

Preparation Prevents Poor Performance

Dr. Max Irsik
College of Veterinary Medicine
Beef Cattle Extension Veterinarian
2005 Florida Beef Cattle Short Course

The most often cited concern or question about preconditioning is how the producer will be paid for the additional expense they incur by preconditioning calves. Producers who market their calves at weaning via traditional marketing arrangements such as auction barns may not receive a higher price for the calves they have preconditioned. By Preconditioning, producers have however, provided their calves with procedures which will enhance the health and performance of calves as they proceed through the beef production value chain. Producers who precondition calves and have alternative marketing arrangements such as contract sales, special calf sales, video auctions, partnership arrangements or retained ownership through part or all the calf's future production can and should expect to receive a return for preconditioning. This additional return may consist of, receiving a higher sale price when calves are sold, enhanced performance if backgrounded or when finished through a feedlot. Cattle feeders with a record or history of producers who precondition their calves should expect to pay for the added expense and work that a producer has invested. A knowledgeable cattle feeder is aware of the added benefits of preconditioned calves. However the economics of feeding cattle indicate one of the major determinants of cattle feeding profitability is the cost of the feeder. Cattle feeders are therefore driven to purchase cattle at least cost.

Preconditioning Program

My recommendations for preconditioning or preparing calves for future production can be summed up in a few brief statements. Vaccinate calves at 2 -3 months of age, again 2 – 3 weeks prior to weaning and at weaning. At weaning, control internal and external parasites, castrate all remaining intact bull calves, if a producer does elect to dehorn calves then dehorn calves either at 2-3 months of age or prior to weaning. After the calves are weaned they should be exposed to supplemental feed and retained for 30 to 45 days. If calves are properly preconditioned prior to shipment, producers have done a great deal to prepare their calves for the future.

Preconditioning programs are variable and highly dependent upon management and the production environment of the cow herd. A producer should utilize their veterinarian when developing a preconditioning program which will be designed to match their production capabilities and goals. Recommendations should be made by the veterinarian familiar with the management of the operation, the type of cattle handled and disease problems typically experienced.

There is concern among veterinarians and producers about vaccinating calves while on the cows, and how effective vaccination may be due to maternal antibody interference. Ridpath et. Al. (2003) looked at the effect of passive immunity and the development of a protective immune response against bovine viral diarrhea (BVD) in calves. Passive immunity acquired through colostrum for BVD did prevent calves from developing acute disease when inoculated with the BVD virus at 2 to 5 wks of age. The serum antibody titers for these calves did not increase following exposure to the virus and serum titers decayed at the same rate as non virus-inoculated colostrum fed calves.

Calves which received colostrum and were inoculated with BVD virus again at 7 to 9 months of age were still protected from clinical disease after their serum antibody titers had decayed to non detectable concentrations. Calves which did not receive colostrum and were not previously exposed to the virus were not protected from developing disease when inoculated with BVD virus at either 2 to 5 wks of age or 7 to 9 months of age. Calves receiving colostrum but not exposed to BVD virus at 2 to 5 wks were not protected against disease when exposed to the virus at 7 to 9 months of age. A protective immune response was mounted in calves with passive immunity exposed to BVD virus at 2 to 5 wks of age, but the immune response was not reflected by serum antibody titers. Serum titers did not increase after exposure to the BVD virus. Cell mediated immunity appeared to be the protective mechanism in preventing post-natal disease.

When vaccinating calves with colostrum immunity producers need to understand their calves can respond with an active immune response. Calves are immunocompetent at birth, and there are two components of the immune system, humoral and cell mediated immunity. Vaccination only insures that the animal has been exposed to the antigens contained in that vaccine; it does not ensure that a protective immune response has been created. Two components required for a successful immunization are efficacious vaccine and an immunocompetent animal.

