is provided with a comfortable surface to lie on, along with good footing, proper feed, clean water, and supportive care.
STOCKER: Weaned cattle; typically weighing between 300–550lbs and pasture-managed.
TERMINAL MARKET: A slaughter facility or packing plant.

- Appropriate and accurate health papers should accompany any cattle being transported.
- If cattle are unable to be transported and must be euthanized, it is recommended that veterinarians develop a written plan with their clients for protocols to be used for making euthanasia decisions as supported by AABP/AVMA, and assist clients with proper training of animal handlers. AABP euthanasia guidelines can be found at **www.aabp.org**.

HANDLING AND TRANSPORTATION OF CALVES

Veterinarians are a vital part of the cattle operation's team and should be directly involved with their clien-

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TRANSPORTATION RECOMMENDATIONS FOR CATTLE

tele during the development, implementation, and associated documentation of policies and procedures for calf management and transportation.

Calves shipped to a calf raising facility should be healthy, individually identified, and fit for transport. These guidelines apply to calves being transported to an off-site rearing facility such as another location of the same farming operation or a commercial calf rearing operation, i.e., "calf ranch" or "heifer grower." These guidelines do not apply to calves being transported to livestock markets or auctions.

Principles of Calf Selection for Transport

Personnel determining fitness of individual calves for transport should be trained in assessment of calf health and welfare.

- All calves should have some form of unique individual identification to facilitate management and record-keeping.
- A calf should not be transported unless it is sufficiently fit, meaning that newborn calves should have received colostrum or an appropriate colostrum replacer, and non-newborn calves should have recently had milk and had access to fresh water and feed. All calves should be dry, well hydrated and free from illness, injury, and be able to stand.
- Very young calves tolerate a narrower range of temperature than older calves, therefore the effects of temperature and weather on their specific requirements should be mitigated by tactics such as targeting optimal timing of movement to account for ambient temperature and weather conditions, adjusting ventilation on transport vehicles, providing a sufficient amount of bedding, or individual calf coverings in winter, i.e., "calf jackets."
- Calves that are unfit for transport due to disease or injury should be evaluated immediately and treatment instituted, or be euthanized using methods supported by the AVMA/AABP guidelines. All calves that have been treated should be individually identified and accompanied by a written health record documenting treatment and withdrawal times, if applicable.

Principles of Handling and Transporting Calves

- Calves are less able to cope with stressors than older cattle, particularly transportation, and extra attention to their well-being is important. All personnel handling or transporting calves should be trained on the farm's protocols to ensure that the health, safety, and welfare of calves of varying ages is maintained. Personnel should be trained on assessing health and welfare of calves; evaluating fitness for transport, proper handling techniques; decision making for euthanasia, and conducting and documenting humane euthanasia supported by AABP/AVMA guidelines. Personnel should also be aware of applicable local, state, and national guidelines pertaining to transport of calves. Calves should be moved using the concept of flight zones when possible. Younger calves may not respond to efforts to move them by using the concept of flight zones and therefore may need to be handled differently when loading, unloading and moving.
- All handling should be performed as calmly as possible to avoid unnecessarily exciting calves. All moving aids, including flags and paddles, should be used judiciously. Electric prods should never be used on calves.
- Calves must never be handled solely by the ears or tail.
- All transportation vehicles should be checked prior to loading for unsafe conditions that could lead to injury of calves or unnecessary delays in transporting calves to their destination. Hauling vehicles and trailers should be cleaned and then disinfected after each load of calves to minimize the risk of disease transfer.
- Calves should have an adequate amount of space during transport. Guidelines for the amount of space during transportation for calves of different weights are available from the Federation of Animal Science Societies (www.fass.org) and these recommendations should be consulted when developing on-farm transportation guidelines.

TRANSPORTATION RECOMMENDATIONS FOR CATTLE

■ Willful or purposeful abuse, neglect, or other maltreatment of calves for any reason, including the use of electric prods, whips, or canes on young calves, and withholding of food/milk or water during the pre-transportation period, should not be tolerated.

TRANSPORTATION OF STOCKER AND FEEDLOT CATTLE

All stocker and finish fed (feeder) cattle must have their processing, treatment and feeding records checked to ensure all cattle have met assigned medication withdrawal times if destined for slaugher. Additionally, all required USDA-APHIS health transport shipping records must be in order, and if applicable, all brand inspection records must also in order. Copies of these records must be provided to the transporter as needed.

All cattle must be examined and fit for transport under the conditions the cattle are to be transported (see the section on transportation of compromised cattle). Arrangements for special needs of the cattle such as protection from weather, bedding, traveling at night during hot weather, arrangements for off-loading rest periods, etc., must be made ahead of securing transportation.

The shipper needs to ensure that transportation arrangements have met required guidelines of the receiver of the cattle, or any suggested guidelines provided by manufacturers of pharmaceuticals the cattle may have received prior to transport.

Loading and Unloading Cattle

Veterinarians are encouraged to make the following recommendations to clients when shipping stockers/feedlot cattle:

■ Identify any weather conditions that could impact the safety and well-being of the cattle during transportation (extreme heat/cold).

■ Using a clean trailer. Fecal-oral transmission of diseases are less likely to occur when cattle are hauled in clean trailers.

■ Make sure that people who are working with the cattle are trained to handle the animals calmly, with minimal noise, avoiding overcrowding and with minimal use of electric prods. Vocalization can be a sign cattle are being overstressed during the loading process.

■ Verify the driver understands the travel route directions and has all required paperwork. Make sure the driver has important emergency phone numbers that may be need en route or at delivery. Have an emergency plan in place that addresses potential transportation emergencies.

■ The trailer should be an appropriate size for the number of cattle scheduled to be hauled. (Adapted from Grandin, 2001: 1.8 sq. ft. for the first 100 lbs. (CWT) of a bovine and 1.4 sq. ft. for each additional CWT of a bovine. This estimate allows for 30% of the cattle to have horns. If no horns are present square footage per CWT can be slightly less. Heavier cattle need slightly less square footage per CWT than do lighter cattle.)

■ The trailer should be inspected for properly working latches/gates and any defects that could impact cattle safety and well-being.

■ The load-out area should be appropriate for the type of trailer being used to haul the cattle, and the load-out chutes/gates should be in good repair.

■ The trailer should be in the proper position in the load-out area to minimize the potential for cattle injury during loading.

■ Check that cattle on trailers are standing and ready for travel.

■ Prior to unloading, check that there are no cattle in a compromised position that might be injured during unloading, and position the trailer properly to minimize the potential for cattle injury during unloading.

■ Have the driver verify that all appropriate documents are transferred to the responsible party receiving the cattle.

For Cattle Being Loaded for Air and Ocean Transportation

Prior to loading the cattle, a load plan should be formulated based on the animal weight, frame size and type, transportation equipment being used, and

TRANSPORTATION RECOMMENDATIONS FOR CATTLE

duration of transportation. Consideration should also be given to the environmental conditions, and adjustments in load plan made accordingly.

■ Water should be made available up until the loading process begins.

■ Feed should be readily available but may be withheld up to 18 hours prior to the loading process beginning provided the shipping protocol has been reviewed and agreed upon by the attending veterinarian and agent of the cattle and it is determined the cattle general well-being will be maintained by withholding feed during the targeted time. At no time should the cattle go without feed for more than 28 hours.

■ TRANSPORTATION OF CULL/MARKET BEEF AND DAIRY CATTLE DESTINED FOR MARKET OR IMMEDIATE SLAUGHTER

Veterinarians should help clients develop and implement plans to manage beef and dairy cull/market cow issues, including fitness for transport, treatment for conditions if warranted, or euthanasia of animals unfit for transport, slaughter and human consumption.

Veterinarians should develop a written plan with their clients for protocols to be used for ambulatory cow culling decisions, and assist clients with proper training of employees.

