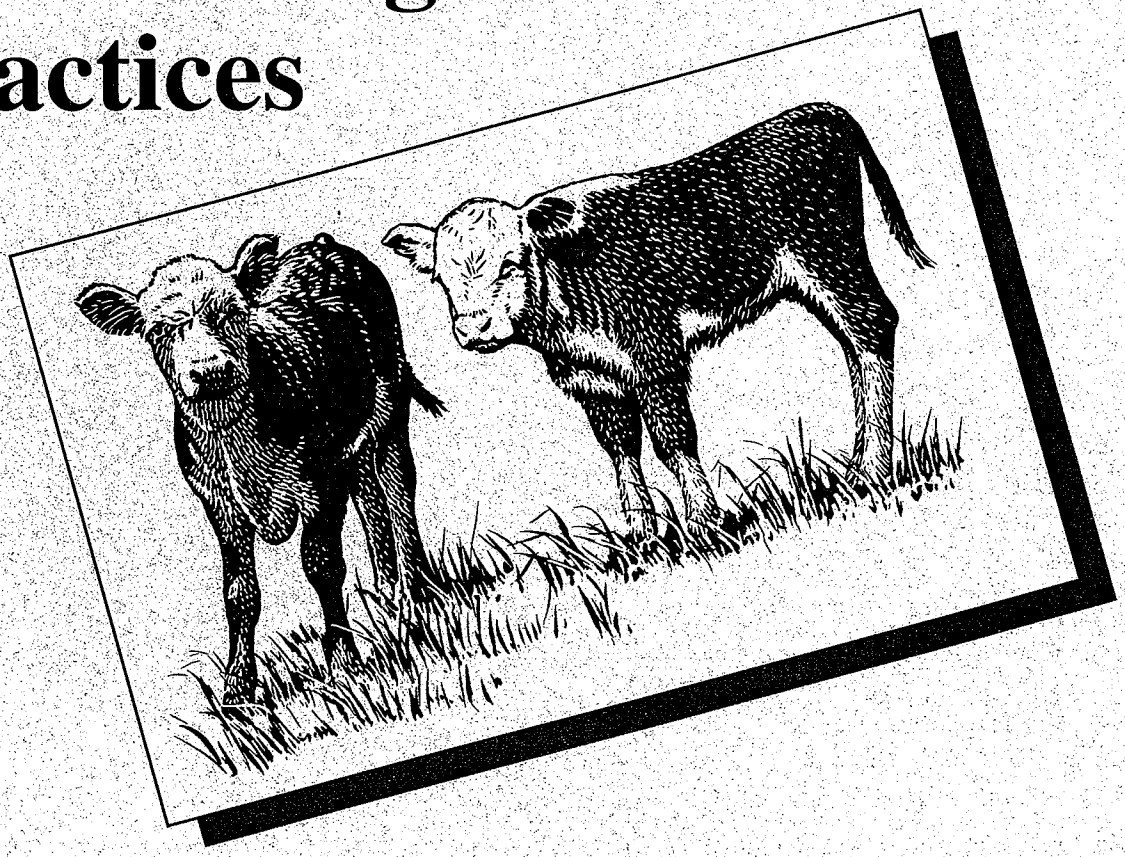
Bulletin 1005 November 1993

An Economic Analysis of Alternative Calf Management Practices



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An Economic Analysis of Alternative Calf Management Practices

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Published by the Office of Agricultural Communications, Division of Agriculture, Forestry, and Veterinary Medicine, Mississippi State University. Edited by Keith H. Remy, Senior Publications Editor. Cover designed by Beth Carter, Graphic Artist.

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Introduction

Most cow-calf producers in the Southeast sell their calves at weaning (Boykin et.al. 1976). In Mississippi, Taylor (1991b) monitored calves after sale and reported sickness (morbidity) up to 40 percent and death loss (mortality) up to 15 percent. Taylor concluded that high morbidity and mortality rates are largely the result of inadequate calf management. Many calves are simply not prepared to face the rigors of weaning, sale, shipping, and co-mingling with other calves.

The inadequate calf management that leads to poor performance often results in lower prices offered for calves. When purchasing recently weaned calves that have not been immunized, castrated, or dehorned, buyer discounts would seem to be justified. These discounts offset the additional risk and expenses associated with poorly-managed calves.

A number of practices exist that can improve the postweaning physical performance of calves. Herrick (1984) developed the concept of "preconditioning" to prevent high morbidity and mortality rates. Preconditioning included scheduled castration, dehorning, weaning, feeding, vaccination, deworming, internal and external parasite control, and trough and bunk adjustment. While preconditioning promotes healthier calves, economic studies report conflicting results (Meyer, 1970; Pritchard, 1990; Berg et al., 1986; Peterson et al., 1989b; Miksch, 1989; Taylor, 1991b).

Several factors influence calf management practices in Mississippi. Small cow herds owned by part-time operators, insufficient knowledge of cattle management practices, and resistance to change contribute to poorly-managed cow herds.

Because poor management often results in discounts for calves, there exists a need to alert cow-calf producers to the relationship between well-managed calves and higher sale receipts (Mintert et al., 1989). An economic analysis of alternative calf management strategies would provide information about viable alternatives, which could enable cow-calf producers to generate higher returns from their operations.

Also, stocker operators need to know if premiums are justified for well-managed calves. Stocker operators need physical and economic information to assist their decision making. An economic analysis of alternative calf management strategies could also include stocker results, illustrating postweaning effects of preweaning calf management.

Objectives

The primary objective of the study reported in this bulletin was to determine the economic impact of selected calf management strategies available to the Mississippi cow-calf producers. Seven calf management strategies were evaluated.

(1) No treatment.
(2) Castrate and dehorn (at 2 months of age).
(3) Castrate and dehorn (at 6 months of age).
(4) Strategy 3 plus vaccinate, deworm.
(5) Strategy 4 plus implant.
(6) Castrate, dehorn, blackleg, implant at 2 months; vaccinate, re-implant, deworm at 6 months.
(7) Strategy 6 plus preconditioning feed.

Specific objectives included:

1. *To determine the relative profitability for a cow-calf producer employing these strategies;*
2. *To determine the relative profitability for a stocker operator growing steers from these strategies; and*
3. *To determine the price differential stocker operators could pay for calves from each strategy.*

Emphasis was placed on relative performance among strategies, rather than absolute performance. This comparative analysis encompassed many management activities available. It was designed to illustrate the differences in production and profitability associated with each strategy.

The key variables associated with calf production are production costs, weaning weight, morbidity, and mortality. These variables are heavily influenced by the cow-calf producer's management level. The primary question to be addressed concerns how the level of management influences variable costs, gross returns, and subsequently, profit.

Based on expected relative performance of calves from each strategy, profitability was also estimated for the stocker operator. Stocker operators select the calves they purchase from among calves with a wide

variety of pre-weaning management, which is unknown in most cases. The stocker operator needs to know the potential economic benefit of preweaning management. Is it more profitable to offer a premium for a well-managed calf whose immune system is prepared to face the rigors of weaning and shipping, or should one purchase poorly managed calves and assume the risks of increased morbidity and mortality?

The key variables important to the stocker operator include: average daily gain (ADG), receiving program and cost, sick treatment program and cost, morbidity, and mortality.

Calf Management Strategies

The strategies were chosen to demonstrate the impact of increasing levels of calf management (Table 1).

Strategy 1 represents the least intensive management practices. The only time the calves are handled is the day they are weaned and sold. By not receiving any preweaning calf management, the calves are subjected to significant stress, which could result in increased levels of postweaning morbidity and mortality. Thus, the cow-calf producer passes potential stress and health-related problems and associated risks to the stocker operator. Also, average daily gain is affected negatively, especially early in the stocker program.

Strategies 2 and 3 require handling the calves, but with minimal cash expenses, and are practiced with the goal of receiving higher sale prices at weaning. In Strategy 2, castration and dehorning are done by the cow-calf producer at 2 months of age.

Castration and dehorning in Strategy 3 are assumed to be done by a veterinarian at 6 months, with a $1-per-head chute charge added to the activity cost. Stress is greater for older calves, but for cow-calf producers not familiar with the practices, allowing the veterinarian to perform the operations reduces health risks. In both strategies, the stocker operator is relieved of the tasks. Thus, stress for the calves entering a stocker program will be much less.

