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Calf Production from Hereford Cows Wintered at Different Nutrition Levels 1/

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A large number of cattle operators in the western range area depend on native flood meadows for their winter hay supplies. Hay production from these meadows is, in most cases, quite erratic from year to year due to varying amounts of run-off water available. When hay supplies are limited ranchers must choose between certain alternatives: a reduction in herd size; the purchase of additional winter feed; or stretching their hay supply by reduced feeding levels. The practice of limited feeding is usually confined to mature animals in the herd.

The purpose of the work reported in this paper was to study the effects of wintering mature pregnant Hereford cows at various nutritional levels on subsequent calf production data.

EXPERIMENTAL PROCEDURE

Two trials were conducted to study the effect of wintering mature pregnant cows at various nutrient levels on the birth and weaning weights of their calves and on the rate and date of conception the following summer. In the first trial 48 uniform cows were stratified by weight and age and randomly alloted to three groups of 16 animals each. Native meadow hay was fed daily to the three groups as follows: (1) all the hay they would clean up in a 24-hour period; (2) 75% of the amount given group 1; and (3) 50% of the amount given group 1. One-half of the animals in each group were fed 1 lb. of cottonseed meal per head daily while the other half received no supplement. The animals receiving each level of hay were wintered in separate fields and were group-fed the hay portion of their diet once daily. Prior to hay feeding each day the animals that received supplementation were sorted into a pen where they were fed the cottonseed meal portion of their ration.

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For the second trial, 30 mature Hereford cows were stratified by weight and age, alloted to five replications and then randomly alloted to treatments of a 2 x 3 factorial study. Variables were full and limited feeding with three combinations of energy and protein levels. Full and limited feeding were designed to provide 100% and 60%, respectively, of the levels recommended by N.R.C. for wintering mature pregnant cows. The animals on full feed received 14 lb. meadow hay daily while those on limited feed received 8.4 lb. Barley and cottonseed meal were used as the main sources of energy and protein supplements, respectively, while small amounts of fish oil and urea were used when necessary to balance calculated energy and protein. Hay and supplements were individually fed daily.

One treatment had energy and protein in balance and the other combinations were high energy-low protein and low energy-high protein based on N.R.C. requirements for these nutrients. The animals on the high energy-low protein diet received 20% more energy and 20% less protein than those on the balanced ration and the reverse was true for those on the low energy-high protein ration.

Each trial was started in late November and the animals remained on their respective treatments until calving (March and April). The length of feeding periods varied from 95 to about 140 days each year. Individual cow weights were taken periodically following an overnight shrink with final winter weights taken each year just prior to the start of calving season. As the animals calved they were removed from their respective treatment and placed on a common ration which provided adequate nutrition for lactation. During the summer the animals were moved to sagebrush-bunchgrass type range and the cows were bred during June and July. In early October the calves were weaned and the cows were returned to aftermath meadow pasture.

RESULTS AND DISCUSSION

Regardless of treatment all animals on the first trial gained in body weight from the start of the trial to a date just prior to parturition (table 1). Weight gains decreased with each reduction in hay intake and were lower in the animals receiving no supplement than in those on the corresponding hay level with supplement. Average daily hay consumption was 27.7, 20.8, and 13.8 lb. for the 100, 75, and 50% hay groups, respectively.

Birth weight, weaning weight, and subsequent rate and date of conception were not significantly affected by treatment during the first trial (table 1). Marion et al. (1962) found no difference in birth or weaning weights of calves from cows maintained on three levels of energy under conditions where all cows were fed to lose weight during pregnancy. Wiltbank et al. (1962) reported decreased birth weights and a delay but no reduction in subsequent conception, when energy was limited during pregnancy but supplied in adequate amounts after calving. It should be noted that the cattle in this study were summered on range where forage was adequate and they were in good condition at the beginning of winter.

Table 1. Average winter gain of cow, birth, and weaning weight of calf and subsequent conception date of cow for each treatment.

Supplement	Measure Performance	Hay intake (%) 1/ 50	75	100	Average
1 lb. CSM	Cow gain (lb)	88	132	170	130
	Birth wt. (lb)	84	76	84	82
	Wn. wt. (lb) 2/	476	458	476	470
	Conception date 3/	6/16	6/16	6/17	6/16
No Suppl.	Cow gain (lb)	84	96	140	107
	Birth wt. (lb)	82	82	80	81
	Wn. wt. (lb)	453	474	471	466
	Conception date	6/9	6/20	6/14	6/14
Average	Cow gain (lb)	86	114	155	118
	Birth wt. (lb)	83	79	82	81
	Wn. wt. (lb)	464	466	474	468
	Conception date	6/12	6/18	6/16	6/15

1/ The 100% level represents all the hay animals would clean up in a 24-hour period and the other levels were 50 and 75% of this amount.