■ Milk all dairy cows that are still lactating just prior to transporting to a terminal or non-terminal market.

■ Verify through records and treatment personnel that cattle that have or may have been treated meet the appropriate withdrawal time.

■ Minimize the number of times cattle need to be handled from time of loading to arrival at the sale barn or slaughter house to reduce stress as well as the risk of bruising.

■ Delay transport of an animal that appears to be exhausted or dehydrated until the animal is rested, fed and rehydrated in a safe area.

■ Make sure employees understand cattle pressure/ flight zone and behavior principles for safe handling procedures when loading cattle onto transport vehicles. Electric prods should be discouraged. If used prods should be applied to the rear quarters of the animal while avoiding sensitive areas such as the anus, perineum, vulva and scrotum.

■ Facility design for loading cattle onto transport vehicles should minimize stress and injury to cattle. Non-slip flooring should exist to keep cattle calm, safe, and minimize injuries. Inspect the loading facility to make sure all contact surfaces are smooth and free of sharp edges in addition to assuring all equipment is well maintained and in proper working order to further assure prevention of injuries to cattle.

■ Assure that transportation vehicles are clean, safe, and provide adequate space for each animal. The bed should be clean, dry, and have a non-slip floor.

■ Do not transport ambulatory animals with conditions that will not pass pre-slaughter inspection at a packing or processing plant. These include, but are not limited to:

- cancer eye, blindness in both eyes
- fever greater than 103°F
- drug residues
- peritonitis
- fractures or lameness (4 or 5 on a 5-point scale)
- unreduced prolapses
- cows that are calving or have a high likelihood of calving during transport
- distended udders causing pain and ambulatory issues
- suspected central nervous system symptoms
- visible open wounds

■ HANDLING AND TRANSPORT OF INJURED AMBULATORY CATTLE/CALVES

Identify “special needs” cattle such as those with lameness/mobility issues, are thin or appear sick. Special needs cattle should be protected on the trailer and be loaded on the back of the trailer to make it easier for them to unload.

Special needs animals that have conditions that

TRANSPORTATION RECOMMENDATIONS FOR CATTLE

increase the likelihood of becoming non-ambulatory because of commingling in transport should be either left at the farm or transported in a separately partitioned compartment without other animal contact. Injured ambulatory cattle/calves with fractured limbs (broken legs) or other non-weight bearing lameness are not fit for transport and should not leave the farm.

If injured ambulatory cattle must be transported, they should not be commingled with others. Injured ambulatory cattle should only be transported to a veterinary facility or a terminal market. Never transport injured ambulatory cattle to a non-terminal market. Care should be exercised during loading, unloading, and handling of injured ambulatory cattle to prevent further injury.

HANDLING AND TRANSPORT OF NON-AMBULATORY CATTLE/CALVES

Non-ambulatory cattle/calves are not fit for transport and should not leave the farm of origin unless being transported for veterinary attention. Either treat and allow sufficient time for recuperation or euthanize. Do not transport animals with bone fractures of the limbs or injuries to the spine. Do not use electric prods on sick or injured cattle.

Segregate sick or injured animals into a safe area separate from ambulatory cattle. Veterinarians should encourage cattle producers to seek veterinary consultation to determine if cattle/calves are likely to respond to treatment or should be euthanized. If euthanasia is the best option, proceed using AABP/AVMA recommended euthanasia methods.

HEALTH CERTIFICATES/ CERTIFICATES OF VETERINARY INSPECTION

The certificate of veterinary inspection (CVI) is typically required for transportation of cattle across state lines and may be required for transport within a state. It assures that transported animals are officially identified for marketing and regulatory purposes and that the veterinarian signing the CVI deems the inspected animal(s) apparently free from clinical signs of disease at the time of inspection. The CVI reduces the risk of transmitting either zoonotic disease or cattle diseases across state lines. Destination states' regulations may require that animals being transported into their state are free of certain diseases and have no clinical signs of other disease. A CVI does not guarantee that cattle are disease-free as cattle with no clinical signs of illness may still carry diseases such as Johnes Disease and bovine viral diarrhea virus.

Veterinarians are encouraged to help clients determine the best strategy to prevent disease introduction into clients' herds, including having cattle tested prior to shipment and recording the results on the CVI. It is recommended that veterinarians advise clients about state requirements or disease testing 2–4 weeks prior to transport of cattle.

REFERENCES

- *Calf welfare*, C. Stull and J. Reynolds, 2008, Veterinary Clinics of North America: Food Animal Practice, 24(1): p. 191-203.
- *Cattle transport: Historical, research and future perspectives*, 2001, Swanson, J.C. and J. Morrow-Tesch, Journal of Animal Science 9 (E-Suppl): p. E102-E109.
- *Effect of Source of Cattle and Distance Transported to a Commercial Slaughter Facility On Carcass Bruises in Mature Beef Cows*, 1998. D.E. Hoffman, M.F. Spire, J.R. Schwenke, J.A. Unrah. JAVMA, Vol. 2012 No 5, p 668-672.
- *Guide for Care and Use of Agricultural Animals in Research and Teaching*, L. Adam, Editor 2010, Federation of Animal Science Societies: Champaign, IL.
- *Guidelines for Dealing with Compromised Cattle, Sheep & Goats*, 2010, Ontario Farm Animal Council. www.ofac.org.
- *Nutrient Requirements of the Young Calf, in Nutrient Requirements of Dairy Cattle*, 2001, National Research Council, National Academy Press: Washington, D.C., p. 214-233.
- *Recommended Animal Handling Guidelines & Audit Guide: A Systematic Approach to Animal Welfare*, T. Grandin and American Meat Institute Animal Welfare Committee, Editors, 2013, American Meat Institute, AMI Foundation, Washington, D.C., p. 1-124.
- *Transport of Animals by Land*, 2013, in Terrestrial Animal Health Code, World Organization for Animal Health, p. 1-14.
- *Ventilation, Air Hygiene and Animal Health*, C.M. Wathes, C.D.R. Jones, A.J.F. Webster, Vet. Rec., 1983, 113(24): p. 554-559.
- *Livestock Trucking Guide*, T. Grandin, 2001, National Institute of Animal Agriculture. Colorado Springs, CO.

OTHER SOURCES:

- Kansas Transport Initiative, Cattle Transportation: Pre-transport Guidelines
- National Cattlemen's Beef Association Truckers Quality Assurance Manual
- National Cattlemen's Beef Association Beef Quality Assurance Manual, Transportation Section
- AABP Position Statement on the Care of Non-ambulatory and Injured Ambulatory Cattle, American Association of Bovine Practitioners, 2013

AABP POSITION STATEMENT

AABP position statement on the care of non-ambulatory and injured ambulatory cattle

STATEMENT:

The AABP believes that all cattle, including non-ambulatory cattle, be handled humanely in all situations. A veterinarian should be involved whenever possible in the timely assessment, prognosis, and implementation of the management plan for each non-ambulatory and injured ambulatory animal.

DEFINITIONS:

AABP: American Association of Bovine Practitioners (Cattle Veterinarians)
Bovine animal or cattle: any cow, bull or calf
Non-ambulatory: a disabled animal unable to rise, stand or walk normally unassisted
'Downer': a bovine animal that is non-ambulatory
Injured ambulatory: any bovine animal that is otherwise healthy (free from systemic metabolic or infectious disease) that as a result of injury is disabled and unable to walk normally
Safe area: a pen or paddock or other space that provides protection from the elements, predators and other animals, where a non-ambulatory cow is provided with a comfortable bed, food, water, and care.
Terminal market: a terminal market is a slaughter facility or packing plant.
Non-terminal market: a non-terminal market is one where animals are bought and sold, for example a sale yard or auction market. A non-terminal market is not a slaughter facility.

