

**THE EFFECTS OF PROTEIN AND(OR) FAT SUPPLEMENTATION
ON GROWTH AND REPRODUCTIVE PARAMETERS
IN YEARLING BEEF HEIFERS**

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This study was conducted using yearling (10 to 12 mo of age), crossbred (Angus X Hereford and Simmental X) heifers to measure production parameters following ruminally undegradable protein or fat plus ruminally undegradable protein supplementation on native range. Heifers were assigned to pastures by weight, birth date, and breed. Supplements were randomly assigned to pastures ($n = 6$) with each treatment replicated in two different pastures. Supplements were formulated with ruminally degradable protein, composed mostly of cottonseed meal (CSM, $n = 22$), ruminally undegradable protein consisting of CSM plus bloodmeal and feathermeal (CSM+BFM; $n = 23$), and CSM + BFM plus 10% fat (Alifat; BFM+FAT; $n = 22$). Supplements were formulated to supply equal amounts of degradable protein and total digestible nutrients. Supplement was fed three times weekly at a rate of 5.8 lb/(animal·d) divided between two feed bunks. Heifers had ad libitum access to feed, water, mineral, and salt. Females were withheld from feed and water at least 12 h preceding body weight measurements.

Body weights were taken at 21-d intervals. Mean body weights (498, 501, and 510 ± 4 lbs for CSM, CSM+BFM, and BFM+FAT, respectively) did not differ

among treatments at trial inception ($P > .10$) or following a 21 d adaptation period where CSM was fed to all heifers (517, 516, and 514 ± 5 lbs for CSM, CSM+BFM, and BFM+FAT, respectively; $P > .10$). Overall body weight gains from treatment start to finish were similar among treatments (48, 67, and 74 lbs ± 13 for CSM, CSM+BFM, and BFM+FAT, respectively; $P > .10$). Body weights, upon completing the trial, did not differ among CSM, CSM+BFM, and BFM+FAT, ($559, 583,$ and 592 ± 10.7 lbs, respectively; $P > .10$). Average daily gain (ADG), although not significant ($P > .10$), was .61, .87, and $.96 \pm .16$ lbs for CSM, CSM+BFM, and BFM+FAT, respectively.

Backfat thickness was measured via ultrasonography at the end of the trial. Heifers consuming the CSM had less ($P \leq .07$) backfat ($.11 \pm .01$ in) than heifers fed CSM+BFM or BFM+FAT ($.13$ and $.13 \pm .01$ in, respectively). Cottonseed meal and BFM+FAT backfat values were similar ($P > .10$).

Treatments and replications were combined following final weigh period and heifers were estrually synchronized (May 11), bred (May 26), and exposed to a clean-up bull (June 1). Pregnancy rates, as determined by rectal palpation, were 77%

(17/22), 100% (23/23), and 86% (19/22) for CSM, CSM+BFM, and BFM+FAT, respectively. Cottonseed meal-fed heifers pregnancy rates differed from CSM+BFM ($P = .02$), yet were similar to BFM+FAT values ($P > .10$). Heifers fed CSM+BFM or BFM+FAT differed ($P = .06$) in pregnancy rates. Thirty-six percent (8/22) of CSM heifers were bred in the first 30 d of the breeding season (May 26 to June 25) whereas CSM+BFM and BFM+FAT values were 78% (18/23) and 68% (15/22), respectively.

Blood samples were collected via caudal venipuncture for progesterone (P_4) quantitation (measure of estrus activity) as determined by radioimmunoassay. Heifers were sampled at 11-d intervals for 21 d following treatment initiation and were

sampled weekly for 21 d during the final phase of the trial. The percentage of females with one P_4 value greater than 1 ng/mL during the first 21 d sampling period were 50% (11/22), 39% (9/23), and 41% (9/22) for CSM, CSM+BFM, and BFM+FAT, respectively. The percentage of females with one P_4 value greater than 1 ng/mL during the final trial phase (last 21 d) were 50% (11/22), 36% (8/22), and 27% (6/22) for CSM, CSM+BFM, and BFM+FAT, respectively.

These data indicate supplementation, especially ruminally undegradable protein supplementation, positively influences body weight gain, backfat thickness, pregnancy rates, and possibly reduces the age at puberty in beef heifers.