BEEF CATTLE RESEARCH REPORT—1975

PROGRESS REPORT 218

UNIVERSITY OF KENTUCKY • COLLEGE OF AGRICULTURE
AGRICULTURAL EXPERIMENT STATION
DEPARTMENT OF ANIMAL SCIENCES • LEXINGTON

July 1975

Dear Kentucky Cattleman:

These are times of change and challenge in the beef cattle industry. None of us knows the exact form these changes will take. However, pasture has always had a key role in the beef cattle industry. Nearly everyone agrees that this will continue to be true and that the emphasis on the use of pasture will increase. Kentucky is in an ideal position to take advantage of this trend. In spite of major problems, the Kentucky beef cattle industry is growing and vigorous. While the near term future is cloudy, there is little doubt that the long term future for beef cattle in Kentucky is bright.

In recognition of the major role of cattle in producing farm income in Kentucky, the large number of cattlemen in the state, and the many challenges facing the beef cattle industry your College of Agriculture has assigned a very high priority to research, teaching and service programs related to beef cattle. With your support and assistance, a large, well trained and enthusiastic faculty has been recruited and organized in a way we hope will be efficient in teaching your sons and daughters, obtaining useful research results and aiding you in applying those results to the solution of problems you encounter in the operation of your business. The office and laboratory facilities in the Agricultural Sciences Building South are among the best of their kind. You are welcome to visit these facilities on Cooper Drive in Lexington at any time. Excellent progress has been made in developing the research potential of the Coldstream, Maine Chance, Spindletop, Princeton and Eden Shale farms and further improvements are continuously being planned.

This report and the field day program represent a continuing attempt to relay the results of our efforts to you. It is your report and your program. Your comments and suggestions can help us make future attempts more effective.

Geo. E. Mitchell Jr.

George E. Mitchell, Jr.
Beef Cattle Coordinator

Table of Contents

FINISHING BEEF CATTLE WITH PASTURE AND GRAIN

N. W. Bradley and J. A. Boling

Increased cattle numbers at a time when grain prices are relatively high has created a need to maximize utilization of high quality forages in beef finishing systems. Feeding a certain quantity of high energy grain is necessary to allow cattle to fatten to the point that their carcasses yield highly desirable beef for human consumption. However, planned use of high quality forages during the growth and early finishing phases will reduce considerably the amount of grain needed to finish cattle to desirable weights and grades.

For the first time in at least two decades, a large positive price spread exists between the price of feeder cattle and finished cattle. In the past, with this situation reversed, there has been every incentive for producers of feeder cattle to sell them. However, with present conditions feeder cattle producers should explore every alternative before selling their cattle at prices which will not cover the cost of production.

Predictions are being made by knowledgeable people that prices of feed grains will remain high for at least the next year or two. It seems likely that considerably less grain will be fed to cattle in the process of preparing them for the slaughter market. It also then seems likely that high quality pasture and high quality harvested forage will play an increasingly important role in cattle feeding. This will mean that slaughter cattle will be going to market carrying less fat and yielding carcasses which will receive lower quality grades. There is some apprehension that eating qualities of beef will be reduced to the extent that per capita consumption of beef will be considerably reduced. However, there seems to be enough objective information available on the production aspects, as well as factors affecting the eating quality of beef, to prevent lowered quality and lowered consumption of beef. Combining high quality forages with cattle of the desired age and breeding, at the right time of year should result in acceptable slaughter beef fed approximately one-half the grain which has been used in many commercial feedlots in the past. Under such conditions beef would also be produced much more efficiently not only from the standpoint of feed, but from costs related to marketing, transporting, stress, sickness, and acclimation to widely differing environments. Feeding cattle on the same farm where they are produced would also make more realistic a system which deals with the "birth-to-beef" aspects of the cattle business. Starting with the right kind of cattle which have the bred-in ability to gain rapidly and yield desirable carcasses is essential to maximize profit in any cattle feeding endeavour.

Pasture alone will not promote fast enough gains on yearling steers to allow them to fatten to the extent that they reach presently desirable slaughter grade. Yearling steers grazing cool season grass-legume pastures during the entire grazing season will gain from 200 to 300 lb. and yield carcasses that will grade U. S. Standard. Standard grade beef is, of course, not what the consuming public prefers. Feeding a full-feed of corn the last 60 days of the pasture season will generally result in enough additional weight that carcasses from these cattle will grade U.S. Good. Since the grade of U.S. Choice has been in greatest demand, considerable attention has been given to combining cattle, grain and grass in such a way as to produce Choice beef. Self feeding grain during the entire pasture season will produce strictly Choice cattle. However, this method uses considerable quantities of grain and does not result in the most efficient utilization of pasture. Allowing cattle to have grass alone during the first 50 to 60 days of the grazing season when the pasture is most plentiful and highly nutritious and, subsequently, starting to feed grain when pasture begins to decline in quantity and quality seems to be the most effective plan.

A forage production curve for cool season grasses is shown in figure 1. This curve shows that grass is most plentiful in May and June, and then decreases considerably as hot and dry weather of summer approaches.

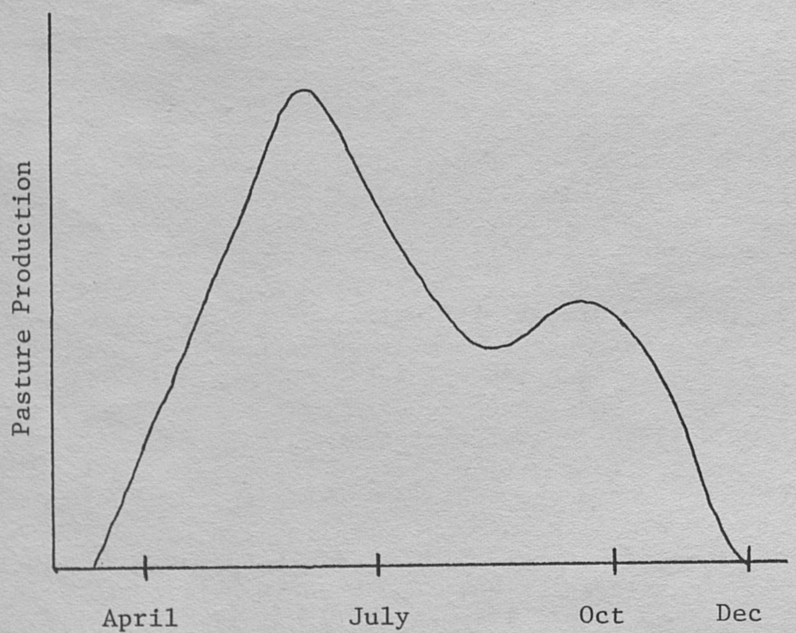


Figure 1. Seasonal Forage Yield of Cool Season Grasses in Kentucky.

Figure 2 shows average daily gains for two groups of steers grazing bluegrass-clover pasture. The curve includes five different sets of cattle over a three-year period. It is interesting to note that during May and June steer gains are between 2 and 3 lb. per head daily. Rate of gain drops at a very rapid rate during the hot and dry months of July and August. Since steer gains indicate that the pasture is highly nutritious during the first 60 days and the pasture growth curve shows the supply to be at least twice as much as for the remainder of the year, it seems logical to stock pastures heavy enough to utilize the early growth and then begin feeding grain as pasture becomes less plentiful.

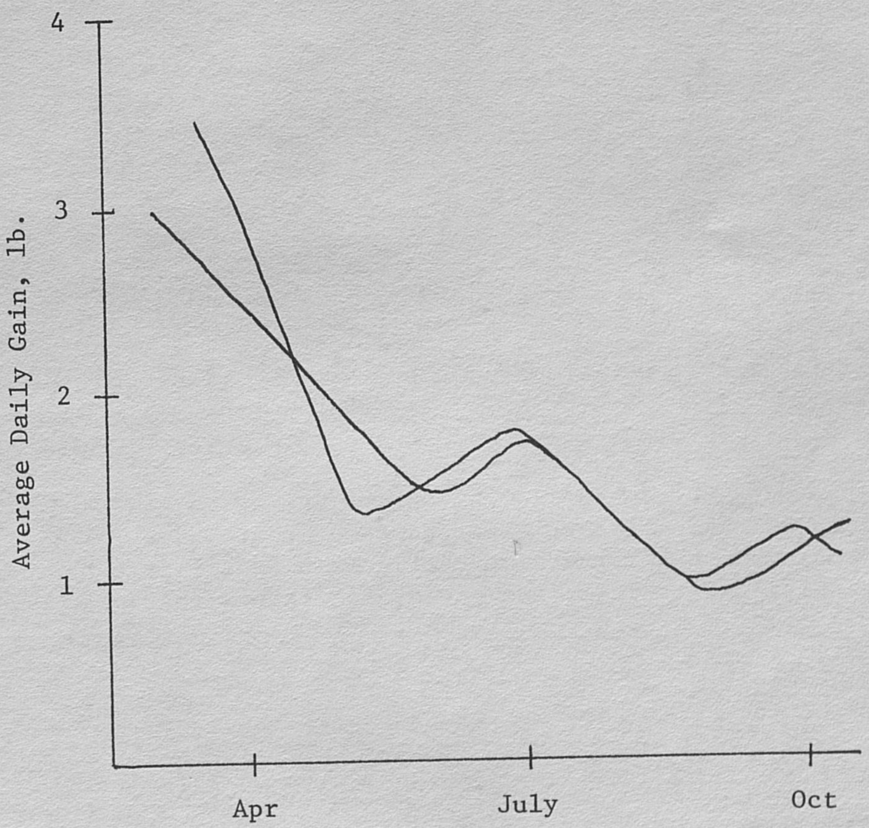


Figure 2. Rate of Gain for Yearling Steers Grazing Bluegrass-Ladino Clover Pastures.

Table 1 presents results of an experiment in which 40 yearling steers were used and one group of 20 steers was self-fed ground shelled corn for the entire 168-day grazing season and the other group of 20 steers received pasture only during the first 56 days and was then self-fed ground shelled corn for the following 112 days.

Table 1. A Comparison of Steers Which Received Grain and Pasture All Summer and Steers Which Received Pasture Alone for 56 Days and then Pasture Plus Grain for 112 Days.

1st 56 days	Deferred Feed	Feed All Summer
Number of steers	20	20
Beginning weight	687 lb.	689 lb.
56-day gain	125 lb.	156 lb.
56-day ADG	2.23 lb.	2.78 lb.
Corn per steer	-------	12 bu.
Last 112 days		
56 to 168-day gain	224 lb.	222 lb.
56 to 168-day ADG	2.00 lb.	1.97 lb.
Corn per steer	35 bu.	35 bu.
Entire 168 days		
Final weight	1036 lb.	1067 lb.
Total gain	349 lb.	378 lb.
ADG	2.08 lb.	2.24 lb.
Total corn per steer	35 bu.	47 bu.

The steers receiving grain during the entire summer gained 31 lb. more than the group which received a deferred feed of grain, but they ate 12 bushels more grain. Both groups of cattle weighed a little over 1000 lb. at the packing plant (table 2) and yielded carcasses that graded average Choice.