SPECIFIC RECOMMENDATIONS:

1. Non-ambulatory cattle on the farm

- If the animal must be moved to a safe area, then this should be done as soon as possible by properly trained employees in a manner that minimizes stress and trauma while providing assisted support for the weight of the animal (eg. bucket, sled or sling) over the shortest distance possible and NEVER involve dragging by the head, leg or tail
- Based on the veterinary assessment, the prognosis for recovery should be determined and appropriate action taken as detailed below.

1.1 Non-ambulatory cattle with a good prognosis

A non-ambulatory cow with a good prognosis for recovery is one that is not in distress, has no severe injury, is bright and alert, continues to eat and drink, and makes frequent attempts to rise.

- If a safe area cannot be provided then the animal should be humanely euthanized immediately using an AVMA approved method
- If a safe area can be provided, the care-giver should provide food, water, bedding, shelter, protection from predators and nursing care
- Non-ambulatory cattle receiving treatment should be evaluated at least twice daily for evidence of improvement or signs of deterioration
- If the condition of the animal deteriorates the prognosis should be re-evaluated OR the cow should be immediately euthanized by an AVMA approved method or humanely slaughtered on the farm

AABP position statement on the care of non-ambulatory and injured ambulatory cattle *(continued)*

1.2 Non-ambulatory cattle with a poor prognosis

A non-ambulatory cow with a poor prognosis for recovery is one that is severely injured, or one that is in distress, or is not alert or aware of her surroundings, is not eating or drinking, makes no attempt to rise and may appear unconscious.

- A non-ambulatory cow with a poor prognosis should be euthanized immediately using AVMA approved methods or humanely slaughtered on the farm

2. Non-ambulatory cattle at a non-terminal market

- The prognosis should be assessed immediately to determine the likelihood for recovery
- If prognosis allows, treatment should only be initiated if facilities and trained personal are available to administer appropriate therapy and nursing care, if not euthanasia using an AVMA approved method is recommended
- If it becomes apparent the cow will not recover, it should be immediately euthanized using an AVMA approved method

3. Non-ambulatory cattle at a terminal market

- A non-ambulatory animal at a terminal market must be immediately euthanized using an AVMA approved method
- A non-ambulatory animal euthanized at a terminal market must not enter the food supply

4. Injured ambulatory cattle

- Injured ambulatory cattle with fractured limbs (broken legs) or non-weight bearing lameness are not fit for transport and should NOT leave the farm of origin unless transported to a hospital for veterinary attention.
- Injured ambulatory cattle should be:
  - treated, OR
  - shipped directly to a state or federally inspected slaughter plant, OR
  - humanely slaughtered on the farm or a custom slaughter facility OR
  - humanely euthanized using an AVMA approved method
- If transported, injured ambulatory cattle should NOT be comingled with other cattle
- Care should be taken during loading, unloading, and handling of injured ambulatory cattle to prevent further injury

(Approved by the AABP Board of Directors, June 2013)

Appendix E

Dairy Well Audit Instrument

Dairy Cattle Animal Welfare Audit Instrument

Dairy Farm Information

Farm: _____ **Farm Owner:** _____

Farm ID # _____ **Farm Representative:** _____

Processor/Co-op: _____ **Date:** _____

Address: _____

City: _____ **State:** _____ **Zip:** _____

Phone: _____ **Fax:** _____

Email: _____ **Alt. Email:** _____

Welfare Evaluator: _____ **Company:** _____

Phone: _____ **Email:** _____

Herd Veterinarian: _____ **Clinic:** _____

Phone: _____ **Email:** _____

Field Rep.: _____

Phone: _____ **Email:** _____

Number of Employees: _____

Rainfall in last 7 days. _____ **inches**

Notes:

Farm Housing Information: Check ALL boxes that apply

Lactating Cow Housing:

Seasonal ☐ Open Lot ☐ Saudi ☐

Confined Free Stall ☐ Tie-Stall ☐ Pasture ☐ Bedded Pack/Compost ☐

Free Stall w/Lot ☐ Stanchion ☐ Other ☐ _____

# of Lactating Cows: _____ # Lactating Cow Pens: _____ Bulls in Pens: _____

Notes:

Growing Heifers (weaned to pre-fresh):

Check if raised off site w/separate management: ☐

Seasonal ☐ Open Lot ☐ Pasture ☐ Tie-Stall ☐

Confined Free Stall ☐ Free Stall w/Lot ☐ Bedded Pack /Compost ☐ _____

Number of Heifers: _____ # of Heifer Pens: _____

Notes:

Milk Fed Calves:

California Hutch (wood 3 stalls) ☐ Individual Pen ☐ Group Pen ☐ # of Group Pens: _____

Calves on milk: _____ Indoor ☐ Outdoor ☐ Other _____

Notes:

Dry Cows:

Seasonal ☐ Open Lot ☐ Pasture ☐ Tie-Stall ☐

Confined Free Stall ☐ Free Stall w/Lot ☐ Bedded Pack/Compost ☐ Other: _____

# of Dry Cows: _____ # of Dry Cow Pens: _____

Notes:

Critical Criteria	Answer	Result

A. Critical Criteria: (Mark "Y" for Yes, "N" for No)

Evidence of non-compliance in the following 3 areas is considered a critical non-conformance. For 2nd party audits a corrective action must be made immediately. If the incident has not disrupted the audit process to the point at which it cannot be completed that day, the audit may continue, otherwise the audit will be postponed. For 2nd party audits the farm will be re-visited in 48 hours to make sure a process has been established to prevent future recurrences and a follow-up visit will take place within 90 days to make sure the established process continues to address the issue. When "N" is marked, provide justification under the comment section. **Mark Acceptable when ALL items marked "Y" for the section.**

A1. All cattle have access to water – All cattle, including calves, must have access to potable water in their home pens. Mark YES if ALL cattle, including calves have access to water in their home pen.	Y ☐	N ☐	**Acceptable** ☐ **Critical Non-Conformance Must Be Addressed Immediately** ☐	
Comments:				
A2. No Observed Acts of abuse or Neglect – Evidence of abuse or neglect during an audit, if not reprimanded (without evidence that there is a process in place to intervene and correct the problem) is considered a critical non-conformance. Caregivers will be observed continuously throughout the audit process for appropriate handling of all cattle wherever human-cattle interactions are occurring. As the audit is performed during the hours of milking there should be opportunity to observe the general handling and movement of cattle to and from as well as within the parlor.	Y ☐	N ☐	**Acceptable** ☐ **Critical Non-Conformance Must Be Addressed Immediately** ☐	
**Evidence includes, but is not limited to with-holding treatment for broken limbs, dragging a live animal, intentional application of a prod or sticks to sensitive parts of the animal, deliberate slamming of gates on animals, hitting or kicking or maliciously driving animals over another, repeated use of an electric prod on an individual animal, restraining a cow with nose tongs, moving cows with hip lifts, spraying cows with water in the face with a hose or twisting a tail beyond 90 degrees or in such a way that the tail breaks.*				
Comments:				
A3. Non-Ambulatory Cattle Evaluation – Mark NA if there are no non-ambulatory cattle to observe the day of the audit.			**Acceptable** ☐ **Critical Non-Conformance Must Be Addressed Immediately** ☐	
A3a.i. Shade - Mark yes if all non-ambulatory cattle are provided overhead shade and shelter such that respiratory rate remains within normal limits (not greater than 60 to 70 breaths per minute).	Y ☐	N ☐ NA ☐		
A3a.ii. Water- Mark yes if all non-ambulatory cattle are provided water such that hydration is maintained. Hydration will be evaluated by using the "skin tent test" (see Appendix A-2 for direction on performing skin test test).	Y ☐	N ☐ NA ☐		
A3a.iii. Feed - Mark yes if all non-ambulatory cattle are provided fresh feed within reach (nose length).	Y ☐	N ☐ NA ☐		
A3a.iv. Soft Bedding - Mark yes if all non-ambulatory cattle are provided soft dry bedding (if not on pasture).	Y ☐	N ☐ NA ☐		
A3b. Protection – Mark yes **if the area designated for non-ambulatory cattle** isolates non-ambulatory cows from other ambulatory cattle.	Y ☐	N ☐		
A3c. Timely Euthanasia - Mark yes if there was physical evidence that moribund cows and calves receive immediate action.	Y ☐	N ☐ NA ☐		
Comments:				