Strategy 4 involves more intensive management, with vaccines and a dewormer administered by a veterinarian. The activities are assumed to occur at least one month prior to sale day, allowing for healing and immunity build-up from the vaccines. These practices produce a calf that is not only dehorned and castrated, but one that is also immunized against the major diseases that affect stocker cattle. The cow-calf producer's objective is heavier, healthier calves (and higher bids). The stocker operator is more confident the cattle will perform better once in a stocker program.

Strategy 5 includes a growth stimulant (Ralgro), that is expected to increase weaning weights. The stocker buyer will also benefit from the residual efficacy of the implant, increasing ADG the first 30 days. Use of the implant will increase the cow-calf producer's cost of production.

In Strategy 6, the cow-calf producer is assumed to castrate, dehorn, vaccinate for blackleg, and implant at 2 months, then deworm, vaccinate, and reimplant at 6 months. The cow-calf producer is assumed to administer medication to treat sick calves, thus sick treatment costs for Strategy 6 do not include veterinarian charges. Morbidity and mortality were estimated to decrease and weaning weights to increase.

The stocker operator can expect lower morbidity and mortality and higher average daily gains with calves from Strategy 6. Stress on the calves will be lower, which may contribute to improved profitability.

Strategy 7, the most intensive strategy in the study, is also termed "preconditioning" by most practitioners in the field. Not only do they have increased immunity, the calves are also acclimated to using a feed bunk and water trough. Because of the 21-day feeding period, calves will endure less stress in the producer-to-stocker transition. In Strategy 7, the cow-calf producer bears some of the feed expenses the stocker operator would normally pay.

The stocker operator will see the healthiest calf of all the strategies and will save on feed cost, but will not receive compensatory gain the first 30 days. Therefore, ADG early in the stocker program is expected to be lower than in Strategy 6.

Included in Strategies 4, 5, and 6 are the vaccines for infectious bovine rhinotracheitis (IBR), parainfluenza-3 (PI-3), bovine respiratory syncytial virus (BRSV), bovine virus diarrhea (BVD)-killed tissue, clostridial (blackleg) in a 4- or 5-way bacterin, and for heifers, brucellosis. These diseases and their effects are discussed in the following section.

Table 1. Calf management strategies.

STRATEGY	
1	No Treatment
2	2 Months: Castrate, Dehorn
3	6 Months: Castrate, Dehorn
4	6 Months: Castrate, Dehorn, Vaccinate, Deworm
5	6 Months: Castrate, Dehorn, Vaccinate, Deworm, Implant
6	2 Months: Castrate, Dehorn, Blackleg, Implant 6 Months: Vaccinate, Deworm, Re-implant
7	2 Months: Castrate, Dehorn, Blackleg, Implant 6 Months: Vaccinate, Deworm, Re-implant 30 Days of Preconditioning Feed

Diseases

The most profound health threat to weaned calves placed in transport stems from infections of the

respiratory tract. The process by which these infections occur is undoubtedly multifactorial and incompletely defined (Hjerpe, 1993, p. 653). Complex interactions develop between respiratory viruses, pathogenic bacteria, and environmental stressors. These interactions are synergistic and work in concert to the detriment of the newly-weaned calf.

There are many known viruses capable of causing respiratory disease, with many more yet to be discovered. If primary uncomplicated viral infection occurs, the disease is usually fairly mild. However, when the virus is combined with a secondary bacterial infection, a severe fibrinous pneumonia or bronchopneumonia often results. This can be further complicated by transport-induced stress and immunosuppression; hence the name, "Shipping Fever Complex" (Hayes, 1984).

Common viral agents incriminated in this complex include infectious bovine rhinotracheitis (IBR), bovine viral diarrhea virus (BVDV), bovine respiratory syncytial virus (BRSV), and parainfluenza-3 virus (PI-3). There are several bacteria that act as secondary invaders, but the most common (and severe) is *Pasteurella hemolytica* (type A1).

Bovine respiratory syncytial virus infection occurs in cattle of all ages. Symptoms of BRSV include coughing, rapid breathing, blood-tinged nasal discharge, and depression. In acute outbreaks, sudden death is possible. BRSV has many of the same features of an allergic reaction.

Parainfluenza-3 infection may cause few noticeable signs. PI-3 is a contributor to the Shipping Fever Complex, but is probably the most mild in terms of clinical signs. Antibodies are present in more than 80 percent of young calves in the United States.

Infectious bovine rhinotracheitis is an acute upper respiratory disease. Affected animals show elevated temperature, excessive nasal and ocular discharge, rapid breathing, cough, and depression. IBR is probably the most common viral component associated with the Shipping Fever Complex.

Bovine viral diarrhea can present itself in many different forms and clinical syndromes. Its exact role in bovine respiratory disease is controversial, but it is known that these calves show depression, mild fever, and slight cough. The immunosuppressive properties of the virus, which have been clearly shown, encourage invasion by secondary bacteria.

Blackleg should be investigated as a cause of sudden death in grazing and newly-weaned cattle. Usually it occurs in cattle less than 2 years of age. Death may be preceded by swelling in the muscle masses of the hindquarters, subcutaneous air pockets, lameness, and high fever. Treatment is usually unrewarding and death usually occurs within 48 hours of onset (Ensminger, 1983).

Preconditioning

Berg (1986) reviewed Nebraska's "Certified Green Tag Preconditioning Program" to test and validate the program in terms of cost effectiveness for the cow-calf producer. Four experiments were conducted over a 3-year period at various locations in Nebraska. Factors considered were weaning weights, 29-day post-weaning weights, average daily gain, and percent treated. Performance of processed calves was similar to those receiving no vaccinations or parasite treatment. Berg concluded there were no differences between preconditioned and non-preconditioned calves and that producers would need a $2 premium per hundredweight to make preconditioning viable.

Meyer (1970) evaluated physical and financial aspects of handling and preconditioning feeder cattle. Four methods were observed and cost-benefit relationships were compared. Calves were shipped directly from farm to feedlot, receiving one of these treatments: **(1)** weaned and shipped the same day; **(2)** weaned 30 days prior to shipment and fed hay, grain, and supplement; **(3)** vaccinated with BVD, IBR, and PI-3 45 days prior to shipment, weaned and shipped the same day; **(4)** vaccinated as in 3, and weaned as in 2. Factors considered were time, cost per calf, weight 45 days prior to shipment, weight on day of shipment, and weight at 14, 28, and 56 days after arrival in feedlot.

Meyer (1970) concluded that there was relatively little difference in feedlot performance among groups when shipped from farm directly to the feedlot. Preconditioning did not necessarily result in heavier calves at marketing.

Peterson (1989) evaluated the profitability of various calf treatments to determine if preconditioning beef calves was profitable to cow-calf producers. Calves were separated into 16 different treatment groups, with combinations of weaning, feeding, vaccinating, grub treating, castrating and dehorning being conducted. Peterson determined the cow-calf producer's required minimum sale price, the cattle feeder's maximum purchase price, and retained ownership by the cow-calf producers. In general, preconditioning was not found economically viable for cow-calf producers, even when they retained ownership. The producer's required minimum sale price exceeded the maximum purchase price that buyers could afford to pay for preconditioned calves by at least $4.50 per hundredweight.

Pritchard (1990) took 600 calves from four different ranches to evaluate pre- and post-shipment performance of calves in South Dakota. Factors considered were shipping weight, actual shrink, feed intake, feed efficiency, and health. Results were varied concerning average daily gain, shrink, health, and perfor-

mance. No improvement in beef production was found due to preconditioning.

The MIMS Program

Taylor (1991a) helped initiate the Maximum Immunity Minimum Stress (MIMS) program in Mississippi. The MIMS program was designed specifically to battle the losses associated with shipping fever in recently weaned calves. Strategy 4 represents the minimum level of calf management practices required for certification in the MIMS program.

In monitoring the effectiveness of the MIMS program, Taylor (1991b) evaluated the performance of MIMS calves in backgrounding operations. The MIMS calves were compared to a control group that followed the same route, but without preweaning practices administered. Taylor was interested in mortality, morbidity, weight gain, cost to cowcalf producer, and financial returns. According to his results, a $5-$7 cost led to a $25-$30 increase in returns, or a $5-$7 per hundredweight premium over non-MIMS calves. MIMS calves out-gained the control group by 23 pounds (after weaning) during the study.

Previous studies have attempted to determine the impact of morbidity on weight gain, death loss, and economic returns. This study, which considers the same items, also includes a comparative profitability analysis for both the cow-calf producer and stocker operator.

