

## Veterinary Extension Program Activities and Accomplishments: Lameness and Welfare of Cattle

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#### **Lameness in Cattle** *Dairy Cattle Lameness*

In the dairy industry, prevalence of lameness averages somewhere between 20-25% with much higher rates reported in problem herds. Direct effects of lameness are responsible for approximately 15% of cows involuntarily culled from dairy herds. However, when the indirect effects of lameness on milk yield and reproductive performance are considered, involuntary losses associated with impaired locomotion are estimated to increase by an additional 50%. Lameness is therefore recognized as the single most costly clinical disease of dairy cattle (Guard, 2009).

The Master Hoof Care Program (now in its 17<sup>th</sup> year) was designed to address lameness problems on dairies by assuring that foot care technicians are properly trained and equipped to handle common lameness disorders. Over the previous 12 month period, we have conducted multiple training programs (under the heading of the ISU Master Hoof Care Program) on foot care and claw trimming to trimmers and dairy farm managers throughout the United States. The format of these programs consists of approximately a half day of classroom and 1 to 2 days of claw trimming on cadavers and live animals. All training programs are conducted in both English and Spanish and intended to address the needs of the dairy industry's multi-cultural workforce. Since large dairies with multiple farm units may have as many as 5 to 10 people serving the foot care needs of the enterprise, on-farm training of foot care technicians may be conducted at the farm of origin with lameness disorders and equipment unique to their workers.

Demand for these programs in Iowa has been limited in part because most trimming and foot care is conducted by veterinarians and trimmers. While it is anticipated that this may change as herds get larger, for now the greater need and opportunity lies with the feedyard industry as conditions such as digital dermatitis are becoming major causes of lameness.

#### **Extension-Related Efforts in Animal Science and Veterinary Education**

Despite the significance of lameness on performance, profit and animal welfare of cattle, it remains one of the most neglected issues in educational programs for animal, dairy and veterinary students. Since these are the extension

audience of the future, it is important to see that they are properly informed on these issues while pursuing their degrees at ISU. Students will receive at most 1 or 2 lectures on the subject of lameness in the course of their 4 year education. To say this is woefully inadequate is an understatement.

I propose to offer lectures and laboratory sessions for animal, dairy and veterinary students. Since these are not part of the current curriculum, it may be necessary to do these sessions on weekends when it is hoped most students could attend. Since the understanding of lameness and foot care in cattle is fundamental to all who serve the livestock industry, offering this educational opportunity to students while they are here at Iowa State University makes sense as one of the best ways to advance the cause of foot health in our industries. In the past, these programs have been conducted on weekends and organized by student organizations. This past year alone, training programs were provided to veterinary students at Iowa State University, the University of Minnesota, Kansas State University and the University of Florida. I would like to see this expanded to reach students in our undergraduate and graduate programs.

#### **The American Association of Bovine Practitioners (AABP) Bovine Lameness Seminar**

I continue to serve as Coordinator of the AABP Bovine Lameness Seminar. Between this activity and those described in veterinary education I am trying to extend the information on bovine lameness to veterinary practitioners. This past year the Bovine Lameness Seminar was conducted in Montreal, Canada at the AABP Annual Meeting. This past year there were approximately 25 practitioners in attendance to the seminar. Plans are currently in progress for development of the 2013 conference and seminar which will also include a wet lab.

Beyond the above described activities are multiple on-farm visits, email and phone consultations with veterinarians, dairy managers and owners, feedyard operators and hoof trimmers from across the country.

#### **Research Related to Extension Emphasis in Lameness**

1. American Association of Bovine Practitioners/Hoof Trimmer's Association. Topical Treatment of Claw Lesions in Dairy Cattle. Jan Shearer, Jennifer Schleining, Paul Plummer, Pat Gorden, Adam Krull, Vickie Cooper and Hans Coetzee. \$24,350.
2. Boehringer Ingelheim, Pathogenesis of Digital Dermatitis in Cattle. Adam Krull, Paul Plummer, Pat Gorden, Jan Shearer and Bruce Leuschen. \$40,000.