Level 1: Animal Care & Handling	Answer		Result
B. Training: Training employees (including family members) on proper stockmanship is essential to protecting the health and welfare of all cattle on the farm. (Mark "Y" for Yes, "N" for No) All Level 1 Non-Conformances require a Corrective Action that is to be successfully completed and verified within 90 days. When "N" is marked, provide justification under the comment section. Mark Acceptable when **ALL** items marked "Y" for the section. Mark NA for the section if there are no hired caretakers.			
B1. Schedule - Records: training logs will be reviewed to determine if all current employees have received initial and annual refresher training by verifying current employee names with the log and date of training. **B1a. New Hires -** Mark yes if training log confirms that all new employees have received training. Mark NA if the farm does not have any new employees.	Y ☐	N ☐ NA ☐	**Acceptable** ☐ **Non-Conformance** ☐
B1b. Existing Employees - Mark yes if training log confirms that all existing employees receive refresher training annually. Mark NA if the farm does not have any employees.	Y ☐	N ☐ NA ☐	
Comments:			
B2. Delivery & Confirmation – Training must be done in a language easily understood by the caregiver. Accepted forms of training include video, webinars, computer modules, hands-on and verbal. **B2**. ***Caretaker Interviews –*** 2 caregivers will be selected at random by the evaluator and asked <u>when</u>, <u>how</u> and <u>what</u> type of training was provided. If necessary, the farm must be sure to have a person available who can translate for the auditor. Mark yes if caretaker confirms that they have received training. Mark NA if the farm has no employees or if there were no employees available for interview. If only 1 employee available, confirm with that single employee.	**NA**	☐	**Acceptable** ☐ **Non-Conformance** ☐
• Caregiver Interview #1 – confirms training	Y ☐	N ☐	
• Caregiver Interview #2 - confirms training	Y ☐	N ☐	
B3. Content - Every individual who works with cattle (stockperson) must be trained on the proper care and handling of cattle. **B3**a. *Cattle Care Agreement* - Confirm that for each employee and service provider, the cattle care agreement has been signed within last 12 months. Mark yes if each employee and service provider has signed the Cattle Care Agreement.	Y ☐	N ☐	**Acceptable** ☐ **Non-Conformance** ☐
B3b. *Stockmanship:* Confirm that for each employee stockperson, there is a record of stockmanship training in the training log within last 12 months. Mark yes if the training log confirms that all employees have watched Merck Dairy Care Modules or have received equivalent training. Mark NA if the farm has no employees.	Y ☐	N ☐ NA ☐	
Comments:			
B4. Stockmanship – Caregivers will be evaluated to be sure that cows are moved calmly and quietly without excessive force. **B4b**. Mark yes if cows are moved calmly and quietly without excessive force. Mark No if caregivers are heard yelling or whistling loudly or moving cows quickly such that it causes slips or falls.	Y ☐	N ☐	**Acceptable** ☐ **Non-Conformance** ☐
B4b. Slips and Falls – If slips or falls are noted during the audit make note of the number and situation. Number of slips or Falls: _____			
Comments:			

Level 1: Animal Care & Handling	Answer		Result
C. On Farm Practices: (Mark "Y" for Yes, "N" for No) *Unless otherwise specified, all Non-Conformances require a Corrective Action to be successfully completed and verified within 90 days. Mark Acceptable when **ALL** items marked "Y" for the section. When "N" is marked, provide justification under the comment section.			
C1. Tail Docking Not Practiced – Routine tail docking is prohibited. Mark yes if there is no evidence of routine tail docking currently taking place. *[To allow for the re-entry of heifers onto the farm that may have been tail docked beginning 2016, there can be no evidence of cattle entering the herd with docked tails as of Jan. 2018]*	Y ☐	N ☐	**Acceptable** ☐ **Non-Conformance** ☐
Comments:			
C2. Udder Health – Using available DHIA data, or other monthly testing, the average of the somatic cell count for <u>both</u> the previous 3 months and 12 months is < 400,000 Avg. SCC for Previous 3 months: _____ Avg. SCC for Previous 12 months:	Y ☐	N ☐	**Acceptable** ☐ **Non-Conformance** ☐
Comments:			
C3. Veterinarian Client Patient Relationship (VCPR) –			**Acceptable** ☐
C3a. VCPR form signed by the veterinarian of record and current within last 12 months	Y ☐	N ☐	**Non-Conformance** ☐
C3b. Approved drug list present and signed by the veterinarian of record – stating drug, indication, dose, route & with-hold (DIDRW). Check 3 drugs present on the farm to compare to the list. If all 3 drugs are noted on the list and DIDRW are noted, mark YES.	Y ☐	N ☐	
Comments:			
C4. Records –			**Acceptable** ☐
C4a. Individual Animal ID – this will be confirmed on male and female calves and cows during animal observations for Level 2 criteria i. Calves – Calves may not be tagged immediately, if there is evidence that calves are tagged within 24 hours mark yes.	Y ☐	N ☐	**Non-Conformance** ☐
ii. Heifers – if Heifers not raised on premises mark NA	Y ☐	N ☐ NA ☐	
iii. Cows	Y ☐	N ☐	
C4b. Health Records (Written or Computer) – Health records, including treatment, morbidity (including injury), and mortality events for all animals will be confirmed for all age groups by comparing three calves and three lactating cows in the hospital/marked for treatment with current treatment lists. If there are no animals currently being treated, confirm that treatment records are being kept.	Y ☐	N ☐	
Comments:			

Level 1: Animal Care & Handling	Answer	Result

C. On Farm Practices continued: (Mark "Y" for Yes, "N" for No)

*Unless otherwise specified, all Non-Conformances require a Corrective Action to be successfully completed and verified within 90 days. Mark Acceptable when **ALL** items marked "Y" for the section. When "N" is marked, provide justification under the comment section.

C5. Written SOPs (Current, dated and updated within last 12 months) – SOPs must be written or computer based and *meet the minimum criteria as outlined in the template documents provided in Appendix B.* While templates are provided as guidance for minimum criteria, farms are encouraged to develop SOPs with the guidance of the veterinarian of record for the farm while meeting all expectations of pain mitigation, humane transport, humane handling & humane euthanasia as put forth by the AVMA and AABP.

C5a. Confirm Presence and Content of SOPs for all the items below: — Y ☐ N ☐ — **Acceptable** ☐ / **Non-Conformance** ☐

1. Herd Health Plan: (including frequency and nature of observations)		**5. Painful Procedures:**			
Vaccine Schedule for all age groups	☐	*Dehorning*	☐		
Parasite Prevention	☐	*Castration (mark NA if not done)*	☐	NA	☐
		Branding (mark NA if not done)	☐	NA	☐
Hoof Health	☐	*Extra Teat Removal (mark NA if not done)*	☐	NA	☐
Sick Cattle Monitoring	☐	**6. Fitness for Transport (Consistent with AABP guidelines)**	☐		
Udder Health	☐	**7. Maternity Management**	☐		
2. Non-Ambulatory Cattle (Consistent with AABP guidelines)	☐	**8. Emergency Response**	☐		
3. Euthanasia (Consistent with AVMA & AABP guidelines)	☐	**9. Biosecurity**	☐		
4. Management of the living Environment for each age group	☐	**10. Personnel Training** *(mark NA if no employees)*	☐	NA	☐

Comments:

C6. Confirm employee familiarity with applicable SOP – One SOP will be chosen at random and one of the caregivers responsible for that SOP will be interviewed. Mark yes if the caregiver confirms knowledge of the SOP and demonstrates clear understanding of their duty in agreement with the SOP. Mark NA if the farm has no employees or there were no employees on the farm at the time of the audit.