General recommendations for Preconditioning:

1. Vaccinate calves at 2-3 months of age.
 - a. Viral respiratory vaccines
 - i. IBR, BVD, BRSV, PI3 Modified Live Virus (MLV)
 - b. Clostridial (7 way)

- c. Castrate and dehorn while on cows
 - d. Implant (enhances performance)
 - e. ID (if not done at birth)
 - i. gender
 - ii. age
 - f. Record all procedures, products, dosages and serial numbers
2. Vaccinate calves (2-4 weeks) prior to weaning
- a. Viral respiratory vaccines
 - i. IBR, BVD, BRSV, PI3 (MLV)
 - ii. Clostridial (7-way)
 - b. Castrate and dehorn
 - c. Internal and External parasite control
 - d. Implant (enhances performance)
 - e. Optional vaccination
 - i. Pasteurella
 - f. Record all procedures, products, dosages and serial numbers
3. Weaning
- a. Separate calves from cows
 - b. Vaccination options
 - i. IBR, BVD, BRSV, PI3 (MLV)
 - ii. 2nd Pasteurella Vaccination
 - iii. 2nd Clostridial vaccination

- c. ID
 - i. Record weaning weight if possible.
 - ii. Calf ID if not performed previously
- d. Record all procedures, products, dosages and serial numbers

A preconditioning program should be designed to enhance health welfare and performance of calves as they progress through their production cycle. It should be noted that calves vaccinated while on the cow with MLV vaccines assumes that the cow has been properly vaccinated during development and throughout her years of production.

Cattle Health

There are numerous variables that can and do have an effect on the performance of cattle. Examples of variables that are easier to manage are: purchase weight, origin and type of cattle, genetic makeup, and background. Variables that are more difficult to control or are often unknown are the health liabilities cattle may experience.

To help understand animal health concerns regarding feedlot cattle, the USDA's National Animal Health Monitoring System (NAHMS) conducted a study in 1999 of feedlots with capacities of 1,000 head or more in the 12 leading cattle feeding states. The feedlots in the study represented 84.9 percent of feedlots in the United States with 1,000 head or more of capacity, and 96.1 percent of the feedlot cattle inventory contained in yards with capacities of greater than 1,000 head. In this study Bovine Respiratory Disease (BRD), also known as shipping fever or bronchopneumonia, was the leading cause of illness and death. Of the animals that became ill, 55% were identified as having

respiratory disease. Table 1 provides a breakdown of the disease conditions as reported by large and small feedyards.

Table 1 Percentage of all Cattle Placed that Developed the Following Disease Conditions after Arrival by Feedlot Capacity

	Feedlot Capacity (Number Head)				All Feedlots	
	1000-7999		8000 or more			
Disease	Percent	Std. Er	Percent	Std. Er.	Percent	Std. Er.
Respiratory	8.7	0.7	15.5	4.7	14.4	4.0
AIP^a	2.9	0.4	3.1	0.4	3.1	0.3
Digestive	1.1	0.1	2.0	0.3	1.9	0.3
Bullers	1.4	0.2	2.3	0.4	2.2	0.3
Lameness	1.3	0.2	2.0	0.9	1.9	0.8
CNS^b	0.3	0.1	0.4	0.1	0.4	0.1

^aAtypical Interstitial Pneumonia

^bCentral Nervous System

Source: USDA, National Animal Health Monitoring System (1999)

The NAHMS study also reported the cost to treat a sick animal which ranged from a high of \$16.49 for atypical interstitial pneumonia in a large feedlot to \$0.86 for a buller in a small feedlot. These data are found in Table 2 which shows the average medicine cost for cattle in the study.

Table 2. Average Medicine Costs to Treat One Sick Animal for Disease Conditions by feedlot Capacity

	Feedlot Capacity (Number Head)				All Feedlots	
	1000 – 7999		8,000 or More		Cost	Std. Er.
Disease	Cost	Std Er.	Cost	Std Er.		
Resp. Disease ^a	\$11.09	\$0.62	\$16.26	\$0.77	\$12.59	\$0.49
AIP^b	\$11.87	\$0.48	\$16.49	\$0.86	\$13.33	\$0.48
Digestive	\$6.14	\$0.83	\$6.27	\$0.36	\$6.19	\$0.56
Bullers	\$0.86	\$0.18	\$1.55	\$0.23	\$1.10	\$0.14
Lameness	\$7.03	\$0.17	\$9.24	\$0.55	\$7.68	\$0.53
CNS^c	\$11.61	\$1.02	\$11.29	\$0.71	\$11.50	\$0.72