3. Alberta Beef Producers. Prevalence, characterization and risk factors associated with lameness within Alberta feedlots. Karen Schwartzkopf-Genswein, Diego Moya, Eugene Janzen, Ed Pajor, Carl Dueck, Phil Klassen, Mike Jelinski, Craig Dorin, Karin Orsel, Suzanne Millman, Jan Shearer, and Christoph Muelling. \$130,000.

### Welfare Issues of Cattle

“Animal welfare” refers to the “state of the animal”. Its primary concerns typically include 3 basic questions: 1) is the animal functioning well (in other words, is it producing well), 2) does the animal have pain or is it distressed (affective states), and 3) is the animal able to express or perform natural behaviors? In production agriculture some assume that we can best determine an animal’s welfare status by addressing only the first of these questions (i.e. is performance affected?). Indeed, this was the approach advocated by the late Stanley Curtis, legendary swine specialist at the University of Illinois, that welfare be assessed on the basis of objective measures of animal performance (production and reproduction) and not on how an animal feels. He argued that the use of subjective criteria (i.e. based on beliefs and values) for assessment of an animal’s welfare were not appropriate for decision-making in how to improve the well-being of animals.

Opponents of this view would say that if good performance equals good welfare, then how does one reconcile high milk yield as desirable knowing that it is associated with an increased potential for disease (mastitis, lameness, milk fever and retained placenta)? Or, how would one assess the welfare of a cow that despite poor body condition, management and handling, may still manage to have relatively high levels of milk production and even become pregnant? In this scenario using performance parameters alone, one might characterize the animal’s welfare as good. On the other hand, knowing the “state of the animal” with respect to its environment and human interactions, one might conclude that its welfare was poor.

Beyond abuse and neglect specific welfare issues in dairy cattle include: lameness, mastitis, conditions contributing to poor reproductive efficiency, poor body condition, euthanasia and euthanasia of unmarketable bull calves, heat stress, housing conditions that prevent the expression of normal behavior, injuries, extreme weather conditions, drought and floods, handling of down cows, transportation issues, handling and care issues and many more.

*Extension-related efforts* to date have been largely confined to events as an invited speaker on several veterinary programs over the past few years. It is not a popular subject for extension programs with livestock producers because unless carefully presented it can be received poorly. Nonetheless, it is an important subject for

our industry. By virtue of having multiple faculty members with expertise in welfare, Iowa State University is especially well-positioned to address this issue.

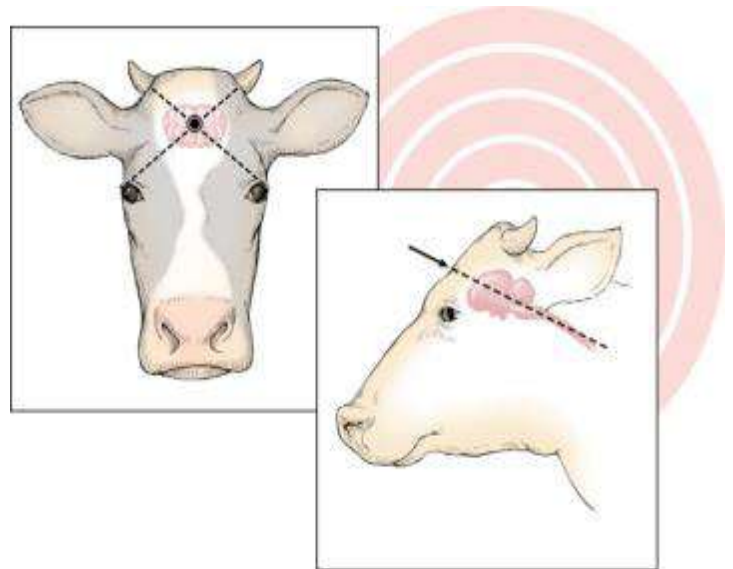
### Euthanasia

One of the most important welfare issues in cattle is the need for timely euthanasia using methods that will consistently yield the desired outcome. This topic is covered in depth for several livestock species at the website below which includes the most up-to-date information currently available. This website contains information on proper application of euthanasia in field conditions by gunshot and captive bolt. It includes animations for assistance in training these techniques and all training materials and downloads (.pdfs) are available in Spanish as well as English.