Y ☐ N ☐ NA ☐ — **Acceptable** ☐ / **Non-Conformance** ☐

Comments:

Level 2: Outcome Based Resource & Animal Welfare Observations

Milk Fed Calves	Answer	Result

D. Resource Based - General Housing/ Facility Design & Management :

(Mark "Y" for Yes, "N" for No)

* All Level 2 Non-Conformances require a Corrective Action Plan to be developed within 90 days and implemented by the next evaluation, the timing of which will be determined by performance benchmarking of lameness and severe hock lesions.

Mark Acceptable when **ALL** items are marked "Y" for the section.

When "N" is marked, provide justification under the comment section.

D1. Milk Fed Calf Environment – Facilities should be designed, constructed and maintained to provide and promote animal health and welfare, reduce the risk of injury, provide protection from extreme weather and prevent the development of injury. *Evaluate hygiene and housing for all calves on milk using the appropriate sample methodology for the number of calves and housing type.*

D1a.i. Hygiene – Using the hygiene score card descriptions (Appendix A3) mark yes if >75% of calves score a 1 or 2. [Results: _____ ; _____ %] Were you able to score calves individually? Y ☐ N ☐	Y ☐	N ☐	**Acceptable** ☐
***D1a. ii. Lying surface* –** Mark yes if calves are provided a soft substrate to lie on. Pasture, grass, shavings, sawdust, straw, compost and sand or dirt lots are considered a soft substrate.	Y ☐	N ☐	**Non-Conformance** ☐
D1b. Space – Mark yes if all calves scored have enough room to turn around and lie down. Evidence for this includes calves facing both directions in the pen/hutch during the evaluation or feces at both the front and rear of a pen/hutch.	Y ☐	N ☐	**NA** ☐
D1c. Shelter – Mark yes if the pen/hutch provides calves the opportunity to access an area protected from inclement weather.	Y ☐	N ☐	
D1d. Additional Protection from inclement weather provided – Mark yes if at least 1 additional protection is provided for heat and cold. Depending on the time of year observation of such provisions may not be possible. In such cases, mark which additional protections are currently in place in addition to any reported by the owner/manager. **Heat** Shade ☐ Fans ☐ Temperature Gauges ☐ Other: **Cold** Bedding ☐ Heat ☐ Calf Jackets ☐ Increased Calories ☐ Other:	Y ☐	N ☐	
D1e. Water Cleanliness – If troughs are used, the 'clean water sheet' (Appendix A1) must be easily read while submerged 6-10 inches below the water surface. If buckets are used for individual pens it is not necessary to use the sheet on each bucket. All water troughs/buckets must be checked and be in acceptable condition to meet this criterion. Mark yes if ALL the troughs/buckets are clean.	Y ☐	N ☐	

Comments:

Level 2: Outcome Based Resource & Animal Welfare Observations

MILK FED CALVES continued	Answer	Result

E. Animal Based Welfare Measures: (Mark "Y" for Yes, "N" for No)

* All Level 2 Non-Conformances require a Corrective Action Plan to be developed within 90 days and implemented by the next evaluation, the timing of which will be determined by performance benchmarking.
Mark Acceptable when **ALL** items are marked "Y" for the section.
When "N" is marked, provide justification under the comment section.

E1. Milk Fed Calf Body Condition - Evaluate body condition and housing for all calves on milk using the appropriate sample methodology for the number of calves and housing type. Mark NA if there are no milk fed calves on the facility.

E1a. i. Emaciated Body Condition - Use the calf body condition score card (Appendix A4) to evaluate for evidence of emaciation. Mark yes if ≤3% are observed to be emaciated. [Results: _____ ; _____ %]	Y ☐	N ☐	**Acceptable** ☐
E1a. ii. Poor Body Condition - Use the calf body condition score card (Appendix A4) to evaluate for evidence of calves with poor body condition. Mark yes if ≤15% of the calves are observed to have poor condition. [Results: _____ ; _____ %]. If calf jackets on all calves, preventing evaluation of body condition, mark Not-Evaluated (NE); otherwise score calves not wearing jackets.	Y ☐	N ☐ NE ☐	**Non-Conformance** ☐
E1b. Care – If emaciated calves are observed, check treatment records to confirm treatment. Mark yes, if treatment records confirm treatment of calves. Mark NA if there are no emaciated calves noted on the day of the evaluation.	Y ☐	N ☐ NA ☐	**NA** ☐

Comments:

E2. Milk Fed Calf Injuries – Housing and handling should be provided such that risk of injury is minimized.

Evaluation – Evaluate injuries on the same calves evaluated for body condition. If a hospital pen is present for milk fed calves, score the entire pen and record the results separately. If it is not possible to score all calves, score those you can evaluate and make a note in the comment section as to the reason why (calves lying inside hutches, difficult to keep track of which calves are scored, etc.). If you are not able to effectively evaluate any, mark Not-Evaluated and record the reason in comments.

E2a. Count and note the % of ***neck and other injuries*** as described in the score sheet (Appendix A6). [Moderate Injury Results: _____ ; _____ %] [Severe Injury Results: _____ ; _____ %]			Not Evaluated ☐

Comments:

Level 2: Outcome Based Resource & Animal Welfare Observations

MILK FED CALVES continued	Answer	Result

E. Animal Based Welfare Measures: (Mark "Y" for Yes, "N" for No)

* All Level 2 Non-Conformances require a Corrective Action Plan to be developed within 90 days and implemented by the next evaluation, the timing of which will be determined by performance benchmarking.
Mark Acceptable when **ALL** items are marked "Y" for the section.
When "N" is marked, provide justification under the comment section.

E3. Milk Fed Calf Painful Procedures

Disbudding – To evaluate disbudding, the drug list will be checked as well as the milk fed calf group for evidence to support method and timing as described in the SOP. Evaluate the same calves for disbudding/dehorning that were evaluated for body condition.

If calves are raised of site and not dehorned under this farms management mark NA and skip section: **NA** ☐

E3a.Method: Paste ☐ Hot Iron/Cautery ☐ Other ☐

Check here if farm is using semen from or breeding with polled bulls, if yes note % bred: ☐ **% Bred** _____

E3b. Age: Complete at < 8 weeks of age Age completed:	Y ☐	N ☐	**Acceptable** ☐
E3c. NSAID provided	Y ☐	N ☐	**Non-Conformance** ☐
E3d. Local provided	Y ☐	N ☐	

Comments:

Level 2: Outcome Based Resource & Animal Welfare Observations

GROWING HEIFERS	Answer	Result

F. Resource Based - General Housing & Facility Design and Management:

(Mark "Y" for Yes, "N" for No)

* All Level 2 Non-Conformances require a Corrective Action Plan to be developed within 90 days and implemented by the next evaluation, the timing of which will be determined by performance benchmarking. Any section that is not pertinent to an individual farm should be marked NA.

Mark Acceptable when **ALL** items are marked "Y" for the section.

When "N" is marked, provide justification under the comment section.

F1. Growing Heifer Environment – Facilities should be designed and maintained to provide and promote animal health and welfare, reduce risk of injury and provide protection from extreme weather. Evaluate hygiene and housing for heifers using the appropriate sample methodology for the number of heifers.

Mark NA if heifers are not raised on the farm.

