BEEF CATTLE RESEARCH UPDATE

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October 2009

Conventional vs. Nonconventional Beef Production

Conventional cattle feeding systems in the United States use pharmaceutical products not allowed in natural or organic feeding system for feedlot cattle. In addition, conventional feeding systems do not use certified organic feedstuffs. Organic beef production, regulated by the USDA's National Organic Program[1], requires feeding with certified organic feed and raising cattle without the use of antibiotics (especially those provided in the feed or water for growth promotion or disease prevention) and growth-promoting hormones. In contrast, natural beef programs are largely defined and regulated by the company that owns the brand rather than the U.S. Department of Agriculture.[2] Natural production guidelines often include a complete restriction on the use of antibiotics and growth-promoting hormones, but unlike guidelines for organic production, they allow feed from nonorganic sources.

Since there is an increasing focus on natural and organic beef production in the Unites States, Kansas State University researchers recently reviewed data[3] evaluating the effects of pharmaceutical technologies used in conventional feeding programs on the performance and health of feedlot cattle. The technologies evaluated were growth implants, monensin, tylosin, endectocides (dewormers), and metaphylaxis (mass medication) with any antimicrobial. In this review, an electronic search of published literature initially identified 14,311 literature citations which yielded 51 papers which were used in evaluating the performance and health effects of pharmaceutical technologies used in feedlot cattle that may be routinely excluded from nonconventional production systems. Studies were used in this meta-analysis only if they were conducted in North America, used randomization for allocation to treatment group, used beef breed animals, and contained an untreated control group. In addition, only data from studies using a single growth implant (no re-implants) were used. An insufficient number of studies met the inclusion criteria to conduct meta-analyses comparing endectocides, monensin, or tylosin with negative controls. Some of the major findings from this analysis are summarized below.

- Mass medication with antibiotics used on arrival at the feedyard increased average daily gain (ADG) by 0.24 lb.
- Mass medication on arrival reduced morbidity from 55 to 29% and reduced death loss from 3.8 to 1.8%.
- Implanting heifers increased ADG by 0.18 lb but did not affect gain efficiency or dry matter intake (DMI).
- Implanting steers increased ADG by 0.55 lb and DMI by 1.17 lb. Implants also improved gain efficiency (gain to feed ratio) by 0.02 (0.17 vs. 0.15).
- Feeding tylosin to feedlot cattle reduced the liver abscess risks from 30 to 8%.
- When average estimated differences in ADG and gain efficiency for implanted and non-implanted steers were incorporated into a breakeven model, implanted steers had a $77/animal lower cost of production than non-implanted steers. This value is similar to that estimated in recent a review by Iowa State University researchers.[4,5] These Iowa researchers used a meta-analysis to examine the effects of removal of all pharmaceutical technologies from all segments of beef production. They estimated that the effect of removing pharmaceutical technologies from the feedlot phase of production would be $155/animal of which $71 was attributed to implants.
- Implanted steers had a $349/animal lower cost of production than organically raised steers. This analysis was based on the assumption that organic feed would cost 1.5 times more than conventional feed. It was also reported that for each 10% increase in the price of organic feed, the breakeven estimate increased by approximately $54/animal.

These researchers concluded that these data illustrate the importance of capturing premiums when operating natural and organic production systems to maintain economic viability.

Effect of Backgrounding Rate of Gain on Subsequent Feedlot Performance

Recent research conducted jointly by North Dakota State University and the University of Nebraska determined the effects of backgrounding rate of gain on subsequent feedlot performance, carcass characteristics, Warner-Bratzler shear force (WBSF), and sensory analysis of the beef (taste panel).[6] This study used 80 crossbred steer calves (566 lb initial weight) fed rations formulated for an ADG of 2.00 lb/day (LG: low gain) and 2.75 lb/day (HG: high gain) during a 70 day growing period. The LG diet consisted of 52.5% barley silage, 39.0% whole shell corn, and 8.5% supplement (DM basis) and was formulated to contain 0.48 Mcal of NEg/lb. The HG diet consisted of 43.9% barley silage, 47.4% whole shell corn, and 8.7% supplement (DM basis) and was formulated to contain 0.54 Mcal of NEg/lb. Following the growing period, all steers were fed a common finishing diet for 135 days. The final finishing diet (5 ration step-up program) consisted of 81.2% dry rolled corn, 7.3% alfalfa, 3.1% corn silage, and 8.4% supplement (DM basis).

During the backgrounding period, steers fed the HG diet had greater gains (3.68 vs. 3.09 lb/day) and consumed more feed (20.93 vs. 18.41lb DM/day) than LG steers. It was noted that gains were greater for both treatments than what was initially projected, due to the cattle consuming more than what was estimated. The LG cattle consumed 2.8% of their initial body weight (DM basis) as compared to a projected intake of 2.4% of body weight. The HG cattle consumed 3.0% of their initial body weight (DM basis) as compared to a projected intake of 2.8% of body weight. Feed efficiency was not affected by treatment.

During the finishing period, treatment had no effect on the performance of the steers (ADG = 3.41 lb/day, DMI = 23.24 lb/day, and Feed/Gain = 6.90). Similarly, hot carcass weight, marbling score, fat thickness, ribeye area, and USDA quality and yield grades were unaffected by treatment. Furthermore, treatment had no effect on shear force analysis or sensory panel rating of tenderness.

These researchers concluded that this data suggest that feeding steers diets that differ in energy concentration and result in gains 3.09 and 3.68 lb/d during the growing period results in minimal changes in subsequent finishing performance and does not affect meat quality. They speculated that there was not enough difference between the ADG of LG and HG treatments during backgrounding to cause changes.

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[1] Agricultural Marketing Service/United States Department of Agriculture. The national organic program. Available at: http://www.ams.usda.gov/AMSv1.0/nop.

[2] Troxel, T. R. Natural and organic beef. University of Arkansas Cooperative Extension Service: FSA3103. Available at: http://www.uaex.edu/Other_Areas/publications/PDF/FSA-3103.pdf

[3] Wileman, B. W., D. U. Thomson, C. D. Reinhardt, and D. G. Renter. 2009. Analysis of modern technologies commonly used in beef cattle production: Conventional beef production versus nonconventional production using meta-analysis. J. Anim. Sci. 87: 3418-3426.

[4] Lawrence, J. D., and M. A. Ibarburu. 2006. Economic analysis of pharmaceutical technologies in modern beef production. Available at: http://www.econ.iastate.edu/faculty/lawrence/pharmaeconomics2006.pdf.

[5] Lawrence, J. D., and M. A. Ibarburu. 2008. Update 2008: Economic analysis of pharmaceutical technologies in modern beef production in a bioeconomy era. Available at: http://www.econ.iastate.edu/faculty/lawrence/Pharma%202007%20update.pdf.

[6] Loken, B. A., R. J. Maddock, M. M. Stamm, C. S. Schauer, I. Rush, S. Quinn, and G. P. Lardy. 2009. Growing rate of gain on subsequent feedlot performance, meat, and carcass quality of beef steers. J. Anim. Sci. 87: 3791-3797.