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Backgrounding of Feedlot Cattle - Levels of Grain on Pasture

L.B. Embry
South Dakota State University

South Dakota State University
Brookings, South Dakota
Department of Animal Science
Agricultural Experiment Station

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Backgrounding of Feedlot Cattle--Levels of Grain on Pasture

L. B. Embry

Utilization of appreciable quantities of roughage for growing and finishing feedlot cattle means some restriction on rate of production in comparison to that obtained from diets containing more liberal quantities of concentrates. Periods of restricted growth of cattle have been shown to be followed by an accelerated rate of growth with an improvement in feed efficiency in comparison to more liberally fed animals during later finishing periods with high-concentrate diets. Thus, there can be some compensation in both rate and efficiency of gain following periods of restriction. However, the amount of compensation may vary depending upon the comparative degree and length of the periods of restriction and liberal feeding.

Periods of restricted growth may be varied in degree by amounts and types of feeds offered and in length by the time such diets are fed. The reduction in performance should be that resulting from a reduced energy intake rather than from deficient levels of protein, minerals and vitamins. Of primary concern in the degree and length of restriction in the total feeding operation are the effects on amounts of various feeds and total time required to produce slaughter cattle of desirable weight and grade.

Experiments have been conducted at this station during the past 5 years to obtain this kind of information where steers were fed various levels of grain on pasture prior to a high-concentrate finishing phase. Four experiments have been completed and are summarized for this report.

Procedures

Steers used in the four experiments were purchased as calves in the fall and fed wintering rations composed of prairie hay and protein supplement. Rates of wintering gain ranged from about 0.75 to 1.25 lb. daily for various wintering treatments. When the pasture had made sufficient growth in the spring, the calves were trucked to Brookings and the experiments were started.

Pasture Phase

The same pasture area was used in each of the four experiments. It was established the year prior to the first experiment and consisted of alfalfa-grass mixture (bromegrass and intermediate wheatgrass). The pasture was seeded for a stand of about equal parts of alfalfa and the grasses. Alfalfa predominated

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the first year with some increase in the grasses in subsequent years. The pasture was fertilized each year in early spring with a typical application being 125 lb. of 18-46-0 per acre.

Levels of rolled corn grain fed daily were 0 (control), 3 lb., 6 lb., and a full feed. Each grain treatment was replicated four times. Acres per replicate (paddock) provided were 5 for the control and 3-lb. groups, 3.75 for the 6-lb. group and 2.5 lb. for those full-fed. The area was of good productivity and ample grazing was available for all groups throughout the grazing season each year.

Steers in all paddocks receiving grain were started at 3 lb. per head daily. The grain was increased at a rate of 1 lb. daily to 6 lb. for this group and until grain remained in the feed bunk at the next feeding for the full-fed group. Grain was fed once daily in feed bunks located near the water supply. Salt and dicalcium phosphate were supplied on a free-choice basis. The steers were implanted with diethylstilbestrol at the beginning of the grazing phase of the experiments.

For the first experiment, eight steers were allotted to each paddock and rotational grazing was not used this year. Some steers were removed during the season to provide ample grazing for those remaining. Those removed were fed alfalfa-bromegrass hay and the same grain treatment level as they received on pasture. Weight gains for this year were based on steers remaining on the pasture throughout the season.

During the subsequent 3 years, procedures were essentially as for the first year except each paddock was divided for rotational grazing. Only four steers were used per paddock and one side was harvested for hay at a typical hay stage. The regrowth was then used in the rotational grazing.

The cattle were weighed at approximately 4-week intervals during the grazing season. The grazing phase of the experiments was terminated when the forage became short or before problems were encountered with freezing of above-ground water lines to the water tanks in years when there was ample forage for late grazing.

High-Concentrate Finishing Phase

Upon termination of the pasture phase of the experiments, the cattle were allotted into replicated pens on basis of previous levels of grain feeding for a high-concentrate finishing phase.

During this phase of the first experiment, whole corn grain was fed with 2 lb. of a 40% protein supplement without roughage for about 2 months. Thereafter, alfalfa-bromegrass haylage was fed at 3 lb. per head daily to prevent consumption of bedding by the cattle. Whole corn was also fed in the second and third experiment, but the corn was rolled for the fourth experiment.