	Answer	Result
F1a.i. Hygiene – Using the hygiene score card descriptions (Appendix A3), mark yes if >75% of heifers score a 1 or 2. [Results: _____ ; _____ %] Were you able to score heifers individually? Y ☐ N ☐	Y ☐ N ☐	**Acceptable** ☐
F1a.ii. Lying surface – Mark yes if the heifers are provided a soft substrate to lay on. Pasture, grass, shavings, sawdust, straw, compost and sand or dirt lots are considered a soft substrate.	Y ☐ N ☐	
F1b. Shade – Evaluate **all heifer pens for shade**. Mark yes if shade is provided to every group of heifers.	Y ☐ N ☐	**Non-Conformance** ☐
F1c. Additional Protection from inclement weather provided – Evaluate all heifer pens for additional protection. Depending on the time of year observation of such provisions may not be possible. In such cases, mark which additional protections are currently in place in addition to any reported by the owner/manager. Mark yes if at least one additional measure is provided for heat and cold. **Heat** Overhead Shade at feed bunk ☐ Fans ☐ Soakers ☐ Other: **Cold** Wind Breaks ☐ Additional bedding ☐ Other:	Y ☐ N ☐	NA ☐
F1d. Water Cleanliness –If troughs are used, the 'clean water sheet' (Appendix A1) must be easily read while submerged 6-10 inches below the water surface. All water troughs in the pens where heifer hygiene is scored must be in acceptable condition to meet this criterion. Mark yes if ALL of the troughs scored are clean.	Y ☐ N ☐	

Comments:

Level 2: Outcome Based Resource & Animal Welfare Observations

GROWING HEIFERS	Answer	Result

G. Animal Based Welfare Measures: (Mark "Y" for Yes, "N" for No)

* All Level 2 Non-Conformances require a Corrective Action Plan to be developed within 90 days and implemented by the next evaluation, the timing of which will be determined by performance benchmarking.
Mark Acceptable when **ALL** items are marked "Y" for the section.
When "N" is marked, provide justification under the comment section.

G1. Growing Heifer Body Condition [See Appendix A5 for score descriptions] – Evaluate body condition on the same heifers scored for hygiene. If a hospital pen is present for heifers, score the entire pen and add the total (numerator and denominator) to the score of the heifer pen evaluated. Mark NA if heifers are not raised on the farm.

G1a. Mark yes if there were no emaciated heifers observed. Mark NA if heifers are not raised on the farm. [Results: _____ ; _____ %]	Y ☐	N ☐	**Acceptable** ☐ **Non-Conformance** ☐
G1b. If emaciated heifers are noted, check treatment records to confirm treatment. Mark yes if emaciated heifers are receiving treatment. Mark NA if there were no emaciated heifers.	Y ☐	N ☐ NA ☐	**NA** ☐

Comments:

G2. Growing Heifer Injuries – Housing and handling should be provided such that risk of injury is minimized.
Evaluate injuries on the same heifers evaluated for body condition and hygiene using the neck and other injury scorecard (Appendix A6). If a hospital is present for heifers, score the entire pen and record the results separately. The broken tails will be considered as part of the overall "total" for broken tails. There is no final determination of "acceptable" for neck and other injury outcomes at this time. Mark NA if heifers are not raised on the farm.

G2a. Broken tails - Count and note the % of broken tails as described in the broken tail score card (Appendix A9). [Results: _____ ; _____ %]			**NA** ☐
G2b. Neck & Other Injuries - Count and note the % of neck injuries as described in the score sheet (Appendix A6). [Moderate Injury Results: _____ ; _____ %] [Severe Injury Results: _____ ; _____ %]			**NA** ☐

Comments:

Level 2: Outcome Based Resource & Animal Welfare Observations

LACTATING COWS	Answer	Result

H. Resource Based - General Housing & Facility Design and Management:

(Mark "Y" for Yes, "N" for No)

* All Level 2 Non-Conformances require a Corrective Action Plan to be developed within 90 days and implemented by the next evaluation, the timing of which will be determined by performance benchmarking. Any section that is not pertinent to an individual farm should be marked N/A. Mark Acceptable when **ALL** items are marked "Y" for the section.

When "N" is marked, provide justification under the comment section.

H1. Lactating Cow Environment – Facilities should be designed and maintained to provide and promote animal health and welfare, reduce risk of injury and provide protection from extreme weather. Evaluate hygiene and housing for lactating cows using the appropriate sample methodology for the number of cows in the pen/group being scored.

H1a. Hygiene – Using the hygiene score card descriptions (Appendix A3), mark yes if >75% of cows score a 1 or 2. [Results: _____ ; _____ %] Were you able to score lactating cows individually? Y ☐ N ☐	Y ☐	N ☐	**Acceptable** ☐
H1b. Shade – Evaluate all lactating cow pens for shade. Mark yes if overhead shade is provided to every group of lactating cows.	Y ☐	N ☐	**Non-Conformance** ☐
H1c. Additional Protection from inclement weather provided – Evaluate all lactating cow pens for additional protection. Rows of trees may be considered a wind break but not as shade. Mark yes if at least one additional measure is provided for heat and cold to every group of lactating cows. **Heat** Overhead Shade at feed bunk ☐ Fans ☐ Soakers ☐ Other: **Cold** Wind Breaks ☐ Additional Bedding ☐ Other:	Y ☐	N ☐	
H1d. Water Cleanliness – If troughs are used, the 'clean water sheet' (Appendix A1) must be easily read while submerged 6-10 inches below the water surface. All water troughs in the pens where lactating cow hygiene is scored must be in acceptable condition to meet this criterion. Mark yes if ALL of the troughs scored are clean.	Y ☐	N ☐	
H1e. Tie Stalls & Stanchion Barns	NA	☐	
H1e.i. Tie-Stall Release – Mark yes of the owner reports that cows are released from tie-stalls or if you observe that the practice is in place. Check the boxes that best describes the area to and period for which cows are released.	Y ☐	N ☐	
Turn out area: Pasture ☐ ; For milking only ☐; Concrete Pen ☐ ***Time out of stalls:*** _____ hours/day ***Season:*** All year ☐ ; Weather Permitting ☐			
H1e. ii. Tie-Stall Trainers – Mark yes if trainers do not touch any of the observed cows while standing in a normal position.	Y ☐	N ☐	

Comments:

Level 2: Outcome Based Resource & Animal Welfare Observations

LACTATING COWS	Answer	Result

I. Animal Based Welfare Measures: (Mark "Y" for Yes, "N" for No)

* All Level 2 Non-Conformances require a Corrective Action Plan to be developed within 90 days and implemented by the next evaluation, the timing of which will be determined by performance benchmarking. Mark Acceptable when **ALL** items are marked "Y" for the section. When "N" is marked, provide justification under the comment section.

I3. Lactating Cow Body Condition - Evaluate body condition using the cow body condition score card (Appendix A5) and the appropriate sample methodology for the number of cows in the pen/group being scored.

I1a. Count and record the number and % of emaciated cows. Mark yes if there were no emaciated cows. [Results: _____ ; _____ %]	Y ☐	N ☐	**Acceptable** ☐ **Non-Conformance** ☐
11b. If emaciated cows are noted, treatment records will be checked to confirm the cow(s) are receiving treatment. Mark yes if all emaciated cows were receiving treatment. Mark N/A if there were no emaciated cow on the day of the audit.	Y ☐	N ☐ NA ☐	

Comments:

I2. Lactating Cow Locomotion – Evaluate locomotion using the locomotion score card (Appendix A8) and the appropriate sample methodology for the number of lactating cows in the pen/group being scored.

