

## **Montana Beef Network: An Integrated Total Quality Management Approach for Beef Production**

### **BACKGROUND**

In 1999, the beef industry began to react to consumers who were asking for more information about the origin of their food and the quality eating experience associated with it. This led to tremendous interest in assuring the quality of beef, whereby cattle producers could document that they were offering a consistent, healthy product to consumers. Early on, the Montana Beef Network (MBN) embraced these concepts with its own Beef Quality Assurance (BQA) program. The idea of identifying feeder calves produced by BQA-certified producers was created as a way to identify calves in the market place, potentially adding value at sale time. Obtaining carcass information on these feeder calves was another incentive for source verification on the part of the rancher. Many producers wanted to know if the genetics they were purchasing were indeed producing calves that excelled in carcass traits. This information is valuable to a producer seeking to improve the genetics of his herd. However, the hurdles of dealing with a segmented industry (cow-calf, stocker, feedlot, packer) were high during the early years of the program. A 2003 BQA survey indicated that producers received a \$9 per head premium for following BQA protocols, however, returns of carcass data to producers struggled to reach 50% data return. Virtually all calves enrolled in the MBN were sold to finishing feedlots and harvested in packing plants across the Midwest. Initially, many of these feedlots and packers were uncooperative in returning carcass data.

On December 23, 2003, bovine spongiform encephalopathy (BSE) was discovered in a cow in the United States. Overnight, all export markets were shuttered. These markets accounted for 11% of U.S. beef production. The major customers, Japan and Korea, would only come back to the trade table if they could be guaranteed that the beef they were receiving came from animals under 21 months of age. MBN identified a process that could help Montana producers access these markets; this required certification using a USDA Process Verified Program, and tracking all cattle with electronic ear tags (EID) in a confidential database. This same database could be used by producers to record production-related information, and to transfer carcass information from packer to producer. Since 2003, carcass data returns have improved to over 75%. Based on feeder calf video sales in 2007 and 2008, Montana producers are receiving an additional \$12 per calf by providing age and source verification. Over 358,000 feeder calves have been enrolled in the program. Market incentives for source and age verification have driven these enrollment numbers higher in the past three years. Most of these calves are from Montana, but producers in surrounding states have also enrolled in the program. As of November 2008, the US beef industry has almost re-attained 2003 levels in the export markets. Further, Montana producers have been able to “add value” directly due to MBN.

Specifically, the Montana Beef Network (MBN) is a producer driven partnership between the Montana Stockgrowers Association (MSGA) and Montana State University (MSU). The MBN is designed to provide a systems approach that helps beef producers document “best management” practices in raising and marketing age- and source-verified calves for which consumers are seeking and are willing to pay a premium. The MBN provides beef quality assurance (BQA) certification, implements and documents bio-security plans on ranches, and provides educational outreach on topics such as disease management, and cow/calf nutrition. The establishment of the animal traceability database company, Verified Beef by MSGA is one successful outcome of this project.

The MBN, using a “supply-chain” management approach, is driven by: 1) customer requirements for quality assurance through documented accountability, 2) understanding customer preferences, and 3)

