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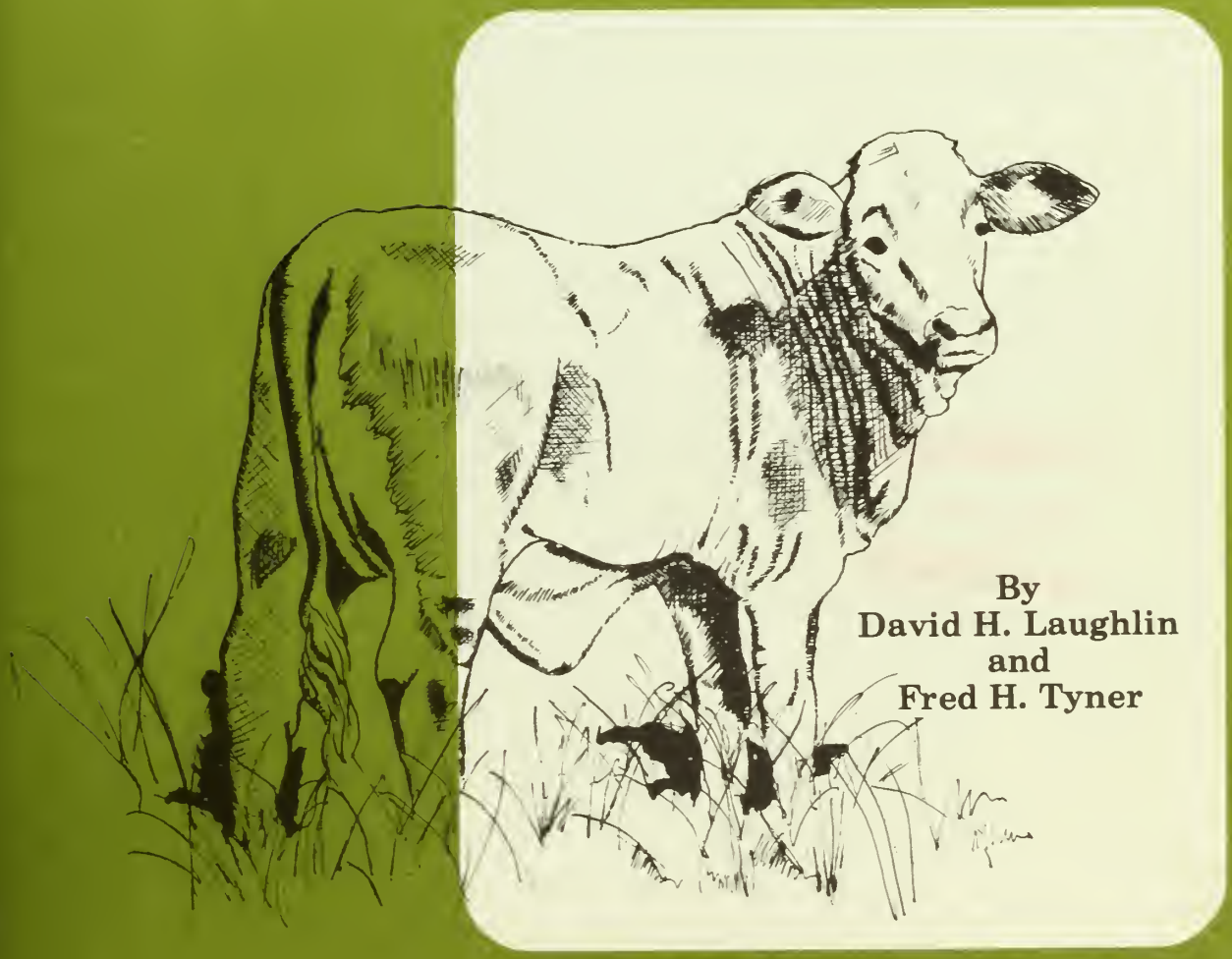

By
David H. Laughlin
and
Fred H. Tyner

MAFES MISSISSIPPI AGRICULTURAL & FORESTRY EXPERIMENT STATION
R. RODNEY FOIL, DIRECTOR MISSISSIPPI STATE, MS 39762

Mississippi State University
James D. McComas, President Louis N. Wise, Vice President

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By

David H. Laughlin,
Former Research Associate

Fred H. Tyner,
Agricultural Economist

MAFES Department of Agricultural Economics

Mississippi Agricultural and Forestry Experiment Station
Mississippi State University

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SUMMARY

Cow-calf operations traditionally have been the major cattle enterprise in the state but recent low selling prices and high production costs for weaned calves have caused producers to search for more profitable enterprises. Available alternatives include carrying calves through the growing and/or finishing phases.

We evaluated the relative profitability of alternative growing and finishing systems for weaned calves in the Upper Coastal Plain area of Mississippi. Alternative systems were specified from combinations of (1) four initial weights, (2) two buying seasons, (3) three rates of gain, and (4) several selling weights. Maximum dry matter capacities of growing beef animals and monthly digestible protein and digestible energy requirements were specified. Monthly production of digestible protein, digestible energy, and dry matter was estimated for specified grazed forages.

The above considerations were incorporated into linear programming models to produce optimal solutions with operating capital unlimited or limited to $50,000 or $100,000; with and without silage; and with either 1.0 or 2.0 pound rates of daily gain on forages.

