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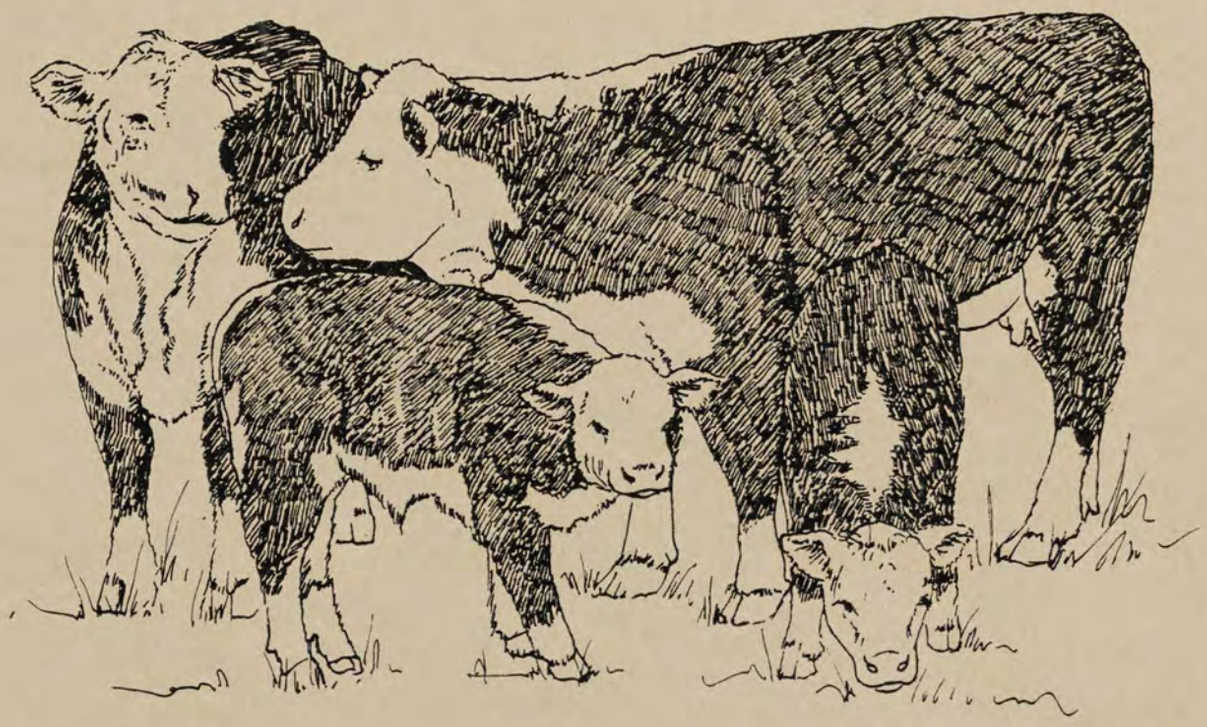

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By Fred H. Tyner and Darryl R. Bruemmer

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Research Report No. 106

COMPARISON OF NET RETURNS FOR COW-CALF AND COW-CALF/STOCKER SYSTEMS, BLACK BELT AREA OF MISSISSIPPI, 1978

by

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SUMMARY

Linear programming was used to analyze the relative profitability of selling calves at weaning versus selling them after a winter grazing (backgrounding) program.

A resource situation consisting of 400 acres of land, two man-years of labor, equipment, and an existing brood cow herd was assumed. Nutrient sources allowed the brood herd and the backgrounding program were farm-produced grazing, hay, and silage crops and purchased supplemental feed (corn and cottonseed meal). The system which provided the highest returns to land, management, and general farm overhead was one in which calves were sold after backgrounding rather than at weaning.

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INTRODUCTION

The major component of the beef cattle industry in Mississippi is cow-calf production. Most of the calves produced are sold at weaning, with the producer depending on the revenue generated from the sale of the weaned calf to pay the annual cost of maintaining the brood cow unit. Means for improving the profitability of such enterprises are needed, and--in fact--proper selection of forage systems and better management to increase calving percentages and reduce death losses are essential if production of weaned calves is to be a profitable farm enterprise. However, an even more important consideration for profitability might be the relative market prices of weaned calves and backgrounded[1/] calves--and the cost of weight gain during backgrounding. Thus, the overall objective of this study was to evaluate the relative profitability of cow-calf systems selling weaned calves versus those selling backgrounded calves. The guiding hypothesis was that a beef producer could obtain higher net returns from the cattle enterprise by retaining all or part of his weaned calves, carrying them through a backgrounding program, and selling them as feeders or heavy stockers.