^aRespiratory Disease

^bAtypical Interstitial Pneumonia

^cCentral Nervous System

Source: USDA, National Animal Health Monitoring System (1999)

The NAHMS study also looked at the placement profile for cattle weighing less than 700 lbs and questioned feeders about preconditioning. Most feeders (65.8 percent) considered administering pre-arrival vaccinations prior to weaning as extremely or very effective in reducing sickness and death loss. If the vaccine was administered at weaning, fewer (51.2 percent), perceived similar levels of effectiveness. Two-thirds (67.2 percent) of the feeders questioned believed weaning calves at least 4 weeks prior to shipping was extremely or very effective in reducing adverse health outcomes. About the same percentage of feeders felt that castrating and dehorning calves at least 4 weeks prior to shipping (64.2 percent) plus introduction to feed (64.8 percent) was extremely or very effective in reducing adverse health outcomes. Results from the NAHMS study on pre-arrival management of cattle are provided in table 3. The management practices are listed in the left column with the percentage response for each management practice listed in the row corresponding to the management practice. The level of effectiveness

considered by feeders ranged from extremely effective to not knowing the level of effectiveness.

Table 3: Pre-Arrival Management.

	Percent Operations						
	Level of Effectiveness						
	Extremely effective	Very effective	Somewhat effective	Not Effective	Does not Apply	Don't Know	Total
Mgmt Practice	Response percentage	Response percentage	Response percentage	Response percentage	Response percentage	Response percentage	Percent
	STD error	STD error	STD error	STD error	STD error	STD error	
Introduction to feed bunk	22.6 (1.7)	42.2 (2.2)	17.4 (1.8)	3.4 (0.9)	6.1 (1.4)	8.3 (1.4)	100
Resp. vaccines give 2 wks prior to weaning	27 (2.0)	38.8 (2.2)	11.8 (1.6)	0.7 (0.9)	9.5 (1.5)	12.2 (1.6)	100
Resp. vaccines give to calves at weaning	18.7 (1.6)	32.5 (2.1)	21.7 (1.9)	1.6 (0.4)	10.4 (1.7)	15.1 (1.7)	100
Calves weaned at least 4 wks prior to shipping	32.4 (2.0)	34.8 (2.1)	9.9 (1.5)	1.0 (0.3)	11.6 (1.8)	10.3 (1.4)	100
Calves castrated and dehorned 4 weeks prior to shipping	31.7 (2.1)	33.5 (2.1)	9.1 (1.2)	1.2 (0.4)	12.9 (1.7)	11.6 (1.6)	100
Calves treated for internal and external parasites	8.0 (1.0)	28.6 (2.1)	27.9 (1.9)	5.4 (0.9)	10.7 (1.6)	19.4 (2.0)	100

Source: USDA National Animal Health Monitoring System (1999)

Other studies have also evaluated health concerns involving feedlot cattle.

Edwards (1996) looked at health records for feedlot cattle over a period of 16 years and the level of morbidity was determined to be 8 percent. Vogel and Parrot (1994) reported the average mortality rate for feedlot cattle to range from 1 to 1.3 percent for the feeding period or a monthly death loss 0.267 percent of capacity (i.e. 27 deaths for each 10,000 head of cattle on feed). Loneragan et. al. (2001) also evaluated trends in feedlot mortality ratios over time and reported a mortality ratio of 12.6 deaths /1000 cattle entering the feedlot.

Several studies have looked at the effect of metaphylaxis on the health of high risk calves. (Metaphylaxis is defined as the timely mass medication of an entire group of animals to eliminate or minimize an expected outbreak of disease.) Guthrie et. al. (2004) evaluated the effect of Tilmicosin on the health of high risk northern calves. High risk calves can be defined as light weight, commingled, long haul cattle with unknown health history. The results of their study suggest that metaphylactic treatment with Tilmicosin at processing decreases morbidity and increases days to first treatment in high risk northern calves. Morbidity due to bovine respiratory disease (BRD) was significantly reduced in the treated vs. the untreated calves (25.5 percent vs. 56.5 percent). Days to first pulls were significantly greater for the metaphylaxis group than the control group (13.9 vs. 9.6 days). Brazle (1994), in another study utilizing Tilmicosin on long haul Alabama calves reported that calves receiving the Tilmicosin at arrival vs. calves that did not receive an antibiotic at arrival had a significant reduction in mortality of 1.2 vs. 8.1 percent and a significant reduction in morbidity of 59.7 vs. 75.5 percent. Coe (2002) in a similar study conducted with Missouri calves, reported similar results. Calves receiving metaphylaxis had a lower

percentage of animals treated for respiratory disease (30.0 vs. 68.7 percent) and an increase in the days to first treatment.