The optimal system (highest net returns to land, management, and general farm overhead) was obtained when 300-pound calves were started on winter grazing, allowed silage, and carried to finished weight at the 2.0 pound rate of gain. Pasture activities included ryegrass-wheat, sorghum x sudan, fescue-clover, and coastal bermuda-clover combinations. The system selected as "best" consisted of 400 calves purchased at 300 pounds in the fall and carried to finished weight at 2.0 pounds per day gain. All 360 acres of available land were used and $89,556 of operating capital was required. Net returns to land, management, and general farm overhead were $49,064.

Results indicate that appropriately selected programs for growing and finishing calves are profitable cattle alternatives for the study area.

INTRODUCTION

Cow-calf operations traditionally have been the major beef enterprise in Mississippi. However, the low selling prices and high production costs for weaned calves in the mid-1970's have caused producers to look for more profitable alternatives.

Mississippi has an ample supply of weaned calves and the soil and climate to produce high yields of high-quality forage for carrying calves through the growing and/or finishing phase, but little information exists to aid in identifying the most profitable systems. Therefore, we designed a study for estimating the profitability of alternative systems for growing and finishing calves on forages in the Upper Coastal Plain of Mississippi (Figure 1).

The study area is characterized by a topography that varies from level (generally in the bottomlands) to steep in the hill portions [8][1]. Many of the rolling

[1]*Numbers in brackets refer to references with corresponding numbers in the Selected References listed at the end of this publication.*

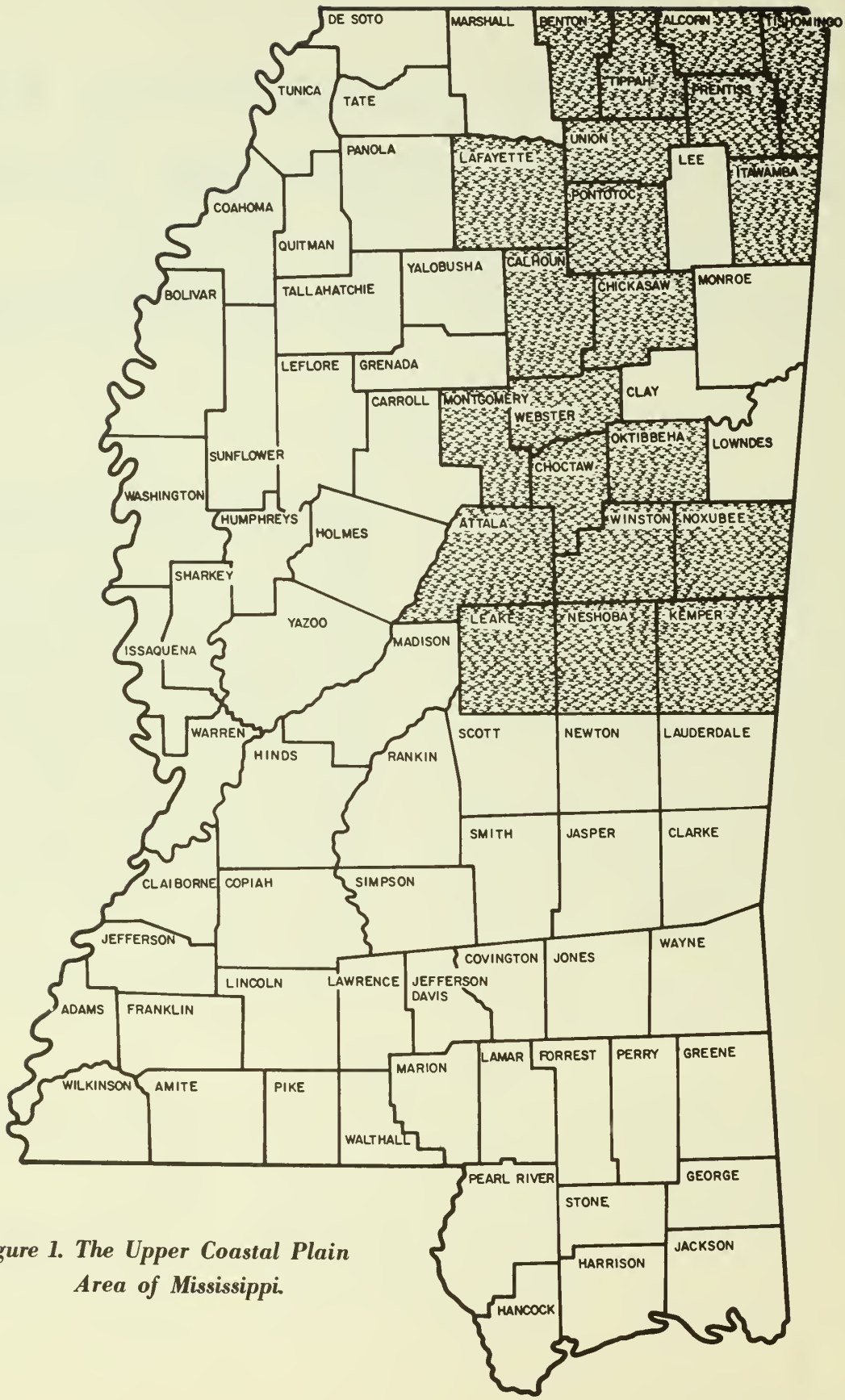

Figure 1. The Upper Coastal Plain Area of Mississippi.

hills of the area are not suited for cultivation but can be productive as pasture. The most frequently-occurring farm size is in the 260-499 acre group, with "livestock" and "general" farms predominating [6].

PROCEDURE

We specified a basic farm situation for the study area---a representative farm with 360 acres suitable for improved pasture, hay, or silage production. Animal, agronomic, and economic data were incorporated into a linear programming (LP) model for determining profit-maximizing combinations of enterprises for alternative systems for growing and finishing claves on forage.