[1/] Backgrounding refers to taking the weaned calf to approximately 650-700 pounds on a grazing or grazing-plus-limited-grain program.

PROCEDURES

The Black Belt area of Mississippi [4] was selected for this study because beef cattle production is an important activity in that area and because no current economic analysis of beef cow-calf production was available for the Black Belt.

As the first step, a "typical" resource situation consisting of 400 acres of land, two man-years of labor, and a complement of machinery was specified. Next, the forage crops shown in Table 1 were selected as alternative sources of nutrients for beef cattle production in the Black Belt. Estimates of monthly production of dry matter, digestible energy, and digestible protein (Appendix Tables 1, 2, and 3) were developed from previous research and other published data with the counsel of Dr. Vance H. Watson, MAFES Agronomist. Data on seeding rates, equipment performance rates, labor requirements, and fertilization rates were obtained from published sources [1, 2]. Data on prices of seed, fertilizers, herbicides, and insecticides (Appendix Table 4) and equipment were collected from area dealers and distributors and used, in conjunction with the other data, to construct complete cost budgets for the establishment and maintenance of the 25 forage alternatives.[2/] Estimated maintenance cost per acre for these forages (based on late 1978 prices) are shown in Appendix Table 5.

[2/] These budgets, updated to May 1980 prices, are available from the Department of Agricultural Economics, Mississippi State University, as AEC Research Report No. 107.

Table 1. Forage crop alternatives considered in analysis of cow-calf and cow-calf/stocker systems, Black Belt area of Mississippi, 1978.

Grazing	Hay
Bahiagrass	Alfalfa
Coastal bermuda	Bahiagrass
Coastal bermuda-clover	Coastal bermuda
Common bermuda	Common bermuda
Common bermuda-clover	Dallisgrass
Dallisgrass	Fescue
Dallisgrass-clover	Red clover
Fescue	Sorghum x sudan
Fescue-clover	
Ryegrass	Silage
Ryegrass-clover	Corn
Ryegrass-oats	Sorghum
Ryegrass-rye	
Ryegrass-wheat	
Sorghum x sudan	

A basic cow-calf production activity was specified, and eight additional activities were developed to reflect two rates of gain and different combinations of weaned-calf and stocker-calf alternatives. Once these alternatives were defined, estimates of nutrient requirements obtained from animal nutritionists and published data [3] were used in a computer program to calculate monthly nutrient requirements for each of the nine cattle production activities.

Linear programming (LP) models structured to represent a one-year segment of a continuous farming operation were used to maximize net returns to the typical resource situation by selecting the optimum combination of forage production, cow-calf, and stocker activities under different sets of circumstances. The models developed allowed analysis of these alternatives: (1) sell all calves at weaning; (2) sell all calves after a backgrounding program; or (3) sell some calves at weaning and sell the remaining calves after backgrounding. Cost data for the cattle activities are shown in Appendix Tables 6, 7, and 8.

ASSUMPTIONS

Calculation of optimal solutions with an LP model requires exact specification of assumptions. Further, awareness of such assumptions is essential to proper interpretation of the results. The assumptions underlying the basic LP model used in this study were:

1. 400 acres of land suitable for improved pasture, hay, or silage production.
2. 400 hours per month of labor available (the amount used was charged at $2.65 per hour).
3. unlimited operating capital available (any capital used was charged for six months at an annual rate of 10%).
4. nutritional requirements of cattle satisfied by combinations of farm-produced pasture, hay, and silage and purchased corn or cottonseed meal.
5. separate stocker activities for two different rates of gain (1.0 or 2.0 pounds per day)
6. producer already established in cow-calf production--purchase of a brood herd not required.
7. land placed in permanent pasture could not be used for temporary (annual) pasture or silage during that same year.
8. supplemental feed could be purchased and fed in any month.
9. silage could be fed in any month.
10. hay could be fed October through April.
11. no animals produced were carried past the stocker stage (except replacement heifers)

Summary descriptions of the nine LP models analyzed are shown in Table 2.