Research Methods

The objective of this research was to determine the relative profitability of preweaning calf management for a cow-calf producer and a stocker operator. Strategy 1 is the base strategy, to which all other strategies are compared. Strategy 1 requires normal maintenance of the cow herd, with no activity directed toward the calves.

Few studies have evaluated calf performance under the management strategies considered in this study. Therefore few actual data were available. A modified Delphi technique was used, where primary calf performance data were gathered via interviews done with knowledgeable producers, animal scientists, extension specialists, and veterinarians. To the extent possible, results of cow-calf production research at the MAFES Prairie Research Unit, Prairie, Mississippi, were used to verify the assumptions used. Eight individuals were asked to estimate preweaning and postweaning calf performance for each management strategy.

To minimize the possibility of one respondent biasing the performance estimates, the differences between the level of a given trait (i.e. weaning weight) in each strategy and the level of that trait in Strategy 1 were calculated for each respondent. Then, differences were averaged across respondents and the average difference was added to the performance estimate for that trait in Strategy 1.

Performance estimates were derived using this equation:

$$(1) \qquad t_j = \bar{t} + \frac{\sum_{i=1}^{n} (t_{ij} - t_{i1})}{n}$$

where t_j is the estimate of the performance trait t in Strategy j, $\bar{t}$ is the average of the experts' estimates of trait t for calves in Strategy 1, t_{i1} is the i^{th} expert's performance estimate of trait t for calves from Strategy 1, t_{ij} is the i^{th} expert's performance estimate of trait t for calves from Strategy j, n is the number of experts (Tables 2 and 3).

The performance assumptions that follow are reflective of the opinions of individuals interviewed. Actual performance will vary with cattle breeds used, weather, feed prices, calving season, cattle prices, calving percentage, and quality of management. Effort was placed on evaluating a representative Mississippi cow-calf producer and the relative performance possibilities for his cow herd.

Relative performance, i.e. weight gain, morbidity, and mortality, of calves among strategies was emphasized rather than absolute performance. The goal was to compare the strategies and extrapolate the differences in economic performance that occur as a result of alternative management practices.

Table 2. Preweaning calf performance estimates.

	STRATEGY						
	1	2	3	4	5	6	7
Weaning Percentage	85.33	86.33	86.00	86.00	87.00	88.67	88.67
Weaning Weights (pounds)							
Steers	426	416	405	461	485	526	561
Heifers	401	392	381	434	456	495	528
Morbidity (percent)	5.00	7.50	10.50	10.00	7.50	2.50	5.00
Mortality (percent)	4.67	3.67	4.00	4.00	3.00	1.33	1.33

Table 3. Stocker steer performance estimates.

	STRATEGY						
	1	2	3	4	5	6	7
Beginning weight (lb)	413	404	393	447	470	510	544
Morbidity (%)	44.17	36.50	34.00	23.83	20.50	13.30	9.50
Repulls[1] (%)	33.33	30.67	30.67	28.17	28.17	22.67	16.53
Mortality (%)	3.63	3.33	2.83	2.23	1.15	0.98	0.98
ADG 1st 30 days	0.37	0.77	0.73	1.29	1.33	1.33	0.85
ADG After 30 days	1.37	1.47	1.47	1.47	1.72	1.88	1.88
End weight	686	711	703	777	862	936	955

[1]Percent of sick calves (morbidity), which have at least one additional treatment.

Production Costs

Production costs for the study were adapted from cow-calf budgets developed at Mississippi State University for a representative spring calving cow-calf operation in Mississippi (Table 4). The cow-calf producer was assumed to follow a herd management program, in which the cows are wormed, vaccinated, and treated for external parasites.

Winter grazing budgets were adapted from Commer et al. (1990) (Table 5). The budgets for the stocker activities reflect typical winter grazing operations in Mississippi. Calves were assumed to enter a ryegrass grazing system in the fall and were sold in May as feeder cattle. The stocker program lasted 240 days for steers from Strategies 1 through 6 and 210 days for steers from Strategy 7.

Grazing costs (Appendix Table 1) did not vary among strategies, since the goal of this study is to determine the impact of preweaning calf management.

Cattle Prices

Ten-year average calf prices from Mississippi markets were used to price weaned calves in the study. Fall selling prices were an average of monthly prices in September, October, and November.

Feeder cattle prices were 10-year averages from Mississippi markets for May. Feeder cattle weights ranged from 686 pounds to 955 pounds. Oklahoma City livestock market averages were also calculated, and for the years that Mississippi prices were unavailable, Oklahoma City prices were adjusted to Mississippi markets. The adjustments were made according to

Table 4. Cost of production budget for a cow-calf enterprise using Strategy 1.

STRATEGY 1 100-cow herd	Unit	$/Unit	Quantity per cow	$/cow
INCOME				
Bull calves	cwt.	88.16	1.76	155.43
Heifer calves	cwt.	78.70	1.11	87.74
Cull cows	cwt.	51.69	0.87	45.13
Cull bulls	cwt.	59.70	0.16	9.27
Cull Rplc heifers	Cwt.	70.04	0.15	10.19
			TOTAL INCOME	$307.76
DIRECT EXPENSES				
Bull	head	1,500.00	0.01	15.00
Pasture cost	acre	76.58	1.50	114.87
Hay harvest costs	acre	50.86	0.40	20.34
Protein supplement	ton	142.59	0.17	23.53
Salt and minerals	cwt.	10.73	0.33	3.54
Equip. and Repairs	yr.	7.39	1.00	7.39
Vet./Health Mgt.	head	15.80	1.00	15.80
Interest on Operating Capital	$	0.12	224.72	12.92
Marketing Costs	$	0.04	307.75	12.31
Labor	hours	5.00	4.85	24.25
Checkoff	head	1.00	0.84	0.84
			TOTAL DIRECT EXPENSES	$250.79
			RETURNS ABOVE DIRECT EXPENSES	$56.97
			$/cwt	19.79

Source: Adapted from: "1991 Livestock and Forage Budgets," Mississippi Cooperative Extension Service. 1991.

Table 5. Cost of production budget for a stocker steer enterprise with steers from Strategy 1.

Winter Grazing Stocker Operation	Unit	$/Unit	Quantity per head	$/head
INCOME				
Feeder steers sold	Cwt.	77.13	6.86	529.11
DIRECT EXPENSES				
Calf (pur. price)	head	88.16	4.13	364.10
Order buying exp.	head	1.40	1.00	1.40
Pasture exp.	acre	96.77	0.67	64.54
Hay	ton	50.00	0.20	10.00
Salt & mineral	cwt	10.73	0.50	5.37
Supplemental feed	cwt	6.00	0.40	2.40
Labor	hours	5.00	2.00	10.00
Rec. & med.	head	26.43	1.00	26.43
Int. on oper. cap	$	0.12	438.28	33.14
Checkoff	head	1	0.96	0.96
TOTAL DIRECT EXPENSES				518.64
RETURN ABOVE DIRECT EXPENSES				10.47
			$/cwt	1.53

Source: Adapted from "Commer, Malcolm Jr., W. C. Couvillion, David H. Laughlin, and C. W. Herndon, "Costs of Winter Grazing, Summer Grazing, and Finishing Calves in the Southeast." Mississippi Agricultural and Forestry Experiment Station, Staff Paper Series #88. 1990.

Table 6. Price discounts due to gender and horns for 400- to 500-pound calves ($/cwt).

	Without horns	Horns
	($/cwt)	
Steers	0	−0.49
Bulls	−3.60	−0.49
Heifers	−13.03	−0.52

Adapted from: Mintert, J. R., F. K. Brazle, T. C. Schroeder, and O. Grunewald, "Factors Affecting Auction Prices of Feeder Cattle." Cooperative Extension Service, Manhattan, Kansas. September 1989.

the basis between Oklahoma City and Mississippi markets for each weight class. All prices were converted to 1990 dollars using the GNP deflator.

The prices used in this study are reported for 100-pound weight intervals; however, lighter animals typically sell for more per pound than heavier animals. Using a single price for all animals within a given weight-range results in an upward bias for enterprises producing heavier calves within that weight interval.

In order to obtain the most accurate prices possible, linear interpolation was used to calculate prices for all weaned calves and stockers. The reported price for a given weight interval was assumed to be for the midpoint of that interval. It was also assumed that weights and prices are linearly related within weight intervals. Linear interpolation was used to adjust prices between midpoints.