Table 2. Carcass Data

	Deferred Feed	Feed All Summer
Weight	1004	1030
Dress, %	61.1	61.7
Grade	12.9	12.8
Fat	0.8	0.9

12-Choice -
13-Choice
14-Choice +

Table 3 shows the economic advantage of the deferred feeding plan compared with feeding grain during the entire grazing season.

Table 3. Costs and Returns

	Deferred Feed	Feed All Summer
Initial Cost	$192	$193
Corn Cost	140	188
Selling Price/cwt.	40	40
Returns to Pasture Labor, Invest.	70	31

Initial cost of feeder steer - $28 per cwt.
Corn cost, per bushel - $4.00

The success of the deferred feeding on grass plan depends upon attention to several details. The 700-pound feeder calf should be in average flesh at the beginning of the grazing season and should be implanted with 24 to 30 mg of stilbestrol. Tables 4 and 5 show that two pellets of stilbestrol will result in an additional 42 lb. of extra gain during the grazing season, but that increased dosage levels will not result in further benefits.

Table 4. Effect of Diethylstilbestrol on Gains of Yearling Steers Grazing Bluegrass-Clover Pasture (150 Days)

	Control	24 mg DES
No. Steers	28	28
Initial Weight	582	585
Gain	201	243
Inc. Gain	---	42
ADG	1.34	1.62

Table 5. Effect of Two Levels of Diethylstilbestrol In Yearling Steers Which Received a Deferred Feed of Corn on Fescue Pasture

	24 mg	36 mg
No. Steers	18	18
Initial Weight	709	703
Final Weight	1067	1060
Gain	358	357
ADG	1.83	1.82
Carcass Grade	12.1 (C-)	11.8 (C-)

In other words, "enough is enough" and cattle should not be overdosed with stilbestrol. Good-to-excellent pasture should be provided until about July 1, and then the cattle should receive a full-feed of grain until they grade Choice. Results presented in table 6 indicate that there is little or no advantage to adding protein supplement to the corn.

Table 6. Effect of Supplementing Steers Receiving Pasture Plus Grain With Soybean Meal

	Corn	Corn + SBM
Initial Wt.	683	684
Final Wt.	1047	1061
ADG	2.17	2.24
Corn/day	18.7	17.6
SBM/day	----	2.0
Cost/gain	51.7¢	55.2¢

Corn cost, per bushel - $3.36

Soybean meal cost, per ton - $180

Good management should be used on both the cattle and pastures with respect to clipping pastures, controlling flies, providing minerals, fresh water and shade.

Table 7 presents results of a trial in which straightbred Angus and crossbred Charolais were compared where corn was self-fed on pasture for 152 days. It should be noted that the Charolais-crossbred steers gained slightly faster. The Angus steers yielded carcasses which graded low Choice, whereas the crossbred cattle yielded carcasses which graded high Good.

Table 7. Feeding on Grass - 152 Days

	Angus	Charolais-Crossbred
No. Steers	18	18
Initial Weight	704	736
Final Weight	1038	1073
ADG	2.18	2.28
Fat thickness	.43	.32
Ribeye Area	11.57	11.76
Carcass Grade	12.2	11.1

Self-feeding grain on pasture is attractive because of minimum labor requirement. The cattle may be started on the self feeder at once if a mixture of 40% ground corn cobs and 60% ground shelled corn is provided for the first week. A mixture of 20% ground corn cobs and 80% ground shelled corn should be provided the second week. At the beginning of the third week, start feeding either ground shelled corn or whole shelled corn. Research results (table 8) indicate that cattle fed whole shelled corn performed as well as those fed ground corn with respect to rate and efficiency of gain. Whole shelled corn seems to be somewhat more desirable from the standpoint of molding and bridging in the self feeder. The expense and labor required to grind the corn are also saved.

Table 8. Form of Corn

	Whole	Ground
Initial Weight	749	746
Final Weight	1044	1029
ADG	1.95	1.87
Corn/day	13.8	16.3
Grade	CH	CH

In general, the deferred feeding plan results in improved utilization of pasture, a higher stocking rate than when steers receive grass alone all summer, minimum labor, minimum expense and minimum corn to reach Choice grade. If pasture fields are very large or if it is a long distance from the self feeder, founder is more likely to occur. Also, founder can occur in heifers that have been in heat for a period of time. When they return to the self feeder they are likely to over eat. A ration somewhat lower in energy than shelled corn might be better suited to feeding heifers in order to reduce the likelihood of founder. Another factor which may contribute to founder is that if fall rains and cooler seasons permit rapid growth of highly palatable pasture, the cattle may prefer the pasture to the grain and lose their adaptation to grain. To avoid founder, consider feeding steers and heifers separately, regulate the size of the field or add more self feeders where there are large numbers of cattle on a large acreage and control stocking rate so that large amounts of lush palatable pasture do not accumulate while cattle are being self-fed grain. With a reasonable amount of attention to these rather minor management problems, acceptable slaughter beef can be produced in a very efficient and rather simple manner.

FORAGE TYPE AND SUPPLEMENTAL FEEDING FOR SPRING AND FALL CALF PRODUCTION

G. M. Hill, N. W. Bradley, J. A. Boling, D. R. Lovell and W. C. Templeton, Jr.*

Feeder calf production in Kentucky is one of the major farm enterprises, but current economic conditions force the feeder calf producer to weigh each management decision with extreme care. A four-year experiment was conducted to study the effects of kind of pasture, season of birth of calves, and creep feeding on preweaning calf performance. Two hundred forty acres of pasture and 120 brood cows were used in this project each year at the Coldstream farm. Four treatments were imposed on both spring-born and fall-born calves, giving a total of eight different methods of producing feeder calves. The treatments were:

Fescue-ladino-clover pastures, no creep feed
Fescue-ladino-clover pastures, with creep feed
Bluegrass-ladino-clover pastures, no creep feed
Bluegrass-ladino-clover pastures, with creep feed

Cows and calves were randomly assigned to eight herds of 15 cows and calves during the first year of the experiment, and 15 cows and calves were maintained on each pasture each year during the nursing phase. Each herd was assigned two 15-acre pastures which were further divided into 7.5- acre pastures with electric fences for rotational grazing. Pastures were maintained at 2-to 4-inch heights in the spring. Surplus spring forage was harvested as hay which was stored until the wintering period and then fed back to the cows. No hay was harvested from the pastures in 1969, which was the initial year of the experiment when all forages were less productive than in subsequent years. Pastures were clipped when necessary during the summer.

Winter Feeding of Cows

Cows in this experiment remained on the pastures throughout the year. Cows received supplemental feed in addition to pasture forage during the wintering periods. The spring calving cows were fed fescue-clover or bluegrass-clover hay (table 1) corresponding to the forage treatments to which they were assigned. Ground shelled corn was fed in small amounts beginning about two weeks before the start of the calving season each year, and was continued until the pastures could adequately support the cows and calves. This corn was fed to provide extra energy to improve reproductive efficiency, and to decrease the possibility of the occurrence of grass tetany. Both hay and ground shelled corn were fed on the ground. The amounts of these supplemental feeds did not meet the nutrient requirements of dry beef cows, therefore the cows were obtaining a substantial amount of their required nutrients from the pastures.

*Department of Agronomy.

Table 1. Winter Feeding of Spring-Calving Cows

	Hay[a]			Ground Shelled Corn	
		Fescue	Bluegrass	All cows[b]	
Year	No. days fed	lb./hd./day	lb./hd./day	No. days fed	lb./hd./day
1969-70	155	13.4	13.5	42	2.0[c]
1970-71	134	9.4	11.1	72	2.8[d]
1971-72	114	11.7	11.6	67	3.4[e]
1972-73	121	9.5	17.0	66	3.4[e]
Four-year Average	131	11.0	13.3	62	2.9

[a]Hay fed December through April; cows assigned to fescue-clover pastures received fescue-clover hay, and cows assigned to bluegrass-clover pastures received bluegrass-clover hay.
[b]Corn was fed to cows assigned to each kind of forage for the same length of time and at the same rate each year.
[c]Cows fed 2 lb./head/day. March 20 to May 1.
[d]Cows fed 2 lb./head/day from February 18 to March 3; and, 3 lb./head/day. March 3 to May 1.
[e]Cows fed 2 lb./head/day from February 20 to March 12; 4 lb./head/day. March 13 to April 27.

The fall-calving cows were fed hay, ground shelled corn, and corn silage during the wintering period in addition to the pasture forages to meet the requirements of the nursing cows during the more severe winter months when weather conditions and decreased pasture forage production combined to add stress to the cows. Table 2 shows the yearly averages of hay, corn and corn silage fed to the fall-calving cows during winter. Cows on both kinds of pastures received corn and corn silage for the same number of days and the same daily amounts each year. Corn silage and a small amount of hay comprised the majority of the supplemental feeds fed to these cows. Corn silage was fed at rates determined by existing weather conditions and forage availability. Each year small amounts of ground shelled corn were fed to supplement standing pasture grasses in the fall before silage feeding was initiated, and in the spring of two years it was fed in an attempt to decrease the occurrence of grass tetany.

Salt and Mineral Supplements

Salt and mineral supplements were provided in all pastures, and bonemeal was provided free-choice at all times. Plain salt was fed

Table 2. Winter Feeding of Fall-Calving Cows

	Hay[a]			Ground Shelled Corn		Corn Silage	
		Fescue	Bluegrass	All cows[b]		All cows[b]	
Year	No. days fed	lb./hd./day	lb./hd./day	No. days fed	lb./hd/day	No. days fed	lb./hd./day
1969-70	154	10.1	10.1	62	2.9[c]	154	51.4
1970-71	115	4.2	4.2	20	3.0[d]	159	38.6
1971-72	114	6.7	5.9	68	3.4[e]	113	37.2
1972-73	122	5.8	6.2	21	4.3[f]	158	29.5
Four year Average	126	6.7	6.6	43	3.4	146	39.2

[a]Hay fed December 9 through April 14; cows assigned to fescue-clover pastures received fescue-clover hay, and cows assigned to bluegrass-clover pastures received bluegrass-clover hay.

[b]Corn and corn silage were fed to cows assigned to each kind of forage for the same length of time and at the same rate each year.

[c]Cows fed 2 lb./head/day. November 10 to November 21; and, 3 lb./day. March 11 to May 1.

[d]Cows fed 3 lb./head/day. November 1 to November 20.

[e]Cows fed 3.6 lb./head/day. November 1 to December 28; and, 2 lb./head/day. April 19 to April 28.

[f]Cows fed 4.3 lb./head/day from November 1 to November 21.

free-choice from May 1 to November 1 each year, and salt was provided along with magnesium oxide and vitamin A concentrate in a 6:3:1 ratio, respectively,for all cows from November 1 to May 1. Additional magnesium oxide (2 oz.per cow daily) was provided with corn as a carrier for spring-calving cows during the spring before calving, and for fall-calving cows in late fall and the early spring of some years in an effort to prevent grass tetany.