ANALYSIS AND RESULTS

The complete linear programming matrix for analysis of the nine models included these activities: (1) 25 forage crops, (2) calf production, (3) sale of weaned calves, (4) stocker production, (5) sale of stocker animals, (6) storage and feeding of hay and silage, (7)

Table 2. Summary description of nine linear programming models used to analyze cow-calf and cow-calf/stocker systems for a specified resource situation in the Black Belt area of Miss., 1978.

Model Number	Calf production	Stocker production[1]	Rate of gain (ADG)	Weaned vs stocker production[2]
			-pounds-	
I	yes	no		--
II	yes	yes	1.0	--
III	yes	--	2.0	yes
IV	yes	yes	2.0	--
V	yes	--	2.0	yes
VI	yes	yes	1.0	--
VII	yes	--	1.0	yes
VIII [3]	yes	yes	2.0	--
IX	yes	--	2.0	yes

[1] Yes means stocker production forced into solution. No means stocker production not allowed.

[2] Yes means stocker production and sale of weaned calves are allowed to compete. Either one or a combination may appear in the optimal solution.

[3] Number of bull units held at level of 15.5. (The level of the optimal solution of model I).

capital borrowing, (8) purchase and feeding of corn and cottonseed meal, (9) sale of cull cows, and (10) sale of culled replacement heifers. Nutrient and labor requirements for all cattle activities were specified on a monthly basis.

The three basic production systems represented by the nine models were (1) a spring calving cow-calf operation using a high level of management, with all calves sold at weaning age [Figure 1]; (2) a spring-calving cow-calf operation with all calves produced carried through the winter in a stocker operation and sold the following May [Figure 2]; and (3) a combination of the first two, allowing some or all of the calves to be sold at weaning or as stockers. Production system (1) corresponds to Model I. Production systems (2) and (3) were evaluated at both 1.0 and 2.0 pound rates of gain and correspond to Models II-V (with the size of the brood herd not restricted) and to Models VI-IX (with the brood herd size forced to 15.5 bull units).

The optimal cattle and forage plans, respectively, for models I-V are shown in Tables 3 and 3-A. Cow-calf production (Model I) is profitable under the conditions and prices used in the LP analysis, providing returns to land, management, and general farm overhead of $16,939 for a 15.5 bull-unit operation. Forcing a 1.0-pound rate-of-gain stocker activity to follow the cow-calf phase lowers returns slightly (Model II), and allowing some calves to be sold at weaning with the others sold after the 1.0 pound stocker program increases returns slightly to $17,944 (Model III).

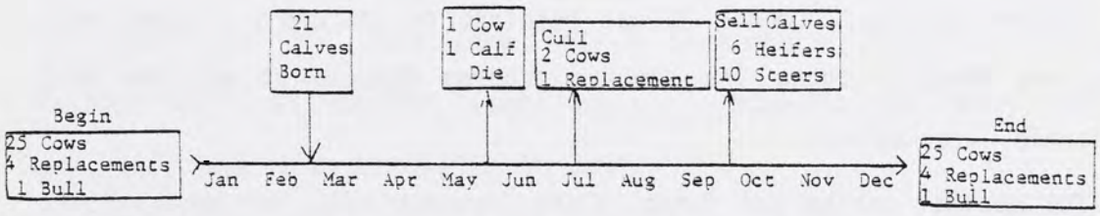

Figure 1. Annual cow-calf system activities, schematically shown.