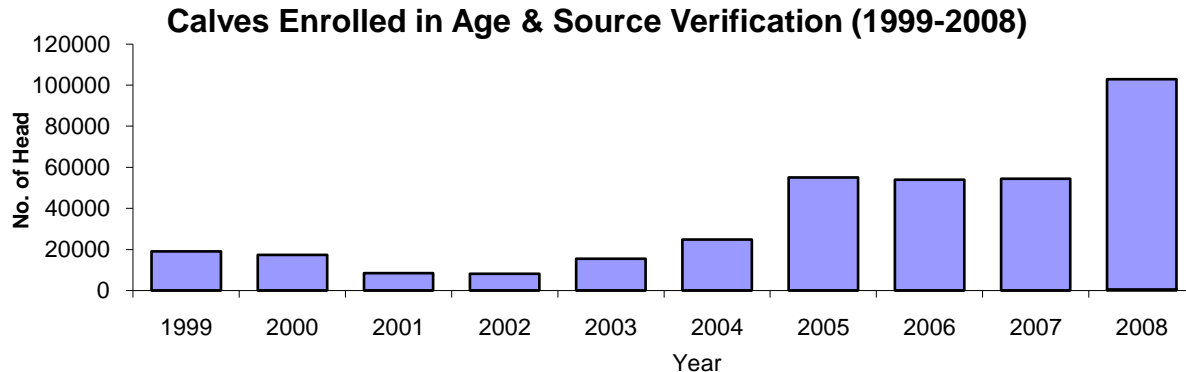
educating customers and producers on globalization, and the advantages of Montana beef cattle in global markets. The beef industry continues to evolve to be more consumer-focused, with greater emphasis on specific and documented management practices which result in safe and consistent end-products. This requires a team approach in first, delivering educational programs, and second, developing protocols which document best management practices, e.g., source and age verification of calves for export markets.

## OBJECTIVES

The MBN has four main objectives: 1) Traceability: Age and Source Verification of Feeder Calves, 2) Beef Quality Assurance and Biosecurity Education, 3) a partnership with the MSGA, and 4) Research.

### 1. Traceability: Age and Source Verification

Overall, the beef industry is interested in source verification or traceability of cattle to: 1) ascertain ownership of the animal, 2) identify parentage of the animal, 3) improve palatability of the product, 4) assure food safety and 5) determine compliance in branded-beef programs and alliances. Since MBN's inception in 1999, over 358,000 calves have been enrolled in the age and source verification program. This approach has resulted in approximately \$12/head (\$ 0 to \$45/ head range) more income for producers enrolled in the program. During 2008, about 100,000 calves were age and source verified through Verified Beef, which has a process verified program (PVP) database required by the USDA to document and audit age- and source-verified calves for export markets. The 2008 numbers reflects almost a 50,000 head increase over the previous year because of demands by cattle buyers from the cattle feeding states in the Midwest.



### 2. Beef Quality Assurance and Biosecurity Education

A major effort of the MBN is Beef Quality Assurance (BQA) education. BQA is a producer-driven, pre-harvest, supply chain management concept that ensures domestic and international beef consumers enjoy ready access to a safe and wholesome beef supply. Many industry analysts believe that BQA efforts across the nation have been instrumental in recent successes in re-building demand for beef. Further, implementing BQA practices helps beef producers avoid burdensome government regulations. Through hands-on demonstration and innovative educational programs based on accepted scientific knowledge, beef producers are inspired to commit to quality beef production at every level. The precursor of BQA in the late 1970s and early 1980s was aimed at assuring that beef was free of violative chemical residues. Emphasis at that time was, and is still today, on targeting real and perceived beef safety issues. Measures encouraging proper use of antibiotics are continually stressed. This includes educating producers about proper use of all pharmaceutical products, and honoring withdrawal times.

BQA ensures that producers understand their role in producing safe and wholesome beef in a manner accepted by consumers. This includes a commitment to the care and welfare of animals throughout the supply chain, an increasingly important segment of BQA programming in Montana.

BQA educational programs are designed to respond to national production benchmarks for end-product quality. Periodic Beef Quality Audits document changes or improvements in cattle and beef production, and subsequent changes in end-product quality over time. The 1991 National Beef Quality Audit, the first comprehensive audit of beef carcasses, determined that the industry lost nearly \$280 per head because of quality defects for the average fed animal. Most of this loss was due to excess fat, lack of marbling, and other carcass defects – including injection site blemishes. By 1995, that figure was \$137.50 per head; by 2000, it had decreased to \$114.92 per head. While losses continue to decrease, the beef industry nationwide recognizes that this can still be improved. A hallmark of Montana BQA programming has been in reducing injection site lesions – a major success story of BQA.