2/ Adjusted to 205 days of age and corrected for sex effect.

3/ Exposed to breeding beginning of June 1.

Cows in trial 2 gained somewhat less than those in trial 1 although all animals gained in body weight, regardless of treatment. Those animals receiving the balanced ration gained more at each level of feeding than those fed either the high energy-low protein or the low energy-high protein diets at corresponding levels of total feed (table 2). Losses in weight during the following summer paralleled the weight gains during the winter for each particular treatment.

Birthweight of calves from cows fed the high energy-low protein diet were significantly lower ($P < 0.01$) than those from cows in other treatments. This decrease in birth weight might be attributed to the low level of protein rather than the high level of energy. Wiltbank et al. (1962) reported an increase in birth weight with higher levels of energy during pregnancy. However, this was with adequate protein. Butcher (1960) reported a decrease in birth weight with lower level of protein in first-calf heifers. In contrast, Woodward et al. (1947)

reported no difference in birth weight of calves from full or limited fed cows and Black et al. (1938) found similar results with protein supplementation. This further emphasizes that the size of the animal in relation to its mature weight, the condition of the animal before entering the last 3 - 4 months of the gestation and the particular feed or environment prior to this period have an effect on the results from this type of study.

Table 2. Average winter gain and summer loss of cow, birth, and weaning weight of calf and subsequent conception date of cow for each treatment.

Level of Feeding	Measure of Performance	Energy-protein combination: Balanced	High E- Low P	Low E- High P	Average
Full	Cow gain, winter (lb)	132	74	102	103
	Cow loss, summer (lb)	114	58	101	91
	Birth wt. (lb)	79	64	76	73
	Wn. wt. (lb) 1/	380	358	412	383
	Conception date 2/	6/11	6/15	6/12	6/13
Limited	Cow gain winter (lb)	46	19	11	25
	Cow loss summer (lb)	44	2	58	35
	Birth wt. (lb)	73	70	75	73
	Wn. wt. (lb)	370	364	371	368
	Conception date	6/14	6/16	6/18	6/16
Average	Cow gain winter (lb)	89	46	56	64
	Cow loss summer (lb)	79	30	78	62
	Birth wt. (lb)	76	67	76	73
	Wn. wt. (lb)	375	361	392	376
	Conception date	6/12	6/16	6/15	6/14

1/ Adjusted to 205 days of age and corrected for sex effect.

2/ Exposed to breeding beginning June 1.

Weaning weights were not significantly affected by treatments. However, the calves with the highest weaning weights came from the cows on full feed. Speth et al. (1962) increased weaning weights by supplementation of cattle during winter pregnancy. This was with growing animals grazing the entire year on semi-desert ranges with weight losses during the winter without supplementation, whereas, the animals in the present trial were mature and wintered so they gained even on limited feed. If the milking ability of this type of animal were at a higher level,

mature animals wintered to gain should conceivably be able to lose weight the following summer and wean a heavier calf.

Conception rate and date, as in the previous year were not significantly affected by any of the treatments. Here again the normal management of the herd is to calve at a constant date each year so approximately 90 days elapses before animals are expected to conceive. During these 90 days feed was not limited and cows were on range grass, at its best, for at least a month before the breeding season. Wiltbank et al. (1962) was concerned with conception as soon after calving as possible. This might be all important if the objective were to keep moving up the calving date in an effort to produce a calf in less than a year. However, operating procedures are usually geared to the basis of a calf a year and under these conditions prenatal nutrition may not be as important.

SUMMARY

Two trials were conducted to study the effect of limited and full feeding with different protein and energy balances for wintering mature pregnant Hereford cattle. Body weight changes of the cow, birth, and weaning weight of the calf and subsequent rate and date of conception were measured.

Birth weights were not significantly affected by levels of feed but calves from cows fed a ration high in energy and low in protein were significantly lighter at birth than those from cows on all other treatments. Weaning weights were not significantly different among calves regardless of the winter treatment of the dam. There were no significant differences in rate or date of conception of cows on the various treatments. The average time of conception was 14 to 15 days after the bulls were turned in with the cows.

All cows regardless of treatment gained weight during the winter feeding period. Gains ranged from 11 to 170 lb. during the two years. Body weight losses in summer paralleled winter gains so that condition and body weight remained relatively constant from year to year.

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