Mintert et al. (1989) surveyed auction markets in Kansas and found that 400- to 500-pound bull calves sold in the fall received discounts of $3.60 per hundredweight, compared to 400- to 500-pound steers. They also found that horned bulls and steers were discounted $.49 per hundredweight (Table 6). These discounts are included in Strategy 1. Prices received for cattle sold by both cow-calf producer and stocker operator are presented in Table 7.

Calf Management Costs

Health management and preconditioning feed costs in each management strategy are presented on a per head basis in Table 8 and on a per cow basis in Table 9.

For both the cow-calf producer and the stocker buyer, sick treatment costs were calculated by multiplying the per head treatment cost by the morbidity rate in each management strategy. Receiving and medication costs for the stocker buyer in each strategy are presented in Table 10.

Table 7. Prices received for livestock[1] ($/cwt).

Type of animal	STRATEGY 1	2	3	4	5	6	7
	($/cwt)						
Weaned steer	88.16[2]	93.26	94.37	89.18	87.75	85.32	83.23
Weaned heifer	78.70[2]	79.46	79.72	78.39	77.59	75.26	73.27
Feeder steer	77.13	75.78	76.21	73.10	71.31	69.70	70.67
Cull cow	51.69	51.69	51.69	51.69	51.69	51.69	51.69
Cull rplc heifer	70.04	70.04	70.04	70.04	70.04	70.04	70.04
Cull bull	59.70	59.70	59.70	59.70	59.70	59.70	59.70

[1]10-year average adjusted to 1990 dollars.
[2]For Strategy 1, discounts for horned bull calf ($4.09) and for horned heifer calf ($.52) included.

Table 8. Estimated feed, health management, and other costs per calf, by strategy, for the representative cow-calf operation.

Activity	STRATEGY 1	2	3	4	5	6	7
Castrate	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Dehorn	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Vaccine	0.00	0.00	0.00	1.62	1.62	1.62	1.62
Implant	0.00	0.00	0.00	0.00	1.05	2.10	2.10
Ivomec	0.00	0.00	0.00	2.00	2.00	2.00	2.00
Chute chg[1]	0.00	0.00	1.00	1.00	1.00	0.00	0.00
Precond. feed[2]	0.00	0.00	0.00	0.00	0.00	0.00	12.86
TOTAL	0.00	2.00	3.00	6.62	7.67	7.72	20.58

[1]Includes $1.00 chute fee by vet for calves over 3 months of age
[2]Preconditioning feed $175.00 on X 7 lb/day X 21 days = $12.86/head (.61/day)

Table 9. Feed, health management, and other costs per cow, by strategy, for the representative cow-calf operation.

Activity	STRATEGY 1	2	3	4	5	6	7
Castrate	0.00	0.43	0.43	0.43	0.44	0.44	0.44
Dehorn	0.00	0.86	0.86	0.86	0.87	0.89	0.89
Vaccine	0.00	0.00	0.00	1.39	1.41	1.44	1.44
Implant	0.00	0.00	0.00	0.00	0.46	0.93	0.93
Ivomec	0.00	0.00	0.00	1.72	1.74	1.77	1.77
Chute Chg[1]	0.00	0.00	0.86	0.86	0.87	0.00	0.00
Precond feed[2]	0.00	0.00	0.00	0.00	0.00	0.00	11.40
Herd health mgt	14.56	14.56	14.56	14.56	14.56	14.56	14.56
Sick treatment[3]	1.24	1.88	2.62	2.49	1.89	0.20	0.40
TOTAL	15.80	17.73	19.33	22.31	22.24	20.23	31.83

[1]Includes $1.00 chute fee by vet for calves over 3 months of age.
[2]Preconditioning feed:
$175.00 on x 7 lb/day x 21 days x 88.67 (weaning percentage) = 11.40 (.61/day)
[3]Producer sick treatment:
LA-200 @ .20/cc ($3) + 3 sulfa boluses @ $2 each ($6) + $20 vet charge = $29.00/calf
Sick Treatment = cost per calf x percent morbidity (Refer to Table 2.)

Table 10.Estimated stocker receiving program and medicine costs per head, by strategy, for the representative stocker operation.

Activity	STRATEGY 1	2	3	4	5	6	7
Castrate	0.90	0.00	0.00	0.00	0.00	0.00	0.00
Dehorn	0.75	0.00	0.00	0.00	0.00	0.00	0.00
Vaccine	3.24	3.24	3.24	1.62	1.62	1.62	1.62
Implant	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Ivomec	1.87	1.87	1.87	1.87	1.87	1.87	1.87
Rec feed[1]	12.86	12.86	12.86	12.86	12.86	12.86	0.00
Sick treatment[2]	5.89	4.77	4.44	3.05	2.63	1.47	1.11
TOTAL	26.43	23.66	23.33	20.32	19.90	18.74	5.52

[1]Receiving ration: $175.00 on x 7 lb/day x 21 days = $12.86/head (.61/day)
[2]Sick treatment = cost per calf x percent morbidity
Cost per calf: (1cc/100 lb x $.50/cc x Weight) x (3 days) + ($3.25 labor)

Cow-Calf Producer Returns

The objective of this research was to determine the relative profitability of preweaning calf management. The strategies evaluated reflected a progression of management intensity, from no treatment to complete vaccination, worming, dehorning, castrating, implanting, and preconditioning feeding. The results of the economic analysis from the cow-calf producer's perspective are presented in this section.

A LOTUS 1-2-3 spreadsheet template was developed to determine the expected profitability of each calf management strategy. Total returns, total direct expenses, and returns above direct expenses for all strategies are presented in Table 11. Differences between returns and expenses in all strategies and Strategy 1 are also presented in Table 11.

Strategy 1 involved selling horned bull and heifer calves. Weaning weights in Strategy 1 were higher than those in Strategies 2 and 3. Calves in Strategy 1 were not subjected to the stress of dehorning and castration.

Total direct expenses in Strategy 1 were lowest of all strategies ($250.79) because no management activities were directed toward the calves. Total returns were also the lowest of all strategies ($307.75). The price discounts associated with horned bull and heifer calves were the main factors that produced the low returns above direct expenses in Strategy 1 ($56.96 per cow). Assuming no discounts for horns and bull calves, returns above direct expenses rose to $64.44 per cow.

Total direct expenses in Strategy 2 were $2.35 more per cow than Strategy 1 because of the charge for castrating and dehorning at 2 months, and increased morbidity. Strategy 2 returned more to the cow-calf producer than Strategy 3 because of higher veterinary expenses and the increased morbidity associated with castrating older calves.

While Strategy 2 earned $4.94 per cow more than Strategy 1, Strategy 3 actually earned $2.08 per cow less than Strategy 1. Total expenses for Strategy 3 increased to $254.60, and total returns were $309.48. The lower returns above direct expenses ($54.88) can be attributed primarily to lower weaning weights, stemming from poor performance caused by the stress of castrating and dehorning at 6 months of age.

Strategy 4 gave the cow-calf producer a higher weaning weight (461 pounds). The producer benefited financially, with returns above direct expenses $16.13 more than in Strategy 1. Returns above direct expenses in Strategy 4 were $73.09. The calf management practices of Strategy 4 are the minimum required for participation in the MIMS program (Taylor, 1991a).

Returns above direct expenses improved further in Strategy 5, returning $29.46 per cow more to the cow-calf producer than Strategy 1. The implant increased direct expenses to $259.13. However, weaning weights for steers in Strategy 5 were 59 pounds more than in Strategy 1. As a result, total returns per cow were $345.55, $86.42 per cow more than direct expenses.

Strategy 6 generated even higher total returns ($367.22) for the cow-calf producer. Low morbidity (3%) and mortality (1%) not only reduced sick treatment cost, but also increased total pounds of weaned calf sold per cow. The improved animal performance resulted in higher returns above direct expenses ($109.32). Direct expenses decreased $1.24 per cow from Strategy 5, yet total returns increased by $21.67.

