BEEF CATTLE RESEARCH UPDATE

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Effect of Time of Vaccination at the Feedyard

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. Recent Arkansas research evaluated the effect of delaying respiratory and clostridial vaccination (day 14 vs. arrival) on health, performance, serum bovine viral diarrhea virus (BVDV) type I titers, and physiological stress and immune measures in high-risk, newly received calves.[1] This study used 263 crossbred bull and steer calves (initial weight of 527 lb) purchased from multiple auction barns in western Arkansas and eastern Oklahoma. Four vaccination treatment groups were evaluated with *Clostridium chauvoei, septicum, novyi, and sordellii* and *perfringens* types C & D bacterin-toxoid (Alpha 7, Boehringer Ingelheim Vetmedica, St. Joseph, MO; CLOS) and infectious bovine rhinotracheitis, BVDV type 1a and type 2a, (parainfluenza$_3$, and bovine respiratory syncytial virus modified-live virus vaccine (Express 5, Boehringer Ingelheim Vetmedica; RESP) administered on arrival (day 0) or delayed (day 14). This resulted in the 4 treatments: 1) arrival CLOS and RESP (ACAR), 2) arrival CLOS and delayed RESP (ACDR), 3) delayed CLOS, and arrival RESP (DCAR), and 4) delayed CLOS and RESP (DCDR). A booster vaccination of the respiratory vaccine was administered 14 days after the initial RESP vaccination. Body weight and blood samples were collected on days 0, 14, 28, 42, and 56.

Daily gains did not differ among treatment groups for the entire 56 day trial. The majority of the cattle became sick with 69% of the calves being treated at least once for BRD. There was a tendency for calve receiving both vaccinations at arrival to be treated two days earlier for BRD than calves receiving delayed vaccinations (6 vs. 8 days). However, morbidity was not affected by vaccination timing. Timing of the RESP vaccine significantly affected serum BVDV type I titers, with greater levels in calves receiving the vaccine on arrival. These researchers suggest that the titer data shows that high-risk, newly received calves vaccinated for RESP on arrival are able to respond adequately to the RESP vaccination despite the typical stress and immune challenges presented during the initial 14 days of receiving. Greater white blood cell (WBC) counts were observed in cattle receiving delayed vaccinations (DCDR). It was suggested that these greater WBC counts may indicate that these cattle had greater occurrence of pathogenic infection or it may also indicate that an animal has increased ability to mount an innate or adaptive immune response to a foreign antigen, which is a key goal of vaccination.

These researchers concluded that timing of vaccination did not affect gains or morbidity or in high-risk, newly received calves. However, antibody titers to BVDV type I developed earlier when cattle were administered a respiratory vaccine on day 0 vs. 14. Several differential WBC measures were greater when both clostridial and respiratory vaccines were delayed. It was suggested this observation may correlate to the occurrence of pathogenic infection or differences in immune status.

Effect of Calf Weaning Age on Cow Performance

Recent West Virginia University research evaluated the effect of shifting calf-weaning age on profiles of energy status (body weight, BW; body condition score, BCS; and rib and rump fat) and reproductive performance of beef cows in a 3-year study.[2] Pregnant and lactating crossbred beef cows (408 head), mainly of Angus and Hereford breeding, were stratified by age and by sex and body weight of their calves and assigned randomly into 2 treatments: weaning at about 180 days of age (early weaning, EW) and normal weaning at 225 days of age (NW). Average cow age in the herd was 4.2 years, but ranged from 2 to 12 years of age. Cow body weight, BCS, rib fat, and rump fat were measured periodically from early weaning through the next breeding. Reproductive performance was evaluated by calving intervals (CI), days from initiation of breeding to calving (BCI), retention in the herd, and adjusted 205-day weaning weight of the subsequent calf.

These researchers reported that early weaned cows had greater body weight at normal weaning than control cows, but the overall pattern of cow weight did not differ among treatments. Body condition scores were greater both pre-calving and post-calving in EW cows than NW cows. In addition, older cows had greater BCS than younger cows. A linear increase in BCS was observed with age, and maximum BCS was generally achieved in cows 4 years of age or greater. Patterns for rib fat and rump fat were nearly identical to those of BCS.

Age of the cows at the beginning of the study significantly affected reproductive performance. Mean CI (372 days) and BCI (300 days) were not affected by treatment but varied with age of the cow. Age of cow accounted for 16% of total variation in CI and 12% of total variation in gestation length. The intervals were longer in first calf heifers than in older cows.

Retention in the herd was a function of pregnancy, calving, and culling rates. The retention patterns among cow age groups during the study are shown in Table 1. Over 40% of the two-year old cows did not calve or wean a calf the subsequent year and were eventually culled (retention pattern = 0), whereas, only about 15% of cows 6 years and older fell in this category. Cows were culled from the herd for various reasons including: not being pregnant at the end of the breeding season, not calving within the designated calving season, not rearing a calf to weaning, producing a still-born calf, low calf BW at weaning, and poor BCS at breeding. Early weaning decreased the proportion of cows culled by about 11 percentage points or about 25%, from 44.8 to 33.5%. Body condition at breeding was an important factor in cow retention in the subsequent breeding season. In addition, earlier weaning of cows in the previous year increased weaning weight of the subsequent calf by 19 lb per cow per year.

Table 1. Comparison of retention pattern (%) among cow age groups during the study.

		Retention Pattern[1]		
Age, years	# head	0	1	11
2	143	41.3[a]	45.5[b]	13.2[c]
3	68	8.8[c]	61.8[a]	29.4[b]
4 and 5	44	31.8[ab]	20.5c	47.7[a]
≥6	59	15.3[b]	28.8[c]	55.9[a]

[a,b,c] Least squares means without common superscripts within columns differ ($P < 0.05$).
[1] Retention pattern 0: Cows that did not wean a subsequent calf during the study period. Retention pattern 1: Cows that weaned a calf in only 1 yr of the study. Retention pattern 11: Cows weaned calves in both subsequent years of study.
Source: Odhiambo et al., 2009

These researchers concluded that early weaning improved energy status and production efficiency in beef cows. The data suggested that calves from first and second parity cows should be weaned earlier than calves from older cows.

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[1] Richeson, J. T., E. B. Kegley, M. S. Gadberry, P. A. Beck, J. G. Powell, and C. A. Jones. 2009. Effects of on-arrival versus delayed clostridial or modified live respiratory vaccinations on health, performance, bovine viral diarrhea virus type i titers, and stress and immune measures of newly received beef calves. J. Anim. Sci. 87: 2409-2418.

[2] Odhiambo, J. F., J. D. Rhinehart, R. Helmondollar, J. Y. Pritchard, P. I. Osborne, E. E. Felton, and R. A. Dailey. 2009. Effect of weaning regimen on energy profiles and reproductive performance of beef cows. J. Anim. Sci. 87: 2428-2436.