Alfalfa-bromegrass hay was fed at 2 lb. per head daily in the second experiment. In the last two, alfalfa-bromegrass haylage was fed at 3 lb. per head daily. A 32% protein supplement was fed at 2 lb. per head daily in the last three experiments. The steers were fed diethylstilbestrol at 10 mg. daily in the first three experiments and implanted with DES or zeranol in the fourth one.

In the first experiment, the cattle were started on an all-concentrate diet and were increased rapidly to a full feed. In subsequent years, typical starting rates for corn were 3 lb. daily for steers fed no corn or the 3-lb. level on pasture, 6 lb. for those fed 6 lb. and 10 lb. for those full-fed during the grazing period. Alfalfa-bromegrass forage was included at levels so that the air-dry feed was about 15 lb. initially. Corn grain was increased by 1 lb. per head daily to a full feed with the forage dry matter being decreased by a similar amount to the constant level fed during the experiments.

All steers within a treatment group were marketed at the same time. An average weight of 1150 lb. was selected, but there was some variation from this weight.

Results

Pasture Phase

Results for the pasture phase of the experiments averaged for the 4 years are presented in table 1. Daily feed of corn did not quite equal the treatment levels for the 3- and 6-lb. groups. Rains and resulting soft lanes prevented feeding on some days during the experiments. The average intake for the full-fed group was 13.9 lb.

Table 1. Grain Feeding on Pasture--Pasture Phase
(Average 1969, 1970, 1971 and 1972)

	Level of corn, lb./head daily			
	0	3	6	Full fed
Number	64	65	70	79
Avg. pasture days	127	127	127	127
Avg. init. shrunk wt., lb.	568	570	572	564
Avg. final shrunk wt., lb.	747	792	814	867
Avg. gain/head, lb.	179	222	242	303
Avg. daily gain, lb.	1.41	1.75	1.91	2.39
Avg. daily feed, lb.				
Rolled corn grain	--	2.81	5.56	13.87
Feed/100 lb. gain				
Pasture days	71	57	52	42
Rolled corn grain, lb.	--	161	291	580
Feed/head, lb.				
Rolled corn grain	--	357	706	1761

Rate of gain increased for each higher level of grain. However, the increase per pound of corn decreased with increasing levels of grain, amounting to 0.121, 0.090 and 0.071 lb. daily for the 3-lb., 6-lb., and full-fed levels over the no-grain control. These values show a low response to the various levels of grain supplementation. Forage consumption would be reduced with increasing levels of grain consumed, but it was not measured in these experiments. Stocking rate was the same for the 3-lb. level of grain as for the no-grain control, but it was increased 1.5 and 2.0 times for the 6-lb. and full-fed levels. Forage growth indicated that the no-grain group exerted the greatest grazing pressure.

Feed requirements per 100 lb. of gain as pasture days and corn grain may be used to calculate costs at this stage of the experiment by use of appropriate charges for corn grain and pasture. These costs along with the cost of the cattle at beginning of the pasture season could be used to arrive at the investment in the cattle at this stage of growing and finishing. Also of importance is the effect the various levels of production up to this stage will have on gain and feed requirements during drylot finishing. These data were obtained during a drylot finishing phase with high-concentrate diets.

Drylot Finishing

Results of the finishing phase with the high-concentrate diets are shown in table 2.

An important consideration when cattle are backgrounded for equal time but for various rates of gain is that the periods for finishing will vary. Therefore, there may be some important differences in climatic environment and the cattle will be sold on different markets. These may have major effects on performance of the cattle and on economic returns.

Initial weight at the beginning of the high-concentrate finishing phase increased with increasing levels of the previous grain feeding. Final weights were not as uniform as desired, but these are not believed to seriously affect average daily gains over the finishing period.

Previous level of grain feeding did not appear to have any important effect on the rate of gain during this phase of the experiment. An important factor to consider here is that there apparently was enough increase in energy content of diets between the pasture and finishing phases to support a substantial increase in weight gain even for the cattle full-fed corn during the pasture phase. This may explain a lack of compensatory growth that has been reported on several occasions by various researchers. Another factor favoring the cattle previously fed the higher levels of grain is that they were brought to a full feed of the high-concentrate diets at a more rapid rate.