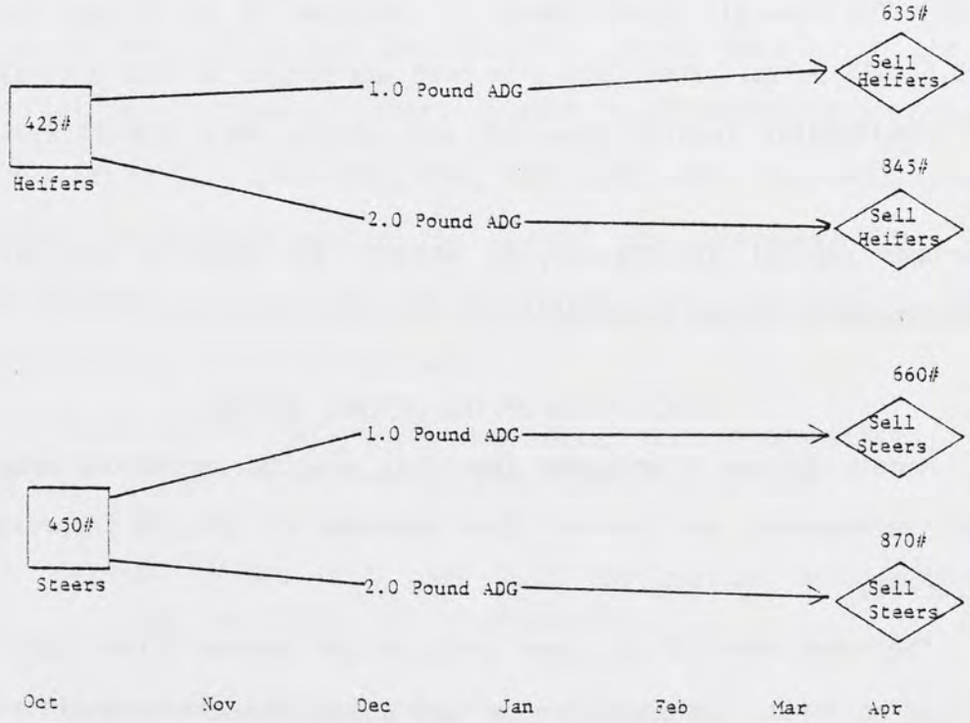

Figure 2. Stocker program activities, schematically shown.

Significant increases in returns occur when a 2.0 pound ADG stocker activity is allowed. The most profitable systems (both Models IV and V had returns of $28,379) produce calves and sell them after a 2.0 pound ADG stocker program. (Model IV was required to include a stocker program, and Model V chose the stocker program because it was the most profitable alternative).

The optimal cattle and forage plans, respectively, for models VI-IX are shown in Tables 4 and 4-A. These models were included to portray the effect of attempting a stocker program without reducing the size of the brood herd. The cow-calf model (Model I) resulted in an optimal herd size of 15.5 bull units. When this size herd was forced in Models VI-IX, excessive supplemental feeding resulted, and returns were significantly reduced.

Labor and capital utilization, by months, for each of the nine models, are shown in Tables 5 and 6.

DESCRIPTION OF THE OPTIMAL SYSTEM

Models IV and V produced identical results--providing returns to land, management, and general farm overhead of $28,379 (approximately $71/acre).

The brood herd of 310 cows produced 248 weaned calves (124 steers and 124 heifers). Seventy-five heifers and 124 steers were wintergrazed after weaning (ADG of 2.0 lbs.) and sold in May (age about 15 months) at 845-870 lbs. Twelve culled replacement heifers and 25 culled cows were also sold.

No supplemental corn or cottonseed meal was purchased, as adequate nutrient levels were provided by the farm-produced forages. The grazing program consisted of 27 acres Coastal bermuda-clover grazed during Feb.-Nov.; 145 acres of fescue-clover grazed Jan.-Dec.; 81 acres of

sorghumxsudan grazed May-Oct.; and 53 acres of ryegrass-oats grazed Nov.-May. Stored forages were produced from 15 acres of corn for silage and 132 acres of alfalfa for hay. Twenty-seven tons of silage were fed in August and 173 tons were fed in September. Alfalfa hay was fed October-April as follows (tons/month): Oct.-85; Nov.-100; Dec.-120; Jan.-130; Feb.-122; Mar.-116; Apr.-54.

Operating capital requirements totaled $38,853 and were distributed by month as: Jan.-$955; Feb.-$1,137; Mar.-$7,192; Apr.-$2,228; May-$4,996; June-$2,239; July-$2,883; Aug.-$3,384; Sept.-$5,178; Oct.-$5,916; Nov.-$913; and Dec.-$1,771. About $9,600 of the operating capital was charged to labor. (Labor requirements in hrs./month, Jan.-Dec., were: 190, 261, 336, 282, 400, 340, 367, 400, 400, 268, 183, and 201.) The highest months for capital use were March, May, September, and October. Major items of operating capital expense (in addition to labor) during these months were:

March--fertilizer (P_2O_5 and K_2O) for fescue-clover; fertilizer for ryegrass-oats; fertilizer for alfalfa.