Creep Feed

Creep feed consisted of cracked yellow shelled corn. It was provided free-choice in commercial feeders to calves in the creep-fed treatment groups from approximately 1 month after birth until weaning.

Breeding Seasons

The breeding season for spring-calving cows began on May 20, and continued through August 5, during the first three years of the experiment. The breeding season was decreased in length from 75 to 60 days in 1971. which was from May 20 to July 20 of that year. During the first two years of the experiment, fall-calving cows were bred between November 20 and February 5, but the season was shortened from 75 to 60 days during the last two years of the experiment which was from November 20 through January 20.

Performance and Supplemental Feeding

Performance and creep feeding data of spring-born calves for the four-year study are shown in table 3. Calves on all four treatments were weaned at about 210 days of age. Actual weaning weight averages were adjusted for sex of calf, age of dam, sire, year of birth, and age at weaning by the method of least squares.

1. Non-creep-fed calves on fescue-clover pastures weighed 72 lb. less at weaning than creep-fed calves on the same forage.

2. Creep feeding resulted in a 38 lb. increase in weaning weight of calves on bluegrass-clover pastures.

3. Non-creep-fed calves on bluegrass-clover pastures were 48 lb. heavier at weaning than non-creep-fed calves on fescue-clover pastures. Creep feeding seemed to reduce the effect of kind of pasture since creep-fed calves on bluegrass-clover pasture were only 13 lb. heavier at weaning than creep-fed calves on fescue-clover pasture.

4. Creep feeding was more beneficial to calves on fescue-clover pastures than to calves on bluegrass-clover pastures. Calves on fescue-clover pastures were more efficient in converting creep feed into extra gain above the gain of non-creep-fed calves on the same forage as compared to those on bluegrass-clover.

Table 3. Four-year Average Performance and Creep Feeding Data for Spring Calves

	Fescue-Clover		Bluegrass-Clover	
	No Creep	Creep	No Creep	Creep
No. calves	59	60	60	60
Age at weaning, days	211	208	214	212
Actual weaning wt., lb.	442	507	503	529
Adj. weaning wt., lb.[a]	439	511	487	525
Birthweight, lb.	66	68	68	66
Gain, birth to weaning	373	443	419	459
No. days creep-fed	---	163	---	163
Creep feed per calf daily, lb.	---	3.5	---	3.5
Total creep feed per calf, lb.	---	568	---	568
Creep feed required per lb. gain above non-creep-fed calves	---	8.1	---	14.4

[a]Weaning weight averages adjusted for sex of calf, age of dam, sire, year of birth, age at weaning by the method of least squares.

Performance and creep feeding data of fall-born calves for the four-year study are shown in table 4. The fall-born calves were weaned at about 290 days of age to allow the calves to take advantage of spring forage growth. Average weaning weights were adjusted for sex of calf, age of dam, sire, year of birth and age at weaning by the method of least squares.

1. Fall-born calves that were creep-fed were heavier at weaning than non-creep-fed calves, regardless of forage consumed.

2. The fall-born calves were creep-fed 238 days, which was considerably longer than were the spring-born calves (163 days; table 3).

3. Total creep feed per calf was 1154 lb. for calves on fescue-clover and 1238 lb. for calves on bluegrass-clover pastures.

Table 4. Four-year Average Performance and Creep Feeding Data for Fall Calves

	Fescue-Clover		Bluegrass-Clover	
	No Creep	Creep	No Creep	Creep
No. calves	60	60	60	60
Age at weaning, days	288	293	287	286
Actual weaning wt., lb.	537	644	547	648
Adj. weaning wt., lb.[a]	504	598	522	614
Birthweight, lb.	63	61	63	63
Gain-birth to weaning	441	537	459	552
No. days creep-fed	---	238	---	238
Creep feed per calf daily, lb.	---	4.8	---	5.2
Total creep feed per calf, lb.	---	1154	---	1238
Creep feed required per lb. gain above non-creep-fed calves, lb.	---	12.0	---	13.0

[a]Weaning weight averages adjusted for sex of calf, age of dam, sire, year of birth, age at weaning by the method of least squares.

4. The fall-born calves on both kinds of forage had low conversion rates for creep feed required for each pound of gain above non-creep-fed calves.

5. No differences in calf performance were observed due to kind of pasture to which the calves were assigned.

Surplus Forage Production

Surplus forage produced from each of the systems is presented in table 5. The fescue-clover system yielded the greatest amount of surplus forage per acre cut in both the spring- and fall-calving pastures. A

Table 5. Fescue-clover and Bluegrass-clover Hay Production

Year	Total Acreage	Fescue-clover Acres Cut	Fescue-clover Tons Cut	Bluegrass-clover Acres Cut	Bluegrass-clover Tons Cut
		Spring Calving			
1970[a]	60	30.0	46.0	30.0	26.0
1971[a]	60	30.0	31.0	0	0
1972[a]	60	30.0	20.0	15.0	7.1
Average	60	30.0	32.3	15.0	11.0
		Fall Calving			
1970[a]	60	45.0	50.0	22.5	36.0
1971[a]	60	45.0	42.0	15.0	10.0
1972	60	75.0[b]	56.4[b]	65.5[c]	30.5[c]
Average	60	55.1	49.5	57.3	25.6

[a]All hay harvested in June.
[b]Fescue-clover pastures produced 20.5 tons of hay on 30 acres in June; and, 35.9 tons on 45 acres in September.
[c]Bluegrass-clover pastures produced 3.5 tons of hay on 15 acres in June, and 27.0 tons on 37.5 acres in September.

greater quantity of surplus forage was harvested from bluegrass pastures grazed by fall-calving cows than from those grazed by spring-calving cows, due mainly to a surplus of pasture growth in the late summer after calves were weaned.

Creep feeding of calves in Kentucky will be governed by economic conditions. However, this experiment indicated that it was beneficial in terms of spring calf performance to creep feed spring-born calves on fescue-clover pastures. Extending the weaning age to 290 days and creep feeding substantially increased the weaning weights of fall calves. However, the large amount of creep feed required for the extra gain and the extra feed required by cows nursing calves in winter may outweigh the benefits of a fall-calving system of management. Extended ownership of the calf may be a factor in considering whether to creep feed.

STUDIES ON BEEF COW HERD MANAGEMENT PRACTICES

Nelson Gay

Cowmen have many options in the management of their herds. Economic influences vary so that decisions must be changed periodically. Many times decisions are based on too little information. If the cowman is astute he realizes that cost of maintaining the herd, the reproductive rate of the herd and the pounds of calf he has to sell are critical to success.

A study has been initiated at the West Kentucky Substation at Princeton to provide additional information on some cow herd management practices. This study utilizes Hereford and Angus cows reciprocally mated to Hereford and Angus bulls. Management includes recommended practices. Specific objectives of the study are:

1. To determine the influence of supplementary energy on reproduction in beef cows.
2. To measure the effects of feeding calves a nutritionally complete creep feed.
3. To measure the relative growth reponses of straightbred and crossbred calves to complete creep feeds.

This report contains the results of a preliminary study with Hereford cows, ranging in age from 2-12 years, bred to Hereford bulls,and which were assigned to three groups on the basis of age, pregnancy and weight. These groups were offered liquid, dry or no protein supplement during a 140-day wintering-calving period beginning December 12, and continuing through calving, April 14. Cows were wintered on short pastures and fed 10 lb. hay as large round bales and 10 lb. corn silage until hay supplies were exhausted, then all cows were fed 35 lb. corn silage. After calving, cow-calf pairs were separated and fed corn silage to appetite until turned to grass on April 3. Treatment groups and daily rations are shown in table 1.

Table 1. Treatment Groups and Daily Rations[1]

Ration	Groups		
	None	Liquid	Dry
Corn Silage	10	10	10
Grass Hay, lb.	10	10	10
Liquid Supp., lb.	-----------	free choice	-----------
Dry Supp., lb.	-----------	-----------	1.1
Salt, Mineral Vitamin Mix.	free choice	free choice	free choice

[1]Ration changed to 35 lb. corn silage when hay supply exhausted and to corn silage, full fed, following calving.

The estimated composition of feedstuffs, as fed,is shown in table 2.

Table 2. Estimated Composition of Feedstuffs,%

(As Fed)

Item	Crude Protein	Ca	P	TDN
Liquid Supp.	35	0.5	1.0	65
Dry Supp.	35	2.2	1.1	65
Fescue Hay	10	0.7	0.3	50
Corn Silage	02.8	0.14	0.10	29

A comparison of NRC requirements and the estimated daily intake of these cows shows the unsupplemented rations to be adequate in crude protein, energy, calcium and phosphorus. All cows received the mineral-vitamin mixture shown in table 3.

Table 3. Mineral, Salt, Vitamin Mixture

Ingredient	%
Magnesium oxide	40
Steamed bone meal	20
Trace mineralized salt	20
Plain salt	20
*Vitamin A	+

*Added to provide 30,000 IU per ounce of mixture.

Observations relating to winter supplementation of cows are shown in table 4.

Table 4. Effects of Winter Supplementation on Weight Change of Cows, Birth Weights, Early Death Losses and Weaning Weights of Calves.

		Supplement Group		
Item	All	0	Liquid	Dry
No. cows	150	50	50	50
Avg. wt. on Dec. 12	917	917	915	922
Birth wt. of calves	68.4	68.6	67.3	69.3
Calf losses, %	6.8	6.1	8.2	6.1
Adj. 205-day[a] weight of calves	460	460	458	462

[a]Adjusted 205-day weights of calves are based on 29 calves in each treatment from the original 50 per treatment.

Weight losses through calving, as a % of beginning weight, were 7.2% for non-supplemented, 5.5% for liquid supplemented and 4.8% for dry supplemented cows. Birth weights of calves averaged 68.5 lb. and showed no effect from cow supplementation. Early death losses of calves averaged 6.8% with no apparent effect from supplementation. Approximately 1/3 of the females were first calvers and accounted for 9 of 10 calf losses. Adjusted 205-day weaning weights averaged 460 lb. and were not affected by winter supplementation of cows.

Following the calving season, cow numbers were reduced to 29 out of the original 50 per group. Data on the calves at weaning reflect this reduced number. Cows were exposed to the bull for a 63-day period during which time 82% of them conceived. Of 16 cows failing to rebreed, 13 were first or second calvers. Admittedly, the seedstock producer desires a short generation interval to allow greater selection. However, a commercial cowman can reduce the problems involved in calving difficulty and rebreeding if he can keep the number of replacements at a minimum. These first and second calvers also wean lighter calves. Body weight gains, during the breeding season of those cows that conceived, averaged 25 lb. vs. 9 lb. for those failing to conceive. All cows had received lepto, vibrio and IBR vaccines prior to the breeding season. Hereford or Angus bulls had equal conception rates among Hereford cows. Calves received blackleg, malignant edema, lepto and IBR vaccines. Following the breeding season, on July 22, the calves averaging 130 days of age and 277 lb. liveweight were divided into three groups for a creep feeding study with 1/3 receiving a simple creep, 1/3 receiving a complex creep and 1/3 not receiving creep. One-half the calves in each group were wormed with injectable Tramisol at the suggested rate. Results of these treatments are shown in table 5. Actual and adjusted weights reported were taken on October 16, at which time the calves averaged 216 days of age.