Cattle Alternatives

The fall season traditionally has been the period when most Mississippi calves are marketed, with October being the heaviest marketing month [1]. Therefore, we assumed that 300-, 400-, 500- and 600-pound stocker animals could be bought in the fall for stocking winter pastures (November through April) and that animals weighing 500 or 600 pounds would be available for purchase in the spring for stocking summer pastures (May through October).

Alternative production systems were specified for calves of each weight bought in fall and in spring (Appendix I). Variables included in the alternatives for calves of each weight bought in fall and in spring included 180 days of winter grazing or 180 days of summer grazing, 180 days of winter grazing followed by 180 days of summer grazing[2] or 180 days of summer grazing followed by 180 days of winter grazing[2]. Average daily gain (ADG) on both winter and summer pasture was specified at 1.0 or 2.0 pounds. Also, some alternatives for calves bought at 400 and 600 pounds specified a 60-day feeding period at 2.5 pounds ADG.

Nutrition Requirements

Nutrient categories specified were digestible energy (DE), digestible protein (DP), and dry matter (DM). DP and DE are minimum requirements that must be met for animals of specified weights and rates of gain. DM is a maximum constraint to limit consumption of animals to their stomach capacity.

Estimates of nutritional requirements were developed from recommendations by H. W. Essig, Animal Scientist, MAFES Department of Animal Science; from data published by the National Academy of Science-National Research Council (NAS-NRC); and from a FORTRAN Program [3] developed by J. G. Dillard, formerly with the MAFES Department of Agricultural Economics.[3]

Monthly minimum DE and DP requirements and maximum DM capacities were calculated by weight group for 1.0, 2.0 and 2.5 pounds ADG. Average daily gains are predicated on the assumption that animals get the nutrients needed to gain at the rates specified. The linear programming model used insures that nutrient requirements are met in the optimal solutions.

Forage and Feeding Alternatives

The forage and feeding alternatives evolved primarily from studies by Dillard [3] and Smith [7], from discussions with V. H. Watson, agronomist, MAFES Department of Agronomy, and from our evaluation of current practices and possibilities in the study area.

DE and DP values of forages and feeds were calculated from monthly dry matter production estimates obtained from MAFES agronomists.

Forage Activities---Grazed forages, silages, and hays were considered as nutrient sources. Complete cost budgets (including labor and equipment) were obtained for each of the 19 forages considered (Table 1).[4] Corn and cottonseed meal were considered as supplementary sources of DE and DP and a finishing ration was included for systems requiring the finishing period.

Forage Yields and Use Estimates---Yields of forage crops are determined largely by weather variability and differences in cultural and fertilization practices. Differences in yield attributable to weather variability are difficult to assess; therefore, average dry matter yield was used as the measure of forage productivity. Average dry matter yields and recommended practices for attaining them were determined in consultation with V. H. Watson, agronomist, MAFES Department of Agronomy. Average yields of forage combinations (e.g., ryegrass-wheat and common bermuda-early ryegrass) were not available. Therefore, dry matter yields of forage combinations

[2]Some alternatives included more than one cycle of winter-summer or summer-winter grazing.
[3]Dillard's program reflects recommendations of both Essig and NAS-NRC.
[4]Cost budgets are available in MAFES Bulletin 861.

(Table 1) were based on yields of forages grown alone.

Estimates of monthly distribution of dry matter production of specified forages (Appendix II, Table 1) were based on clipping data. Grazing animals will not consume all available forage because of trampling, spot grazing, and spoilage; therefore, a factor to reflect the amount of forage consumed was required. We used factors of 50% for perennial pasture (e.g., coastal bermuda and fescue), 65% for annual pastures (e.g., ryegrass and sorghum x sudan), 80% for hay, and 90% for silage (Appendix II, Table 2).

Combined data on DM production, use rates, DP, and kilocalories (Kcal) of digestible energy per kilogram were the basis for the nutrient input-output coefficients used in the LP model.

Assumptions

Calculating optimal solutions with an LP model of the type and size used in this study requires exact specification of assumptions. The assumptions underlying the basic LP model used in this study were:

(1) labor restricted to two man-equivalents per month but charged at $2.30 per hour for actual hours of employment,
(2) operating capital available in specified quantities and charged at 9% for six months of each year,
(3) calves of specified weights purchased in fall or spring at specified prices,
(4) nutritional requirements of cattle satisfied by combinations of pasture, hay, silage, and supplemental feeds,
(5) hay and/or silage crops grown specifically for beef production and not saleable,
(6) supplemental feeds---corn, cottonseed meal, finishing ration---purchased at

Table 1. Forages incorporated into linear programming models for determining profit-maximizing combinations of enterprises for alternative systems for growing and finishing calves on forage in the Upper Coastal Plain of Mississippi, with estimates of their maintenance cost per acre, 1977.

Forage	Maintenance Cost/acre
	(dollars)
Grazed Forages	
Ryegrass	75.26
Ryegrass-Clover	60.71
Ryegrass-Wheat	83.69
Wheat	80.57
Fescue	52.36
Fescue-Clover	41.82
Coastal Bermuda	77.91
Coastal Bermuda-Clover	70.68
Coastal Bermuda-Clover-Ryegrass	142.81
Common Bermuda	59.88
Common Bermuda-Ryegrass	117.30
Common Bermuda-Early Seeded Ryegrass	130.59
Dallis-Clover	49.54
Sorghum x Sudan	81.79
Silages	
Corn	154.90
Sorghum	146.22
Hays	
Coastal Bermuda	142.81
Common Bermuda	111.61
Sorghum x Sudan	125.40

SOURCE: [4]

Table 2. Constraints imposed upon 11 linear programming models for determining profit-maximizing combinations of enterprises for alternative systems for growing and finishing calves on forage, by model number, Upper Coastal Plain of Mississippi, 1977.

