

SUMMARY

Twenty yearling Angus, Hereford, and Angus-Hereford crossbred heifers and 20 two-year-old Hereford heifers were individually fed rations consisting of different levels of protein but similar amounts of energy, minerals, and vitamins. Five heifers of each age were allotted per group and fed for a period of 159 to 207 days, depending on reproduction performance. Yearling heifers, initially weighing about 500 pounds, with a daily consumption of 1.06, 0.65, 0.28, and 0.08 pound crude protein, gained 0.94, 0.70, 0.01, and -0.72 pound per day, respectively. Two-year-old heifers, initially weighing 675 pounds, consuming 1.34, 1.06, 0.71, and 0.62 pound crude protein daily, gained 0.75, 0.52, -0.07 , and -0.23 pound per day, respectively. The differences obtained in the performance between the yearling and two-year-old heifers were due in part to age and weight differences, as well as source of energy and level of TDN and protein intake. The nutritional stress due to a low protein intake decreased appetite and rate of gain.

At 44 days post-breeding, there were 10 normal embryos from 10 yearling heifers fed the two highest levels of protein, while there were no normal embryos from the 10 heifers on the two lower levels of protein. Eight of these latter heifers did not ovulate. Yearling heifers that consumed 0.28 pound crude protein daily or less exhibited delayed puberty, long anestrus periods, failure to show estrus and ovulate, and weak expression of estrus.

Two-year-old heifers on the two higher intakes of protein had seven normal embryos from 10 heifers bred, while there were only four normal embryos from seven heifers bred that were on the lower protein intakes. Three of the five two-year-old heifers fed 0.71 pound crude protein daily ovulated without showing estrus and could not be bred. The explanation for the large number of regressed embryos and of increased services per normal embryos in the two-year-old heifers is not apparent.

Heifers on the protein-deficient rations had low hemoglobin and hematocrit values in the blood. The anemia was largely due to a decreased number of erythrocytes, while no apparent change occurred in blood volume. The number and type of leukocytes was not apparently influenced, and, likewise, calcium and phosphorus were not affected by the protein deficiency. Marked declines occurred in liver and blood serum protein levels