Table 11. Estimated returns and expenses by calf management strategy for the representative cow-calf operation ($/cow).[1]

	STRATEGY							
	1	1-ND[2]	2	3	4	5	6	7
Total returns	307.75	315.54	315.04	309.48	331.74	345.55	367.22	379.44
Total direct expenses	250.79	251.10	253.14	254.60	258.65	259.13	257.89	269.72
Returns above direct expenses	56.96	64.44	61.90	54.88	73.09	86.42	109.33	109.72
$/cwt	16.14	18.25	17.74	16.24	18.98	21.13	24.13	22.71
Difference in total returns[3]	0.00	7.79	7.29	1.73	23.99	37.80	59.47	71.69
Difference in direct expenses[3]	0.00	0.31	2.35	3.81	7.86	8.33	7.10	18.93
Difference in returns above direct expenses[3]	0.00	7.48	4.94	-2.08	16.13	29.46	52.36	52.76
$/cwt	0.00	2.11	1.60	0.10	2.84	4.99	7.99	6.57

[1]These results are contingent on the performance assumptions used, which were developed via interviews with an expert panel. (See Research Methods section for details.)
[2]1-ND: Strategy 1 with no price discounts included.
[3]Difference from Strategy 1.

Direct expenses ($257.89) decreased in Strategy 6 due to the cow-calf producer assuming responsibility for administering health management practices. Veterinary charges were reduced from Strategy 5. While Strategy 6 required more work, net returns were $52.36 per cow more than Strategy 1.

Calves sold in Strategy 7 were the heaviest (561 pounds) and returns above direct expenses ($109.72) were the greatest of the strategies considered. The preconditioning feed increased direct expenses to $269.72 per cow. Returns above direct expenses in Strategy 7 were $52.70 per cow higher than in Strategy 1.

The profitability of Strategy 7 is sensitive to the cost of preconditioning feed. Given the small margin of returns above direct expenses over Strategy 6 ($.30), a slight increase in feed costs would make Strategy 7 inferior to Strategy 6.

Based on the assumptions used, the results suggest that Strategy 6 would benefit the cow-calf producer most ($109.33 per cow returns above direct expenses). Strategy 6 included castration, dehorning, blackleg vaccine, and implant at 2 months of age; then vaccinate, deworm, and re-implant at 6 months of age. Strategy 3, where calves were castrated and dehorned and 6 months of age, returned the least per cow ($54.88) of all seven strategies.

Stocker Operator Returns

The estimated total returns, direct expenses, and returns above direct expenses for a stocker operator buying calves from each management strategy are presented in Table 12. The differences in returns and expenses between steers from each strategy and Strategy 1 are also presented. The results illustrate the potential impacts of preweaning calf management on the profitability of winter grazing.

Strategy 1 offered the stocker operator nominal returns ($10.71 per head). Due to the stocker buyer providing health and management practices and a high morbidity rate (44.17%), receiving and medication costs of $26.43 per head were incurred (Table 10). High mortality (3.63%) and low ADG (.37 pound the first 30 days, 1.37 pounds thereafter) contribute to the lowest selling weight (686 pounds) of all strategies.

Failure to discount for horns and bull calves increased total direct expenses to $536.72. This scenario resulted in a loss of $7.47 per head to the stocker operator.

Steers from Strategy 2 finished the stocker program at a heavier weight (711 pounds) than those in Strategies 1 and 3. This illustrates the negative relationship between the stress of castration and dehorning and weight gain. Since calves in Strategy 2 were castrated and dehorned at an early age, they recovered quickly and soon regained lost weight. Calves from Strategies 1 and 3 lose more weight after castration and dehorning and take longer to regain that lost weight. Regardless, the Strategy 2 calf has an advantage in ADG compared to Strategies 1 and 3.

Returns above direct expenses were higher for the stocker operator in Strategy 3 than in Strategy 2 ($13.60 versus $10.17). Strategy 2 returned $.54 per head less than Strategy 1, while Strategy 3 realized $2.89 per head more than Strategy 1.

In Strategy 4, improvements were seen in variables that affect the stocker operator. Total expenses increased to $549.09, but total returns increased to $567.88. Added returns more than offset the expense of purchasing calves that have been vaccinated, dehorned, castrated, and dewormed. Benefits from in-

Table 12. Estimated returns and expenses by calf management strategy for the representative stocker operation ($/head).[1]

	STRATEGY							
	1	1-ND[2]	2	3	4	5	6	7
Total returns	529.25	529.25	538.67	535.74	567.88	614.36	652.15	635.44
Total direct expenses	518.54	536.72	528.50	522.14	549.09	563.73	598.29	587.13
Returns above direct expenses	10.71	-7.47	10.17	13.60	18.79	50.63	53.86	48.31
$/cwt	1.56	-1.09	1.43	1.93	2.42	5.88	5.76	5.37
Difference in total returns[3]	0.00	0.00	9.42	6.49	38.63	85.11	122.90	106.19
Difference in direct expenses[3]	0.00	18.18	9.96	3.60	30.55	45.19	79.75	68.59
Difference in returns above direct expenses[3]	0.00	-18.18	-0.54	2.89	8.08	39.92	43.15	37.60
$/cwt	0.00	-2.65	-0.13	0.37	0.86	4.32	4.20	3.81

[1]These results are contingent on the performance assumptions used, which were developed via interviews with an expert panel. (See Research Methods section for details.)

[2]1-ND: Strategy 1 with no price discounts included.

[3]Difference from Strategy 1.

creased ADG (1.29 pounds first 30 days, 1.47 pounds thereafter) and decreased mortality (2.23%) increased returns above direct expenses to $18.79 per head.

In Strategy 5, the stocker operator realized an increase in returns above direct expenses of $39.92 per head over Strategy 1, or $4.32 per hundredweight. Both direct expenses and total returns increased, but at a rate that widens the gap between the two. The use of implants resulted in an increased ADG (1.33 pounds during the first 30 days, 1.72 pounds thereafter), which led to the higher selling weight (862 pounds).

The well-managed calf from Strategy 6 also benefitted the stocker buyer. Less morbidity (13.3%) and higher ADG (1.33 pounds during the first 30 days, 1.88 pounds thereafter) contributed to returns above direct expenses of $53.86. At this point, the stocker operator received $43.15 more per head in returns above direct expenses than the calf purchased from Strategy 1.

Compared to other strategies, Strategy 7 benefitted the stocker buyer by reducing the feed bought and decreasing morbidity (9.5%). This decrease in expenditures, accompanied by higher total returns ($635.44) led to returns above direct expenses of $48.31, $5.37 per cwt above Strategy 1. Strategy 7 proved to be the most profitable strategy for the stocker operator. Net returns decreased and were lower than in Strategy 6. Upon entering a stocker program, calves from Strategy 7 had considerable less compensatory gain because of the precondition feeding. Also, the duration of the stocker program for calves in Strategy 7 was only 210 days instead of 240 days as in the other strategies.

Summary and Conclusions

Due to poor calf management, many cow-calf producers fail to maximize profit from their cow herds. This study determined the potential economic benefit of preweaning calf management. Seven calf management strategies were considered, encompassing a wide spectrum of management practices. The strategies were identified in a progressive manner from low input/low management to high input/high management scenarios. Relative performance and profitability were emphasized in an effort to illustrate the relative impact of proper calf management.

Since actual performance data were not available, professionals in the field of beef cattle production were consulted concerning animal performance in each strategy. Performance traits included weaning weight, average daily gain, morbidity and mortality. Averages of these experts' estimates of traits for each strategy were calculated to develop performance estimates for the economic analysis.

Although this manner of data collection is less than ideal, the cost and resource requirements of conducting experiments limit the opportunity for generating actual performance data. The research methods employed were designed to minimize the opportunity for any given professional's response to bias the data.

According to the analysis, cow-calf producers who invest in proper calf management will increase net return to their cattle operations. The timing of calf processing and vaccination can have significant impact on future calf performance. Studies have shown that the delivery of a preweaning health program, without creep or preconditioning feed, offers the best profit potential for both cow-calf and feeding operations (Peterson et al., 1989a and 1989b).

Based on the results, cow-calf producers who input $7.10 per cow (Strategy 6) more than they would by practicing no active calf management (Strategy 1), would receive about $50 more per cow in return.

Given the assumptions used, the findings show that the timing of castration (Strategy 2 versus Strategy 3) has significant impact on the development of the calf and the weaning weight it attains. Cow-calf producers can see that benefits are realized by castrating and dehorning at an early age.

Steers from Strategy 2 yield the stocker operator minimal net returns. The small difference between returns above direct expenses of Strategy 1 and Strategy 2 ($.54 per head) could be considered equal and allows the stocker operator the option of assuming the risk associated with Strategy 1 calves, paying less for them, and increasing returns above direct expenses. This scenario illustrates the importance of discounting for horns and bull calves to make Strategy 1 calves more attractive to the stocker buyer. With no discounts, steers from Strategy 1 become a losing proposition for the stocker buyer.