I2a. ≤ 15 % Cows Scored Moderately Lame [Results: _____ ; _____ %]	Y ☐	N ☐	**Acceptable**	☐
I2b. ≤ 1% Cows Scored Severely Lame [Results: _____ ; _____ %]	Y ☐	N ☐	**Non-Conformance**	☐
I2b. i. Severely lame cows are kept separate from the lactating group (tie-stall barns excluded) & are receiving treatment (verified with treatment records). *A NO is a non-conformance.*	Y ☐	N ☐		
I2c. Lameness Performance Benchmark: The timing of the next audit is determined by the poorest performing outcome benchmark.	**Top 76-100%** (≤15% moderately lame OR ≤1% severely lame)		Next evaluation in **24-30 months**	☐
	Middle 26-75% (16-32% moderately lame OR 2-5 % severely lame)		Next evaluation in **12-16 months**	☐
	Bottom 25% (>32% moderately lame OR >5% severely lame)		Next evaluation in **6-9 months**	☐

Comments:

Level 2: Outcome Based Resource & Animal Welfare Observations

LACTATING COWS continued	Answer	Result

I. Animal Based Welfare Measures: (Mark "Y" for Yes, "N" for No)

* All Level 2 Non-Conformances require a Corrective Action Plan to be developed within 90 days and implemented by the next evaluation, the timing of which will be determined by performance benchmarking. Mark Acceptable when **ALL** items are marked "Y" for the section. When "N" is marked, provide justification under the comment section.

I3. Lactating Cow Injuries – Evaluate injuries using the appropriate sample methodology for the number of cows in the pen/group being scored. [See Appendix A for score descriptions].

I3a. i. Moderate Hock Lesions – Count and record the % of cows with moderate (score=2) hock lesions. [Results: _____ ; _____ %]			**Acceptable**	☐
I3a. ii. Severe Hock Lesions – Count and record the % of cows with severe (score=3) hock lesions. **Mark yes if the % of severe knee lesions is ≤1%.** [Results: _____ ; _____ %]	Y ☐	N ☐	**Non-Conformance**	☐
I3c. ii. Severe Knee Lesions - Count and record the % of cows with severe (score=3) knee lesions. **Mark yes if the % of severe knee lesions is ≤1%.** [Results: _____ ; _____ %]	Y ☐	N ☐		
I3d. i. Moderate Neck & Other Injuries - Count and record the % of cows with moderate (score=2) injuries on any other part of their body (hips, flank, face etc.). [Results: _____ ; _____ %]				
I3d. ii. Severe Neck & Other Injuries- Count and record the % of cows with severe (score=3) injuries on any other part of their body (hips, flank, face etc.). **Mark yes if the % of severe lesions is ≤2%.** [Results: _____ ; _____ %]	Y ☐	N ☐		
I3e.Tails - Count and record the % of cows with broken tails. **Mark yes if there were no observed broken tails.** If this evaluation is done as a follow-up having confirmed broken tails previously look for evidence of new/recently broken tails. [Results: _____ ; _____ %]	Y ☐	N ☐		
I2f.Severe Hock Performance Benchmark: The timing the next audit is determined by the poorest performing outcome benchmark.	**Top 76-100%** (≤1% Severe Hocks)		Next evaluation in **24-30 months**	☐
	Middle 26-75% (2-7% Severe Hocks)		Next evaluation in **12-16 months**	☐
	Bottom 25% (>7% Severe Hocks)		Next evaluation in **6-9 months**	☐

Comments:

Level 2: Outcome Based Resource & Animal Welfare Observations

SICK COWS	Answer	Result

J. Resource Based - General Housing & Facility Design and Management:

Mark Acceptable when **ALL** items are marked "Y" for the section.
When "N" is marked, provide justification under the comment section.

J. Sick Cow Environment – Facilities should be designed and maintained to provide and promote animal health and welfare, reduce risk of injury and provide protection from extreme weather. Evaluate the pen including taking measurements to confirm space allowances.
If there is a dedicated pen for sick or injured animals evaluate it for the following items. If there is no such pen, mark "No" for J1a.i and NA for the remainder of section J. Evaluate hygiene using the appropriate sample methodology for the number of cows in the pen/group being scored.

J1a.i. Dedicated Pen – Mark yes if there is a dedicated sick pen for sick or injured animals.	Y ☐	N ☐	**Acceptable** ☐
J1a.ii Hygiene – Count and record the % of cows that score a 1 or 2. Mark yes if >75% of cows score a 1 or 2. [Results: _____ ; _____ %] Were you able to score the sick cows individually? Y ☐ N ☐	Y ☐	N ☐ NA ☐	**Non-Conformance** ☐
J1b. Shade – Evaluate the hospital pen for shade. Mark yes if the hospital pen provides shade.	Y ☐	N ☐ NA ☐	
J1c. Additional Protection from inclement weather provided – Evaluate the hospital pen for additional protection. Mark yes if at least 1 additional protection is present for both heat and cold stress. **Heat** Overhead Shade at feed bunk ☐ Fans ☐ Soakers ☐ Other: **Cold** Wind Breaks ☐ Additional Bedding ☐ Other:	Y ☐	N ☐ NA ☐	
J1d. Lying Space – Measure the area provided for the hospital pen. Mark yes if the area provides at least 100 sq. ft. per cow. (9.2m^2/cow).	Y ☐	N ☐ NA ☐	
J1e. Bunk Space/Feeding Area – Mark yes if the feeding area provides at least 30" (75 cm) of accessible bunk space per cow.	Y ☐	N ☐ NA ☐	
J1f. Water Cleanliness – If troughs are used, the 'clean water sheet' (Appendix A1) must be easily read while submerged 6-10 inches below the water surface. All water troughs in the pens where sick cow hygiene is scored must be in acceptable condition to meet this criterion. Mark yes if ALL of the troughs scored are clean.	Y ☐	N ☐	

Comments:

Level 2: Outcome Based Resource & Animal Welfare Observations

SICK COWS	Answer	Result

K. Animal Based Welfare Measures: (Mark "Y" for Yes, "N" for No)

Mark Acceptable when **ALL** items are marked "Y" for the section.
When "N" is marked, provide justification under the comment section.

K. Sick Cow Condition and Injuries – Evaluate locomotion, body condition and injuries using the appropriate sample methodology for the number of cows in the pen/group being scored. It is recognized that some cows in this pen may not be able to be evaluated for locomotion if they are not willing (although able) to rise. The auditor should make a gentle attempt to make animals rise, but should not force any cow to get up. If there are no sick cows or a designated sick pen on the day of the evaluation, mark NA.

K1. Body Condition – Count the number of emaciated cows. Confirm that any emaciated cow in the pen is receiving treatment by examining current treatment records**. Mark yes if emaciated cows are receiving treatment.** [Results: _____ ; _____ %] Mark N/A if there were no emaciated cow on the day of the audit.	Y ☐	N ☐ NA ☐	**Acceptable** ☐ **Non-Conformance** ☐ **NA** ☐
K2a.i. Moderately Lame – Count the number of cows with a locomotion score of 2. [Results: _____ ; _____ %]			
K2a.ii. Severely Lame – Count the number of cows with a locomotion score of 3. [Results: _____ ; _____ %]			
K2b. Care – Confirm that severely lame cows are receiving treatment by checking treatment records. **Mark yes if severely lame cows are receiving treatment.**	Y ☐	N ☐	
K3a.i. Moderate Hocks – Count and record the number of cows with moderate (score=2) hock lesions. [Results: _____ ; _____ %] **K3a.ii. Severe Hocks** – Count and record the number of cows with severe (score=3) hock lesions. [Results: _____ ; _____ %]			
K3b.ii. Severe Knees – Count and record the number of cows with severe (score=3) knee lesions. [Results: _____ ; _____ %]			
K3c.i. Moderate Neck & Other Injuries – Count and record the number of cows with moderate (score=2) injuries on any other part of their body (hips, flank, face etc.). [Results: _____ ; _____ %]			
K3c.ii. Severe Neck & Other Injuries – Count and record the number of cows with severe (score=3) injuries on any other part of their body (hips, flank, face etc.). [Results: _____ ; _____ %]			
K3d. Broken Tails – Count and record the number of cows with broken tails. [Results: _____ ; _____ %]			

Comments:

Level 2: Outcome Based Resource & Animal Welfare Observations

DRY COWS	Answer	Result

L. Resource Based - General Housing & Facility Design and Management:

(Mark "Y" for Yes, "N" for No)
Mark Acceptable when **ALL** items are marked "Y" for the section.
When "N" is marked, provide justification under the comment section.

