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MILK PRODUCTION BY HEREFORD COWS

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Weaning weight and percent calf crop are the most important traits affecting net income on a cow-calf ranch. Dams' milk production is crucially important to the pre-weaning performance of calves. On semidesert grassland, natural forage often limits reproduction and lactation of range cows. Consequently, a part-year confinement program could overcome periods of reduced forage and permit a more flexible ranching operation.

The purpose of this experiment was to compare the performance of beef cows as milk producers, the effect of milk consumption on growth of suckling calves, and trends in milk composition under range and drylot conditions.

Experimental Procedure

The experiment was conducted from April 18 to July 24, 1973, and involved 64 lactating grade Hereford cows ranging in age from 3 through 7 years. Cows were stratified by body weight, age group, and age of their calves and randomly allotted to the two treatment groups.

The range group was maintained on a moderately-stocked range typical of the arid, semidesert grassland, as described by Herbel and Nelson (1966), and, in addition, fed a protein-energy supplement during the first six weeks of the study.

The drylot group was fed twice daily a ration composed of rain-damaged alfalfa hay, cotton gin trash, and supplement made up of crushed cottonseed, molasses, and rolled milo. The mixed supplement was fortified with stabilized vitamin A (37,400 I.U. per kg) and defluorinated rock phosphate (1.5%). In addition, the cattle had access to free choice salt and mineral supplement. Calves were creep-fed good quality alfalfa hay during the drylot period and also consumed a part of the ration given to the cows. Before this experiment, chemical composition and nutrient digestibility values for each roughage component fed had been established in conventional digestion trials using crossbred wethers.

All cattle were weighed at monthly intervals. Daily milk yield was estimated by the calf-nursing method using 12-hour intervals and extrapolating to a 24-hour basis. Five cows from each treatment group were sampled for studies of milk composition. Cows were paired for age and stage of lactation and milk was sampled three times. Milk letdown was induced by injecting each cow intramuscularly with 40 I.U. of oxytocin and samples were taken by complete hand-milking of one or two quarters.

Results and Discussion

During this study, rainfall was recorded as 0.6, 2.6, and 7.5 cm for May, June, and July, respectively, compared with the long-term averages of 0.7, 1.3, and 4.0 cm for these months. Thus, monthly rainfall varied from 86 to 200% of "normal" over the 3-month period. Moreover, winter precipitation (January through March) in 1973 was 232% of the long-term average (7.2 vs. 3.1 cm), which favorably influenced range forage production.

An attempt was made to feed the drylot group as economically as possible and still provide an adequate diet. Feed consumption records were used for estimation of total feed and specific nutrients consumed per head daily (table 1). Although calves consumed part of the ration fed to cows, individual cows received more nutrients than their suggested requirements (N.R.C., 1970).

Although the range group produced slightly more milk than the drylot group (4.8 vs. 4.5 kg) for the total experimental period, the difference was statistically nonsignificant. Means for individual month determinations were quite variable (table 2). Cows on range showed a sharper decline from the first to the second month, with an increase the third month. Apparently fluctuations in range forage availability were reflected in milk yield. Similarly, Pope et al. (1963) observed that changes in winter supplementation levels were reflected in milk production. Spring range forage appeared to be superior to the drylot ration for milk production. Kropp et al. (1973) observed that cottonseed hulls were superior to dry winter grass for lactating cows but alfalfa hay and a high-energy roughage ration (alfalfa:milo:molasses) were inferior to summer forage.

Means and standard deviations for milk components are presented in table 3. Values are average for three determinations. Differences resulting from treatment were statistically nonsignificant for all constituents studied.

Kropp et al. (1973) observed that milk composition was affected by level of supplement. Heyns (1960) reported variation in total solids, solids-not-fat, protein, lactose, ash, calcium, and phosphorus caused by stage of lactation, season, and age in Afrikander cows. Nevertheless, Gleddie and Berg (1968) found nonsignificant differences among breeds and months of test for all constituents analyzed. These workers reported higher and less variable values for constituents than those of the present study. Our differences could be partially accounted for by smaller numbers of animals sampled and differences in stage of lactation among cows sampled. Some re-

ported differences in milk constituent values may be caused by use of different analytical procedures. Milk components might vary when diets have a wide range in nutritive value; however, milk yields probably will differ first. Because reported correlations between percentage of milk constituents and calf gain have been small (Jeffery and Berg, 1971; Totusek et al., 1973), factors affecting total milk yield should receive primary attention.

A significant difference in average daily gain of calves existed between treatments. Calves on range showed higher ($P < .01$) average daily gain than did calves in drylot (0.66 vs. 0.44 kg). Stepwise multiple regression showed that the effect of treatment explained most of the variation in gain, followed by daily milk yield. The wide range in age of calves probably reduced the importance of milk yield upon calf gain ($r = .43$). Because calves on range gained significantly more than calves in drylot, and milk yield did not differ detectably, differences in gain suggest that calves on range used available feed and milk more efficiently. However, cattle kept on drylot did not perform as well as expected.

Summary

No significant differences for daily milk yield or milk constituents were observed between treatments. However, calves on range had significantly higher average daily gain than did calves in drylot. Unusually high rainfall during the study favorably influenced range forage. Treatment and average daily milk yield were the variables most closely associated with calf gain, but calves on range depended less on dams' milk production.

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TABLE 1. NUTRIENT CONSUMPTION COMPARED TO N.R.C. NUTRIENT REQUIREMENTS FOR DRYLOT COWS

Ration component	Dry matter (kg)	Digestible protein (kg)	Metabolizable energy (Mcal)	TDN (kg)
Alfalfa hay	7.3	0.75	11.6	3.2
Gin trash	5.5	0.18	8.0	2.2
Supplement	1.4	0.15	4.2	1.1
Total	14.2	1.08	23.8	6.5
N.R.C. requirement for 350 Kg lactating cow[1]	8.6	0.46	17.7	4.9

[1]N.R.C. Nutrient Requirements for Beef Cattle (1970)

TABLE 2. MEANS AND STANDARD ERRORS FOR AVERAGE DAILY MILK YIELD

Month	Drylot (kg)	Range (kg)
May	5.4 ± 0.3	5.6 ± 0.4
June	4.0 ± 0.4	3.5 ± 0.3
July	4.0 ± 0.3	5.4 ± 0.4
Mean	4.5 ± 0.2	4.8 ± 0.2

TABLE 3. MEANS AND STANDARD DEVIATIONS FOR MILK CONSTITUENTS

Treatment	Fat	Total solids	Solids-not-fat	Protein	Ash
	Percent				
Drylot	3.2(1.33)	11.4(1.23)	8.2(0.38)	3.0(0.27)	0.7(0.03)
Range	2.6(1.32)	11.0(1.49)	8.4(0.44)	3.2(0.33)	0.7(0.02)