Feed consumption and feed efficiency were quite similar except steers full-fed corn on pasture consumed slightly less feed and were slightly more efficient. However, they were marketed at a lighter weight and were fed under more favorable weather conditions that the other groups.

When marketed at similar weights, there were only slight differences in the carcass characteristics measured.

Table 2. Grain Feeding on Pasture--Drylot Phase
(Average 1969, 1970, 1971 and 1972)

	Level of corn, lb./head daily			
	0	3	6	Full fed
Number	79	79	77	79
Days fed	131	112	101	79
Avg. init. wt., lb.	747	791	813	867
Avg. final wt., lb.	1167	1144	1145	1124
Avg. daily gain, lb.	3.21	3.15	3.29	3.25
Avg. daily feed, lb.				
Alfalfa-brome forage[a]	3.28	3.35	2.94	2.28
Corn grain[b]	19.61	19.40	20.05	19.13
Suppl.	1.96	1.96	1.95	1.97
Total	24.85	24.71	24.94	23.38
Feed fed/head, lb.				
Alfalfa-brome forage	430	375	297	180
Corn grain	2569	2173	2025	1511
Suppl.	257	220	197	156
Total	3256	2768	2519	1847
Feed/100 lb. gain, lb.				
Alfalfa-brome forage	102	106	89	70
Corn grain	611	616	609	589
Suppl.	61	62	59	61
Total	774	784	757	720
Carcass wt., lb.	708	700	703	687
Dressing percent	60.7	61.2	61.4	61.1
Conformation[c]	20.9	21.3	21.2	21.6
Marbling[d]	5.9	5.5	5.5	5.5
Final grade[c]	19.7	19.2	19.2	19.2
% kidney fat	3.1	3.1	3.1	3.0
Color[e]	4.7	4.9	4.9	5.3
Firmness[f]	5.6	5.7	5.7	5.5
Maturity[g]	22.5	22.5	22.6	22.8
Rib-eye area, sq. in.	11.45	11.44	11.40	11.65
Fat thickness, in.	0.54	0.51	0.54	0.56

[a]Fed as hay in the first two experiments and as haylage in the last two experiments.

[b]Fed as whole grain in three experiments and as rolled grain in one experiment.

[c]Prime = 23, Choice = 20, Good = 17.

[d]Modest amount = 6, small amount = 5.

[e]Light cherry red = 5, cherry red = 4.

[f]Firm = 6, moderately firm = 5.

[g]A maturity = 23, B maturity = 22.

Combined Backgrounding and Finishing Phases

Steers fed no grain when on pasture made the lowest rate of gain (2.26 lb.) daily during both phases of the experiment (table 3). They were fed for a total of 258 days. If all cattle had been fed to the same final weight of 1150 lb., the number of days of drylot finishing on basis of daily rates of gain obtained (table 2) would have been 126, 114, 102 and 87, respectively, for the 0, 3-lb., 6-lb. and full-fed levels of grain.

Table 3. Combined Pasture and Drylot Phase
(Average 1969, 1970, 1971 and 1972)

	Level of corn, lb./head daily			
	0	3	6	Full fed
Days fed				
Pasture	127	127	127	127
Drylot	131	112	101	79
Total	258	239	228	206
Avg. init. wt., lb.	568	570	572	564
Gain/head, lb.				
Pasture	179	222	242	303
Drylot	420	353	332	257
Total	599	575	574	560
Avg. daily gain, lb.	2.32	2.41	2.52	2.72
Feed fed/head, lb.				
Corn grain	2569	2530	2731	3272
Alfalfa-brome forage	430	375	297	180
Suppl.	257	220	197	156
Total	3256	3125	3225	3608
Days/100 lb. total gain				
Pasture	21.2	22.1	22.1	22.7
Drylot	21.9	19.5	17.6	14.1
Total	43.1	41.6	39.7	36.8
Feed/100 lb. of total gain				
Corn grain	429	440	476	584
Alfalfa-brome forage	72	65	52	32
Suppl.	43	38	34	28
Total	544	543	562	644

Since there appeared to be no important differences in carcass characteristics measured between the treatments, differences in cost of producing slaughter cattle under the various systems would be primarily those costs resulting from the differences in amount of various feeds, number of days in drylot and difference in pasture cost because of variable stocking rates with the various levels of grain feeding. Assuming a total gain of 600 lb. for each group, differences in feed requirements in comparison to the control would be as shown in table 4. Calculations are on basis of no changes in performance during the pasture phase and from the daily rate of gains and feed efficiencies shown in table 2 for the remainder of the 600 lb. of total gain.