L1. Dry Cow Environment – Facilities should be designed and maintained to provide and promote animal health and welfare, reduce risk of injury and provide protection from extreme weather. Evaluate hygiene using the appropriate sample methodology for the number of cows in the pen/group being scored. If there are no dry cows on the facility mark NA.

L1a. Hygiene – Using the hygiene score card descriptions, mark yes if >75% of dry cows score a 1 or 2. [Results: _____ ; _____ %] Were you able to score dry cows individually? Y ☐ N ☐	Y ☐	N ☐	**Acceptable** ☐
L1b. Shade – Evaluate all dry cow pens for shade. Mark yes if ALL dry cows are provided shade.	Y ☐	N ☐	**Non-Conformance** ☐
L1c. Additional Protection from inclement weather provided – Evaluate all dry cow pens for additional protection. Mark yes if at least 1 additional protection is present for both heat and cold stress. **Heat** Overhead Shade at Feed Bunk ☐ Fans ☐ Soakers ☐ Other: **Cold** Wind Breaks ☐ Additional Bedding ☐ Other:	Y ☐	N ☐	**NA** ☐
L1d. Water Cleanliness – If troughs are used, the 'clean water sheet' (Appendix A1) must be easily read while submerged 6-10 inches below the water surface. All water troughs in the pens where dry cow hygiene is scored must be in acceptable condition to meet this criterion. Mark yes if ALL of the troughs scored are clean.	Y ☐	N ☐	

Comments:

Level 2: Outcome Based Resource & Animal Welfare Observations

DRY COWS	Answer	Result
M. Dry Cow Animal Based Welfare Measures: (Mark "Y" for Yes, "N" for No) Mark Acceptable when **ALL** items are marked "Y" for the section. When "N" is marked, provide justification under the comment section.		
M. Dry Cow Condition and Injuries - Evaluate injuries using the appropriate sample methodology for the number of cows in the pen/group being scored. This information is being collected for further review. ***There is no final determination of "acceptable" on these outcomes at this time.***		
M3a. i. Moderate Hocks – Count and record the number of cows with moderate (score=2) hock lesions. [Results: _____ ; _____ %]		
M3a. ii. Severe Hocks – Count and record the number of cows with severe (score=3) hock lesions. [Results: _____ ; _____ %]		
M3b. ii. Severe Knees - Count and record the number of cows with severe (score=3) knee lesions. [Results: _____ ; _____ %]		
M3c. Neck & Other Injuries – Count and record the number of cows with severe injuries on any other part of their body (hips, flank, face etc.). [Moderate Injury Results: _____ ; _____ %] [Severe Injury Results: _____ ; _____ %]		
Comments:		

Animal Welfare Audit Summary	Follow-up

Critical Criteria - A corrective action must be made immediately. If the incident has not disrupted the audit process to the point at which it cannot be completed that day, the audit may continue, otherwise the audit will be postponed. For 2nd party audits, the farm will be re-visited in 48 hours to complete the audit if it was postponed or to make sure a process has been established to prevent future recurrences and a follow-up visit will take place within 90 days to make sure the established process continues to address the issue.

1. Water – Attention Required ☐
2. Care and Stockmanship – Attention Required ☐
3. Non-ambulatory Cow Care – Attention Required ☐

Level 1 Criteria – All objectives within Level 1 must be completed. A farm will be allowed 90 days to make corrective actions. Any farm unwilling to make necessary corrective actions will be considered "non-compliant"

Corrective Actions Required:	Completed: Notes
1.	☐
2.	☐
3.	☐
4.	☐
5.	☐
6.	☐
7.	☐
8.	☐
9.	☐
10.	☐
Dairy Well Level 1 Compliant – "Dairy Well Assured"	☐

Level 2 Criteria – Level 2 Criteria are founded on the principles of continuous improvement and focus on animal welfare outcome measures that will be tracked over time and benchmarked against available national data.

Areas identified in need of improvement:	Corrective Action Plan	Implemented
1.	☐	☐
2.	☐	☐
3.	☐	☐
4.	☐	☐
5.	☐	☐
6.	☐	☐
7.	☐	☐
Dairy Well Level 1 & 2 Compliant – "Dairy Well Elite"	☐	☐

When a farm meets, or exceeds all the requirements and goals outlined in the Dairy Well Audit, the farm will be designated "Dairy Well Elite"

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DAIRY WELL
Science Driven, Cow Centered

Appendix F

Sample Size Calculator

Appendix F

n = N*X / (X + N – 1)

- N= population being sampled
- $X = (Z^2 \times p(1 - p))/e^2 = 384.16$

  Z= 1.96; p=0.5 & e = 0.05

Sample Size calculator							
Group Size (N)	Sample Size (n)	Group Size (N)	Sample Size (n)	Group Size (N)	Sample Size (n)	Group Size (N)	Sample Size (n)
<30	**ALL**	105	**83**	300	**169**	1,000	**278**
30	**28**	110	**86**	320	**175**	1,050	**282**
32	**30**	115	**89**	340	**181**	1,100	**285**
34	**32**	120	**92**	360	**187**	1,150	**289**
36	**33**	125	**95**	380	**192**	1,200	**292**
38	**35**	130	**98**	400	**197**	1,250	**295**
40	**37**	135	**101**	420	**201**	1,300	**297**
42	**38**	140	**103**	440	**206**	1,350	**300**
44	**40**	145	**106**	460	**210**	1,400	**302**
46	**42**	150	**109**	480	**214**	1,450	**304**
48	**43**	155	**111**	500	**218**	1,500	**306**
50	**45**	160	**114**	520	**222**	1,550	**309**
52	**46**	165	**116**	540	**225**	1,600	**310**
54	**48**	170	**119**	560	**229**	1,650	**312**
56	**49**	175	**121**	580	**232**	1,700	**314**
58	**51**	180	**123**	600	**235**	1,750	**316**
60	**53**	185	**126**	620	**238**	1,800	**317**
62	**54**	190	**128**	640	**241**	1,850	**319**
64	**55**	195	**130**	660	**244**	1,900	**320**
66	**57**	200	**132**	680	**246**	1,950	**322**
68	**58**	205	**134**	700	**249**	2,000	**323**
70	**60**	210	**137**	720	**251**	2,050	**324**
72	**61**	215	**139**	740	**254**	2,100	**325**
74	**63**	220	**141**	760	**256**	2,150	**327**
76	**64**	225	**143**	780	**258**	2,200	**328**
78	**65**	230	**145**	800	**260**	2,250	**329**
80	**67**	235	**147**	820	**262**	2,300	**330**
82	**68**	240	**148**	840	**264**	2,350	**331**
84	**70**	245	**150**	860	**266**	2,400	**332**
86	**71**	250	**152**	880	**268**	2,450	**333**
88	**72**	255	**154**	900	**270**	2,500	**334**
90	**74**	260	**156**	920	**272**		
92	**75**	265	**158**	940	**273**		
94	**76**	270	**159**	960	**275**		
96	**77**	275	**161**	980	**277**		
98	**79**	280	**163**				
100	**80**	285	**164**				
		290	**166**				
		295	**168**				

Examples:(1) If the oldest group of bred heifers is housed in a pen of 44, a minimum of 40 heifers in the pen should be scored. (2) If there are 560 milk-fed calves housed in individual hutches, a minimum of 229 should be scored randomly to obtain a representative sample across ALL ages represented in that life-stage group.