Understanding morbidity mortality and factors which aid in reducing the incidence of treated or dying cattle is important. Effective preconditioning programs are directed toward improving the health of cattle as they progress through their production cycle.

Cattle Performance

Studies which evaluate the relationship between health and animal performance are also very useful. A few of the studies which have considered the impact of disease on performance will be discussed briefly.

Wittum (1996) evaluated the relationship of treating cattle for respiratory disease and associated weight gain. He found no association between treatment for respiratory disease and effects on mean daily gain. There was an association between lung lesions at slaughter and weight gain. Pulmonary lesions at slaughter were associated with a 0.167 pound reduction in average daily gain (ADG). In these studies the percentage of cattle with lung lesions at slaughter was much greater than the percentage of cattle treated for respiratory disease. This study indicates that the number of cattle identified as sick and treated in a feedlot may be much lower than the actual number of cattle which experience respiratory disease while on feed.

A study by Gardener et. al. (1996) evaluated the economic impact of respiratory disease on fed cattle. Cattle with no lung lesions at slaughter were found to have a \$20 higher net return per head when compared to cattle with inactive lung lesions. Cattle

with active lung lesions noted at slaughter had a \$70 lower net return per head than cattle with no lesions.

Factors known to significantly contribute to profit for fed cattle are: fed cattle sales price, feeder cattle purchase price, corn prices, feed conversions, average daily gain and interest rates. Price risk accounts for 85 percent of profit variability and animal performance accounts for 5 to 10 percent of profit risk (Schroeder et. al 1993).

Albright et. al. (1994) evaluated variables that impact the cost of gain (COG) for feedlot cattle. Corn prices, feed conversions (FC) and average daily gain were found to explain 92 to 94 percent of the variability in COG.

Analysis of pen level data from customer close out sheets from 2 Western Kansas feedyards provides quantitative data on the effects that adverse health has on fed cattle performance. Animal health was found to have a significant effect on the performance of feed lot cattle. As the incidence of disease, (measured by mortality or treatments) increased, the performance and profitability of cattle decreased. For pens of cattle in this study, percent mortality or the percent of treatments had the most impact on animal performance. Either of these animal health parameters (mortality or treatments) significantly impacted FC, ADG and the added costs (AC) component of cost of gain (Irsik unpublished data).

An analysis of this data provided some helpful thumb rules for correlating animal health to pen-level performance.

1. Feed Conversion: As cattle died within a pen the feed conversion ratio was found to increase by 0.27 lbs for each percentage increase in death loss.

2. Average Daily Gain: Average daily gain decreased by 0.08 lbs for each percentage increase in death loss.
3. Added costs (COG): Added costs increased by 1 dollar per head for each percentage increase in cattle dying within a pen.
4. Mortality: Death loss for a pen of cattle can be estimated by multiplying the percent treated by 0.14. For every treatment administered in a pen of cattle, death loss was found to increase by 0.14 percent. When 10 percent of the cattle in a pen were treated death loss would be estimated at 1.4 percent.

The mortality model utilizing treatment data provides insight into the impact of treatments on FC, ADG and the AC portion of cost of gain. The data and models from this study suggest that if no animals are treated FC would be 6.34, ADG would be 3.32 pounds and AC would be \$22.86. Conversely, using the same model with all of cattle receiving treatment, FC would be 10.24, ADG would be 2.06 pounds and AC would be \$37.51. This difference in the number of cattle treated would result in COG values ranging from \$50.13/cwt if no animals were treated to \$85.66/cwt if all cattle were treated, a \$35 cost per cwt. of gain difference. Cattle in this study gained on average 500 lbs for the feeding period. At a \$35 cost per cwt. of gain difference there could be as much as \$175 difference in the cost per head between pens where no animal were treated vs. a pen in which all the cattle were treated. On a pen level basis with an average head count of 80 head the difference in cost would be estimated at \$14,000.