Table 4. Feed Requirements in Comparison to No-Grain Control For Various Levels of Grain Feeding on Pasture For 600 lb. Total Gain

Item	Grain level on pasture (127 days)		
	3 lb.	6 lb.	Full-fed (14 lb.)
Corn, lb.	+133[a]	+314	+938
Alfalfa-bromegrass, lb.[b]	-28	-110	-221
Protein suppl., lb.	-23	-46	-76
Drylot days	-11	-22	-40

[a](+) values represent a higher requirement and (-) values a lower requirement in comparison to the no-corn control pasture treatment during the pasture phase.

[b]Fed as hay in two experiments and as haylage in two experiments.

Differences in costs of producing finished cattle by the various systems in comparison to the pasture no-grain control group can be estimated by making appropriate charges for the feeds, drylot days and pasture days. The values shown (table 4) indicate that the 3-lb. level of grain might be justified on basis of savings in forage, protein supplement and days in drylot in comparison to the increase in amount of corn at typical prices for these items. More importance probably would have to be given to the fewer days in drylot and the possible heavier stocking rate during the pasture season to justify the system with 6 lb. of grain during the pasture season. In view of the higher requirement for corn in relation to reductions for forage, protein supplement and days in drylot, the full-fed or pasture system would not appear as economical as the systems with lesser amounts of grain.

Summary

During 4 years, steers which had been wintered for rates of gain in the order of 0.75 to 1.25 lb. daily were fed various levels of corn grain during grazing periods of about 4 months. The pasture was an alfalfa-grass mixture (bromegrass and intermediate wheatgrass). Rates of grain feeding were 0, 3 lb., 6 lb. and a full feed (or about 14 lb.) daily. The pasture furnished ample forage for the number of steers used.

Rates of gain increased with increasing rates of grain amounting to 1.41, 1.75, 1.91 and 2.39 lb. per head daily for the four treatments. However, the response in weight gain per unit of increasing grain intake was quite low. There was an increase in daily rate of gain for each pound of corn consumed of 0.121, 0.090 and 0.071 lb., respectively, for the 3 lb., 6 lb. and full-fed treatments in comparison to the no-grain control group. Increasing levels of grain would reduce consumption of pasture forages which was not measured in these experiments. The decrease in forage consumption would mean more animals could be stocked per acre and result in a lower pasture charge per animal.

Feeds fed and pasture days shown in table 1 could be used to calculate costs of gain at the end of the pasture phase of the experiment. These costs with the initial value of the cattle could be used to arrive at the investment in the cattle at this stage of growing and finishing.

Rate of gain during the pasture backgrounding phase appeared to have little effect on the rate of gain when fed high-concentrate finishing diets. Therefore, heavier cattle off pasture required fewer days of drylot finishing. Thus, they were fed under more favorable weather conditions. They also were raised to a full feed of the high-concentrate diets at faster rates. The diets during the finishing phase apparently contained a level of energy capable of supporting a high rate of gain even for the cattle full-fed grain during the pasture phase of the experiment.

There were no large differences in feed efficiency between treatment groups during the finishing phase of the experiment but was slightly lower for steers full-fed corn on pasture.

Carcass characteristics measured showed only small differences between treatment groups when fed to similar final weights.

Differences in feed requirements and days required to produce 600 lb. of gain are presented (table 4). Cost of producing finished cattle under the system of no grain on pasture or the 3-lb. level prior to drylot finishing would not appear to differ greatly. Justification for the 6-lb. level of grain would depend largely on the value placed on the reduction in days in drylot and the possible higher stocking rate on pasture. Gains made from the full-fed group were more costly in terms of feed. However, they required less days in drylot and thus would be marketed at an earlier date. This system would have the most merit where maximum number of cattle are desired on a given acreage with a minimum period of drylot finishing with high-concentrate diets. Additional value might be given to this system where some of the finishing period would be desired on pasture rather than a continuous drylot period.