Biosecurity programs incorporate management components that can build healthier herds by: 1) immunizing properly, 2) providing adequate nutrition, 3) isolating animals and quarantine (when needed), 4) surveying for disease pathogens, 5) reducing handling stress, and 6) record keeping. Livestock managers with a keen and advanced understanding of these biosecurity concepts are better equipped to plan, implement and document strategies that reduce disease in their herds. Protecting livestock against highly infectious diseases is important in reducing overall industry risk. But, controlling persistent, common diseases that cause a constant drain on profitability is of at least equal or in reality of higher importance.

A priority in BQA biosecurity programming has been to assess risks and threats of catastrophic diseases such as foot and mouth disease (FMD) on Montana ranches. The economic impact of an outbreak of FMD, if spread unchecked in the U.S., could reach billions of dollars in the first year. Because Montana is a cattle exporting state, an FMD outbreak would virtually shut down the commercial and seedstock cattle industries.

With direction from the MSGA, MBN at Montana State University is rapidly becoming a national leader in BQA programming with the following operational objectives in place:

Pre-harvest BQA Practices - BQA encourages anyone who works regularly with cattle – on the ranch or feedlot – to become BQA certified through hands-on, classroom-style and online training. Sponsoring BQA training at Montana ranches using “Twilight Training Seminars” has been well received. The sessions emphasize hands-on demonstration involving: proper handling and application of pharmaceutical products, judicious treatment and handling of livestock, and animal identification and recordkeeping. Group discussions that highlight individual treatment practices and regimes are compared and analyzed. Participants take the BQA exam as a group and individually. These sessions also reflect new information (i.e., recent quality audit results), new technologies (i.e., electronic identification systems) and new regulations (i.e., ruminant-derived feed ban, “downer” ban, etc.).

The value of BQA education was recently published in the Journal of Extension, indicating that BQA certified producers differ significantly from non-BQA certified producers in several ranch management practices. About 1,400 producers from MT and adjoining states have been BQA-certified (<http://www.mtbqa.org/producers.cfm>).

Livestock Biosecurity - Producer surveys continue to determine the value of biosecurity education and subsequent development of herd health programs, including: 1) livestock vaccination, 2) disease surveillance, 3) animal identification and recordkeeping systems, and 4) documentation and verification. This has been demonstrated in projects with the Montana Department of Livestock, and USDA-APHIS to prevent the introduction of brucellosis and bovine viral diarrhea (BVD) into cowherds. Objectives of some of these projects include: 1) reduce common cattle diseases through health and nutrition management, 2) prevent the introduction and/or spread of foreign or emerging animal diseases, 3) assess the risks, threats and possibilities of agroterrorism, installing appropriate and commensurate measures to protect Montana's food production industries, and 4) determine prevalence of BVD in Montana cowherds.

Based on survey results, more ranchers now understand how to prevent and, if necessary, successfully remove BVD carrier animals from infected herds. But surveys have indicated that more is needed to assist in cost-effective assessments of risk. Therefore, recently, a peer-reviewed BVD-PI Herd Biosecurity Risk Self-Assessment has been built from information derived from this project. This self-assessment takes the next step in helping fine-tune BVD biosecurity and disease control.

Global Beef Production - The U.S. beef cattle industry is in the midst of an evolution that began more than a decade ago. That evolution accelerated on Dec. 23, 2003, when BSE was detected in a cow in the U.S, changing forever the realm in which the U.S. beef cattle industry operates. Today, the direction of the industry centers on beef supply chain management driven by the following forces: 1) consumer preferences and consumer confidence, 2) quality assurance through accountability, and 3) globalization, including comparative advantages.

These key forces will intertwine to shape the future of the American food animal and animal product business. Worldwide demand for American beef products will continue to grow if consumer incomes rise and trade barriers are lowered – with government and private sector assurances of product safety and quality. And, while animal disease outbreaks, income growth in developing economies and trade liberalization are tenuous factors, there are no boundaries to the technology or limits to the capital available to fuel industry growth. This growth will ultimately emerge where resistance to change is low and economic opportunity is compelling. MBN is addressing this topic by: 1) examining trends in the global meat and grain protein industries, 2) providing producer-oriented study tours and experience in foreign beef production and marketing systems, 3) assessing global markets and marketing strategies that will benefit Montana producers as they plan and manage their operations to fit into a global marketplace, and 4) empowering beef producers to communicate and educate their peers in managing global competition.