Model Number	Maximum Operating Capital Allowed	Silage Allowed	Average Daily Gain
	Dollars		Pounds
1	Unrestricted	Yes	1.0 and 2.0
2	100,000	Yes	1.0 and 2.0
3	100,000	No	1.0 and 2.0
4	50,000	Yes	1.0 and 2.0
5	50,000	No	1.0 and 2.0
6	100,000	Yes	1.0 and 2.0
7	100,000	No	1.0 and 2.0
8	100,000	Yes	2.0
9	100,000	No	2.0
10	100,000	Yes	1.0
11	100,000	No	1.0

Table 3. Optimum cattle growing and finishing systems, 11 linear programming models (arrayed by level of returns), Upper Coastal Plain of Mississippi, 1977.

Item	Model Number 6	8	7	1	2	9	4	3	10	5	11
						Number					
Cattle Production System											
Buy Oct.-Nov. (300 Lbs.)	414	400	401	340	412	377	226	402	584	224	557
Buy Oct.-Nov. (500 Lbs.)							14				
Buy Apr.-May (500 Lbs.)				198	26						
Graze Nov.-Apr. (2.0 Lbs. ADG)	386	400	354	184	298	377	221	267		153	
Graze May-Oct. (2.0 Lbs. ADG)	386	400	354	184	298	377	221	267		153	
Sell in October (1020 Lbs.)	386	400	354	184	298	377	221	267		153	
Graze May-Oct. (2.0 Lbs. ADG)				198	26						
Graze Nov.-Apr. (2.0 Lbs. ADG)				198	26						
Sell in April (1220 Lbs.)				198	26						
Graze Nov.-Apr. (1.0 Lb. ADG)							14				
Graze May-Oct. (2.0 Lbs. ADG)							14				
Sell in October (1040 Lbs.)							14				
Graze Nov.-Apr. (1.0 Lb. ADG)	28										
Sell in April (480 Lbs.)	28										
Graze Nov.-Apr. (1.0 Lb. ADG)			47				5		584	71	557
Graze May-Oct. (1.0 Lb. ADG)			47				5		584	71	557
Sell in October (660 Lbs.)			47				5		584	71	557
Graze Nov.-Apr. (1.0 Lb. ADG)				156	114			135			
Graze May-Oct. (1.0 Lb. ADG)				156	114			135			
Graze Nov.-Apr. (1.0 Lb. ADG)				156	114			135			
Sell in April (1020 Lbs.)				156	114			135			
						Dollars					
Operating capital requirement	88,591	89,556	100,000	142,631	100,000	100,000	50,000	100,000	100,000	50,000	100,000
Returns to Land, Management, and General Farm Overhead: Total	49,126	49,064	35,406	52,751	51,585	33,648	31,498	40,537	19,941	19,042	15,405
Annual Rate	(49,126)	(49,064)	(35,406)	(35,167)	(34,390)	(33,648)	(31,498)	(27,025)	(19,941)	(19,042)	(15,405)

specified prices ($7 cwt for corn, $12 cwt for CSM, $7 cwt for the finishing ration),

(7) silage available for feeding in any month but hay available for feeding only in September through May,

(8) sale of cattle permitted at the end of each stage of each alternative production system,

(9) average daily gain of 1.0 or 2.0 pounds in each 180-day grazing period, 2.5 pounds in each 60-day feeding period, and

(10) land suitable for improved pasture, hay, or silage limited to 360 acres.

Eleven models (three permitting up to a complete 2-year cycle and eight permitting up to a complete 1-year cycle) were developed. Constraints imposed upon the different models are presented in Table 2.

ANALYSIS AND RESULTS

The linear-programming matrix included the 19 forage alternatives shown previously in Table 1 and 54 cattle alternatives[5]---along with the monthly forage and supplemental feeding activities, buying and selling activities, and transfer activities needed to complete the model. Models 1, 2, and 3 were structured to cover a maximum time period of two years to allow sufficient time for the slowest-gaining animals (1.0 pound ADG) to grow to a finished weight. Models 4-11 were struc-

[5]The 54 alternative systems for growing and finishing calves on forage are described in Appendix I Detailed cost and return budgets for each alternative were developed as shown in Appendix II, Table 3.

Table 4. Forage and feed requirements for optimum cattle growing and finishing systems, 11 linear programming models (arrayed by level of returns), Upper Coastal Plain of Mississippi, 1977.