May--fertilizer (P_2O_5 and K_2O) for coastal bermuda clover; seed and fertilizer for sorghumxsudan.

Sept.--seed and fertilizer for ryegrass-oats.

Oct.--clover seed and fertilizer for coastal bermuda-clover; fertilizer for alfalfa.

Table 3. Optimum cattle systems (Models I, II, III, IV, V), Black Belt Area of Mississippi, 1978.

Activity	Unit	Month	I	II	III	IV	V
Bull units			15.5	12.4	14.4	12.4	12.4
Calf production							
Heifers	hd	Feb-Sep	93	77	87	75	75
Steers	hd	Feb-Sep	155	129	144	124	124
Stocker programs							
Heifers							
425# - 635#	hd	Oct-Apr		77	87		
425 - 845#	hd	Oct-Apr				75	75
Steers							
450# - 660#	hd	Oct-Apr		129			
450# - 870#	Hd	Oct-Apr				124	124
Cattle sales							
Heifers							
425#	hd	Sep	93				
635#	hd	May		77	87		
845#	hd	May				75	75
Steers							
450#	hd	Sep	155		144		
660#	hd	May		129			
870#	hd	May				124	124
Replacements							
740#	hd		15	13	14	12	12
Culls							
900#	hd		31	25	28	25	25
Returns to land, management, and general farm overhead	dol		16,938	16,341	17,944	28,379	28,379

Table 3-A. Optimum forage systems (Models I, II, III, IV, V), Black Belt Area of Mississippi, 1978.

Activity	Unit	Month	I	II	III	IV	V
Grazed forages							
Sorghum x sudan	acre		79	64	73	81	81
Ryegrass-oats	acre					53	53
Coastal bermuda--clover	acre		79			27	27
Fescue-clover	acre		133	122	128	145	145
Hays							
Alfalfa hay	acre		87	129	104	132	132
Silages							
Corn	acre		22	18	20	15	15
Land used							
May-Oct	acre		400	400	400	400	400
Nov-Apr	acre		299	317	306	357	357
Returns to land, management, and general farm overhead	dol		16,939	16,341	17,944	28,379	28,379

Table 4. Optimum cattle systems (Models VI, VII, VIII, IX), Black Belt Area of Mississippi, 1978.

Activity	Unit	Month	VI	VII	VIII*	IX
Bull units			15.5	15.5	15.5	15.5
Calf production						
Heifers	hd	Feb	93	93	93	93
Steers	hd	Feb	155	155	155	155
Calf programs						
Heifers						
425# - 635#	hd	Oct-Apr	93	93		
425# - 845#	hd	Oct-Apr			93	93
Steers						
450# - 660#	hd	Oct-Apr	155			
450# - 870#	hd	Oct-Apr			155	
Cattle sales						
Heifers						
425#	hd	Sep				28
635#	hd	May	93	93		
845#	hd	May			93	93
Steers						
450#	hd	Sep		155		153
660#	hd	May	155			
870#	hd	May			155	2
Replacements						
740#	hd		15	15	15	15
Culls						
900#	hd		31	31	31	31
Returns to land, mgt, and general farm overhead	dol		10,150	17,733	15,176	21,041

Table 4-A. Optimum forage systems (Models VI, VII, VIII, IX), Black Belt Area of Mississippi, 1978.

Activity	Unit	Month	VI	VII	VIII	IX
Grazed forages						
Sorghum x Sudan	acre		79	75	74	72
Ryegrass-oats	acre		80	53	79	63
Coastal bermuda-clover	acre		88	87	92	95
Fescue-clover	acre		110	129	109	119
Hays						
Alfalfa	acre		85	86	87	89
Coastal bermuda	acre		37		33	9
Silages						
Corn	acre		1	18	4	17
Sorghum	acre			5	2	
Purchased feed						
Corn grain	ton		75		205	22
Cottonseed meal	ton				0	
Land used						
May-Oct	acre		400	400	400	400
Nov-Apr	acre		400	355	400	375
Returns to land, mgt, and general farm overhead	dol		10,150	17,734	15,176	21,041

Table 5. Operating capital utilization in the optimal solutions of the nine models, by month.