### **3. The Montana Stockgrowers Partnership**

The Montana Stockgrowers Association (MSGA) was a sub-recipient of federal funds awarded to Montana State University in the amount of \$276,934 for Fiscal Year 2007 and \$451,950 for Fiscal Year 2008. These funds were used to perform the following services as a partner of the Montana Beef Network (MBN), and to cover expenditures for program staff, travel, supplies, venue facilities and contracted services.

Direct Producer Communications - Through the use of MSGA's direct communication channels, Montana and Western U.S. cattle producers have received the most current and up-to-date information regarding MBN's latest research information and programs. These programs include Beef Quality Assurance (BQA), BQA Certification, cattle age and source verification information, cattle bio-security and disease

information, carcass data information, and carcass data trends. These communications have also discussed ongoing MBN applied research initiatives and materials to help producers make sound marketing and business decisions in their own respective operations. MSGA continues to inform producers through its far-reaching network of beef industry colleagues about events that involve the MBN, and special education forums co-hosted by MBN and MSGA. Most notably of the forums are the Cattlemen's Colleges held during MSGA's annual meetings. MSGA holds two statewide meetings each year, an annual convention in December and a mid-year meeting in June. The mid-year usually has more than 250 participants while the annual convention usually has over 1,000 participants related to the beef industry. Representatives of the MBN continue to be a critical part of these meetings to present applied beef industry research completed by MBN staff. The ability to hold meetings at the state level and share the wealth of knowledge is critical to Montana producers being able to provide the quality of beef for which Montana is renowned.

Cattle Identification/Cattle Health Demonstrations - Working with MBN staff, MSGA continues to organize demonstrations at sites across Montana. At each site, producers are invited to hear presentations on current industry topics, which included animal bio-security, MBN research and BQA initiatives. During the summer of 2008 a series of "Twilight Trainings" were organized to feature BQA educational sessions that helped Montana beef producers apply quality assurance practices and become BQA certified. These sessions were held in Malta, Lewistown, White Sulphur Springs, Sidney, Havre and Hall, Montana to ensure that producers from across the state had a reasonable distance to travel to attend these informative training sessions.

Data Management Services - MSGA is providing a database service that electronically identifies and documents the source and age of individual cattle, and they disperse cattle ear tags. The data management system provides data services to enrolled producers. MSGA hopes to increase the quantity of the carcass data returned to producers. Furthermore the intent is to expand the availability, user-friendliness, and usefulness of the data system to producers.

MBN researchers have access to the data for research and educational purposes, and will maintain the individual producer's data confidentiality. MSGA has chosen to work with Verified Beef, LLC to architect and provide these data management services. Verified Beef has been granted a USDA Process Verified Program (PVP) certificate and has a fully functioning, USDA approved database, via a website, to capture all animal identification tags with associated ranch (premise) information for age and source verification of cattle. MSGA has also worked with the company to modify its PVP to include certifications for Non-Hormone Treated Cattle (NHTC), Never-ever 3 (NE3) and Grass-fed. Over 100,000 head of feeder cattle were enrolled in the company's age and source verification system in 2008.

