DIFFERENT REPRODUCTIVE AND LACTATIONAL RESPONSES TO PROTEIN SUPPLEMENTS BY TWO-YEAR OLD RANGE COWS: 1995 - 1996 TRIAL

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Two years of field research (1995 - 1996 and 1996 - 1997) have been conducted at the NMSU Corona Range and Livestock Research Center (Corona, NM) to determine the potential of protein supplements to cause early rebreeding after calving in 2 year-old range cows. Not only can supplementation correct nutrient deficiencies and nutrient imbalances in cattle consuming low protein dormant rangelands, but also may stimulate responses through changes in hormonal release and (or) nerve impulses. Feeding protein which bypasses ruminal degradation can directly provide those amino acids and metabolic precursors needed to improve young lactating cow performance. Sources of ruminally undegradable protein studied in our research include feathermeal, meat and bone meal, and blood meal as opposed to more degradable protein sources (cottonseed meal and soybean meal).

In the 1996 report of the Livestock Research Briefs and Cattle Growers' Short Course, preliminary data from the 1995 trial was presented. To summarize, four protein supplements were individually fed on 3 d/week at a rate of 5.7 lbs/feeding from average 20 to 98 days postcalving to two year-old Hereford x Angus x Hereford cows. Note that the last date was after the first 26 days of the breeding season (allowing a 21-d heat cycle). Supplements consisted of feeding approximately .67 lbs (300 g) per day of ruminally degradable protein, .33 lbs (150 g) or .73 lbs (330 g) per day of ruminally undegradable protein in low versus high bypass protein supplements, and .04 lbs (20 g) or .24 lbs (110 g) per day of hydrogenated tallow in low versus high fat supplements. This resulted in supplement combinations of low bypass/low fat (n = 12 cows); high bypass/low fat (n = 13); low bypass/high fat (n = 12); and high bypass/high fat (n = 13).

Feeding fat with low or high bypass protein increased cow weight loss during lactation. This effect was especially seen when supplying low bypass/high fat cube, which caused larger losses in cow condition and backfat by the start of the breeding season. It appeared that feeding low bypass/high fat cube stimulated milk production, resulting in heavier calf weaning weights than when feeding high

bypass with low or high fat. In contrast, feeding high bypass with low or high fat resulted in positive changes in condition scores and minimized backfat losses by the start of breeding.

Actual calving dates from Spring 1996 revealed similar rebreeding performance across treatments. However, interactions between early and late calving blocks and reproductive performance were found within treatments. Using weekly blood samples to determine return to estrus after calving (progesterone > 1 ng/ml), more high bypass/low fat-supplemented cows had cycled prior to the breeding season overall. No cows fed low bypass/high fat cube that had calved late were cycling by then. By back-calculating day of conception (1996 calving date - 280 d gestation), percent pregnant during the first 26 days of breeding was determined. It appears that feeding high bypass/low fat cube had a negative effect on early rebreeding rates in late-calving cows. Supplementing with low bypass/high fat tended to cause later conception dates. Due to the large variation in gestation lengths, no differences in overall days open were found. Although early calvers appeared to take longer to rebreed, this resulted from the date that the bulls were put into the pasture relative to their calving date.

The results from this first study suggest the ability to redirect nutrients to support increased milk yields or improved cow body reserves via supplementation of high fat versus high bypass protein supplements. Because late-calving cows fed high bypass/low fat supplements were not able to achieve rebreeding rates as high as those fed high bypass/high fat or low bypass/low fat cubes, we suspect that protein was fed in excess. This is supported by observations from the dairy industry, which has found lowered conception rates in cows fed high protein diets. Furthermore, blood urea nitrogen levels were increased (interaction; $P = .05$) by feeding high bypass/low fat cube to cannulated cows maintained in the same pasture (13.5, 19.0, 14.6, and 15.0 $\pm$ 1.02 mg/dl for low bypass/low fat, high bypass/low fat, low bypass/high fat, and high bypass/high fat, respectively). This indicates more protein was degraded in high bypass/low fat cube. Not only have high urea nitrogen levels been associated with lowered reproduction, but also with a lower utilization of protein by both the ruminal microbes and the cow. Adding fat to high bypass appeared to prevent these effects. Similar reproductive performance across treatments suggests we had met the threshold protein requirement and need to feed less ruminally undegradable protein.

Supplement type (calving group)	% cycling before the breeding season	% pregnant in the first 26 days	Days open
low bypass/low fat			
Early calvers	50	67	100
Late calvers	50	100	79
high bypass/low fat			
Early calvers	83	83	96
Late calvers	43	57	81
low bypass/high fat			
Early calvers	67	67	100
Late calvers	0	67	88
high bypass/high fat			
Early calvers	67	83	96
Late calvers	43	86	84