<http://vetmed.iastate.edu/HumaneEuthanasia>

### Anatomical Landmarks in Cattle

In cattle, the point of entry of a “free bullet” should be at the intersection of two lines, each drawn from the outside corner of the eye to the base of the opposite horn (OIE, 2009). The firearm should be positioned so that the muzzle is perpendicular to the skull to avoid the possibility of ricochet. Proper positioning of the firearm or penetrating captive bolt is necessary to achieve the desired results.



Use of the poll position (top of the head) for stunning or euthanasia of cattle 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. Furthermore, aiming or directing the projectile to the regions of the brain that control vital functions such as respiration and heart function are more easily missed by use of the poll position for euthanasia in cattle.

Gunshot is the method most commonly used for on-farm euthanasia of cattle (Fulwider et al., 2008). Death results from mass destruction of brain tissue. For euthanasia purposes, handguns are limited to close range shooting (within 1 to 2 feet or 30 to 60 cm) of the intended target. Shotguns loaded with either birdshot or slugs are appropriate from a distance of 1 to 2 yards (1 to 2 meters) and rifles from a longer distance if required. Although all shotguns are lethal at close range, the preferred gauges for this procedure in cattle are the 20, 16, or 12 gauge shotguns. Number 6 or larger birdshot or shotgun slugs are the best choices for euthanasia of cattle. It is important to note that birdshot begins to disperse as it leaves the end of the gun barrel. However, if the operator stays within short range (i.e. within 6 to 10 feet of the target) of the intended anatomical site, destruction of the brain will be sufficient to result in rapid death. One advantage of euthanasia by shotgun with birdshot shells is that it is unlikely that any of the birdshot will 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 placing by-standers in danger.

### **Extension related activities/ accomplishments for 2012**

The topic of euthanasia has consumed a major amount of my time and effort over the past 3 years. During this time I have served as Chair of the AVMA's Food Animal Working Group's Panel on Euthanasia. The Panel has completed its revision of the AVMA Euthanasia Guidelines which will be published in January 2013. By virtue of knowing what this information would include Dr. Alex Rameriz and I have updated our website to include the most up-to-date information on euthanasia available. In addition, all of the information on the website including all downloadable materials have been translated into Spanish during the past year. This is the most frequently cited website on euthanasia of livestock. During the past year I have prepared several papers on euthanasia of livestock, particularly cattle. I have also been invited to speak on this subject at several national and international conferences.

Currently, I am serving on the AVMA's Panel on Humane Slaughter and on the AVMA's Panel on Mass Depopulation. Both groups are preparing documents that will be published on these subjects. The first to come will be that prepared by the Panel on Humane Slaughter followed by a paper on mass euthanasia of livestock. As listed below, much of the information on mass euthanasia of cattle will be based upon research in progress here. Our group has responsibility for validation of a captive bolt with air channel pithing for mass euthanasia of feedlot cattle.

**Euthanasia laboratories** are conducted for veterinary students each year; however I would like to expand these training opportunities to animal and dairy science students. As described previously in the discussion of lameness, I see the need to understand how to conduct euthanasia in cattle as core information for students who will be the industry leaders of tomorrow.