Item	Model Number 6	8	7	1	2	9	4	3	10	5	11
						Acres					
Forage Enterprise											
Grazed Forage (First two 180-day grazing periods)											
Ryegrass						42					
Ryegrass-Wheat	130	126	175	155	135	138		193	12	103	
Sorghum x Sudan	99	107	123	142	124	115	44	113	89	61	87
Fescue-Clover	6	12	3			23	135		146	19	169
Coastal-Clover	38	30	1								
Hay (First two 180-day grazing periods)											
Sorghum x Sudan	15	14	58	3	54	42		54	82	28	104
Silage (First two 180-day grazing periods)											
Corn Silage	72	71		60	47		63		31		
Hay (Third 180-day grazing period)											
Sorghum x Sudan								88			
Silage (Third 180-day grazing period)											
Corn Silage				11							
Sorghum Silage				139	62						
Total Land Used (First two 180-day grazing periods)	360	360	360	360	360	360	242	360	360	211	360
Total Land Used (Third 180-day grazing period)	—	—	—	150	62	—	—	88	—	—	—
						tons					
Purchased Feed (First two 180-day grazing periods)											
Corn Grain	22	38	121			151	7			33	40
Cottonseed Meal	10	12	14			16	5			5	
						dollars					
Return to Land, Management, and General Farm Overhead:											
Total	49,126	49,064	35,406	52,751	51,585	33,648	31,498	40,537	19,941	19,042	15,405
Annual Rate	(49,126)	(49,064)	(35,406)	(35,167)	(34,390)	(33,648)	(31,498)	(27,025)	(19,941)	(19,042)	(15,405)

tured to cover only one year (two 180 day grazing periods). The general format for the cattle cost and returns budget and the cattle buying and selling prices used are shown in Appendix II, Tables 3 and 4.

The optimum systems determined from the 11 linear programming models are shown in Table 3. The most profitable system resulted from Model 6, and consisted of buying 414 head of 300-lb. calves in Oct.-Nov., grazing 386 of them at 2.0 lbs ADG for two 180-day periods, and selling the 386 in October at 1020 lbs. The other 28 calves were grazed for 180 days at 1.0 lb ADG and sold in April at 480 lbs. Net returns were $49,126.[6]

While Model 6 provided the highest return, it involves a more complex program, using both 1.0 and 2.0 lb rates of gain. Model 8 provides a net return of $49,064 (only $62 less) and uses only the 2.0 lb rate of gain. This more practical system buys 400 head of 300-lb calves in Oct.-Nov., grazes for two 180-day periods at 2.0 lbs ADG, and sells at 1020 lbs. in October. The detailed cost and returns budget for Model 8 is shown in Appendix II, Table 5.

Operating capital requirements for each optimum system are also shown in Table 3. Inclusion of silage (Models 6 and 8, for example) resulted in less operating capital required than in similar models excluding silage (Models 7 and 9, for example). Monthly operating capital flows are shown in Appendix II, Table 7.

Forage and feed requirements for all of the optimum systems are shown in Table 4. In Model 8, for example, nutritional requirements are met by grazing 126 acres of ryegrass-wheat, 107 acres of sorghum x sudan, 12 acres of fescue-clover, and 30 acres of coastal-clover. Hay is produced from 14 acres of sorghum x sudan,

[6] *Net returns after paying all costs except land, management, and general farm overhead.*

and corn silage is produced from 71 acres. Purchased feed consists of 38 tons of grain and 12 tons of cottonseed meal. Details of feed requirements and sources by month for the Model 8 system are shown in Appendix II, Table 6.

The results of this study suggest several general conclusions. First, growing and finishing calves on high quality forages can be a profitable alternative for Mississippi producers. Second, buying lighter calves to use in higher rate of gain programs is more profitable. Third, production of corn silage as a basic part of the feed ration adds to net returns--- and also reduces operating capital requirements. Finally, the realization of the study results in an actual situation will require management capable of producing high quality forage and of obtaining high rates of cattle gain.

APPENDIX I

Alternative Systems for Growing and Finishing Calves on Forage

300-POUND CALVES (fall bought)

1. Winter graze 180 days at 1.0 pound ADG, sell at 480 pounds.
2. Winter graze 180 days at 2.0 pounds ADG, sell at 660 pounds.
3. Winter graze 180 days at 1.0 pound ADG, summer graze 180 days at 1.0 pound ADG, sell at 660 pounds.
4. Winter graze 180 days at 1.0 pound ADG, summer graze 180 days at 2.0 pounds ADG, sell at 840 pounds.
5. Winter graze 180 days at 2.0 pounds ADG, summer graze 180 days at 1.0 pound ADG, sell at 840 pounds.
6. Winter graze 180 days at 1.0 pound ADG, summer graze at 1.0 pound ADG, winter graze 180 days at 1.0 pound ADG, sell at 840 pounds.

*7. Winter graze 180 days at 2.0 pounds ADG, summer graze 180 days at 2.0 pounds ADG, sell at 1020 pounds.

8. Winter graze 180 days at 1.0 pound ADG, summer graze 180 days at 1.0 pound ADG, winter graze 180 days at 2.0 pounds ADG, sell at 1020 pounds.
9. Winter graze 180 days at 1.0 pound ADG, summer graze 180 days at 2.0 pounds ADG, winter graze 180 days at 1.0 pound ADG, sell at 1020 pounds.
10. Winter graze 180 days at 2.0 pounds ADG, summer graze 180 days at 1.0 pound ADG, winter graze 180 days at 1.0 pound ADG, sell at 1020 pounds.
11. Winter graze 180 days at 1.0 pound ADG, summer graze 180 days at 1.0 pound ADG, winter graze 180 days at 1.0 pound ADG, summer graze 180 days at 1.0 pound ADG, sell at 1020 pounds.

*Model 8 solution.

12. Winter graze 180 days at 1.0 pound ADG, summer graze 180 days at 2.0 pounds ADG, winter graze 180 days at 2.0 pounds ADG, sell at 1200 pounds.
13. Winter graze 180 days at 2.0 pounds ADG, summer graze 180 days at 1.0 pound ADG, winter graze 180 days at 2.0 pounds ADG, sell at 1200 pounds.

