cattle on irrigated pastures using a covered self-feeder to provide *ad libitum* access to a high energy ration, and compare animal performance and carcass traits to steers finished in a typical feedlot situation.

On September 29, 1999, thirty-two steers (BW = 896 ± 10 lb) were removed from an irrigated pasture grazing trial at the Agricultural Science Center at Tucumcari and assigned to one of two finishing treatments (feedlot finishing or pasture finishing). Steers assigned to the feedlot finishing treatment were shipped to the Clayton Livestock Research Center. Upon arrival at Clayton, the steers were weighed to determine on-trial weight and were penned, in two replications. Steers assigned to the pasture finishing treatment were placed on two mixed pasture replications of alfalfa, tall wheatgrass, alfalfa/ tall wheatgrass and alfalfa/tall wheatgrass/bluestem at Tucumcari (18 acres/replication). Steer live weights at the end of the summer grazing trial, less a 2% shrink, became the on-trial weights for the steers assigned to the pasture finishing treatment.

At the beginning of the finishing trial, steers at both locations were treated for parasites (Dectomax, 1% injectable solution); vaccinated with Vision 8 with Spur, and Pyramid MLV 4; and were implanted with Synovex-S. All steers were fed a 90% concentrate ration, which was formulated to meet or exceed the nutrient requirements for finishing steers (NRC, 1996). The ration was mixed at the Clayton Livestock Research Center. Feed for the pasture finishing treatment was hauled to Tucumcari in lots of 3,000 to 8,700 lb.

Steers in the feedlot were adapted to the ration over a period of three weeks. Thereafter, they were fed, once a day, an amount to provide ad libitum consumption. Steers on pasture were provided ration from a single 16 ft. covered self-feeder that was centrally located between the two pasture replications. For the first 7 days on pasture, steers on pasture were fed increasing amounts of the ration (5 to 10 lb/hd/d). Thereafter, ration was available in an amount to provide *ad libitum* consumption. The pastures received no cultural management practices (irrigation, fertilizer, herbicides, etc.) during the finishing trial.

The finishing trial was terminated on January 6, 2000 (98-d), when 60% of the steers at both locations were deemed to have sufficient finish to grade USDA Choice. Steers at both locations were shipped to the IBP slaughter facility in Amarillo, TX. After slaughter, hot carcass weight and carcass quality characteristics were recorded.

There were no differences in overall animal performance or carcass characteristics due to finishing treatment. At the beginning of the finishing trial, steers assigned to the feedlot finishing treatment were not as heavy ($P < .01$) as the steers assigned to pasture finishing (887 vs 906 lb). Even though initial body weights were different, the treatment groups possessed similar ($P > .50$) weights in subsequent weigh periods. At the end of the trial, the pasture-finished steers weighed 1,290 lb, compared with 1,298 lb for feedlot-finished steers.

During the 98-day feeding period, both treatment groups had similar ($P > .45$) gains (411 and 385 lb, for the feedlot and pasture treatments, respectively). Accordingly, overall ADG was similar ($P > .45$) for the two treatment groups (4.16 and 3.88 lb/d for steers on feedlot and pasture treatments, respectively).

Over the duration of the trial, feed intake averaged 22.12 lb/d (dry matter basis) for the steers in the feedlot, compared with 22.80 lb/d for the steers on pasture. The steers in the feedlot required 5.32 lb of feed to produce a pound of gain, compared with 5.91 lb for steers on pasture. Statistical comparison of dry matter intake and feed/gain ratio was not possible since the steers on pasture consumed feed from a single feeder.

There were no differences in carcass quality ($P > .15$) due to finishing treatment. Mean carcass characteristics for the two finishing treatment groups were: hot carcass weight of 799 ± 4 lb; marbling score of small-moderate (numerical value = 40 ± 2); fat thickness of 0.45 ± 0.01 in.; ribeye area of 12.8 ± 0.1 in ^{2}; internal fat of 2 ± 0%; yield grade of 2.96 ± 0.03, and quality grade of Choice$^-$ (numerical value of 40 ± 2).

Results of the trial indicate similar levels of steer performance and carcass characteristics can be obtained from finishing steers in a traditional feedlot setting or on irrigated pasture where a self-feeder is used to provide *ad libitum* access to a high energy ration. Although the steers on pasture had higher initial body weight, there were no differences in finished body weight, or overall rate-of-gain. In addition, the carcasses of steers from the feedlot and pasture finishing treatments were similar in weight, yield grade, quality grade and other characteristics.