Table 5. Influence of Worming and Creep Feeding on Nursing Calves

Group	Number	Actual Average Weight, lb.	
		7-22	10-16
All	87	277	452
Wormed	43	280	465
Non-wormed	44	274	440
No creep	29	275	449
Simple	29	278	447
Complex	29	278	462

Wormed calves weighed significantly more at weaning than non-wormed calves, 464 lb. vs. 440 lb. This advantage continued through weaning at 265 days of age. Creep feeding observations showed no response to a simple (shelled corn) creep but a significant increase in adjusted 205-day weights due to a complex creep. The complex creep was composed of shelled corn and a pelleted, complete supplement to give a mix containing 16% crude protein. Both creeps were fed free-choice in portable feeders. Consumption averaged 3.2 and 4.1 lb. daily for the simple and complex creeps, respectively.

In conclusion, winter supplementation of dry, pregnant cows with protein did not result in any benefits as seen in early death loss of calves, conception rates or weaning weights. From this, one could conclude that average grass hay and corn silage, limited fed, was adequate when properly supplemented with salt, minerals and vitamin A. These cows were in average flesh and were gaining in weight before and during the breeding season. Whether or not extra energy at this time would improve conception hopefully can be determined by results of further studies.

Results of the worming study were somewhat surprising but the season was an unusually wet one which might be expected to increase internal parasites. These observations will be repeated with future calf crops. The lack of response to simple creep was disappointing since the calves ate over 3 lb. daily. Presumably, the calves found it easier to consume creep than graze or nurse and simply substituted one source of energy for another. Another possibility is that protein was the limiting nutrient and that additional energy without additional protein could not produce added weight gains. Added weaning weight due to complex creep was about as expected; however, the conversion rate was poor. Certainly present prices would not make creep feeding economically feasible.

HAYING WITH THE BIG PACKAGE SYSTEMS

J. K. Evans,* N. Gay, G. Lacefield* and J. E. Sherman

Nutrients provided by field-cured hay, harvested at the proper stage of plant growth, packaged without excessive weather damage and fed properly, cost less than other nutrient sources except for pasturage. Seasonal production of forage makes it essential to harvest and store the excess for use when growth is inadequate. Forage quantity and quality are enhanced when the surplus is harvested, either by grazing or haying. Therefore, most cattlemen find it necessary and profitable to make hay by some means.

Packaging hay in large round bales and stacks has met with wide acceptance in Kentucky in recent years. Many types and makes of equipment have provided farmers various methods of preserving and utilizing winter feed with a minimum of time and labor. Many unanswered questions relative to big-package haying systems remain. Recent research and practical observations show that quality hay can be packaged, stored and fed outside without excessive weather loss. Feeding losses through wastage and overconsumption can be excessive if proper management is not used.

Making and Storing Stacks and Bales Properly

Forage quality is not improved through cutting and storing, therefore, certain rules must be followed if the most nutritious hay is to be provided. Cutting forages at the proper stage of maturity is the single most important factor in determining quality of hay. Grass hay should be cut in the boot to early flower stage for best quality. Successive cuts should be taken at 4- to 6-week intervals, depending on growing conditions and grazing needs. Cut legumes during early bloom for best quality. As maturity increases, quality or feeding value decreases. Mature hay will have little value for young, growing animals but can be adequate for dry, pregnant beef cows. If forage is cut at the proper stage of maturity then care in baling and storing is needed.

Both bales and stacks should be made as dense and uniform as possible for best storage results. Uneven filling of a stacker chamber or an inadequate number of compression cycles will make for fluffy, uneven stacks that will not shed water or hold together. Uniform bales may be made by having windrows the same width as the baler pick-up unit or zigzagging over narrow windrows. Moisture level at baling should be the same for big packages as for conventional bales.

*Department of Agronomy.

Stacks or bales should be stored in a stack yard, on a well-drained, sod site. Distance between packages should be 18-24 inches to allow air circulation and prevent water trapping. Side by side storage will allow selection of the proper quality for the feeding need. Storage along a fence row, near the feeding site, will save time and fencing. On site storage will frequently result in wastage and killed sod areas. However, these disadvantages should be weighed against the labor and time saved.

Storage Losses

Hay stored over time loses weight, regardless of packaging or storage methods. The following tables show that weather losses do not have to be excessive with outside storage of big packages.

Table 1 Losses from Large Round Bales of Alfalfa[1]

Storage Method	Wt. Before Storage	Wt. After Storage	Wt. Change %
In barn, on ground	1345	1135	-15.7
Outside, on ground	1241	925	-25.4
Outside, elevated	1432	1150	-19.7

[1] Rider, A.H., and Boyer, B.D. Storing and feeding large roll bales. Eastern Okla. Pasture Research Sta. Report P-705. 1974. The hay was stored from June 1973 to April 1974, during which time rainfall was 30 inches.

Table 2. Weathering Losses in Grass[1] Hay Stored in Various Packages (2-year average)

Package	Avg. Wt. of Package	% Weathered	TDN Good	TDN Bad
Hesston 10	1100	11.1	56	38
Ver Meer	1125	10.5	56	41
Hawk-Bilt	615	19.5	56	40
Small Round	36	20.4	57	38

[1] Smith, W.H., V.L. Lechtenberg, S.D. Parsons and D.C. Petritz. Suggestions for the storage and feeding of big-package hay. Ind. Coop. Ext. Service ID-97. 1974. The hay was stored from June to November in 1972 and from June 1972 to February 1973.

Observations at the West Kentucky Substation during 1974 showed the weathered portion of bales from a Ver Meer baler to be 11.3%. During the 180 days of storage 26.7 inches of rainfall occurred. Chemical analyses showed that crude protein losses were similar for inside and outside stored bales. These losses may have resulted partially from leaf loss due to processing for feeding. It should be recalled that some time is saved when big package systems are used and thus weather losses should be reduced.

Feeding Round Bales

Results of a balance trial and nutrient digestibility determinations showed insignificant differences between inside and outside stored bales, except for nitrogen retention. Crude protein from inside stored bales was better utilized by young growing steers. Results of a feeding trial with round bales, supplemented with two protein sources, are shown in table 3. Apparently, this hay was too mature to support adequate growth in calves even through they consumed over 10 lb. daily. Average composition

Table 3. Large Round Bales for Wintering Calves, West Kentucky Substation, 1974-1975

	Hay + Liquid Supp.	Hay + Soybean Meal
No. calves	20	20
Avg. wt. 12/4, lb	495	489
Avg. wt. 4/2, lb	497	528
ADG, lb	0.02	0.43
Avg. Daily Ration		
Hay, lb	10.5	10.4
Liquid Supp., lb	1.03	----
Dry Supp., lb	----	1.3

of this hay and that fed to the cow herd is given in table 4. These calves were fed on a concrete apron in dry lot using a feeding rack. Less than 5% feeding loss was estimated.

Table 4. Composition of Bales Fed to Wintering Calves and to Dry Pregnant Cows

Item	Composition
Avg. bale wt., lb.	1070
Dry matter, %	72.5
Crude protein	10.1
Acid detergent fiber (approximate crude fiber)	52.5
Neutral detergent fiber (plant cell wall contents)	77.0

West Kentucky Substation, 1974-75.

Dry pregnant beef cows have been wintered sucessfully at the West Kentucky Substation on large round bales. Here the cows were limited to 16-18 lb. daily and fed 3 times weekly with racks. Minerals, salt and vitamin A were fed free-choice with the round bales. Feeding losses were minimal when racks were used.

Feeding large round bales or stacks without feeding racks has resulted in large losses. Research from Oklahoma showed 2.6% and 36% losses with and without racks. Table 5 shows results from a Purdue study that indicates feeding racks are essential.

Table 5. Hay Requirements and Losses From Different Feeding Methods (Smith, *et al.*, 1974)

Type of Package	Hay Required Per cow/day	Hay Required Over Rack Feeding, %
On Ground Without Racks		
Hesston	33.4	35.0
Ver Meer	28.2	22.6
Hawk-Bilt	32.2	38.6
	31.3	32.1
On Concrete With Racks		
Hesston 10	24.7	----
Ver Meer	23.0	----
Hawk-Bilt	23.3	----
	23.7	

It is essential to weigh a sample and estimate the moisture content of the big packages before feeding. Overfeeding or underfeeding by a large margin can result if weight and moisture are not taken into consideration. An amount of hay that will be eaten in two or three days should be fed. Of course this is not possible in some instances, but unlimited access to big packages will result in disappointing results. Essentially, the same may be said of feeding conventional bales.

Each cattleman needs to weigh the advantages and disadvantages of various haying systems for his specific operation. Herd size, terrain of his farm, labor available, size of equipment other than hay packager, capacity and cost of different machines and the possibility of doing custom work are some considerations. Visits to other operations where different equipment is in use can be helpful.

PROTEIN LEVELS AND NITROGEN SOURCES FOR GROWING STEER CALVES

J. A. Boling and N. W. Bradley

The continued growth and development of calves during the growth phase subsequent to weaning are dependent upon an adequate supply and balance of dietary nutrients. Protein and energy are commonly deficient in calves during this growing period. Protein deficiency not only limits the supply of absorbable amino acids which are necessary for growth but also decreases the intake of other nutrients.

The ruminant is unique among mammals in its ability to utilize nutrients which cannot be used directly as food sources for man. This feat is accomplished primarily through the bacteria and protozoa inhabiting the rumen, or forestomach, which is essentially a fermentation vat holding more than 100 lb. of contents. The bacteria and protozoa of the rumen digest fibrous feeds such as silage, grass, hay and straw yielding usable nutrients called volatile fatty acids (principally acetic, propionic and butyric acids). These acids are the major source of energy for the ruminant. In addition, the ruminant can convert sources of nonprotein nitrogen such as urea, ammonium chloride and biuret to ammonia which can be subsequently synthesized into amino acids and protein. However, when high quality natural proteins are fed (soybean meal, cottonseed meal, linseed meal, distillers dried grains with solubles), it is disadvantageous for the ruminal microbes to hydrolyze these high quality proteins to ammonia. When growing cattle are fed natural high quality proteins, greater performance will be observed when a large quantity of the protein escapes ruminal breakdown.

The synthetic capability of the rumen enables the ruminant to consume many diverse types of feedstuffs. Therefore, many alternative dietary regimes can produce acceptable growth of calves during the postweaning or growing period.

Protein levels for steer calves fed corn silage diets are presented in table 1 (Willard *et al*., 1971). Angus steer calves averaging approximately 396 lb. in weight were randomly allotted to three treatments and fed diets containing: (1) corn silage alone, (2) corn silage plus 1 lb. soybean meal (SBM) per head daily and (3) corn silage plus 1½ lb. SBM per head daily. Salt which was fortified with vitamin A and steamed bone meal were offered free-choice.

