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Abstract

Results of four simulated production systems indicated that high levels of milk produced calves that were heavier at weaning, primarily because of an increase in body fat. High levels of milk production, however, were a disadvantage when calves went directly to the feedlot. With slow-growing calves, the fat either had to be depleted postweaning, or the calves had to be slaughtered at less-than-desirable weights in order to maintain desirable carcass fat. High milk intake is more tolerable for calves with fast growth rates, whereas low milk intake is a an economic necessity for calves with slow growth rates. The moderate size (1250 lbs), moderate milking (average of 16.6 lbs per day) cows produced the greatest return over feed cost.

Keywords

Cattlemen's Day, 1989; Kansas Agricultural Experiment Station contribution; no. 89-567-S; Report of progress (Kansas State University. Agricultural Experiment Station and Cooperative Extension Service); 567; Beef; Milk levels; Simulation; Beef cows

INFLUENCE OF MILK LEVELS OF BEEF COWS ON RETURNS: A SIMULATION APPROACH

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Summary

Results of four simulated production systems indicated that high levels of milk produced calves that were heavier at weaning, primarily because of an increase in body fat. High levels of milk production, however, were a disadvantage when calves went directly to the feedlot. With slow-growing calves, the fat either had to be depleted postweaning, or the calves had to be slaughtered at less-than-desirable weights in order to maintain desirable carcass fat. High milk intake is more tolerable for calves with fast growth rates, whereas low milk intake is a an economic necessity for calves with slow growth rates. The moderate size (1250 lbs), moderate milking (average of 16.6 lbs per day) cows produced the greatest return over feed cost.

Introduction

The optimum milk production level for beef cows has been discussed by cattlemen for years. Until recently, when milk EPD's (expected progeny differences) became available, selection was based on a combination of milk and early calf growth rate. Today, cattlemen can select for both traits separately by using both weaning weight and milk EPD's. Thus, it becomes important to determine the optimum combination for each production system.

Experimental Procedures

Two levels of milk production for two rates of calf growth were evaluated by using the Manhattan, Kansas, environment and native bluestem pasture data as inputs for the Colorado State University cow herd simulation program. Two herds of cows were simulated with a mature cow weight of 1050 lbs, in body condition score of 5. One herd was simulated with an average daily milk production of 15.8 lbs and the other with an average daily milk production of 19.1 lbs These levels of milk production are higher than those reported for Polled Hereford cows in a preceding paper (Polled Hereford and Simmental milk production), with the lower level being close to that obtained from the Simmentals. Two more herds were simulated with a mature cow weight of 1250 lbs; one producing an average of 16.6 lbs of milk per day, the other averaging 21.9 lbs per day. The lower level is similar to that reported for the Simmentals in the preceding paper. The levels of milk production were chosen so the calves from the high-milking, small cows and high-milking, moderate size cows would have similar condition scores at weaning, and the same would be true for the moderate milking cows of the two sizes. The relative growth rate was the same for all calves, with genetic yearling weight of 64.3% of mature size. A 60-day June-July breeding season was used, with calves weaned on October 1.

Cows were grazed on native bluestem pasture all year, with supplemental feeding from December through April designed to allow cows to have a body condition score of 5 on May 1. The supplement was alfalfa hay, with a grain mix added when energy was needed.

At weaning, calves were fed in drylot for a month, at which time replacement heifers were selected. Non-replacement heifers and steers were placed in a feedlot on December 1, and replacement heifers were put on pasture but were fed hay and grain to meet their requirements. All open and unsound cows were culled and sold at weaning. Open and unsound long-yearling heifers were also put in the feedlot. Cattle were sold from the feedlot when 80% of the group would be expected to grade low choice. Two feedlot rations were used. The starting ration had 72% TDN (total digestible nutrients). The finishing ration had 85% TDN. Both contained 12% crude protein.

Economic comparisons were made, assuming the following prices: grass, $10.30 per A.; energy supplement, $5.90 cwt.; alfalfa hay, $100 per ton; starting feedlot ration, $5.90 cwt; and finishing feedlot ration, $6.00 cwt. Slaughter steers were priced at $71.50 per cwt., and slaughter heifers at $70.50 per cwt., with a $5 per cwt. discount for carcasses under 650 lbs, and cull cows priced at $43 per cwt. Simulated economic scenarios compared were 1) doubled calf slaughter prices, 2) doubled cull cow prices, 3) doubled pasture cost, 4) half the pasture cost, 5) half the hay cost, and 6) half the grain cost. All economic comparisons were made with cow numbers that would remove the same amount of dry matter (DM) from the range (approximately 425 ton per year), when the cow, her calf, and her share of the replacement heifers were considered.

Results and Discussion

Results of the simulation are shown in Table 4.1. High-milking and moderate-milking cows consumed similar amounts of grass during the summer, i.e., all they could eat. High-milking cows were thinner in the fall than moderate-milking cows and required more supplemental feed during the winter. As the level of supplemental winter feed increased, the amount of dead winter grass consumed decreased. Thus the high-milking cows consumed less total grass dry matter than the low-milking cows, but required more winter supplementation.