Advanced Producer Marketing Education - MSGA works to provide the latest information on cattle marketing and education for Montana beef producers. Effective marketing is a vital component for any beef producer. MSGA strives to ensure that producers are using quality beef production practices, making sure that producers are well educated on the beef supply chain and how it impacts the industry. As a result of MSGA's efforts, producers are making informed marketing decisions to receive the maximum added value for their efforts. The Montana Market Manager program is an effective partner on this effort. The program plays a key role and is an integral part of the continued education and outreach to assist producers in continuing to provide quality beef, and to become astute marketers of their cattle and beef. In August of 2007, MSGA and MBN coordinated a tour for over fifty industry participants through the JBS Swift & Company processing plant in Greeley, Colorado. JBS Swift and Co. is the largest beef processor in the world, processing over 52,000 cattle per day globally. The scope of the

tour then shifted towards two major capacity feedlots, the Gilcrest Feedyard of Five Rivers Cattle Feeding, LLC in La Salle, Colorado and Dinklage Feedyards in Proctor, Colorado. MSGA, working with MBN staff, have been coordinating these tours every other year to allow Montana producers to travel and observe other segments of the beef industry outside of Montana. An important objective of the MBN is to provide Montana beef producers with the tools and information necessary to maximize profits from their beef marketing strategies by integrating workshops, tours and online market information.

#### **4. MBN Research**

##### **a. Evaluation of Electronic Ear Tags**

Currently, the U.S. beef industry uses a cumbersome system of visual ear tags, hot iron brands and paper files, coupled with limited manpower to try to contain a potential disease outbreak and to traceback to the original source. This incompatibility or inefficiency directly impacts the ability to respond quickly and effectively to animal disease events. The last four tuberculosis investigations took animal health officials an average of 125 days to complete. Requirements by international and domestic markets for source, age, and production verification and traceback to validate food safety and quality demonstrate the need to develop a more robust form of tracking cattle.

Animal Health Australia implemented a national individual animal identification program using radio frequency identification (RFID) ear tags to serve as a rapid traceback/trace-forward tool and offer the opportunity to improve surveillance and control of livestock diseases. The ability to trace animals from one premise (location) to another would provide a critical tool for animal health professionals to control, and potentially eradicate, diseases such as brucellosis, tuberculosis and foot-and-mouth.

The National Animal Identification System (NAIS) is envisioned to be a rapid multi-animal RFID scanning system that works non-invasively at auction markets and slaughter facilities, and would allow for the rapid transfer of valuable information from farm to feedlot, packer, processor and consumer. Before seamless application can occur, the technology must be tested to determine if scanning RFID tags at the speed of commerce (1m/sec) with 95% readability rates (USDA, 2007) can be obtained.

The objectives of a series of MBN studies were to: 1) compare readability rates of three commercially available multi-antenna panel reader systems for their speed, accuracy and reliability in reading either half-duplex or full-duplex RFID tags, 2) determine readability rates of 13 different RFID ear tags using the three panel reader systems, and 3) determine long-term retention of RFID ear tags in cows on ranches in MT. Results of these studies indicate that: 1) retention and readability of electronic ear tags exceeded 97% (five-year study), 2) readability of RFID tags in an "auction-type" setting exceeded 98% (two-year study), and 3) in another simulated, auction market environment using three different systems, readers met USDA 95% readability standards, and flow rates met the National Animal Identification System (NAIS) standards (1 m/sec).

##### **b. Effect of Aging and Sex on Tenderness of Beef**

The success of branded beef programs that guarantee tenderness has strengthened the belief that consumers are willing to pay higher prices for greater tenderness. Unfortunately, a significant portion of beef cuts are unacceptable in tenderness. Several antemortem factors, such as genetics, growth implants and age at slaughter have been shown to affect beef tenderness. Objectives of two experiments were to compare tenderness of strip-loin steaks from non-implanted steers and heifers from similar genetic backgrounds, and to define benchmark differences, similarities, or both in carcass

characteristics of steers and heifers. Overall, findings indicate that sex should be added to the list of antemortem factors contributing to variation in cooked beef steak tenderness.

#### c. Improving Feed Efficiency in Beef Heifers by Selecting for Residual Feed Intake

Improving the feed efficiency of a beef cattle herd could mean significant savings for producers. One way to achieve this goal is to select breeding bulls that are naturally feed efficient, since 80 to 90 per cent of the genetic improvement in a herd comes through the sires. Theoretically, it could cost \$50 less over 112 days to feed an efficient bull compared with an inefficient one. An efficient bull may pass on superior genetics for feed efficiency to his progeny, which will be realized as feed savings for calves, in the feedlot and for replacement heifers entering the cowherd.