Table 1. Growth of Steer Calves Fed Corn Silage (C.S.) Supplemented with Different Levels of Soybean Meal (SBM) (126 Days)

	Treatment		
	Corn[a] silage	C.S. + 1 lb. SBM	C.S. + 1½ lb. SBM
No. steers	24	24	24
Initial wt., lb.	402	397	390
ADG, lb.	0.53	1.39	1.50
Silage/day, lb.	23.97	27.00	32.72
TDN/lb. gain	12.77	6.19	6.88

Source: Willard et al., 1971. Univ. of Kentucky.
[a]Corn silage contained 40.3% dry matter and 2.96% crude protein.

Steer calves fed corn silage alone were protein deficient and gained only 0.53 lb. per day for the 126-day trial. Calves fed 1 lb. soybean meal (44% crude protein) gained 1.39 lb. per day, while those fed 1½ lb. SBM gained 1.50 lb. per day. The calves fed 1 lb. soybean meal per day were slightly more efficient (6.19 lb. TDN/lb. gain) than steers fed 1½ lb. SBM, and were approximately twice as efficient as those fed only corn silage. It should be noted that intake of corn silage increased as the level of dietary protein (SBM) increased. Growing cattle fed diets deficient in protein (corn silage) usually have a lower total daily nutrient intake than those fed adequate protein.

In a subsequent study (table 2), steers were fed different levels of soybean meal up to 2 lb. per head daily and an attempt was made to maintain corn silage intake constant (Boling et al., 1974). One hundred and twenty Angus and Charolais-crossbred steer calves averaging 493 lb. were fed corn silage diets containing the following added levels of soybean meal: (1) no supplemental protein, (2) 1 lb. soybean meal, (3) 1½ lb. soybean meal, and (4) 2 lb. soybean meal per head daily.

Table 2. Performance of Steer Calves Fed Corn Silage Diets Supplemented with Different Levels of Soybean Meal (112 Days).

	Treatment			
	Corn[a] silage	C.S.+ 1 lb. SBM	C.S.+ 1½ lb. SBM	C.S.+ 2 lb. SBM
No. steers	30	30	30	30
Initial wt., lb.	486	496	493	498
ADG, lb.	0.42	1.66	1.70	1.85
Silage/day, lb.	20.4	26.5	26.4	26.4
TDN/lb. gain	14.60	5.23	5.31	5.08

Source: Boling et al., 1974. Univ. of Kentucky.
[a]Corn silage contained 42.9% dry matter and 3.0% crude protein.

Steers fed corn silage supplemented with protein gained similarly when corn silage intake was held rather constant. All protein-supplemented treatment groups had significantly higher daily gains and were more efficient (TDN/lb. gain) than the corn silage fed steers which received no supplemental nitrogen. Steers fed only corn silage in these two studies exhibited the characteristic signs of protein deficiency: decreased feed intake, very emaciated (skinny), dull appearance, long and rough hair which did not shed properly.

In the study by Willard et al.(1971), a comparison was also made among different nitrogen sources for growing steer calves fed corn silage. Soybean meal, a corn-urea mixture and alfalfa hay were compared as isonitrogenous supplements for corn silage (table 3).

Table 3. Growth of Steer Calves Fed Corn Silage and Different Sources of Supplemental Nitrogen (126 Days)

	Treatment			
	Corn silage	C.S.+ 1 lb. SBM	C.S.+ Urea[a]	C.S. + alfalfa hay[b]
No. steers	24	24	24	24
Initial wt., lb.	402	397	402	394
ADG, lb.	0.53	1.39	0.97	0.97
Silage/day, lb.	23.97	27.00	24.87	21.64

Source: Willard et al. (1971) Univ. of Kentucky.
[a]Urea supplement contained 13% urea 281 (45% nitrogen) and 87% ground shelled corn. One pound of urea supplement equalled the nitrogen content of 1 lb. SBM.
[b]Alfalfa hay analyzed 13.88% crude protein on an as fed basis.

The alfalfa hay was analyzed for crude protein as it was received at the farm. On the basis of this analysis, 3.17 lb. of alfalfa hay was required to equal the nitrogen content of 1 lb. of SBM.

Steer calves fed the urea supplement and alfalfa hay as nitrogen sources had the same average daily gain, which was significantly less than those steers fed soybean meal. The gains of these two groups of steers were intermediate between those fed soybean meal and the corn silage alone treatment group. The reduced silage consumption and performance of growing steer calves fed all of the supplemental nitrogen as a urea supplement is consistent with previous observations. The reduced intake of corn silage by steers fed alfalfa hay as a protein supplement was principally due to the dry matter intake of alfalfa hay. Substitution of liquid urea supplements for the dry urea used in this study should give similar gains with corn silage.

Restricting the energy intake of calves decreases gain, even though protein may be adequate for a higher rate of gain. Burris et al. (1974) restricted the intake of Holstein steers which were fed corn-cottonseed hull complete diets with the supplemental nitrogen supplied as either soybean meal or urea. The diets consisted of 30% cottonseed hulls and 70% concentrate, which was principally ground shelled corn. The fifty-six Holstein steers averaging 527 lb. were allotted to three treatments and fed diets containing: (1) no supplemental protein, (2) supplemental protein as soybean meal, and (3) supplemental nitrogen as urea. All diets were fed at the level of 17.5 lb. per steer daily throughout the trial (table 4).

Table 4. Growth of Steers Fed Different Nitrogen Sources at Restricted Intake (112 Days)

	Diet		
	No suppl. nitrogen	Soybean meal	Urea
No. steers	20	18	18
Initial wt., lb.	541	517	524
ADG, lb.	1.63	2.49	2.53
Feed/day, lb.	17.5	17.5	17.5
Crude protein in diet, %	6.91	9.93	9.87

Source: Burris *et al*. (1974) Univ. of Kentucky.

These data indicate that the previously observed depression in gain with urea as compared with soybean meal is masked when total dietary (energy) intake is restricted. Also, even at restricted intake, it should be noted that steers fed the protein deficient (no supplemental nitrogen)diet gained significantly less than those fed either of the two nitrogen-supplemented diets.

In a later study, similar soybean meal or urea diets were full-fed to Holstein steers. The results are shown in the following table.

Table 5. Growth of Steers Fed Diets Supplemented with Soybean Meal or Urea at *Ad Libitum* Intake (140 Days)

	Diet	
	Soybean meal	Urea
No. steers	30	30
Initial wt., lb.	560	556
ADG, lb.	3.54	3.32
Feed/day, lb.	29.5	28.9
F/G	8.44	8.77

Source: Pendlum *et al*. (Unpublished data). Univ. of Kentucky.

When steers were full-fed the complete diet in which all of the supplemental nitrogen was as urea, average daily gains were lower than gains of their soybean meal supplemented counterparts. It should also be noted that feed intake was considerably greater than that of steers in the restricted intake trial (table 4).

The utilization of accumulated forage by growing cattle during the winter is of considerable interest since harvest and storage is eliminated. Steers were wintered on standing Kentucky bluegrass in a 2-year study with protein and energy supplements and a combination of these two supplements (Boling _et al_., 1971). Kentucky bluegrass was allowed to grow up in the late summer and fall. Steers were turned to pasture on an average date of December 5 for an average duration of 133 days. Adequate forage was available at all times during the wintering period. Steers were assigned to the following treatment groups: (1) grass only, (2) 1 lb. soybean meal per head daily, (3) 3 lb. corn per head daily, and (4) 1 lb. SBM plus 3 lb. corn per head daily. Steers were injected with vitamins A, D and E at the initiation and on day 56 of the trials. Salt and steamed bone meal were offered free-choice. Growth of steers during the 2-year trial is presented in the following table.

Table 6. Performance of Steers Fed Limited Protein and Energy Supplements While Wintered on Standing Kentucky Bluegrass Pasture

	Treatment			
	Grass only	1 lb. SBM	3 lb. corn	1 lb. SBM + 3 lb. corn
No. steers	50	49	50	50
Initial wt., lb.	686	686	686	683
ADG, lb.	0.24	0.38	0.53	0.74

Source: Boling _et al_. (1971). Univ. of Kentucky.

The accumulated grass alone did not allow satisfactory gains. The cattle were only meeting their nutrient requirements for slightly more than maintenance. Slight improvements in gain were noted when the protein and energy supplements were fed separately and in combination. Since the pasture analyzed 9.9% crude protein on a dry matter basis, it appears that the low gains were primarily due to inadequate energy intake. Cool season grasses increase in sugar content in late fall and are very palatable. The initiation of accumulation of grass during late September or early October would probably provide forage yielding higher daily gains than were observed with the summer accumulated forage in this study.

Steers which gain slowly during the winter, or during any period, and are later subjected to a feeding regimen that provides nutrients required for maximum growth undergo compensatory gain. Compensatory gain is very efficient, and these cattle coming from a period of restricted nutrient intake gain more rapidly and more efficiently than normally expected. Producers feeding cattle to gain slowly during the winter should plan to retain these cattle during the spring and early summer to take advantage of compensatory gain.

In summary, steer calves subjected to dietary regimens inadequate in protein or energy experience decreased growth. Growing steer calves fed natural protein supplements (such as soybean meal, cottonseed meal, linseed meal, distillers dried grains with solubles) have higher rates of gain than those fed all of the supplemental nitrogen as nonprotein nitrogen. Corn silage is deficient in protein for growing steer calves and proper protein supplementation can improve efficiency of gain (TDN/lb. gain). The effect of dietary nitrogen source can be masked when energy intake is limited,and gains of steers fed different supplemental nitrogen sources may be very similar. Calves fed to gain slowly in the growing period for moderate lengths of time (100-140 days) have compensatory gains in the following period, and will usually recover from this period of malnourishment. Calves malnourished in protein and/or energy from birth through the growing phase are likely to have difficulty recovering from such nutritional inadequacies.

Literature Cited

Boling, J. A., N. W. Bradley and D. R. Lovell. 1971. Limited protein and energy for wintering yearling steers on standing Kentucky bluegrass. J. Animal Science 33:691.

Boling, J. A., N. W. Bradley and L. C. Pendlum. 1974. Response of steer calves fed different levels of soybean meal. J. Animal Science 39:231 (Abstr.).

Burris, W. R., N. W. Bradley and J. A. Boling. 1974. Growth of steers fed different nitrogen sources at restricted intake. J. Animal Science 38:233 (Abstr.).

Pendlum, L. C., J. A. Boling and N. W. Bradley. Effect of nitrogen source and sulfur level on growth of steer calves (Unpublished data).

Willard, J. C., J. A. Boling and N. W. Bradley. 1971. Supplemental nitrogen sources for growing steer calves. Ky. Animal Science Research Report. Prog. Report 196. p. 47.

EFFECTS OF PRE- AND POSTCALVING NUTRITION ON REPRODUCTION

John Thomas Johns

Maximum reproduction performance in beef cattle is a result of good planning and management. Factors that must be planned for include both genetic and environmental influences. One of the major environmental influences is adequate nutrient intake throughout the life cycle of the beef female.