Steer calves weaned from the high-milking cows were approximately 60 lbs heavier in both cow size groups. Weaning condition scores ranged from a high of 5.7 and 5.9 from the moderate milk level and a low 7.2 and 7.1 from the high milk level. The 60 lbs difference in weight was primarily due to body fat.

In a preliminary analysis, calves weaned from small cows with high milk production, were fed a low energy feed for 3 months, which required the calves to deplete their fat stores prior to being finished on a high energy ration. Although this was very inefficient, it was necessary to keep these calves on the starting feedlot ration for 2 months in order for them to be heavy enough at slaughter to avoid penalty for light carcasses.

Steers produced by the larger cows were placed on the high energy feedlot ration within a month after entering the feedlot. Steers from the lower milk producing cows weighed 1323 lbs at slaughter, which is near the upper end of the acceptable weight range. Those from the high-milking cows had a more desirable weight, 1238 lbs.

Calves from the high-milking cows were younger when they reached slaughter condition than those from the low-milking cows. Calves from the moderate size cows were about 2 weeks older and 245 lbs heavier at slaughter than those from the small cows. This management system for calves was similar to the one used for the steers in a preceding paper (Managing Fast vs. Slow Growth Genotypes to Optimize Quality and Yield Grades). The greatest biological efficiency (pounds of product per pound of TDN) was obtained from the moderate size (1250 lbs), low-milking cows. Least efficient were the small, high-milking cows. The biological efficiency of the small, low milking cows and the moderate sized high-milking cows was very similar.

Economic efficiency is difficult to evaluate because of continuously changing feed and cattle prices. With all scenarios compared, the small, high-milking cows were the least profitable, and the moderate size (1250 lbs), moderate-milking cows were the most profitable. The small size, moderate-milking and moderate size, high-milking cows yielded similar returns over feed cost. In order to maximize profit on a fixed grazing area, it is necessary to reduce the stocking rate for moderate size cows by 4 to 11%, compared to the small cows. Using the price assumption noted previously, 89 moderate size, low-milking cows would produce $6,500 more return over feed cost than 100 small size, high-milking cows. This advantage was the least ($4,500) when hay price was half the assumed price ($50 vs. $100 per ton). The greatest advantage ($11,900) for the 89 moderate size, moderate-milking cows was when slaughter calf prices were doubled.

The economic results are different if calves are sold at weaning. Those results were reported in the 1986 Cattlemen's Day Report (Cow Size and Milk Level: Results of a Simulation Program), where 1300 lb cows producing an average of 24 lb of milk daily gave the greatest return per unit of grass.

Table 4.1. Comparison of Cattle Genotype at Different Price Relationships

	Cattle Size			
	Small		Moderate	
Traits	Moderate Milk	High Milk	Moderate Milk	High Milk
Cow Weight (lb)	1050	1050	1250	1250
Avg. Daily Milk (lb)	15.8	19.1	16.6	21.9
Calf Weaning Cond. Score	5.7	7.2	5.9	7.1
Calf Wean Wt (lb)	480	541	584	640
Cow May Cond.	5.1	5.0	5.2	4.9
Heifer Slaughter Wt (lb)	898	815	1032	1003
Steer Slaughter Wt (lb)	1079	991	1323	1238
Steer Slaughter Age (days)	429	383	444	406
Grass DM Removed per Cow (lb)	8508	7887	9559	8815
Grass TDN Removed per Cow (lb)	4286	4041	4803	4516
Supplemental TDN Fed per Cow (lb)	1851	2285	2321	2828
Number of Cows[1]	100	108	89	96

Economic Scenarios (Return over Feed Costs on Set Pasture Size and Retained Ownership Through the Feedlot)

Current Prices[2]	20,300 (3)[3]	16,700 (4)	23.200 (1)	20.500 (2)
Double Slaughter Prices	74,200 (3)	69,300 (4)	81,200 (1)	79,300 (2)
Double Cull Cow Prices	27,700 (3)	24,200 (4)	31,300 (1)	28,800 (2)
Double Pasture Cost	10,000 (3)	6,300 (4)	12,900 (1)	10,000 (2)
Half Pasture Cost	25,400 (3)	22,000 (4)	28,300 (1)	25,700 (2)
Half Hay Cost	28,200 (3)	27,000 (4)	31,500 (2)	31,600 (1)
Half Grain Cost	27,700 (2)	22,900 (4)	31,300 (1)	27,600 (3)

[1]Number of cows is determined by a set pasture size (425.4 ton of dry matter removed, approximately 1000 A.)

[2]Assumed prices used were: Grass $10.30/A.; Energy supplement $5.90 cwt.; alfalfa hay $100/ton; feedlot starting ration, $5.90 cwt.; feedlot finishing ration, $6.00 cwt.; slaughter steers, $71.50/cwt.; slaughter heifers, $70.50/cwt.; $5 discount for carcasses under 650 lbs; cull cows, $43.00 cwt.

[3]Number in parentheses is the genotype ranking scenario.