400-POUND CALVES (fall bought)

14. Winter graze 180 days at 1.0 pound ADG, sell at 580 pounds.
15. Winter graze 180 days at 2.0 pounds ADG, sell at 760 pounds.
16. Winter graze 180 days at 1.0 pound ADG, summer graze 180 days at 1.0 pound ADG, sell at 760 pounds.
17. Winter graze 180 days at 1.0 pound ADG, summer graze 180 days at 2.0 pounds ADG, sell at 940 pounds.
18. Winter graze 180 days at 2.0 pounds ADG, summer graze 180 days at 1.0 pound ADG, sell at 940 pounds.
19. Winter graze 180 days at 1.0 pound ADG, summer graze 180 days at 1.0 pound ADG, winter graze 180 days at 1.0 pound ADG, sell at 940 pounds.
20. Winter graze 180 days at 1.0 pound ADG, summer graze 180 days at 2.0 pounds ADG, finishing ration 60 days at 2.5 pounds ADG, sell at 1090 pounds.
21. Winter graze 180 days at 2.0 pounds ADG, summer graze 180 days at 1.0 pound ADG, finishing ration 60 days at 2.5 pounds ADG, sell at 1090 pounds.
22. Winter graze 180 days at 1.0 pound ADG, summer graze 180 days at 1.0 pound ADG, winter graze 180 days at 1.0 pound ADG,

finishing ration 60 days at 2.5 pounds ADG, sell at 1090 pounds.

23. Winter graze 180 days at 2.0 pounds ADG, summer graze 180 days at 2.0 pounds ADG, sell at 1120 pounds.
24. Winter graze 180 days at 1.0 pound ADG, summer graze 180 days at 1.0 pound ADG, winter graze 180 days at 2.0 pounds ADG, sell at 1120 pounds.
25. Winter graze 180 days at 1.0 pound ADG, summer graze 180 days at 2.0 pounds ADG, winter graze 180 days at 1.0 pound ADG, sell at 1120 pounds.
26. Winter graze 180 days at 2.0 pounds ADG, summer graze 180 days at 1.0 pound ADG, winter graze 180 days at 1.0 pound ADG, sell at 1120 pounds.

500-POUND CALVES (fall bought)

27. Winter graze 180 days at 1.0 pound ADG, sell at 680 pounds.
28. Winter graze 180 days at 2.0 pounds ADG, sell at 860 pounds.
29. Winter graze 180 days at 1.0 pound ADG, summer graze 180 days at 1.0 pound ADG, sell at 860 pounds.
30. Winter graze 180 days at 1.0 pound ADG, summer graze 180 days at 2.0 pounds ADG, sell at 1040 pounds.
31. Winter graze 180 days at 2.0 pounds ADG, summer graze 180 days at 1.0 pound ADG, sell at 1040 pounds.
32. Winter graze 180 days at 1.0 pound ADG, summer graze 180 days at 1.0 pound ADG, winter graze 180 days at 1.0 pound ADG, sell at 1040 pounds.
33. Winter graze 180 days at 2.0 pounds ADG, summer graze 180 days at 2.0 pounds ADG, sell at 1220 pounds.
34. Winter graze 180 days at 1.0 pound ADG, summer graze 180 days at 1.0 pound ADG, winter graze 180 days at 2.0 pounds ADG, sell at 1220 pounds.

500-POUND CALVES (spring bought)

35. Summer graze 180 days at 1.0 pound ADG, sell at 680 pounds.
36. Summer graze 180 days at 2.0 pounds ADG, sell at 860 pounds.
37. Summer graze 180 days at 1.0 pound ADG, winter graze 180 days at 1.0 pound ADG, sell at 860 pounds.
38. Summer graze 180 days at 1.0 pound ADG, winter graze 180 days at 2.0 pounds ADG, sell at 1040 pounds.
39. Summer graze 180 days at 2.0 pounds ADG, winter graze 180 days at 1.0 pound ADG, sell at 1040 pounds.
40. Summer graze 180 days at 1.0 pound ADG, winter graze at 1.0 pound ADG, summer graze 180 days at 1.0 pound ADG, sell at 1040 pounds.
41. Summer graze 180 days at 2.0 pounds ADG, winter graze 180 days at 2.0 pounds ADG, sell at 1220 pounds.
42. Summer graze 180 days at 1.0 pound ADG, winter graze 180 days at 1.0 pound ADG, summer graze 180 days at 2.0 pounds ADG, sell at 1220 pounds.

600-POUND CALVES (fall bought)

43. Winter graze 180 days at 1.0 pound ADG, sell at 780 pounds.
44. Winter graze 180 days at 2.0 pounds ADG, sell at 960 pounds.
45. Winter graze 180 days at 1.0 pound ADG, summer graze 180 days at 1.0 pound ADG, sell at 960 pounds.
46. Winter graze 180 days at 2.0 pounds ADG, finishing ration 60 days at 2.5 pounds ADG, sell at 1110 pounds.
47. Winter graze 180 days at 1.0 pound ADG, summer graze 180 days at 1.0 pound ADG, finishing ration 60 days at 2.5 pounds ADG, sell at 1110 pounds.
48. Winter graze 180 days at 1.0 pound ADG, summer graze 180 days at 2.0 pounds ADG, sell at 1140 pounds.

600-POUND CALVES (spring bought)

49. Summer graze 180 days at 1.0 pound ADG, sell at 780 pounds.
50. Summer graze 180 days at 2.0 pounds ADG, sell at 960 pounds.
51. Summer graze 180 days at 1.0 pound ADG, winter graze 180 days at 1.0 pound ADG, sell at 960 pounds.
52. Summer graze 180 days at 2.0 pounds ADG, finishing ration 60 days at 2.5 pounds ADG, sell at 1110 pounds.
53. Summer graze 180 days at 1.0 pound ADG, winter graze 180 days at 1.0 pound ADG, finishing ration 60 days at 2.5 pounds ADG, sell at 1110 pounds.
54. Summer graze 180 days at 1.0 pound ADG, winter graze 180 days at 2.0 pounds ADG, sell at 1140 pounds.