Both the cow-calf producer and stocker operator gain most net returns in Strategy 7. However, in a relative comparison, Strategy 6 is the most economical strategy to employ for the cow-calf producer. For the stocker operator, the reduction in feed costs in Strategy 7 decreases total direct expenses, which in turn increases returns above direct expenses. Therefore, stocker operators have incentive to pay more for calves that have been started on feed. Strategies 4 through 7 had highest relative net returns, illustrating that well-managed calves perform better for the stocker operator.

Cow-calf producers who practice Strategy 7 are encouraged to monitor feed price volatility. Small increases in feed prices could render Strategy 7 inefficient in a profit-maximizing venture.

These conclusions are dependent upon the accuracy of performance assumptions used and, therefore, must be treated as tentative until actual field test data become available. Small changes in medicine or

feed prices can affect profitability of each strategy. Also, changes in the price differentials for calves of different weights can also affect the relative profitability of the various-calf management strategies. Actual performance results may vary due to different cattle breeds and quality of forage offered the cow herd.

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APPENDIX

Tables 1-20

Appendix Table 1. Strategy 1 cow-calf health management and veterinary medicine budget.

Items	Unit	$/Unit	Quantity	$/Head
Veterinary Medicine (Cow Herd Only)				
5-way Lepto-Vibrio	Dose	0.34	1.00	0.34
Clostridium (Blackleg)	Dose	0.10	1.00	0.10
Dewormer IBR, PI-3	Dose	3.50	2.00	7.00
KBVD, BRS	Dose	1.52	1.00	1.52
		Total Veterinary Medicine per Cow		8.96
Herd Management				
Fly Control	Head	2.00	1.00	2.00
Pregnancy Check	Head	2.00	1.00	2.00
Bull Exam	Head	40.00	0.04	1.60
		Total Herd Management per Cow		5.60

Appendix Table 2. Winter grazing pasture budget.

Items	Unit	$/Unit	Quantity	$/Acre
Rye Seed	Bushels	8.25	0.00	0.00
Ryegrass Seed	Pounds	0.23	40.00	9.20
Wheat Seed	Pounds	0.11	0.00	0.00
Fertilizer				
Nitrogen	Pounds	0.09	500.00	45.00
Phosphate	Pounds	0.09	150.00	13.50
Potash	Pounds	0.07	100.00	7.00
Lime	Tons	23.00	0.33	7.59
Application Exp	Acres	4.00	1.00	4.00
Prep. & Plant. Expense	Acres	10.48	1.00	10.48
Misc. Expense	Acres	0.00	1.00	0.00
Variable Cost per Acre				96.77

Appendix Table 3. Strategy 2 cow-calf budget.

STRATEGY 1 100-Cow Herd	Unit	$/Unit	Quantity per cow	$/Cow
INCOME				
Bull Calves	Cwt	88.16	1.76	155.43
Heifer Calves	Cwt	78.70	1.11	87.74
Cull Cows	Cwt	51.69	0.87	45.13
Cull Bulls	Cwt	59.70	0.16	9.27
Cull Replacement heifers	Cwt	70.04	0.15	10.19
			TOTAL	$307.76
DIRECT EXPENSES				
Bull	Head	1,500.00	0.01	15.00
Pasture Cost	Acres	76.58	1.50	114.87
Hay Harvest Costs	Acres	50.86	0.40	20.34
Protein Supplement	Tons	142.59	0.17	23.53
Salt and Minerals	Cwt	10.73	0.33	3.54
Equip. and Repairs	Year	7.39	1.00	7.39
Vet./Health Mgt.	Head	15.80	1.00	15.80
Interest Operating Capital	$	0.12	224.72	12.92
Marketing Costs	$	0.04	307.75	12.31
Labor	Hours	5.00	4.85	24.25
Checkoff	Head	1.00	0.84	0.84
			TOTAL	$250.79
		RETURNS ABOVE DIRECT EXPENSES		$56.97
			$/CWT:	19.79

Appendix Table 4. Strategy 2 cow-calf health management budget.

VETERINARY MEDICINE Items	Unit	$/Unit	Quantity	$/Head
Cow Herd				
5-way Lepto-Vibrio	Dose	0.34	1.00	0.34
Clostridium (Blackleg)	Dose	0.10	1.00	0.10
Dewormer	Dose	3.50	2.00	7.00
IBR, PI3, KBVD, BRS	Dose	1.52	1.00	1.52
			Total per Cow	8.96
Bull Calves				
Dehorn	Head	1.00	1.00	1.00
Castrate	Head	1.00	1.00	1.00
			Total per Bull Calf	2.00
Heifer Calves				
Dehorn	Head	1.00	1.00	1.00
			Total per Heifer Calf	1.00
Herd Management				
Fly Control	Head	2.00	1.00	2.00
Pregnancy Check	Head	2.00	1.00	2.00
Bull Exam	Head	40.00	0.04	1.60
			Total Herd Management	5.60

Appendix Table 5. Strategy 2 Stocker Grazing Budget.

WINTER GRAZING STOCKER OPERATION

INCOME	Unit	$/Unit	Quantity per head	$/Head
Feeder steers sold	Cwt	75.78	7.11	538.67

DIRECT EXPENSES

Item	Unit	$/Unit	Quantity per hd	Dollars Per hd
Calf (Purchase Price)	Head	93.26	4.04	376.32
Order Buying Expense	Head	1.40	1.00	1.40
Pasture Expense	Acres	96.77	0.67	64.55
Hay	Ton	50.00	0.20	10.00
Salt & Mineral	Cwt	10.73	0.50	5.37
Supplemental Feed	Cwt	6.00	0.40	2.40
Labor	Hours	5.00	2.00	10.00
Rec. & Med.	Head	23.66	1.00	23.66
Interest on Operating Capital	$	0.12	447.54	33.84
Checkoff	Head	1	0.97	0.97
			TOTAL	528.51
		RETURNS ABOVE DIRECT EXPENSES		$10.16
			$/CWT:	1.43

Appendix Table 6. Strategy 3 cow-calf budget.

STRATEGY 6 100-Cow herd	Unit	$/Unit	Quantity per cow	$/Cow
INCOME				
Steer Calves	Cwt	85.32	2.26	193.00
Heifer Calves	Cwt	75.26	1.46	109.63
Cull Cows	Cwt	51.69	0.87	45.13
Cull Bulls	Cwt	59.70	0.16	9.27
Cull Replacement Heifers	Cwt	70.04	0.15	10.19
			TOTAL	$367.22
DIRECT EXPENSES				
Bull	Head	1,500.00	0.01	15.00
Pasture Cost	Acres	76.58	1.50	114.87
Hay Harvest Costs	Acres	50.86	0.40	20.34
Protein Supplement	Tons	142.59	0.17	23.53
Salt and Minerals	Cwt	10.73	0.33	3.54
Equip. and Repairs	Year	7.39	1.00	7.39
Vet./Health Mgt.	Head	20.23	1.00	20.23
Interest on Operating Capital	$	0.12	229.15	13.18
Marketing Costs	$	0.04	367.22	14.69
Labor	Hours	5.00	4.85	24.25
Checkoff	Head	1.00	0.88	0.88
			TOTAL	$257.90
	RETURNS ABOVE DIRECT EXPENSES			$109.32
			$/CWT:	29.40

Appendix Table 7. Strategy 3 cow-calf health management budget.

VETERINARY MEDICINE Items	Unit	$/Unit	Quantity	$/Head
Cow Herd				
5-way Lepto-Vibrio	Dose	0.34	1.00	0.34
Clostridium (Blackleg)	Dose	0.10	1.00	0.10
Dewormer	Dose	3.50	2.00	7.00
IBR, PI3, KBVD, BRS	Dose	1.52	1.00	1.52
			Total per Cow	8.96
Heifer Calves				
Dehorn	Head	1.00	1.00	1.00
Vet. chute charge	Head	1.00	1.00	1.00
			Total per Heifer Calf	2.00
Bull Calves				
Castrate	Head	1.00	1.00	1.00
Dehorn	Head	1.00	1.00	1.00
Vet. chute charge	Head	1.00	1.00	1.00
			Total per Bull Calf	3.00
Herd Management				
Fly Control	Head	2.00	1.00	2.00
Pregnancy Check	Head	2.00	1.00	2.00
Bull Exam	Head	40.00	0.04	1.60
			Total Herd Management	5.60

Appendix Table 8. Strategy 3 stocker grazing budget.