### **Related Involvement in Support of Extension Program Activities in Welfare**

1. Chair of the AVMA Panel on Euthanasia Food Animal Working Group. - I am responsible for the food animal groups' (dairy, beef, small ruminant, swine, and poultry) submissions for this document. The AVMA Guidelines on Euthanasia are a comprehensive review of current research on euthanasia of animals. The final document has been reviewed and is now in press with a publication date planned for the first quarter of 2013.
2. Member of the AVMA Panel on Humane Slaughter – this past year the Panel met twice to complete its document on Humane Slaughter and AVMA Panel on Depopulation.
3. Diplomate of the American College of Animal Welfare – a Veterinary Medical Specialty Board in Animal Welfare.
4. Member of the Validus Scientific Advisory Committee and a Welfare Assessor and Auditor for Validus.
5. Other welfare related activities include: Member of the Scientific Review Committee of the Humane Farm Animal Care and a member of the Dean Foods Animal Welfare Advisory Council.

### **Research Related to Extension Program Emphasis in Welfare of Cattle (Euthanasia)**

1. USDA APHIS - Development and Validation of a Portable Pneumatic Captive-Bolt Device for the Depopulation of Dairy Cattle For use in Animal Health Emergencies and Welfare Depopulations. Jan Shearer, James Reynolds, Grant Dewell, Renee Dewell and John Gilliam. \$418,042.
2. USDA APHIS - Development and Validation of a Portable Pneumatic Captive-Bolt Device for the Depopulation of Dairy Cattle For use in Animal Health Emergencies and Welfare Depopulations. James Reynolds and Jan Shearer. \$418,042.
3. USDA APHIS - Captive Bolt Euthanasia of Cattle: Determination of Optimal Shot Placement and Evaluation of the Cash Special Euthanizer Kit for Euthanasia of Cattle. John Gilliam (Oklahoma State University), Jan Shearer, Jennifer Woods, Jeff Hill and James Reynolds. \$199,850.
4. USDA NIFA Agricultural and Food Research Initiative Competitive Grants Program Foundational Program. An examination of argon gas for on-farm anesthesia and euthanasia of livestock. Suzanne Millman, Anna Butters-Johnson, Renee Dewell, Locke Karriker, Annette O'Connor, Jan Shearer and Hongwei Xin. \$500,000.

### **Bovine Emergency Response Program (BERP)**

Over 50 million cattle and calves are marketed and transported annually. The majority of these are transported via a semi-truck and trailer. During the period of 1994-2007, there were 415 rollover accidents in the US and Canada. The most common cause of these accidents was driver fatigue with 59% of accidents occurring between midnight and 9:00 AM. As might be expected, the highest incidence was in yearling and weaned calves undergoing long haul transport to feeding operations from areas such as the southeastern United States or other distant areas.

The BERP program arose in response to a number of reports indicating that many of these accidents were poorly handled. Furthermore, closer inspection of this issue indicates that there is no standardized plan for managing rollover accidents. This prompted a group of extension specialists from North Dakota State University, University of Tennessee, West Virginia University and Iowa State University to seek funding from the National Cattlemen's Beef Association to develop a plan for first responders of livestock hauler accidents. A recent meeting was held in

North Dakota to share this information with first responders. I presented this information at this year's Iowa Veterinary Rapid Response Team (IVRRT) meeting in Ames, Iowa. A final report by the group has been prepared and is now being reviewed.

### **Program Activities and Accomplishments**

In support of the above extension program activities I have authored or co-authored 2 refereed publications on euthanasia (1 is in press), 17 non-refereed publications as proceedings, 1 article in popular press (Iowa Cattleman), 2 book chapters and 1 book (2nd Edition of the Manual of Foot Care in Cattle). I have delivered 44 presentations at state, national or international meetings (most as an invited speaker). We have also conducted 7 foot care training programs on dairies with on-farm trimmers and 4 programs with student groups. More importantly, all of these publications, seminars and training programs pertain to the major program activities outlined above and are more or less evenly split between beef and dairy cattle.