Model	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
							(dollars)						
I	783	1006	5119	2648	485	2634	2613	3316	2082	6344	753	778	32929
II	978	1159	5935	2512	4494	2691	2669	3236	2245	6936	945	971	34770
III	865	1071	5456	2595	4706	2657	2636	3283	2149	6589	834	859	33701
IV	955	1137	7192	2288	4996	2239	2883	3384	5178	5916	913	1771	38853
V	955	1137	7192	2288	4996	2239	2883	3384	5178	5916	913	1771	38853
VI	1147	1357	6240	3287	4874	3426	3485	7992	21238	7036	1100	2382	63562
VII	907	1124	5954	2598	4797	2763	2557	3236	5148	6810	867	1721	38484
VIII	1190	4288	6310	14199	4727	3436	3326	9054	22400	24220	1134	2406	96689
IX	924	1140	6010	2786	4639	2981	2742	9001	5580	7113	878	1899	45692

Table 6. Labor utilization in the optimal solutions of the nine models, by month.

Model	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
							(hours)						
I	152	240	287	270	400	353	350	400	320	249	147	151	3321
II	195	268	325	292	400	362	361	400	336	292	190	190	3616
III	170	252	303	280	400	357	355	400	327	267	165	169	3446
IV	190	261	336	282	400	340	367	400	400	268	183	201	3628
V	190	261	336	282	400	340	367	400	400	268	183	201	3628
VI	230	316	373	320	400	400	397	400	400	330	222	248	4036
VII	179	266	322	288	400	357	348	400	396	284	173	191	3605
VIII	237	327	382	316	400	400	392	400	400	313	228	254	4049
IX	182	269	325	287	400	372	360	400	400	290	174	196	3659

Appendix

Appendix table 1. Estimated dry matter production by month, selected forages, Black Belt of Mississippi, 1978.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	total
	lbs/acre												
Grazed forages													
Bahiagrass				500	1000	1200	1400	1400	500	200			6200
Coastal bermuda				350	2100	2600	3200	1550	1400	800			12000
Coastal bermuda-clover		500	720	1320	2180	1990	1960	1070	950	640	400		11730
Common bermuda				300	1300	1700	1800	700	500	200			6500
Common bermuda-clover		150	250	750	1200	1500	1200	800	250	150			6250
Dallisgrass			150	200	1300	1200	1000	800	200	150			5000
Dallisgrass-clover		150	250	750	1200	1500	1200	800	250	150	100		11810
Fescue	150	150	500	1100	1000	600	200	200	250	350	300	200	5000
Fescue-clover	160	180	600	1600	1480	800	250	250	400	400	300	200	6620
Ryegrass	600	700	1400	1600	900								5200
Ryegrass-clover		600	1200	1200	600								3600
Ryegrass-oats	650	700	1400	1600	900						800	700	6750
Ryegrass-rye	700	650	1400	1600	900						850	750	6850
Ryegrass-wheat	600	700	1400	1600	900						750	650	6600
Sorghumxsudan					1000	2500	2800	2800	1000	600			10700
Hays													
Alfalfa					2200	2400	3000	2400	2000				12000
Bahiagrass						3000		2500	1200				6700
Coastal bermuda						4000	3200	3000	1800				12000
Common bermuda						3000		2500	1200				6700
Dallisgrass					2500			2500					5000
Fescue					4000								4000
Red clover					2800	2900		2800					8500
Sorghumxsudan						3500	2800	2800	1000				10100
Silages													
Corn								9100					9100
Sorghum									10500				10500