INCOME	Unit	$/Unit	Quality per head	$/Head
Feeder steers sold	Cwt	76.21	7.03	535.74
DIRECT EXPENSES				
Item	**Unit**	**$/Unit**	**Quantity per head**	**$/Head**
Calf (Purchase Price)	Head	94.37	3.93	370.73
Order Buying Expense	Head	1.40	1.00	1.40
Pasture Expense	Acres	96.77	0.67	64.55
Hay	Tons	50.00	0.20	10.00
Salt & Mineral	Cwt	10.73	0.50	5.37
Supplemental Feed	Cwt	6.00	0.40	2.40
Labor	Hours	5.00	2.00	10.00
Rec. & Med.	Head	23.33	1.00	23.33
Interest on Operating Captial	$	0.12	441.62	33.39
Checkoff	Head	1	0.97	0.97
			TOTAL	522.14
		RETURNS ABOVE DIRECT EXPENSES		13.60
			$/CWT:	1.93

Appendix Table 9. Strategy 4 cow-calf budget.

100-Cow Herd	Unit	$/Unit	Quantity per cow	$/Cow
INCOME				
Steer Calves	Cwt	89.18	1.92	171.48
Heifer Calves	Cwt	78.39	1.22	95.68
Cull Cows	Cwt	51.69	0.87	45.13
Cull Bulls	Cwt	59.70	0.16	9.27
Cull Replacement heifers	Cwt	70.04	0.15	10.19
			TOTAL	$331.75
DIRECT EXPENSES				
Bull	Head	1,500.00	0.01	15.00
Pasture Cost	Acres	76.58	1.50	114.87
Hay Harvest Costs	Acres	50.86	0.40	20.34
Protein Supplement	Ton	142.59	0.17	23.53
Salt and Minerals	Cwt	10.73	0.33	3.54
Equipment and Repairs	Years	7.39	1.00	7.39
Vet./Health Management	Head	22.32	1.00	22.32
Interest on Operating Capital	$	0.12	231.24	13.30
Marketing Costs	$	0.04	331.74	13.27
Labor	Hours	5.00	4.85	24.25
Check-off	Head	1.00	0.85	0.85
			TOTAL	$258.66
		RETURNS ABOVE DIRECT COSTS		$73.09
			$/CWT:	23.25

Appendix Table 10. Strategy 4 cow-calf health management budget.

VETERINARY MEDICINE Items	Unit	$/Unit	Quantity	$/Head
Cow Herd				
5-way Lepto-Vibrio	Dose	0.34	1.00	0.34
Clostridium (Blackleg)	Dose	0.10	1.00	0.10
Dewormer	Dose	3.50	2.00	7.00
IBR, PI3, KBVD, BRS	Dose	1.52	1.00	1.52
			Total per Cow	8.96
Heifer Calves				
5-way Clostridium (Blackleg)	Dose	0.10	1.00	0.10
Dewormer	Dose	2.00	1.00	2.00
IBR, PI3, KBVD, BRS	Dose	1.52	1.00	1.52
Dehorn	Head	1.00	1.00	1.00
Vet. chute charge	Head	1.00	1.00	1.00
			Total per Heifer Calf	5.62
Bull Calves				
5-way Clostridium (Blackleg)	Dose	0.10	1.00	0.10
Dewormer	Dose	2.00	1.00	2.00
IBR, PI3, KBVD, BRS	Dose	1.52	1.00	1.52
Dehorn	Head	1.00	1.00	1.00
Vet. chute charge	Head	1.00	1.00	1.00
Castrate	Head	1.00	1.00	1.00
			Total per Bull Calf	6.62
Herd Management				
Fly Control	Head	2.00	1.00	2.00
Pregnancy Check	Head	2.00	1.00	2.00
Bull Exam	Head	40.00	0.04	1.60
			Total Herd Management	5.60

Appendix Table 11. Strategy 4 stocker grazing budget.

INCOME	Unit	$/Unit	Quantity per head	$/Head
Feeder steers sold	Cwt	73.10	7.77	567.88
DIRECT EXPENSES				
Item	**Unit**	**$/Unit**	**Quantity per head**	**$/Head**
Calf (Purchase Price)	Head	89.18	4.49	398.79
Order Buying Expense	Head	1.40	1.00	1.40
Pasture Expense	Acres	96.77	0.67	64.55
Hay	Ton	50.00	0.20	10.00
Salt & Mineral	Cwt	10.73	0.50	5.37
Supplemental Feed	Cwt	6.00	0.40	2.40
Labor	Hour	5.00	2.00	10.00
Rec. & Med.	Head	20.32	1.00	20.32
Interest on Operating Capital	$	0.12	466.67	35.29
Checkoff	Head	1	0.98	0.98
			TOTAL	549.09
			RETURNS ABOVE DIRECT COSTS	$18.79
			$/CWT:	2.42

Appendix Table 12. Strategy 5 cow-calf budget.

100-Cow Herd	Unit	$/Unit	Quantity per cow	$/Cow
INCOME				
Steer Calves	Cwt	87.75	2.05	179.58
Heifer Calves	Cwt	77.62	1.31	101.39
Cull Cows	Cwt	51.69	0.87	45.13
Cull Bulls	Cwt	59.70	0.16	9.27
Cull Replacement Heifers	Cwt	70.04	0.15	10.19
			TOTAL	$345.56
DIRECT EXPENSES				
Bull	Head	1,500.00	0.01	15.00
Pasture Cost	Acres	76.58	1.50	114.87
Hay Harvest Costs	Acres	50.86	0.40	20.34
Protein Supplement	Tons	142.59	0.17	23.53
Salt and Minerals	Cwt	10.73	0.33	3.54
Equipment and Repairs	Years	7.39	1.00	7.39
Vet./Health Management	Head	22.23	1.00	22.23
Interest on Operating Capital	$	0.12	231.15	13.29
Marketing Costs	$	0.04	345.55	13.82
Labor	Hours	5.00	4.85	24.25
Checkoff	Head	1.00	0.86	0.86
			TOTAL	$259.12
		RETURNS ABOVE DIRECT COSTS		$86.44
			$/CWT:	25.78

Appendix Table 13. Strategy 5 cow-calf health management budget.

VETERINARY MEDICINE Items	Unit	$/Unit	Quantity	$/Head
Cow Herd				
5-way Lepto-Vibrio	Dose	0.34	1.00	0.34
Clostridium (Blackleg)	Dose	0.10	1.00	0.10
Dewormer	Dose	3.50	2.00	7.00
IBR, PI3, KBVD, BRS	Dose	1.52	1.00	1.52
			Total per Cow	8.96
Heifer Calves				
5-way Clostridium (Blackleg)	Dose	0.10	1.00	0.10
Dewormer	Dose	2.00	1.00	2.00
IBR, PI3, KBVD, BRS	Dose	1.52	1.00	1.52
Dehorn	Head	1.00	1.00	1.00
Vet. chute charge	Head	1.00	1.00	1.00
			Total per Heifer Calf	5.62
Bull Calves				
5-way Clostridium (Blackleg)	Dose	0.10	1.00	0.10
Dewormer	Dose	2.00	1.00	2.00
IBR, PI3, KBVD, BRS	Dose	1.52	1.00	1.52
Dehorn	Head	1.00	1.00	1.00
Vet. chute charge	Head	1.00	1.00	1.00
Castrate	Head	1.00	1.00	1.00
Implant	Head	1.05	1.00	1.05
			Total per Bull Calf	7.71
Herd Management				
Fly Control	Head	2.00	1.00	2.00
Pregnancy Check	Head	2.00	1.00	2.00
Bull Exam	Head	40.00	0.04	1.60
			Total Herd Management	5.60

Appendix 14. Strategy 5 stocker grazing budget.