APPENDIX II

Appendix II, Table 1. Estimated dry matter production, by month, in pounds per acre for selected forages, Upper Coastal Plain of Mississippi.

Forage	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ryegrass	600	700	1,200	1,200	550							
Ryegrass-Clover		600	1,200	1,200	600							
Ryegrass-Wheat	600	700	1,200	1,200	550						750	650
Wheat			1,000	1,200	500						750	650
Fescue	150	150	500	1,100	1,000	600	200	200	250	350	300	200
Fescue-Clover	160	180	600	1,600	1,480	800	250	250	400	480	300	200
Coastal Bermuda				350	2,100	2,600	3,200	1,550	1,400	800		
Coastal-Clover		500	722	1,317	2,181	1,995	1,958	1,066	951	636	400	
Coastal-Ryegrass	275	500	900	1,038	1,460	1,779	2,714	1,266	951	492	275	275
Dallis-Clover	75	150	250	750	1,200	1,500	1,200	800	250	150	100	75
Common Bermuda				300	1,300	1,700	1,800	700	500	200		
Common-Ryegrass	275	500	900	1,038	1,100	1,500	1,700	600	450	150		
Common-Early Ryegrass	275	500	900	1,038	1,100	1,500	1,700	600				
Sorghum x Sudan					1,000	2,500	2,800	2,800	1,000	600		
Coastal Bermuda Hay						4,000	3,200	1,550	1,440			
Common Bermuda Hay						3,000		2,500	1,200			
Sorghum x Sudan Hay						3,500	2,800	2,800	1,000			
Corn Silage								9,100				
Sorghum Silage									10,500			

Source: [4]

Appendix II, Table 2. Utilization rate[1], digestible protein[2], and digestible energy[2] for selected forages, Upper Coastal Plain of Mississippi.

Forage	Utilization rate[1]		Digestible protein[2]		Digestible energy[2]	
	1st	2nd[a]	1st	2nd[a]	1st	2nd[a]
	----------(percent)---------				(K cal./kg.)	
Ryegrass	65	---	11.7	---	3,000	---
Ryegrass-Clover	65	---	14.6	---	3,021	---
Ryegrass-Wheat	65	---	11.5	---	3,000	---
Wheat	65	---	11.2	---	3,000	---
Fescue	50	---	10.7	---	2,850	---
Fescue-Clover	50	---	12.8	---	2,908	---
Coastal Bermuda	50	---	10.7	---	2,960	---
Coastal-Clover	50	---	11.1	---	2,932	---
Coastal-Ryegrass	50	65	11.0	11.7	2,960	3,000
Dallis-Clover	50	---	11.6	---	3,131	---
Common Bermuda	50	---	7.8	---	2,822	---
Common B-Ryegrass	50	65	7.8	11.7	2,822	3,000
Common B-Early Ryegrass	50	65	7.8	11.7	2,822	3,000
Sorghum x Sudan	65	---	12.0	---	3,050	---
Coastal Hay	80	---	7.0	---	2,610	---
Common Bermuda Hay	80	---	7.0	---	2,116	---
Sorghum x Sudan Hay	80	---	7.0	---	2,600	---
Corn Silage + urea	90	---	8.0	---	3,086	---
Sorghum Silage + urea	90	---	5.0	---	2,478	---

[a]Forage combinations in which the growing season for each of the forages in the combination can be distinctly separated will have two separate figures for utilization rate, percent digestible protein, and energy content.

[1]Based on discussions with H. W. Essig, Animal Scientists, MAFES Department of Animal Science

[2]Developed from NAS-NRC Published Data [5] and Data Published by Crampton and Harris [2].

Source: [4]

Appendix II, Table 3. Beef cattle: Representative expenses for calves for six-month grazing periods. [a]

Item	Unit	Quantity	Price/unit	Amount
Calves	cwt.	b	c	d
Order buying	cwt.	e	.25	e
Death loss	head	1.0	f	f
Vet., medicine, minerals, etc.	cwt.	g	g	g
Labor [h]	hour	1.68	2.30	3.86
Interest on operating capital	head	1.00	i	i

[a] Budgets for 54 livestock activities were prepared from this general table by inserting appropriate weights, etc. This representative table is presented in lieu of the 54 budgets.
[b] Budgets were developed for 300, 400, 500, and 600 pound fall-purchased calves and 500 and 600 spring-purchased calves gaining at 1.0 and 2.0 pounds per day.
[c] See Appendix Table 4.
[d] Weight x purchase price.
[e] For purchase weights 300, 400, 500, and 600 pounds. No charge for transferred animals.
[f] Three percent of the selling price.
[g] $1.00/cwt. for purchased animals; $.50/cwt. for transferred animals.
[h] Includes inspection of animals on pasture, treatment of sick animals, etc.
[i] Nine percent for six months.

Appendix II, Table 4. Estimated cattle buying and selling data.