Puberty, or sexual maturity, in the beef female is attained with the first ovulatory estrus. Age at puberty is very important as more producers attempt to calve heifers at 24 months of age. Heifers must be cycling and bred around 15 months of age to obtain this early calving date. Although significant breed differences exist in age at puberty, nutritional factors have a major influence regardless of breed as indicated in table 1.

Table 1. Percent of Heifers Showing Puberty[1]

	Age in Months						
	10	11	12	13	14	15	16
Angus							
Low Feed[2]	13	23	27	33	57	77	100
High Feed[3]	40	56	64	76	80	92	100
Hereford							
Low Feed	0	0	0	4	22	41	59
High Feed	0	12	23	38	65	77	92
Shorthorn							
Low Feed	0	6	16	25	56	91	100
High Feed	65	65	69	73	85	92	100

[1]Adapted from Commercial Beef Cattle Production, O'Mary and Dyer, Eds. 1972.
[2]Low Feed made 0.5 lb ADG from October to May.
[3]High Feed made 1.0 lb. ADG from October to May. Both groups on grass from May to October.

At any given age and regardless of breed, a greater percentage of heifers wintered to gain 1.0 lb. ADG had reached puberty than those gaining 0.5 lb ADG.

The influence of differing planes of nutrition on percent of heifers cycling and conception rates are shown in table 2.

Table 2. Nutritional Effects on Heifer Breeding Performance[1]

Wintering Level	1	2	3
Number of heifers	30	29	30
ADG, lb	0.6	1.0	1.5
Age at puberty, days	434	412	388
% in heat by:			
Start of breeding	7	31	83
End of breeding	80	97	100
Not bred	20	3	0
% Pregnant after:			
20 days breeding	30	62	60
40 days breeding	40	83	80
60 days breeding	50	86	87

[1]Adapted from Commercial Beef Cattle Production, O'Mary and Dyer, Eds. 1972.

Age at puberty decreased as level of nutrient intake increased. Consequently a greater percentage of heifers consuming the high level of nutrient intake had shown heat by the start of breeding as compared to heifers on the low and medium level of nutrient intake. At the end of breeding no difference in percent heifers showing heat was observed between animals on high and medium levels of nutrition. However, 20 percent of the heifers wintered on the low level of nutrition did not show heat and therefore were not bred. Conception rates did not vary between heifers on the medium and high levels of nutrition; however, conception rate was decreased in heifers wintered on the low level of nutrient intake. The data indicate that adequate nutrient intake is required to obtain early cycling and high conception rates; however, overfeeding will not assure an earlier breeding. In this experiment, optimal wintering level judged by conception rate was 1.0 lb. ADG.

Overfeeding will not assure earlier breeding and can be detrimental to overall performance as indicated in table 3.

Table 3. Effects of Winter Feed Level on Lifetime Performance[1]

Age at first parturition		2 years	
Winter feed level[1]	Low	Med	High
Number of cows	14	14	13
Avg. lifespan, years	14.65	13.07	10.88
Total wt. of calf weaned/cow, lb.	5465	4811	3839

[1]Adapted from Pinney et al., JAS 34:1067. 1972.
[2]All cows grazed on native range year round. From November to mid-April. Low level received 0.11 lb of 43% solvent process cottonseed meal; medium level 2.45 lb. CSM; high level 2.48 lb. CSM and 2.88 lb. whole oats daily.

Average lifespan and pounds of calf per cow decreased as nutrient intake increased. The most prevalent reason for removing cows from test was failure to wean a calf in two successive years. Overfeeding the herd was responsible for decreased production due to a lower % calf crop born and weaned. Overfeeding increases calving difficulty as well as decreasing milk production per cow (table 4).

Table 4. Effect of Excessive Nutrition on Cow Performance[1]

	Low Level[2]	High Level
Number of cows	11	11
Avg wt. at calving	827	1334
Cows requiring assistance	1	6
Calves lost	1	3
Cows lost	0	2
Avg. daily milk, lb. 112 day	9.2	6.8

[1]Adapted from Totusek et al. Okla. MP 64:63. 1961.
[2]Heifers on the low level of feed gained from 0.5 to 0.66 lb/day while heifers on high level consumed this ration plus a full feed of corn. Heifers are bred to calve after 30 months of age.

Proper nutrition not only plays an important role in determining performance to first parturition but in rebreeding performance as well. Every producer should have as a goal a calving interval of 12 months. To accomplish this, females must recover from calving, cycle and conceive within about 80 days. Nutrition must be optimal for this to occur. Turman (Okla. MP 76:25) fed pregnant heifers such that a loss of body weight in the winter of none, 10% or 20% was obtained. The post-partum intervals from calving to conception were measured and found to be: no weight loss, 74 days; 10% loss, 86 days; and 20% loss, 95 days. Dunn *et al*. (JAS 29:719) in work at Nebraska also found that onset of estrus after calving is related to precalving energy levels; however, pregnancy rate was influenced by postcalving energy levels. Thus,level of feeding during pregnancy is a major determinant in return to estrus after calving,but conception rate seems to be more dependent on rate of gain after calving and during breeding.

Nutrition for heifers should be such that: puberty is reached by 14-16 months; heifers weigh 600-700 lb. at breeding; and 950-1000 lb. at calving. If these goals can be met, nutrient intake will not be a limiting problem for reproduction. Guidelines for rates of gain to meet the above goals are given in table 5.

Table 5. Rates of Gain, Spring Calves

(1) Wean at 7-8 months, 400-450 lb.
(2) Gain 1-1.25 lb./day first winter, 600-625 lb.
(3) Spring and summer pasture gain, 1-1.5 lb./day.
(4) Weigh 650-700 lb. by breeding and 825-850 lb. by second winter.
(5) Gain 1 lb./day second winter, 950-1000 lb. at calving.

Rations suitable to meet winter gains are given in table 6.

Table 6. Rations[1]

Gain 1-1.25 lb./day, 500 lb. Nonpregnant Heifer
(1) 30 lb. corn silage and 1.5 lb. plant protein supplement
(2) 10 lb. mixed hay and 5.0 lb. ground ear corn

Gain 1.0 lb./day, 800 lb. Pregnant Heifer
(1) 45 lb. corn silage and 2.0 lb. plant protein supplement
(2) 15 lb. mixed hay and 6.0 lb. ground ear corn

[1]Feed according to condition of heifers, decrease if fat and increase if excessively thin.

IMPACT OF PINKEYE (INFECTIOUS BOVINE KERATOCONJUNCTIVITIS) ON WEANING AND POSTWEANING PERFORMANCE OF HEREFORD CALVES

F. A. Thrift

Pinkeye (Infectious Bovine Keratoconjunctivitis) has been a problem plaguing cattlemen for many years (Ensminger et al., 1955). The condition seems to be more prevalent in young cattle during the spring and summer months, and the traditional method of attacking the problem has centered around administering of medication(s) together with isolation of afflicted animals away from direct sunlight (Wilcox, 1968). There has been little or no study to ascertain the effect that pinkeye contracted during the preweaning period has on animal performance. Consequently, the present investigation was undertaken to study the impact of pinkeye on weaning and postweaning performance of a group of purebred Hereford calves.

Data utilized for this study were collected on 158 purebred Hereford calves born in a single herd during the spring of 1971. Most of the calves, which were the progeny of 12 sires, were born during March and the cows together with their calves were allotted at random on a within calving date, sire of cow and age of cow basis to 12 breeding groups during the second week of April to comply with a specified breeding procedure (Thrift, 1971). Each of the 12 breeding groups was allotted at random to one of 12 comparable fescue-ladino clover pastures. Breeding began on May 10 and was terminated on July 15 at which time the 12 breeding groups were allotted at random into two groups to facilitate use of the fescue-clover pasture and automatic water supply system.

During the last week of July, all calves were subjectively scored for the presence or absence of pinkeye as each calf stood in a holding chute. Late July was chosen as the time of evaluation since previous observation in this herd revealed that the incidence of pinkeye was greatest during the latter part of July and the early part of August. Also, this time period coincided with what appeared to be a maximum face fly population and much of the fescue-clover pasture had matured and gone to seed. Both of these environmental factors appear to contribute greatly to the pinkeye problem. The calves were evaluated only once, and no attempt was made to associate the incidence of pinkeye with eyelid pigment nor was any attempt made to assess the severity of each individual case of pinkeye. Prior to and after their evaluation, no medication of any type was administered to those calves that had the pinkeye condition nor were any of these calves isolated from the herd. All cattle were sprayed periodically for control of flies.

The calves were assessed to have either no pinkeye or some pinkeye in the right, left or both eyes. This method of evaluation provided for the following simple pinkeye classification: absence of pinkeye and presence of pinkeye. Where pinkeye was present, calves were classified as having pinkeye in one or both eyes; however, when pinkeye was present in one eye, no attempt was made to distinguish right from left eye in the data summarization. Of the 33 calves having pinkeye in only one eye, 20 had pinkeye in the right eye and 13 had pinkeye in the left eye.

The calves were weaned during early October at an average age of 205 days. All of the bulls were placed on a 160-day postweaning feeding test and received an ad libitum feeding of corn silage plus some shelled corn and protein supplement. After weaning, all of the heifers remained on fescue-clover pasture until the 160-day performance test was concluded. These heifers did not receive any supplemental feed during the 160-day period since they would not be bred until two years of age. Consequently, most of the heifers lost weight during the 160-day period after weaning.

Weaning and postweaning data for the bulls and heifers by pinkeye classification are presented in table 1. For 205-day weight, there was a 36 and 40 pound advantage for bulls and heifers, respectively, that had no pinkeye compared to those that had pinkeye. For the postweaning data, bulls that had no pinkeye during the preweaning period had a greater weight per day of age, final weight and 365-day weight. A similar trend is evident for the heifers although the differences are not statistically significant. It would appear that, especially for bulls, the pinkeye condition does have some carry-over effect into the postweaning period.

Table 1. Means for Weaning and Postweaning Traits by Pinkeye Classification and Sex of Calf

Pinkeye classification[a]	Weaning: No.	Weaning: 205-day weight	Postweaning: No.	Postweaning: Weight per day of age	Postweaning: Actual yearling weight	Postweaning: 365-day weight
			Bulls			
Absent[b]	50	332	45	1.74	671	657
Present[c]	28	296	27	1.55	586	587
Difference		36**		.19**	85**	70**
			Heifers			
Absent[b]	63	322	61	0.74	287	284
Present[c]	17	282	13	0.68	263	267
Difference		40**		0.06	24	17

[a]Calves evaluated during last week of July.

[b]No pinkeye in either eye.

[c]Pinkeye in right, left or both eyes.
**$P < .01$.

In table 2, data for both sexes combined are summarized by sire group for the two pinkeye classifications. The information presented in the right hand column indicates that the incidence of pinkeye varied from a low of 0% to a high of 62% ($P < .01$) for the various sire groups. Although the values presented in table 2 are somewhat misleading because of the differing number of offspring weaned per sire, these results suggest that some of the sire groups probably expressed more genetic resistance to the pinkeye condition than others.