To increase profitability of cow-calf operations, feed input costs must be reduced while maintaining a moderate level of production. Two alternatives to achieve this are to: 1) decrease the amount of feed necessary to maintain cows, or 2) decrease the cost of the feed used to maintain cows. Because of the economic impact that feed efficiency can have, researchers and breed associations have and are currently attempting to calculate accurate expected progeny differences (EPD) for Residual Feed Intake (RFI) that can be used to select for more efficient cattle.

The objectives of this current research project are to: 1) measure RFI and feed conversion ratio in replacement heifers sired by Simmental, Simmental x Angus or Angus Bulls exhibiting either high or low RFI, 2) determine the sale value of performance-tested purebred bulls that have low or high RFI and improved feed conversion ratios, and 3) research specific DNA markers that may be used to identify cows which consume approximately \$50 less feed/year, thereby improving production efficiency.

#### d. Reducing Sickness and Mortality of Montana Calves before Arrival in the Feedlot

The benefits of preconditioning (vaccinations) and backgrounding (45 d of care before shipment) calves include: 1) minimizing shipping stress, 2) giving more predictable feeding results, 3) changing delivery and marketing schedules, 4) reducing morbidity and mortality, 5) reducing risk, 6) increasing predictability, 7) expanding marketing options, and 8) improving the value of calves. In addition, preconditioning calves are becoming the industry standard to reduce sickness, death loss, poor performance and meat quality losses. In a review of controlled studies on the effects of preconditioning on health of calves, morbidity was reduced from 26.5 to 20.4% and mortality was reduced from 1.44 to 0.74% compared with calves which were not preconditioned.

Calves (1,836) from eight Montana ranches were individually identified to determine if a standardized weaning protocol which included vaccinations, nutrition and 45-d of backgrounding could reduce morbidity from weaning until harvest. Freshly weaned calves were randomly allocated to two treatments: 1) present ranch management practices determined by the livestock owner, or 2) MSU Protocol in which calves were fed either 1.82 kg/d of a weaning pellet or 0.45 kg/d of liquid supplement for 28 d. The supplement contained additional levels of Cu, Zn, Mn, CP, vitamins A, D and E and a coccidiostat. Overall, the findings indicate that calves that followed the MSU protocol of defined vaccinations, nutrition and backgrounding had less morbidity (sickness) and greater weight gains (0-45 days) than control calves. This weaning pellet has been fed to over 300,000 calves in MT since it was developed in 2000.

#### e. Food Safety: Prevalence of *E. coli* O157:H7 in Montana and Vaccination Against

*E. coli* O157:H7 that produce sigma-like toxins causes an estimated 62,000 human cases of food borne illness in the US each year resulting in 1,800 hospitalizations and 52 deaths. Although postmortem

methods of reducing *E. coli* O157:H7 have been improved over the past decade, limited success has been measured with antemortem protocols. One novel approach would be to vaccinate cattle against *E. coli* O157:H7 producing bacteria before harvest. Two studies were conducted to first measure the prevalence of *E. coli* O157:H7 in Montana cattle, and second to determine if a vaccine would be useful in decreasing the shedding of this bacterium in the feces. Prevalence of *E. coli* O157:H7 on MT ranches was not high (about 1%) based on a three-year study. These rates climbed to approximately 8-10% when retested in Midwestern feedlots.

In the second study, 137 beef cows in the last trimester of pregnancy were used to determine if vaccinating against *E. coli* O157:H7 would increase antibody titers in the serum and also result in the transfer these antibodies to the neonatal calf. Overall, results indicate that vaccinating gestating cows for *E. coli* O157:H7 resulted in elevated antibody titers compared to control cows and these antibodies were transferred to the calf.