INCOME	Unit	$/Unit	Quantity per head	$/Head
Feeder steers sold	Cwt	71.31	8.62	614.36
DIRECT EXPENSES				
Item	**Unit**	**$/Unit**	**Quantity per Head**	**$/Head**
Calf (Purchase Price)	Head	87.75	4.70	412.82
Order Buying Expense	Head	1.40	1.00	1.40
Pasture Expense	Acres	96.77	0.67	64.55
Hay	Ton	50.00	0.20	10.00
Salt & Mineral	Cwt	10.73	0.50	5.37
Supplemental Feed	Cwt	6.00	0.40	2.40
Labor	Hours	5.00	2.00	10.00
Rec. & Med.	Head	19.90	1.00	19.90
Interest on Operating Capital	$	0.12	480.27	36.32
Checkoff	Head	1	0.99	0.99
			TOTAL	563.75
		RETURNS ABOVE DIRECT EXPENSES		$50.61
			$/CWT:	5.87

Appendix Table 15. Strategy 6 cow-calf budget.

100-Cow Herd	Unit	$/Unit	Quantity per cow	$/Cow
INCOME				
Steer Calves	Cwt	85.32	2.26	193.00
Heifer Calves	Cwt	75.26	1.41	109.63
Cull Cows	Cwt	51.69	0.87	45.13
Cull Bulls	Cwt	59.70	0.16	9.27
Cull Replacement Heifers	Cwt	70.04	0.15	10.19
			TOTAL	$367.22
DIRECT EXPENSES				
Bull	Head	1,500.00	0.01	15.00
Pasture Cost	Acres	76.58	1.50	114.87
Hay Harvest Costs	Acres	50.86	0.40	20.34
Protein Supplement	Tons	142.59	0.17	23.53
Salt and Minerals	Cwt	10.73	0.33	3.54
Equipment and Repairs	Years	7.39	1.00	7.39
Vet./Health Mgt.	Head	20.23	1.00	20.23
Interst on Operating Capital	$	0.12	229.15	13.18
Marketing Costs	$	0.04	367.22	14.69
Labor	Hours	5.00	4.85	24.25
Checkoff	Head	1.00	0.88	0.88
			TOTAL	$257.90
		RETURNS ABOVE DIRECT COSTS		$109.32
			$/CWT:	29.40

Appendix Table 16. Strategy 6 cow-calf health budget.

VETERINARY MEDICINE Items	Unit	$/Unit	Quantity	$/Head
Cow Herd				
5-way Lepto-Vibrio	Dose	0.34	1.00	0.34
Clostridium (Blackleg)	Dose	0.10	1.00	0.10
Dewormer	Dose	3.50	2.00	7.00
IBR, PI3, KBVD, BRS	Dose	1.52	1.00	1.52
			Total Per Cow	8.96
Heifer Calves				
5-way Clostridium (Blackleg)	Dose	0.10	1.00	0.10
Dewormer	Dose	2.00	1.00	2.00
IBR, PI3, KBVD, BRS	Dose	1.52	1.00	1.52
Dehorn	Head	1.00	1.00	1.00
			Total Per Heifer Calf	4.62
Bull Calves				
5-way Clostridium (Blackleg)	Dose	0.10	1.00	0.10
Dewormer	Dose	2.00	1.00	2.00
IBR, PI3, KBVD, BRS	Dose	1.52	1.00	1.52
Dehorn	Head	1.00	1.00	1.00
Castrate	Head	1.00	1.00	1.00
Implant	Head	1.05	2.00	2.10
			Total Per Bull Calf	7.72
Herd Management				
Fly Control	Head	2.00	1.00	2.00
Pregnancy Check	Head	2.00	1.00	2.00
Bull Exam	Head	40.00	0.04	1.60
			Total Herd Management	5.60

Appendix Table 17. Strategy 6 stocker grazing budget.

INCOME	Unit	$/Unit	Quantity per head	$/Head
Feeder steers sold	Cwt.	69.70	9.36	652.15

DIRECT EXPENSES Item	Unit	$/Unit	Quantity per head	$/Head
Calf (Purchase Price)	Head	85.32	5.10	435.32
Order Buying Expense	Head	1.40	1.00	1.40
Pasture Expense	Acres	96.77	0.67	64.55
Hay	Ton	50.00	0.20	10.00
Receiving Ration	Cwt	9.00	1.30	11.70
Salt & Mineral	Cwt	10.73	0.50	5.37
Supplemental Feed	Cwt	6.00	0.40	2.40
Labor	Hours	5.00	2.00	10.00
Rec. & Med.	Head	18.74	1.00	18.74
Interest on Operating Capital	$	0.12	513.32	38.82
Checkoff	Head	1	0.99	0.99
			TOTAL	598.29
			RETURNS ABOVE DIRECT EXPENSES	$53.86
			$/CWT:	5.76

Appendix Table 18. Strategy 7 cow-calf budget.

100-Cow Herd	Unit	$/Unit	Quantity per cow	$/Cow
INCOME				
Steer Calves	Cwt	83.32	2.41	201.02
Heifer Calves	Cwt	73.27	1.55	113.84
Cull Cows	Cwt	51.69	0.87	45.13
Cull Bulls	Cwt	59.70	0.16	9.27
Cull Replacement Heifers	Cwt	70.04	0.15	10.19
			TOTAL	$379.45
DIRECT EXPENSES				
Bull	Head	1,500.00	0.01	15.00
Pasture Cost	Acres	76.58	1.50	114.87
Hay Harvest Costs	Acres	50.86	0.40	20.34
Protein Supplement	Tons	142.59	0.17	23.53
Salt and Minerals	Cwt	10.73	0.33	3.54
Equipment and Repairs	Years	7.39	1.00	7.39
Vet./Health Management	Head	20.43	1.00	20.43
Preconditioning feed	Head	12.86	0.88	11.40
Interest on Operating Capital	$	0.12	229.35	13.19
Marketing Costs	$	0.04	379.44	15.18
Labor	Hours	5.00	4.85	24.25
Checkoff	Head	1.00	0.88	0.88
			TOTAL	$270.00
	RETURNS ABOVE DIRECT EXPENSES			$109.45
			$/CWT:	27.59

Appendix Table 19. Strategy 7 cow-calf health management budget.

VETERINARY MEDICINE Items	Unit	$/Unit	Quantity	$/Head
Cow Herd				
5-way Lepto-Vibrio	Dose	0.34	1.00	0.34
Clostridium (Blackleg)	Dose	0.10	1.00	0.10
Dewormer	Dose	3.50	2.00	7.00
IBR, PI3, KBVD, BRS	Dose	1.52	1.00	1.52
			Total Per Cow	8.96
Heifer Calves				
5-way Clostridium (Blackleg)	Dose	0.10	1.00	0.10
Dewormer	Dose	2.00	1.00	2.00
IBR, PI3, KBVD, BRS	Dose	1.52	1.00	1.52
Dehorn	Head	1.00	1.00	1.00
Preconditioning feed	Head	12.86	1.00	12.86
			Total Per Heifer Calf	17.48
Bull Calves				
5-way Clostridium (Blackleg)	Dose	0.10	1.00	0.10
Dewormer	Dose	2.00	1.00	2.00
IBR, PI3, KBVD, BRS	Dose	1.52	1.00	1.52
Dehorn	Head	1.00	1.00	1.00
Castrate	Head	1.00	1.00	1.00
Implant	Head	1.05	2.00	2.10
Preconditioning feed	Head	12.86	1.00	12.86
			Total Per Bull Calf	20.58
Herd Management				
Fly Control	Head	2.00	1.00	2.00
Pregnancy Check	Head	2.00	1.00	2.00
Bull Exam	Head	40.00	0.04	1.60
			Total Herd Management	5.60

Appendix Table 20. Strategy 7 stocker grazing budget.

INCOME	Unit	$/Unit	Quantity per head	Dollars per head
Feeder steers sold	Cwt	70.67	8.99	635.44
DIRECT EXPENSES				
Item	**Unit**	**$/Unit**	**Quantity per head**	**$/Head**
Calf (Purchase Price)	Head	83.32	5.44	453.40
Order Buying Expense	Head	1.40	1.00	1.40
Pasture Expense	Acres	96.77	0.67	64.55
Hay	Tons	50.00	0.20	10.00
Salt & Mineral	Cwt	10.73	0.50	5.37
Supplemental Feed	Cwt	6.00	0.40	2.40
Labor	Hours	5.00	2.00	10.00
Rec. & Med.	Head	5.52	1.00	5.52
Interest on Operating Capital	$	0.12	506.47	33.51
Checkoff	Head	1	0.99	0.99
			TOTAL	587.13
	RETURNS ABOVE DIRECT EXPENSES			$48.31
			$/CWT:	5.37

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