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Managing beef genotypes for profit: a computer simulation

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Abstract

In a computer simulation based on KSU data, cattle bred and managed to be moved directly from weaning to feedlot and slaughtered at a young age produced the greatest profit. Cattle that were too small or too large and management systems that increased age at slaughter were less profitable. This accelerated system of production allows a producer to take advantage of superior genetics and the economic opportunities they provide, especially with retained ownership. The beef industry has the opportunity to continue to produce quality beef, while reducing days to slaughter by taking advantage of the higher efficiency of feed conversion of younger animals. In addition, less shrink, lower trucking costs, fewer sick days, a reduction in medication, lower marketing costs, and reduced interest costs are associated with the accelerated production system. With the availability of EPDs, there is little reason for profit minded cow-calf producers to wean calves that are not of acceptable size to enter the feedlot after the weaning process.

Keywords

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MANAGING BEEF GENOTYPES FOR PROFIT: A COMPUTER SIMULATION

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Summary

In a computer simulation based on KSU data, cattle bred and managed to be moved directly from weaning to feedlot and slaughtered at a young age produced the greatest profit. Cattle that were too small or too large and management systems that increased age at slaughter were less profitable.

This accelerated system of production allows a producer to take advantage of superior genetics and the economic opportunities they provide, especially with retained ownership. The beef industry has the opportunity to continue to produce quality beef, while reducing days to slaughter by taking advantage of the higher efficiency of feed conversion of younger animals. In addition, less shrink, lower trucking costs, fewer sick days, a reduction in medication, lower marketing costs, and reduced interest costs are associated with the accelerated production system. With the availability of EPDs, there is little reason for profit minded cow-calf producers to wean calves that are not of acceptable size to enter the feedlot after the weaning process.

(Key Words: Beef Genotype-management Interactions, Economics, Simulation.)

Introduction

To maximize profit from a beef production system, the management system must match the genotype. Competitively priced edible proteins necessitate that the beef industry evaluate alternative production systems and genotypes to be competitive.

A number of trials have been completed examining the feasibility of accelerated management systems (moving weaned calves directly to the feedlot) compared with conventional systems in which cattle are grown for various periods before finishing. Schalles (1983, KAES Rep. of Prog. 427) found no difference between the systems in feed energy required to produce a pound of retail cuts; however, when yardage, facilities, labor, and interest were considered, faster gaining cattle and accelerated management programs were more economical. Lambert et al. (1984, KAES Rep. of Prog. 448) found that calves required 1.2 lb less feed per lb of gain and were 155 d younger at slaughter, making them more profitable than yearlings. Breed groups in the Kansas Steer Futurity (Lambert, 1984, KAES Rep. of Prog. 448) with the ability to gain rapidly and grade choice were the most profitable. Dikeman et al. (1985, J. Anim. Sci.) compared Angus × Hereford (AH) crossbred steers to steers that were 3/8 Simmental, 1/4 Chianina, 3/8 Angus or Hereford (SC) on a conventional vs accelerated management system. The SC steers on the accelerated system had the lowest break-even live price and lowest cost/lb

retail product. Schalles et al. (1989, KAES Rep. of Prog. 567) compared fast-growth genotype steers placed on a high energy ration one month after weaning to slow-growth genotypes on a growing ration for 155 d followed by a 62-d finishing ration. The fast-growth steers produced heavier, higher quality carcasses in less time and at a greater profit than the slow-growth steers.

Experimental Procedures

Three biological genotypes for growth and mature size, and two management systems (conventional vs accelerated) were evaluated using Kansas research data cited in the introduction as inputs for the Colorado State University cow herd simulation program. The three genotypes simulated were mature cow weights of 1,600 lb (LARGE), 1,250 lb (MEDIUM), and 900 lb (SMALL), with all cows in body condition score 5. The relative rate of maturity was the same for all genotypes. A 60-d June/July breeding season was used. Steer calves, cull heifer calves, and open yearling heifers were fed out. The conventional system (WGF) included November 1 weaning, winter growing, summer grazing, and finishing. The accelerated system (ACC) involved October 1 weaning and going directly to the feedlot for

Table 24.1. Herd, Production, and Economic Data

Item	Biological type					
	Large		Medium		Small	
	WGF	ACC	WGF	ACC	WGF	ACC
Mature cow wt, lb	1600	1600	1250	1250	900	900
Frame score	9-10	9-10	5-6	5-6	2-3	2-3
Cows/640 acres grass[a]	37.7	50.8	43.2	57.1	66.0	81.5
Steer adjusted 205 wt, lb	672	672	555	555	353	353
Maximum milk, lb	24	24	22	22	16	16
Dystocia, %	18.6	18.9	6.6	6.7	5.4	5.4
Calf death, %	5.5	5.5	4.2	4.2	4.1	4.1
Post birth death, %	3.2	3.8	2.2	2.5	2.1	2.4
Total death, %	8.7	9.3	6.4	6.7	6.2	6.5
Heifers pregnant, %	88.6	87.8	90.4	89.5	90.8	90.0
Two-yr-olds pregnant, %	81.6	81.4	86.6	86.2	86.6	86.1
Cows pregnant, %	82.5	80.7	88.3	88.0	87.8	87.7
Replacement females, %	29.6	30.9	23.2	23.7	23.2	23.7
Cull cows, %	20.9	21.6	16.8	17.0	17.0	17.2
Total TDN, lb[a]	14,152	11,875	11,550	9,281	7,990	6,569
Total feed cost[a], $	727	641	566	476	400	332
Return above feed[a], $	233	217	232	257	171	64
Return/acre above feed, $	14	17	16	23	18	8

[a]Cow unit = the cow, her % of progeny and replacement heifers.

finishing. All steers and heifers were slaughtered at approximately .4 in. backfat. Body components of growth (fill, bone, muscle, fat, and other) were calculated to evaluate muscle mass production by the genotype-management system combinations. To make land resource comparisons, cow numbers were adjusted based on cow size, milk production, percentage replacement heifers, and management system and presented as cows per 640 acres of grass.

Results and Discussion

As cow size and milk production increased, the number of cows per section of grass decreased (Table 24.1). From 23% (with SMALL cows) to 35% (with LARGE cows) more cows could be kept under the ACC system. The SMALL and MEDIUM cattle had higher pregnancy rates and lower death loss rates than LARGE, necessitating a lower percentage of heifers to be saved for replacements. The WGF management system required more feed (TDN) per cow than the ACC system and the feed cost per cow decreased with smaller size cows. Considerable more muscle mass per cow unit was produced by the LARGE cows. More muscle mass per cow was produced by the WGF system; however, more muscle per acre was produced with the ACC system. Steers from the LARGE and MEDIUM cows on the WGF system received a price discount because of heavy carcasses, whereas steers from SMALL cows on the ACC system received a discount because of light carcasses. Steers from the MEDIUM cows on the ACC system and from SMALL cows on the WGF system produced carcasses within the weight range of maximum price. The highest return above feed cost, both per acre and per cow, was from MEDIUM cows on the ACC system. The lowest returns were from the SMALL cows on the ACC system.