Table 2. Percent Incidence of Pinkeye by Sire Group

Sire	Pinkeye classification[a]		Percent incidence
	Absent[b]	Present[c]	
1	8	5	38
2	6	3	33
3	12	8	40
4	10	1	9
5	15	2	12
6	7	1	13
7	5	8	62
8	12	2	14
9	5	7	58
10	14	5	26
11	12	0	0
12	7	3	30
Total	113	45	28

[a]Calves evaluated during last week of July.

[b]No pinkeye in either eye.

[c]Pinkeye in right, left or both eyes.

There was a higher incidence of pinkeye in bulls than in heifers (table 1). Thirty-six percent of the bulls had some degree of pinkeye compared to only 21% of the heifers. This 15% increased incidence of pinkeye in the bulls was statistically significant ($P < .05$). Of the bulls having pinkeye, 36% expressed the condition in both eyes as compared to 12% for the heifers. This 24% difference in favor of the heifers approached statistical significance ($P < .05$). It may be that bulls are more susceptible to pinkeye than heifers, or these results may be a reflection of the fact that bull calves tend to move around more in the pasture than heifers especially when cows are in heat. This increased contact with individuals within the herd would increase their chances of contracting the pinkeye condition if they were genetically susceptible.

Literature Cited

Ensminger, M. E., M. W. Galgan and W. L. Slocum. 1955. Problems and practices of American cattlemen. Wash. Agr. Exp. Sta. Bull. 562.

Thrift, F. A. 1971. Beef cattle breeding research at the West Kentucky Substation. Unpub. data.

Wilcox, G. E. 1968. Infectious bovine kerato-conjunctivitis. A review. Vet. Bull. 38:349.

BEEF GRADING AND ITS RELATIONSHIP TO KENTUCKY PRODUCED BEEF

James D. Kemp

There are many ways of feeding cattle to slaughter weight. Three ways that have been used in Kentucky are:

1. Feeding forage alone.

2. Feeding grain on grass.

3. Feeding concentrates in drylot after feeder cattle have received mother's milk and pasture.

These three systems have their own characteristics and produce beef with varying quality attributes. For example, table 1 gives some approximate comparative carcass traits for the three groups.

Table 1. General Carcass Traits from Different Feeding Systems

Trait	Grass Only	Grass + Grain	Feedlot
Carcass wt.	Lightest	Intermediate	Heaviest
Dressing %	Lowest	Intermediate	Highest
External Fat	Thin	Intermediate	Thick
Marbling	Very little	Intermediate	Most
Quality Grade	Standard	Good to Choice	Choice
Yield Grade	Highest	Intermediate	Lowest
Color of Fat	Slightly yellow to yellow	Slightly yellow	White

Carcass weight is a function of age and rate of gain. Since grass cattle normally gain more slowly than fed cattle except in flush pasture seasons the carcasses would be lighter at equivalent age. However, since part of the extra weight of feedlot cattle is fat the difference in retail cuts or edible portion is less than indicated by carcass weight.

Dressing percent is related mainly to fatness and fill. Grass cattle carry less fat and normally will have more rumen contents and thus will have a lower dressing percent. Therefore packers may be justified in paying less for cattle of this type especially when carcasses are sold mainly on the basis of quality grade.

External fat increases as the amount of feed increases so feedlot cattle are normally fatter. External fat is the single most important factor in determining yield grade which is used to estimate cutability. Thus we would expect the grass cattle to have higher yield grades.

Marbling increases with feeding time and maturity. It is the single most important factor in determining quality grade. Thus we would expect longer fed cattle to have higher quality grades.

Quality grade is primarily a function of marbling as stated above and would be higher in the fed cattle.

Yield grade is related to external fat, kidney fat and muscling in relation to carcass weight. Thus the grass cattle would have a big advantage from this standpoint.

Color of fat is much more pronounced in grass cattle. Yellow fat has traditionally been considered inferior although there is no official discrimination against it by the U.S.D.A. Grading Service. It has been associated with old animals and dairy type cattle such as Jerseys and Guernseys. Nutritionally there is little difference in yellow and white fat. Yellow fat contains carotene which is a precursor of Vitamin A. There is no taste difference. There is still some retailer and consumer resistance against it even though it is not justified.

For some time various segments of the beef industry have recommended that changes be made in the beef carcass specifications for various grades. Research has shown that the relationship between marbling and tenderness is very low in cattle up to 30 months of age. Conformation has little or nothing to do with eating quality and only a minor influence on cutability. The U.S.D.A. studied proposals and suggestions from various groups and individuals and in 1974 established tentative new beef grade standards. The old and new standards are depicted on the accompanying grade charts. After publishing the proposals in the Federal Register and weighing the comments of interested people, it was decided to implement the new standards on April 14, 1975. Shortly before this date, however, a restraining order was issued postponing the implementing date. At the time of this writing it has not been established when or if the new standards will be used.

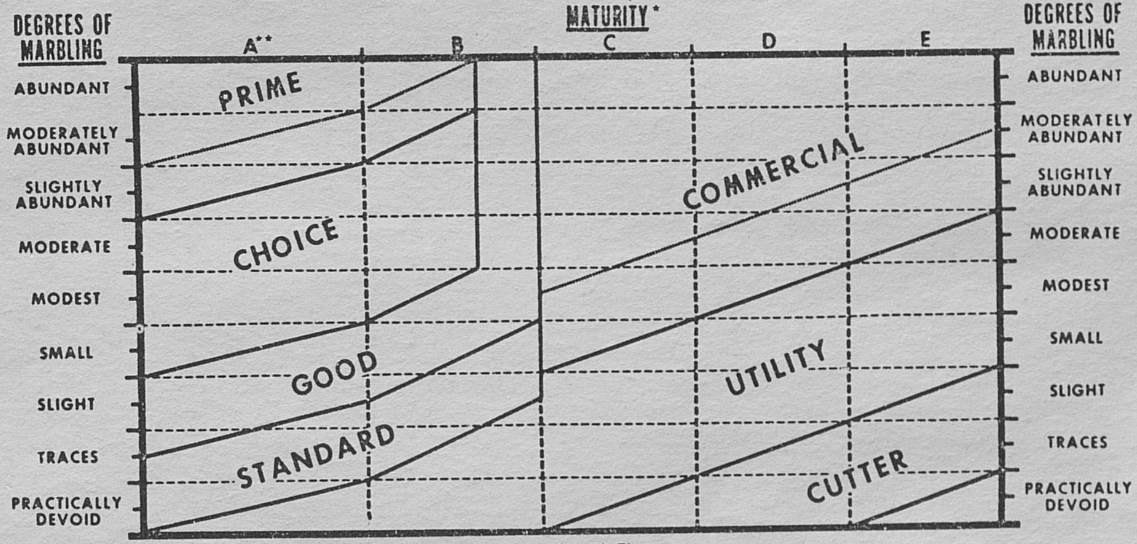
The major changes in the new standards are:

1. Conformation is no longer being considered in determining quality grades.

2. For beef from cattle under approximately 30 months of age, the minimum amount of marbling required in Prime, Choice and Standard grades would be set at the level now required for the youngest that qualify as beef. Only in beef from older cattle will marbling requirements increase as maturity increases.

(Old Standards)

RELATIONSHIP BETWEEN MARBLING, MATURITY, AND QUALITY



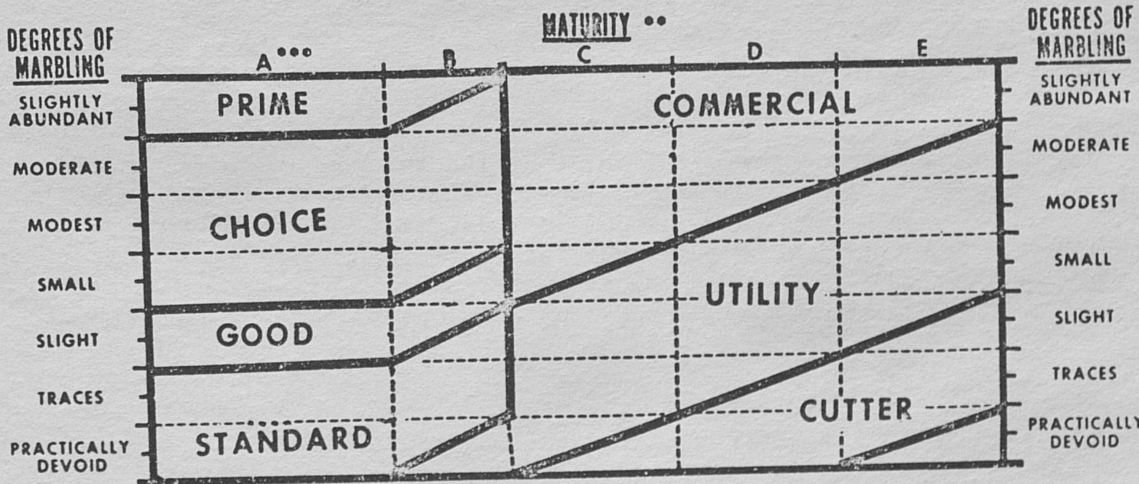
*Maturity increases from left to right (A through E)

**The A maturity portion of the Figure is the only portion applicable to bullock carcasses.

——Represents midpoint of Prime and Commercial grades.

(New Standards)

RELATIONSHIP BETWEEN MARBLING, MATURITY, AND CARCASS QUALITY GRADE *



*Assumes that firmness of lean is comparably developed with the degree of marbling and that the carcass is not a "dark cutter."

**Maturity increases from left to right (A through E).

***The A maturity portion of the Figure is the only portion applicable to bullock carcasses.

3. The Good grade has been narrowed. For the youngest carcasses the marbling requirement is increased while for the older carcasses it is decreased.

4. All carcasses would be identified for quality and yield grade if either is used.

The reduction in marbling requirements would result in slightly leaner beef with less excess fat going into the Prime and Choice grades. This would enable feeders to reduce feeding time somewhat in order to attain the desired grade. For very young grass cattle, however, an opposite effect will be noted in the Good grade in some cases. Cattle with midpoint traces of marbling that have been grading Good will grade Standard.

Let's see how the grade changes affect slaughter cattle in Kentucky.

1. Very young grass cattle. If they are immature and grade as calf there will be no changes. If they are mature enough to grade as beef, those that formerly graded Standard will continue to grade Standard and those grading Low Good will be downgraded to Standard. Those now grading Average Good will stay in the Good grade. In rare cases a carcass of this type might grade Choice. But, in general, more carcasses of this type will be lowered to Standard than will be raised to Choice. Good will become a narrow uniform grade.