BUYING

Animal weight	Price/cwt.	Order buying fee	Total amount
300# (Fall)	$38.50	$.25 cwt.	$116.25
400# (Fall)	38.75	.25 cwt.	156.00
500# (Fall)	37.25	.25 cwt.	187.50
600# (Fall)	37.25	.25 cwt.	225.00
500# (Spring)	37.25	.25 cwt.	187.50
600# (Spring)	37.25	.25 cwt.	225.00

SELLING

Animal weight	Price/cwt.	Death loss (3%)	Total amount
480#	$36	$ 5.88	$166.92
580#	36	6.26	202.54
660#	35	6.93	224.07
680#	35	7.14	230.86
760#	33	7.52	243.28
780#	33	7.72	249.68
840#	32	8.06	260.74
860#	32	8.25	266.95
940#	35	8.87	319.13
960#	35	10.08	325.92
990#	36	10.69	345.71
1020#	38	11.62	375.98
1090#	38	12.42	401.78
1110#	38	12.65	409.15
1120#	38	12.76	412.84
1040#	38	11.85	383.35
1220#	38	13.90	449.70
1140#	38	12.99	420.21

Appendix II, Table 5. Estimated costs and returns for an optimum growing and finishing system (Model 8), Upper Coastal Plain of Mississippi, 1977.

Item	Unit	Quantity	Price/unit	Amount
Income				
Calves	head	388.00	387.60	$150,388
Expenses				
Cattle				
Calves	head	400.00	114.00	45,600
Order buying	head	400.00	.75	300
Death loss	head	12.00	387.60	---
Vet., medicine, minerals, misc., etc.	head	400.00	6.30	2,640
Labor	head	400.00	7.72	3,088
Grazed forages				
Ryegrass-Wheat	acre	126.00	80.41 [a]	10,132
Fescue-Clover	acre	12.00	40.50 [a]	486
Sorghum x Sudan	acre	107.00	78.57 [a]	8,407
Coastal-Clover	acre	30.00	68.52 [a]	2,056
Hay				
Sorghum x Sudan	acre	14.00	121.30 [a]	1,698
Feeding	ton	56.00	2.51	141
Silage				
Corn Silage	acre	71.00	162.07 [ab]	11,507
Feeding	ton	923.00	2.76	2,548
Purchased feed				
Corn grain	ton	38.00	140.00	5,320
Cottonseed meal	ton	12.00	240.00	2,880
Interest on operating capital	dollar	89,556.00	.045	4,030
Return to land, management, and general farm overhead				$49,555 [c]

[a] Cost excluding interest.
[b] Cost includes storage.
[c] Enterprise quantities have been numerically rounded causing differences between net returns reported here and in the text tables.

Appendix II, Table 6. Monthly requirements and sources of digestible energy for an optimum growing and finishing system (Model 8), Upper Coastal Plain of Mississippi, 1977.

	Unit	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.
Energy requirement -400 calves -	1,000 Mcal	152.8	179.2	200.0	198.0	238.0	248.4	274.0	282.8	309.6	327.2	333.2	361.2
Energy sources													
Ryegrass-Wheat (126 acres)	1,000 Mcal	84.6	72.2	66.5	77.9	133.4	133.4	61.2					
Fescue-Clover (12 acres)	1,000 Mcal	3.2	1.6	1.3	1.4	4.7	12.7	11.7	6.3	2.0	2.0	3.2	3.8
Sorghum x Sudan (107 acres)								96.1	240.1	269.1	269.2	96.2	68.0
Coastal-Clover (30 acres)	1,000 Mcal	7.9			9.8	14.3	14.1	43.0	39.3	38.5	21.1	18.8	12.5
Sorghum x Sudan hay (14 acres)	1,000 Mcal			16.6									102.5
	ton			7.8									48.3
Corn Silage (71 acres)	1,000 Mcal	8.0	81.2	111.2	75.1	64.8	88.2	62.0			35.0	209.0	171.5
	ton	8.1	82.8	113.3	76.5	66.0	89.8	63.0			35.6	213.2	174.8
Corn grain (38 tons)	1,000 Mcal	48.0	20.1		29.8	20.8							
	ton	15.6	6.4		9.5	6.6							
Cottonseed meal (12 tons)	1,000 Mcal	1.1	4.1		4.4	4.1						6.0	13.7
	ton	.4	1.5		1.6	1.5						2.2	5.0
Total digestible energy	1,000 Mcal	152.8	179.2	200.0	198.0	238.0	248.4	274.0	285.7	309.6	327.2	333.2	372.0

Appendix II, Table 7. Monthly operating capital flows for optimum one-year growing and finishing systems, Upper Coastal Plain of Mississippi, 1977.

Model number	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.
4	-30,736	-561	-586	-749	-3,156	-6,828	-1,506	-153	-956	-2,504	-755	+88,432
5	-26,935	-1,076	-167	-323	-1,982	-4,332	-824	-599	-1,457	-1,206	-10,331	+72,667
6	-51,352	-1,944	-706	-1,294	-2,695	-6,352	-2,318	-1,321	-2,381	-3,704	-7,931	+143,211
7	-49,474	-3,088	-1,621	-2,087	-3,415	-8,842	-1,575	-1,235	-2,918	-2,394	-19,479	+139,579
8	-50,249	-2,499	-738	-1,998	-3,459	-11,326	-2,351	-1,127	-2,357	-3,716	-7,774	+148,451
9	-47,257	-4,068	-1,971	-2,501	-4,336	-7,785	-1,510	-946	-2,550	-2,722	-19,312	+136,704
10	-70,081	-547	-470	-462	-4,081	-10,473	-2,056	-1,749	-3,140	-3,410	-2,110	+129,439
11	-66,882	-439	-450	-444	-4,304	-8,975	-1,694	-2,090	-3,482	-2,729	-6,987	+123,287

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