Appendix Table 7. Estimated digestible energy by month, selected forages, Black Belt of Mississippi, 1978.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
						mcal/acre							
Grazed forages													
Bahiagrass				265.02	530.03	636.04	742.04	742.04	265.02	106.01			3286.20
Coastal bermuda				234.97	1409.79	1745.45	2148.25	1040.56	939.86	537.06			8055.94
Coastal bermuda-clover		332.49	478.78	877.77	1449.65	1323.31	1303.36	711.53	631.73	425.59	265.99		7800.20
Common bermuda				192.01	1409.79	1745.45	2148.25	1040.56	939.86	537.06			8055.94
Common bermuda-clover		90.49	150.82	452.47	723.95	904.93	723.95	482.63	150.82	90.49			3770.55
Dallisgrass			114.31	152.41	990.66	914.46	762.05	609.64	152.41	114.31			3810.25
Dallisgrass-clover		160.52	532.58	177.53	852.13	1065.17	852.13	568.09	177.53	106.52	71.01		4509.21
Fescue	96.96	96.96	323.19	711.02	646.38	387.83	129.28	129.28	161.60	226.23	193.91	129.28	3231.92
Fescue-clover	105.53	118.72	395.72	1055.26	976.11	527.63	164.88	164.88	263.81	263.81	197.86	131.91	4366.12
Ryegrass	530.71	619.16	1238.33	1415.23	796.07								4599.50
Ryegrass-clover		534.43	1068.85	1068.85	534.43								3206.56
Ryegrass-oats	574.94	619.16	1238.33	1415.23	796.07						707.62	619.16	5970.51
Ryegrass-rye	559.31	519.36	1118.62	1278.43	719.11						679.16	599.26	5473.28
Ryegrass-wheat	530.71	619.16	1238.33	1415.23	796.07						663.39	574.94	
Sorghumxsudan					899.26	2248.16	2517.93	517.93	899.26	539.56			9622.10
Hays													
Alfalfa					2264.78	2470.67	3088.34	2470.67	2058.89				12353.35
Bahiagrass						2313.36		1927.80	925.34				5166.50
Coastal bermuda						4025.25	3220.20	3018.94	1811.36				12075.75
Common bermuda						2447.54		2039.61	979.01				5466.16
Dallisgrass					2477.22			2477.22					4594.44
Fescue					4379.96								4379.96
Red clover					2551.59	2642.72		2551.59					7745.90
Sorghum x sudan						3508.60	2806.88	2806.88	1002.46				10124.82
Silages													
Corn								11464.44					11464.44
Sorghum									10622.00				10622.00

Appendix Table 3. Estimated digestible protein by month, selected forages, Black Belt of Mississippi, 1978.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
	kg/acre												
Grazed forages													
Bahiagrass				4.20	8.39	10.07	11.75	11.75	4.20	1.68			52.04
Coastal bermuda				8.50	51.00	63.10	77.66	37.62	33.98	19.41			291.27
Coastal bermuda-clover		12.59	18.13	33.23	54.88	50.10	49.34	26.94	23.92	16.11	10.07		295.31
Common bermuda				5.30	23.00	30.07	31.84	12.38	8.85	3.54			114.98
Common bermuda-clover		3.81	6.35	19.05	30.48	38.10	30.48	20.32	6.35	3.81			158.75
Dallisgrass			2.86	3.81	24.77	22.86	19.05	15.24	3.81	2.86			95.26
Dallis-clover		3.95	6.58	19.73	31.57	39.46	31.57	21.05	6.58	3.95	2.63		167.07
Fescue	3.64	3.64	12.13	26.69	24.27	14.56	4.85	4.85	6.07	8.50	7.28	4.85	121.33
Fescue-clover	4.65	5.23	17.42	46.45	42.97	23.22	7.26	7.26	11.61	11.61	8.71	5.81	192.20
Ryegrass	20.70	24.15	48.30	55.19	31.05								179.39
Ryegrass-clover		25.83	51.66	51.66	25.83								154.98
Ryegrass-oats	30.09	32.41	64.81	74.06	41.66						37.03	32.41	312.47
Ryegrass-rye	33.44	31.05	66.87	76.42	42.99						40.60	35.83	327.20
Ryegrass-wheat	20.34	23.74	47.47	54.25	30.52						25.43	22.04	223.79
Sorghumxsudan					35.38	88.45	99.07	99.07	35.38	21.23			378.58
Hays													
Alfalfa					177.28	193.40	241.75	193.40	161.16				966.99
Bahiagrass						80.97		67.47	32.39				180.83
Coastal bermuda						107.96	86.37	80.97	48.58				323.88
Common bermuda						80.97		67.47	32.39				180.83
Dallisgrass					57.83			57.83					115.66
Fescue					225.17								225.17
Red clover					148.98	154.30		148.98					452.26
Sorghumxsudan						94.46	75.57	75.57	26.99				272.59
Silages													
Corn								297.20					297.20
Sorghum									214.33				214.33

Appendix Table 4. Estimated seed, fertilizer, and chemical prices, Black Belt area of Mississippi, 1978.

