

intake of crude protein decreased 0.41 pound per day from group I to group II. However, even though the daily intake of TDN per 100 pounds body weight remained somewhat similar, there was a decrease in daily gain of 0.69 pound as crude protein intake decreased another 0.37 pound from 0.65 to 0.28. The differences in gain between heifers of groups II and III would indicate that there is a very marked influence of protein intake on gains as intake approaches a level which only maintains body weight.

The TDN intake per 100 pounds body weight for the two-year-old heifers was comparable for all groups except III, where it was significantly decreased. However, the daily gain for the heifers on the two higher intakes of protein was significantly higher than heifers on the two lower levels of protein. As the daily crude protein intake decreased 0.28 pound from 1.34 to 1.06, there was a decrease in gain of 0.23 pound per day. However, as the daily intake of crude protein was reduced 0.35 pound from 1.06 to 0.71 pound, there was a decrease in gain of 0.59 pound per day. Thus, protein intake was again shown to have marked effect on feed utilization when the ration contained only enough protein for maintenance of body weight. This is similar to the results obtained with the yearling heifers. Additional evidence that protein intake is critical in determining gains is the comparison in gains between groups III and IV of the two-year-olds. The TDN intake per 100 pounds body weight was consistently higher in heifers of group IV than in heifers of group III, whereas there was a greater weight loss ( $-0.23$ ) in group IV animals compared to group III ( $-0.07$ ). The latter observation of increased feed consumption but poor feed utilization was made by Klosterman *et al.* (22), who fed cane molasses to cattle on a ration sub-optimal in protein.

To obtain supplementary information of feed utilization, rumen filtrates were obtained from two-year-old heifers at slaughter for determination of the effect of the various levels of protein and molasses on cellulose digestion. The average percent of cellulose digested by rumen filtrates was 19.1, 12.5, 12.5 and 5.7 percent for groups I through IV, respectively, with large variability observed within groups.

The results on performance of the protein deficiency produced in these studies was probably influenced by the amount and nature of the carbohydrate fed in order to have a ration low in protein and adequate in energy. In sheep, increased proportions of starch (Head, 20), glucose (Hamilton, 17), and sucrose