#### f. Nutritional Research to Evaluate Byproducts in Cattle Diets

*Field Peas.* Field pea production has increased in North Dakota and Montana over the last decade. Field pea has been primarily grown for human consumption; however, the feed industry is an excellent potential market for field peas which do not meet specifications for human consumption. Based on previous research with sheep, increasing field pea in the diet should have little effect on growth performance or carcass traits when replacing corn or barley and a portion of the protein supplement for growing and finishing beef cattle. Results indicated that field pea can be included successfully into rations at levels up to 36 percent (DM basis) without negatively affecting growth or carcass characteristics. The energy content of field peas is similar to cereal grains such as corn or barley when included in high concentrate finishing diets.

*Light test-weight barley grain for cows and calves.* The objectives of two experiments were to determine the effects of animal age (cows vs. calves), animal gender (steers vs. heifers), and barley processing method (whole vs. rolled) on rate and efficiency of gain, and diet digestibility when fed as a supplement to medium quality grass hay. The study included a control, whereby animals were only fed hay. Animals fed hay only had similar rates and efficiencies of gain as supplemented animals. Barley processing method had no effect on rate or efficiency of gain for cows or calves. Calves gained weight more efficiently than cows.

*Corn versus wheat middlings as energy supplements for beef cattle.* Three experiments were conducted to determine how supplementing grass hay diets with either corn grain (high in starch) or wheat middlings (high in fiber) would influence dry matter, protein or fiber digestibilities, and feeding behavior. Corn grain reduced hay fiber digestibility, but had no effect on dry matter or protein digestibility. Wheat middlings did not reduce hay digestibility, but increased dry matter and protein digestibility. Heifers consumed more diet per day when supplemented with a 50:50 mix of corn and wheat middlings compared with corn or middlings supplemented alone.

*In progress.* As potential inexpensive feedstuffs, the feeding value of distiller's grains and whole soybeans will be evaluated. Camelina meal will also be evaluated.

#### g. Feedlot Performance of Montana Feeder Cattle

Performance of seventy pens of cattle was obtained from a Colorado branded-beef feedlot program. The effect of a variety of factors on morbidity (sickness), mortality, average daily gain, carcass weight, and carcass quality were assessed. Results indicate that pens which contained animals from multiple

ranches had 6.7% greater incidence of morbidity. Pens containing heavier feeder cattle had lower morbidity. Pens which had lower morbidity had higher average daily gains. Because of higher average daily gains, heavier carcass weights, and a greater percentage of animals grading Choice, Montana feeder cattle generated \$31.47-\$35.70/head more than other animals, depending on Choice-Select price spreads and selling method.

#### h. Beef Quality Assurance Survey

Based on a survey, when compared with non-certified producers, more BQA-certified producers: 1) kept track of animal numbers and descriptions, 2) kept cowherd records, 3) maintained vaccination records, 4) kept on-farm electronic record keeping system, such as Excel, and 5) used plastic ear tags for animal ID. This highlights just a few of the differences noted in the survey.

#### i. Age and Source Verification – Adding Value

Source-verification of cattle offered with all background information and documentation helps a potential buyer determine the value of the calves. Buyers may offer premiums for the quality they expect, for background information, and for confidence in the reliability of the information presented about the feeder animals. In June and July of 2007, data from Superior Livestock Video Auctions were collected to determine if a premium existed for source and age verification of Montana calves. Results indicated that for a 600-pound calf, the premium received for source and age verification was \$12.83 per head. The average cost of participating in a source and age verification program is \$3 per head, leaving a Montana cattle producer with a profit of \$9.83 per head under this scenario. Other premiums received by Montana producers included those who vaccinated with VAC 34 received an additional \$14.81 per head.

