



BEEF CATTLE RESEARCH UPDATE

Britt Hicks, Ph.D., PAS
Area Extension Livestock Specialist
Oklahoma Panhandle Research & Extension Center

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Effects of Timing of Vaccination and Implants on Health and Performance of Stocker Cattle

Most feedlot receiving protocols include vaccination against bovine respiratory disease (BRD) viruses for high-risk cattle within 48 hours of arrival. However, the stress commonly associated with weaning, marketing, and shipment of feeder cattle can temporarily compromise immune function, thereby reducing the effective response to vaccination. Feedyards commonly implant newly received cattle shortly after arrival to improve performance and economic returns. The stress that occurs during the receiving period may result in nutrients being shunted towards the immune system which might result in implants being less effective during this period.¹

Recent University of Arkansas research determined the effects of BRD vaccination timing (at arrival or on day 14) with or without a growth-promoting implant at arrival on the health and performance of high-risk, newly received beef stocker cattle during a 42-day receiving period.² Bull and steer calves (384 head) initially weighting 445 lb were used in this study. The bull calves were castrated on arrival and equally distributed among treatments. The respiratory vaccine used in this study was Bovi-Shield GOLD 5 (Pfizer Animal Health) and the implant used was Ralgro (Intervet ScheringPlough Animal Health).

These researchers reported that that daily gains did not differ because of vaccination timing or implant during the 42-day receiving period. The health of these calves was very poor with 80.4% of the calves receiving at least one treatment for BRD. Possibly, the implant did not increase weight gains due to this extremely high morbidity rate. In addition, morbidity and days to initial BRD treatment did not differ among treatments. In conclusion, in this trial there were no beneficial or detrimental effects of implanting on arrival or delaying BRD vaccination 14 days on performance or morbidity rates of high-risk, newly received stocker calves. These authors suggested that these results indicate that when lightweight calves are being preconditioned for a subsequent grazing period that it may be beneficial to delay implantation until turnout on grass to extend the implant payout longer into the grazing period.

Effect of Roughage Concentration in Feedlot Diets Containing Wet Distillers Grains with Solubles

Roughages (fiber) are included at low concentrations in high-concentrate finishing feedlot diets to help maintain rumen health and to reduce the incidence of digestive disorder including bloat, acidosis, live abscesses and laminitis and to maximize energy intake. A 2007 survey of 29 consulting feedlot nutritionists reported that finishing diets in the United States on average contain 8.3 and 9% roughage in summer and winter, respectively (dry matter basis).³

Distillers grains and solubles are by-products of grain fermentation used to produce ethanol. These by-products contain little starch since most of the starch in the grain is converted to ethanol. Since grain (corn or milo) is about two-thirds starch, removing the starch causes the levels of neutral detergent fiber (NDF) and acid detergent fiber (ADF) to increase by about 3-fold compared to the basal grain. For example, with corn based wet distillers grains with solubles (WDGS) NDF increases from about 11 to 33% and ADF from 4 to 16% (compared to corn). Many feedlots use WDGS as an energy and protein source. Since WDGS contains more fiber than corn, it is plausible that the dietary concentration of roughage could be reduced in feedlot diets containing WDGS.

Research at the U.S. Meat Animal Research Center in Clay Center, NE evaluated the effects of roughage concentration in dry rolled corn (DRC) based finishing diets containing WDGS with feedlot

steers (748 lb initial weight).⁴ Each diet contained DRC and 25% corn based WDGS with coarsely ground alfalfa hay replacing corn at 2%, 6%, 10%, or 14% on a DM basis.

The effects of roughage level on feedlot performance are shown in Table 1. Final body weight (BW) tended to respond in a quadratic manner (P = 0.07), where final BW (nonshrunk) increased from 2 to 6% alfalfa inclusion but decreased from 6 to 14% alfalfa inclusion. Similarly, average daily gain (ADG) responded in quadratic manner (P = 0.01) with ADG increasing as alfalfa level increased from 2 to 6% yet ADG decreased as alfalfa level increased from 6 to 14%. DM intake increased linearly (P = 0.02) as alfalfa inclusion increased in the diet. These researchers pointed out that the reason that intake increases with the greater concentrations of roughage is likely due to an energy dilution effect in which the cattle increase intake in an attempt to maintain energy intake. Gain efficiency (gain to feed ratio, G:F) increased with 2 to 6% alfalfa inclusion and then decreased linearly (P < 0.01) from 6 to 14% alfalfa inclusion.

These researchers concluded that the optimal roughage level in DRC-based finishing diets containing 25% WDGS is less than the industry standard of 8 to 9% of DM. With further analysis of this data, they suggested that the ideal roughage level in such diets was 3% for optimal gain efficiency and 7% for optimal ADG.

Table 1. Effect of roughage level in DRC-based finishing feedlot diets with 25% WDGS.

Item	Alfalfa Hay Level, % of DM				P-value	
	2%	6%	10%	14%	Linear	Quadratic
Final BW, lb	1362	1404	1373	1330	0.23	0.07
ADG, lb	3.35	3.57	3.46	3.26	0.38	0.01
DMI, lb	20.37	21.65	21.90	21.70	0.02	0.07
G:F	0.163	0.165	0.157	0.152	< 0.01	0.23
Feed:Gain ^a	6.13	6.06	6.37	6.58		

^aInverse of G:F.

Adapted from Hales et al., 2013.

¹ McDaniel, M. R., W. C. Murdock, K. M. Taylor, N. P. Miller, B. H. Carter, F. Castillo, N. A. Elam, D. U. Thomson, and C. A. Loest. 2012. Comparing a delayed growth implant strategy to conventional feedlot practices. Pages 131-136 (Abstr.) in Plains Nutrition Council Spring Conference, San Antonio, TX.

² Poe, K. D., P. A. Beck, J. T. Richeson, M. S. Gadberry, E. B. Kegley, T. W. Hess, and D. S. Hubbell. 2013. Effects of respiratory vaccination timing and growth-promoting implant on health, performance, and immunity of high-risk, newly received stocker cattle. *Prof. Anim. Sci.* 29:413-419.

³ Vasconcelos, J. T. and M. L. Galyean. 2007. Nutritional recommendations of feedlot consulting nutritionists: The 2007 Texas Tech University survey. *J. Anim. Sci.* 85:2772-2781.

⁴ Hales, K. E., H. C. Freetly, S. D. Shackelford, and D. A. King. 2013. Effects of roughage concentration in dry-rolled corn-based diets containing wet distillers grains with solubles on performance and carcass characteristics of finishing beef steers. *J. Anim. Sci.* 91:3315-3321.

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