2. Grain-on-grass cattle. This group should be helped considerably. Most are under 30 months of age. Other quality attributes such as firmness and color of lean are satisfactory. Many that now grade Good will grade Choice. Work at U.K. has shown that an average carcass grade of Low Choice was obtained on cattle grazed 56 days and then fed grain-on-grass for 112 days. Under the new grading system the same feeding regime should boost this grade to average or Top Choice which would mean that most or all would grade at least Low Choice. If the feeding period were reduced, an average of Low Choice could still be attained although some carcasses would probably grade Good. I believe the new grading system would be "tailor made" for the grain-on-grass type of program. If pastures could be improved further and the grazing period extended, more acceptable beef per acre could be produced with a minimum of grain.

3. Feedlot cattle. This system of beef production is more prevalent in the Western Plains and Corn Belt but is used to a limited extent in Kentucky. If grain prices in relation to cattle prices should become more favorable, feedlots are likely to be

filled again. The time required to produce Choice cattle will be reduced because of the new grade standards. There will be no particular advantage to Kentucky in this as the large Western and Midwestern lots will do the same thing. However, if grain prices become more favorable, feeder cattle should recover in price.

Although there is a limited market for slaughter cattle from grass alone, this type of production is not likely to expand at a rapid rate unless the price of grain stays extremely high or the world demand for grain for human food increases. The grass beef is wholesome and can be very palatable if properly prepared. However, the weight of saleable meat is much less per breeding unit and the amount of labor required to slaughter and process the product per unit of weight is greater. Thus packers and retailers are likely to handle this type of beef only when the spread between farmer and consumer is enough greater than for grain fed beef to allow a reasonable profit. Thus, over the long run, production of beef for slaughter strictly from grass is not likely to be profitable.

On the other hand, with improved pastures and with limited feeding, maximum use can be obtained from forage and more pounds of meat can be obtained per breeding unit and per acre. Also consumers are more likely to be satisfied with the flavor of more mature beef.

So I think we have a good thing working in our favor if the grade changes occur. Grain can be fed on grass to produce Choice cattle. If grain prices become more favorable and the price of feeders advance, it will be very simple to switch back to selling feeder cattle or have a combination program.

A GOLDEN OPPORTUNITY FOR GRADED AND GROUPED FEEDER CALF SALES IN KENTUCKY-SERIOUS PROBLEMS YET TO BE FACED

Everette Mackey*

Kentucky farmers have the largest feeder calf crop on record. Most of these calves (over 1,000,000) will move sometime this year to new homes where finishing for slaughter is the farmer's business. This crop of calves properly prepared for market and properly merchandized could attract and "satisfy" buyers from far and wide. Kentucky's feeder calf could do a good job for the feeder this year and build better reputations. Kentucky is feeder calf country with a lot of fine quality feeder calves. Feeder calves are a major source of income to Kentucky cattlemen. Leadership in the industry is necessary if this big crop moves in the appropriate fashion. Graded and grouped marketing affords an excellent opportunity for feeder calf associations, working with their livestock auction market, the Kentucky Beef Cattle Association and the Cooperative Extension Service, to merchandise 100,000 of these calves in graded and grouped demonstrations.

Some of the serious problems facing the program are:

1. How to get the buyers here who want Kentucky calves.

2. Increasing the size of the sale lot. The graded program averaged 12 head per sale lot in 1970 and 7 in the fall of 1974. Spring sales to date, 1975, averaging 7 head per sale lot, show a trend that must be reversed.

The following reports are a brief resume from 1970-74 and a summary of 1974, for your use in planning and carrying out an improved feeder calf marketing program.

1974 Highlights with Comparisons for Graded and Grouped Feeder Calf Sales in Kentucky

	1970	1971	1972	1973	1974
Spring Sales	7	9	11	12	10
Fall Sales	31	34	45	46	51
Total Sales	38	43	56	58	61
Total Head	36,700	49,000	58,000	53,000	55,307
Av. Size Sale Lot	12	8	9	8	8
Average Weight	476	488	490	506	517
$ per Cwt.	$32	$34	$42	$52	$31.44
$ per Head	$152	$164	$207	$263	$163
$ Total Sale Value (Mil. $)	5.6	8.1	11.7	13.9	8.0

*Department of Agricultural Economics.

An average of 38 sales per year from 1960 to 1970 were included in the graded calf market program. These programs marketed about 10 percent of the total calves. The sales were held in about one-third of the auction markets in Kentucky.

To be most effective this method should be available to more areas of Kentucky. It should also include at least one-fourth of the total calves marketed. This would require 100 graded sales with an average of 1,000 calves at each sale. This would require a doubling of the present program.

Changes in the Offerings at Graded Feeder Calf Sales. 1970 to Date

	1970	1971	1972	1973	1974	Spring 1975
	Percent of Total Calves					
Angus	57	54	51	47	44	37
Hereford	27	24	20	18	16	17
Charolais	1	5	7	11	13	17
BWF	--	--	11	13	14	18
Mix	15	17	8	8	9	8
Holstein	--	--	3	4	3	4

Note: With limited facilities that can process 1000 calves, all breeds other than Angus will be plagued with inadequate numbers of about 80 to 180 of each breed. Offerings totaling 180 Black/Whitefaced calves might include 108 steers in 20 pens averaging 5 calves and 72 heifers grouped in 15 pens averaging 5 calves. Angus and Hereford accounted for 84% of the calves in 1970 but only 54% in 1975.

Kentucky Feeder Calf Sale
1975 Spring Sale Summary of 18 Sales
January 17 to April 22, 1975

Breed	No. Head	Average Weight (lb.)	Average Price $/Head	Average Price $/Cwt
Steers				
Angus	2882	515	151.35	29.37
Hereford	1307	538	158.55	29.46
Charolais	1178	551	148.52	26.94
B&W Face	1238	527	161.98	30.71
Crossbred	682	556	134.07	24.11
Holstein	478	628	129.04	20.56
Total and Average	7765	537	150.93	28.10
Heifers				
Angus	1808	456	99.86	21.92
Hereford	816	450	96.05	21.33
Charolais	969	492	101.35	20.61
B&W Face	1036	452	102.72	22.71
Crossbred	340	486	87.10	17.93
Holstein	0	0	0.0	0.0
Total and Average	4969	463	99.25	21.43
Grand Total	12,734	508	130.77	25.73

Total number of pens = 1715
Average number per pen = 7

Kentucky Feeder Calf Sale
1974 Fall Sale Summary of 51 Graded Sales

Breed	No. Head	Average Weight (lb.)	Average Price $/Head	Average Price $/Cwt
Steers				
Angus	12,101	532	163.26	30.71
Hereford	4680	535	161.10	30.11
Charolais	3710	552	160.26	29.02
B&W Face	3920	529	166.37	31.47
Crossbred	2718	571	146.15	25.62
Holstein	1194	659	149.88	22.75
Total and Average	28,323	544	160.73	29.57
Heifers				
Angus	6417	460	111.46	24.21
Hereford	2428	473	113.78	24.07
Charolais	2147	504	121.28	24.05
B&W Face	2489	473	117.08	24.74
Crossbred	1260	487	107.17	22.00
Holstein	0	0	0.0	0.0
Total and Average	14,741	473	113.85	24.06
Grand Total	43,064	520	144.69	27.85

Total number of pens = 5913
Average number per pen = 7

SUMMARY OF PERFORMANCE TESTED BULL SALES IN 1975

Russell BreDahl

The three tables that follow summarize three sales of performance tested bulls held in Kentucky in the spring of 1975. The sales were co-sponsored by the University of Kentucky and the Kentucky Beef Cattle Association. Bulls that were sold in the two sales at Princeton had been tested on individual breeders' farms according to procedures specified in the University of Kentucky's on-farm performance testing program. They averaged about 2 years of age at sale time. The bulls sold at Paris were only 12 to 13 months of age at sale time. They were the top performing 2/3 of each of the six breeds represented at the 1974-1975 Kentucky central bull test.

Similar sales are planned for 1976. To be eligible to sell bulls in any of the sales a breeder must have his herd enrolled in the Kentucky on-farm performance testing program. Further information about performance testing can be obtained from your county extension agent for agriculture and in Kentucky Cooperative Extension publications ASC-3, ASC-4 and ASC-5.

On Farm Performance Tested Bull Sale
Princeton, Kentucky
14 March 1975

Breed	No.	205-Day Adj Wt.	ADG	WPA	365-Day Adj Wt.	Price
Angus	41	592	3.10	2.87	1083	739.88
Charolais	11	647	3.42	3.16	1193	689.55
Chianina %	1	623	3.10	2.97	1119	500.00
Simmental %	7	614	3.38	3.11	1153	650.71
All Bulls	60	605	3.19	2.95	1112	716.25

On Farm Performance Tested Bull Sale
Princeton, Kentucky
21 March 1975

Breed	No.	205-Day Adj Wt.	ADG	WPA	365-Day Adj Wt.	Price
Hereford	5	499	3.01	2.67	980	580.00
Polled Hereford	71	538	3.02	2.74	1021	681.41
All Bulls	76	536	3.02	2.73	1018	674.74

On Farm Performance Tested Bull Sale
Paris, Kentucky
31 March 1975

Breed	No.	205-Day Adj. Wt.	ADG	WPA	365-Day Adj Wt.	Price
Angus	20	512	2.71	2.44	917	567.50
Charolais	13	625	3.29	2.95	1123	486.92
Chianina %	4	573	3.21	2.87	1067	425.00
Maine Anjou %	1	804	3.39	3.24	1291	425.00
Polled Hereford	11	589	2.86	2.64	1010	735.91
Simmental %	23	609	3.03	2.76	1060	558.70
All Bulls	72	583	2.98	2.70	1028	565.97

BEEF CATTLE PUBLICATIONS AVAILABLE FOR DISTRIBUTION

The following publications pertaining to beef cattle are available to you without cost. They may be obtained through your County Extension Agent's Office.

Publication Number	Title
ASC-3	Learn the Modern Cowboy Lingo
ASC-4	Preweaning Evaluation of Growth Rate
ASC-5	Postweaning Evaluation of Growth Rate
ASC-6	Artificial Insemination for the Beef Cattle Herd
ASC-7	Nonprotein Nitrogen in Beef Cattle Rations
ASC-8	Feeding and Management of the Beef Female
ASC-9	Nutrient Requirements of Beef Cattle
ASC-10	Choosing a Protein Supplement
ASC-11	Individual Identification of Cattle
ASC-12	Balancing Rations for Beef Cattle
ASC-15	Diethylstilbestrol in Beef Production
ASC-16	Grass Tetany in Beef Cattle
ASC-17	Double Muscling in Beef Cattle
ASC-23	Backgrounding Lightweight Calves in Kentucky
ASC-25	Implants for Improving Growth and Feed Efficiency
AEN-16	A Mineral Feeder for Cattle
ID-9	Salvage Feeds for Beef Cattle
ID-13	Beef Corral Essentials
ID-14	Beef Health and Management Calendar
ENT-4	Cattle Backrubber
ENT-11	Control of Beef Animal Insects
VET-2	Stomach Worm Disease of Cattle
VET-3	Infectious Bovine Rhinotracheitis
VET-4	Preconditioning Feeder Calves
VET-15	Blackleg in Cattle

4M---6-75