#### j. Carcass Value of Montana Fed Cattle

A project with Certified Angus Beef and Colorado State University was implemented to summarize carcass data (17,306 animals) from 1999 through 2003. The carcass characteristics analyzed were: yield grade (YG), quality grade (QG), hot carcass weight (HCW), ribeye area (REA), back fat (BF), marbling score (MB), and kidney, pelvic, heart fat (KPH). Results indicated that: 1) the average QG for the calves was 66.6% which was higher than the national average of approximately 51%, 2) 35% of the carcasses averaged choice or better, 3) rib eye area per hundred pounds (REA/cwt) averaged 1.64 with a range of 0.91 to 3.34, 4) back fat averaged 1.3 cm and suggested the cattle were harvested at the correct weight, and 5) the ratio of REA/cwt was nearly twice as important (0.764) as back fat (-0.314) or carcass weight (0.47) to final YG. Overall, these results indicate that these cattle did not have the muscling to be 386 to 409 kg carcasses. They also indicate that these calves had the genetic potential to grade at least low choice but overfeeding to a heavier carcass weight would result in a significant yield grade discount.

### **ACCOMPLISHMENTS AND OUTCOMES**

- Completed six graduate student (5 MS and 1 PhD) programs. Two students are currently working towards their M.S. degree.
- Besides varying numbers of graduate students, there have been, on average, two staff members employed by MBN annually.
- Published ten peer-reviewed manuscripts. Four manuscripts are under review.
- Published twenty seven scientific abstracts and proceedings papers
- Presented sixty four invited talks
- Developed the following direct communications with livestock producers:

- 55 “Beef Questions and Answers” Printed Newsletters (2001-2005) (<http://www.animalrangeextension.montana.edu/articles/beef/main-beefqa.htm>)
- 45 “Prime Cuts” Electronic Newsletters (July 2007-present) (<http://www.mtbeefnetwork.org/>)
- Developed two web sites:
  - Montana Beef Network: <http://www.mtbeefnetwork.org/> (6,346 hits in February 2009).
  - Montana Beef Quality Assurance: <http://www.mtbqa.org/> (3,900 hits in February 2009).
- Presented 693 talks on BQA, BVD, nutrition, food safety, and reproductive management, *educating tens of thousands of livestock producers.*
- Organized ten Montana Livestock and Nutrition Conferences co-sponsored by MBN, MSGA and MT Feed Assoc. (Cargill, CHS, West Feeds, Silent Herder, Novus, Roche, Nutralix, Loomix, etc.)
- Since 1999, MBN grants have leveraged 19 other grants with a total value over \$1.1 million.
- Some MBN funds have been used to improve or add new infrastructure for research and extension/outreach, including squeeze chutes, metabolism crates, and a state-of-the-art, electronic feeding facility.

### MBN PERSONNEL

Individual	Responsibilities	Years
John Paterson, MSU	Co-PI	1999-present
Jim Peterson, MSGA/MSU	Collaborator/Co-PI	1999-2007
Steve Pilcher, MSGA	Collaborator	2003-2006
Errol Rice, MSGA	Collaborator	2006-present
Myles Watts, MSU	Co-PI	2007-2008
Leif Anderson, MSU	Staff	1999-2002
Lisa Duffey, MSU	Staff	2002-2006
Andy Kellom, MSU	Staff	2005-2007
Mo Harbac, MSU	Staff	2006-present
Clint Peck, MSU	Staff	2006-present
Ryan Clark, MSU	Staff	2006-2008
Lindsey Wallace, MSU	Staff	2007-2008

### MBN FUNDING

Year	USDA to MBN	Other*
1999	\$500,000	\$10,000
2000	\$650,000	\$10,000
2001	\$750,000	\$21,900
2002	\$934,611	none
2003	\$934,611	\$163,000
2004	\$934,611	\$540,000
2005	\$860,000	\$240,697
2006	\$960,000	\$73,500
2007	\$148,000	\$125,000
2008	\$860,000	0
<b>Total</b>	<b>\$7,531,833</b>	<b>\$1,184,097</b>

\* Sources include Montana Beef Council, Cargill-Animal Nutrition, Ft. Dodge (pharmaceuticals), USDA CSREES Four State Ruminant Consortium, NCBA, USDA-APHIS, Montana Department of Livestock.