Developing Replacement Heifers Grazing Winter Range: Forage Nutrients and Responses to Supplementation

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Keywords: Heifer development, supplementation

Heifers grazing winter range require supplemental nutrients to compliment available forage for optimal growth. A study was conducted to evaluate nutritional

environment and effect of different supplementation strategies for developing heifers grazing winter range at the Corona Range and Livestock Research Center, Corona N.M. In the first experiment, fifty-five Angus cross replacement quality heifers were stratified by weaning weight, allocated to one of four replicated pastures, and randomly assigned one of two supplemental treatments: 2 lb/d of a control (C) supplement consisting of .72 lb/hd/d crude protein CP with .28 lb undegradable intake protein UIP (n=28), or 2 lb/d of a bypass supplement (BP) consisting of .73 lb/hd/d CP with .36 lb UIP (n=27). Also, twenty-nine lightweight Angus cross non-replacement quality heifers were given 4 lb/hd/d of a energy supplement (E) consisting of .72 lb/hd/d CP with .28 lb UIP + .22 lb propionate salt (NutraCal™, Kemin Industries, Inc.; n=29), and allocated to one of two replicated pastures adjacent to pastures containing the C and BP treatments. Initially, heifers were weighed November 23, 1998, and monthly 12 h shrunk weights obtained from January to April 1999. Diet samples collected at the beginning and end of the study provided 80 and 79% NDF, 5.2 and 7.7% CP, 50.1 and 51.5% forage 96 h in-situ digestibilities, respectively. Average daily gain (ADG) throughout the study was similar for heifers fed C, BP, and E (.44, .33, and .53 lb/d, respectively). Weight gain was greater for E fed heifers between February and March (.06, .33, and .75 lb/d for C, BP, and E, respectively). The cost of supplements per animal for 180 days on feed was ($42.88, $61.67, and $95.73) for C, BP, and E supplements, respectively. In experiment 2, eight ruminally cannulated heifers receiving BP and E were fed individually, and VFA concentrations were measured over one supplementation interval 48 h. Samples obtained over this sampling interval revealed increases in propionate, acetate, and butyrate in the E fed heifers suggesting that overall energy availability may have been improved. The increase in propionate provided by the E treatment may have increased insulin sensitivity stimulating glucose uptake in peripheral blood; therefore, improving nutritional status of the animal. Diet quality estimates indicated that dormant winter range does not satisfy the nutrient requirements of developing heifers and that different supplements may alter the pattern of body weight change by altering absorbed products.

Changing the Ratio and Amount of Bypass Protein Fed to Young Range Cows Changes the Efficiency of Supplement Utilization

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Key Words: Range cows, Bypass protein, supplementation

Feeding protein supplements high in bypass protein has been reported to improve range cow productivity in some cases, but not in others. A study was conducted at the Corona Range and Livestock Research Center 13 km east of Corona, NM in an effort to determine an optimal amount and proportion of bypass protein can improve production from young postpartum cows. During the spring of 1998 and 1999, 2 and 3 yr old postpartum cows were fed one of three protein supplements individually at a rate of 2 lbs. per head per day. The supplements were formulated to provide either 0.75 lb/d crude protein (CP) with 0.25 lb of bypass protein (LOW), 0.75 lb/d crude protein with 0.375 lb bypass protein (MID), or 1.12 lb/d crude protein with 0.75 lb bypass protein (HIGH). Supplements were fed for an average of 75 d in 1998 and for 60 d in 1999. Average cost of supplementation per cow was $20.03, 21.00, and 26.93 in 1998 and $16.02, 16.80, and 21.54 in 1999 for LOW, MID, and HIGH respectively. In both years, 3 yr old cows produced more milk and heavier calves. During 1998, cows fed MID and LOW tended (P=.22) to produce less milk than cows fed HIGH. Cows fed HIGH during 1998 also tended to have higher average daily gain from the lowest body weight until the end of breeding, but cows fed MID and LOW used supplement more efficiently, converting a higher proportion of supplemental nutrients into body weight gain over this period. Adjusted 205-d weaning weights of calves were similar in 1998 for cows fed all three supplements. During 1999, all cows produced more milk than in 1998. Cows fed MID tended to produce less milk (11% less than LOW, 17% less than HIGH). Cows fed MID had greater ADG than cows fed LOW, but were similar to cows fed HIGH. The reduction in milk production and improvement in cow weight gain did not affect calf weaning weight, as calves from cows fed MID and HIGH had 25 lb. greater adjusted 205-d weaning weights than those from cows fed LOW. Again, the efficiency of protein use was higher in cows fed MID, since they were fed less total protein than cows fed HIGH. In general, a supplement providing a smaller amount of total protein with a higher ratio of bypass protein improved the metabolic and economic efficiency of production when fed to young range cows. Adding more bypass protein