Conclusion

The cattle feeding industry in the United States is a capital intensive high-risk business, which relies heavily on economies of scale to minimize costs and maximize returns. Profit margins for fed cattle are often small and variable while losses can be large. One of the tools cattle feeders utilize in managing economic risk is evaluating or estimating the performance of fed cattle and then applying that knowledge to cattle currently on feed or on future purchases of cattle to be fed. While animal performance is not the major determinant of cattle feeding profitability, it does have an affect on cattle feeding profitability. Steps taken to minimize adverse health will enhance cattle feeding profitability and animal performance. Information provided in this paper should assist producers when evaluating feeder cattle. It should encourage producers to prepare young cattle for future production, with many of these animals eventually being placed on feed.

REFERENCES

- Albright, M.L. T.C. Schroeder, and M. R. Langemeier. "Determinants of Cattle Feeding Cost of Gain Variability." *Journal of Production Agriculture*. 7(April-June 1994):206-210.
- Brazle F.K. "The Effect of Mass Treatment with Micotil at Arrival on the Health and Performance of Long Hauled Calves." *Cattlemen's Day Report* 50, 1994: 51
- Coe, P.H., Grooms D., "Metaphlaxis." *Cattle Call, Michigan State University Extension*, 1-2 , Volume7, Issue 3, September 2002
- Edwards, A. "Respiratory Diseases of Feedlot Cattle in Central USA." *The Bovine Practitioner*. 30(May1996):5-7.
- Gardner, B.A. Northcutt, S.L. Dolezal, H.G. Gill, DR. "Factors Influencing Profitability of Feedlot Steers." Oklahoma State University. Animal Science Research Report. 1996, No P-951: 164-172.
- Guthrie, C.A., K.C. Rogers, R.A. Christmas, G.A.Vogel, S.B. Laudert, and G.D. Mechor "Efficacy of Metaphylactic Tilmicosin for Controlling Bovine Respiratory Disease in High-Risk Northern Feeder Calves" *The Bovine Practitioner*.. 38(February 2004): 46-53
- Irsik M.B. "Estimating the Effects of Animal Health on the Performance of Feedlot Cattle" *Masters of Agribusiness Thesis*. 2002
- Langemeier, M., T. Schroeder, and J. Mintert. "Determinants of Cattle Finishing Profitability." *Southern Journal of Agriculture Economics*. 24(December 1992): 41-47.
- Loneragan, G.H., D.A. Dargatz, P.S. Morley, M.A Smith., "Trends in Mortality Ratios Among Cattle in U.S. Feedlots." *Journal Of The American Veterinary Medical Association*, 219(October 2001):1122-1127
- Ridpath, J.F., J.D. Neill, J. Endsley, J.A. Roth, "Effect of Passive Immunity on the Development of a Protective Immune Response Against Bovine Viral Diarrhea Virus in Calves." *American Journal of Veterinary Research*, 64(January 2003): 65-69
- Schroeder, T.C., M.L. Albright, M.R. Langemeier, and J. Mintert. "Factors Affecting Cattle Feeding Profitability." *Journal of American Society of Farm Managers and Rural Appraisers*. 57(May 1993):48-54.

- USDA. 2000. Part III: Health Management and Biosecurity in U.S. Feedlots, 1999. USDA:APHIS:VS, CEAH, National Animal Health Monitoring System. Fort Collins, CO. #N336.1200.
- Vogel, G.J., and C. Parrot. "Mortality Survey in Feedyards: The Incidence of Death from Digestive, Respiratory, and Other Causes in Feedyards on the Great Plains." *The Compendium on Continuing Education for the Practicing Veterinarian*. 16 (February 1994):227-234.
- Wittum, T.E., N.E. Woollen, L.J. Perino, and E.T Littlelike,. "Relationship Among Treatment for Respiratory Tract Disease, Pulmonary Lesions Evident at Slaughter, and Rate of Gain in Feedlot Cattle." *Journal Of The American Veterinary Medical Association*. 209(August 1996):814-818.