Item	Unit	Price/unit
		-dollars-
Seed		
Coastal sprigs	bu.	20.00
Common bermuda	lb.	2.50
Bahiagrass	lb.	.65
Dallisgrass (liveseed)	lb.	3.00
Fescue	lb.	.50
Ryegrass	lb.	.17
Wheat	lb.	.09
Oats	lb.	.10
Rye	lb.	.16
SorghumxSudan	lb.	.34
Alfalfa	lb.	1.35
Corn	lb.	.78
Sorghum	lb.	.52
Red clover	lb.	1.50
Regal white clover	lb.	2.85
Subterranean clover	lb.	1.45
Fertilizer		
Ammonium nitrate	cwt.	6.80
Triple superphosphate	cwt.	8.50
Muriate of potash	cwt.	5.75
Lime (spread)	cwt.	.50
Chemicals		
2,4-D Amine	lb.	1.88
AAtrex (Atrazine)	lb.	3.00
Milogard (Propazine)	lb.	2.85
Banvel (Dicamba)	lb.	8.65
Methyl Parathion	lb.	2.15
Feed additive		
Urea	lb.	.08
Limestone	lb.	.02

Appendix Table 5. Estimated maintenance cost per acre for selected forages, Black Belt area of Mississippi, 1978.

Forage	Cost/acre
	-dollars-
Grazed forages	
Bahiagrass	65.65
Coastal bermuda	88.10
Coastal bermuda-clover	70.90
Common bermuda	71.66
Common bermuda-clover	62.58
Dallisgrass	69.88
Dallisgrass-clover	54.27
Fescue	58.41
Fescue-clover	43.58
Ryegrass	95.62
Ryegrass-clover	71.58
Ryegrass-oats	105.26
Ryegrass-rye	109.30
Ryegrass-wheat	103.69
Sorghumxsudan	79.13
Hays	
Alfalfa	142.99
Bahiagrass	125.62
Coastal bermuda	189.58
Common bermuda	133.77
Dallisgrass	113.05
Fescue	95.62
Red clover	103.74
Sorghumxsudan	151.36
Silages	
Corn	199.07
Sorghum	193.61

Appendix Table 6. Calculation of prices for cattle selling activities used in the linear programming model.

Type animal	Animal weight	Price/ cwt.	Death loss amount	Final price
	lbs		dollars	
Heifer	425	$55	$11.69	$222.06
	635	50	15.88	301.62
	740	49	18.13	344.47
	845	48	20.28	385.32
Steer	450	67	15.08	286.42
	660	55	18.15	344.85
	870	54	23.49	446.31
Cow	900	44.44	16.00	383.96

Appendix Table 7. Estimated annual maintenance costs for a 25-cow unit beef cow-calf herd, Black Belt area of Mississippi, 1978.

Item	Unit	Quantity	$/unit	Total amount
			-------dollars-------	
Direct expenses				
Veterinary & medicine	hd	30	6.32	189.66
Salt & minerals	cwt	6.80	5.00	34.00
Int. on op. cap.	herd	1	58.50	58.50
Total direct expenses				643.51
Fixed expenses				
Int. on investment	herd	1	1,205.00	1,205.00
Total fixed expenses				1,205.00
Total expenses				1,848.51

Appendix Table 8. Estimated annual stocker costs, per head, Black Belt area of Mississippi, 1978.

Item	Unit	Quantity	$/unit	Total amount
Direct expenses				
Veterinary & medicine	hd	1	2.94	2.94
Salt & mineral	hd	1	.70	.70
Labor	Hr	1.96	2.65	5.19
Total direct expenses				8.82

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