Feeding Cattle on Grass

OSU Extension Facts

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High operating costs force cattle producers to seek faster gains and increased stocking rates in order to improve profit potentials. Forage quality is a function of plant maturity and is not easily altered. Forage quantity is vulnerable to the quirks of weather, and the producer can do little else but change stocking rates to provide ample forage for grazing cattle. Feeding grain on grass is a tool that can be used to increase daily gain and stocking rates. Decisions about whether to feed grain to calves still nursing cows or to grazing stockers depend on the expected returns compared to added feed costs. An understanding of the factors affecting responses to feeding grain on grass is necessary for making sound decisions.

Why Feed Grain on Grass?

The reasons are many and include considerations such as:

- Increasing carrying capacity.
- Increasing daily gains.
- Extending available forage during short months.
- Providing a carrier for growth promoters.
- Reducing certain health and/or disease problems: e.g. as a carrier for poloxalene (bloat control), Mg (grass tetany), coccidiosis control, etc.
- Increasing protein intake for certain types of cattle grazing certain types of forages (e.g. calves grazing bermuda or range pasture in mid to late summer). This is not applicable for cattle grazing small grains since small grains are high in protein and supply an excess of protein in most cases.
- Teaching calves to eat as related to preconditioning and health management programs.
- Enhancing cattle management considerations such as taming wild cattle, controlling movement of cattle and facilitating daily checking of cattle.

To effectively answer the question, "Should I feed grain on grass?" five points must be considered: 1) the value of the added gain, 2) anticipated feed conversions under grazing conditions, 3) the effect of increased carrying capacity, 4) the value of added performance from additives, and 5) the effect that faster gains on grass will have on subsequent feedlot performance. Many producers rationalize that feeding grain on grass makes for a heavier calf that will gross more total dollars per head at the time of sale. The critical question, however, is: *Will feeding supplemental grain result in more net return per head?*

What Is Extra Gain Worth?

The value of extra gain fluctuates with changing cattle margins. In most cases cattlemen can easily figure the relative prices at any given time. When positive cattle margins exist (heavier cattle are worth more per cwt), the value of extra weight (increasing calf weight 100 lb) is often worth more than when negative margins exist (heavier cattle bring less/cwt than lighter weight cattle). Representative prices for a single day at the Oklahoma City market are shown below:

Weight	Steers, $/cwt	$ Value/head
400	69.00	276.00
450	67.00	301.50
500	65.00	325.00
550	64.00	352.00
600	63.50	381.00
650	63.00	409.50
700	62.50	437.50
750	62.00	465.00
800	61.70	493.60
850	61.50	522.75
900	61.00	549.00

A negative margin existed for this particular day with 900 lb steers worth about $8.00/cwt less than 400 lb steers. Increasing the sale weight of a calf from 400 to 500 lbs would increase its value from $276 ($69/cwt) to $325 ($65/cwt), an increase of $49. The value of each additional pound of weight ($49 ÷ 100 lb = 49¢/lb) is obviously less than the apparent $65/cwt selling price for the 500 lb steer. Conversely, the reverse can be true when lighter weight cattle bring less per pound than heavier and/or fleshier cattle. To figure the value of extra weight (and/or fleshing condition) one needs only to make a realistic estimate of the difference in selling price and do the calculations as illustrated.

Estimating Feed Conversions

The amount and quality of forage available to the cattle have an important bearing on the response to grain feeding. Results from a 4-year study under grazing conditions where cattle had ample forage are shown in Table 1.

In this study, 400-450 lb stocker steers were grazed on small grain pastures for 150-day periods from November to May. One treatment group received no supplemental grain while the other received supplemental grain at an average rate of approximately 1% of body weight daily during the grazing period. The term "steer grazing days per acre" is derived by multiplying the stocking rate per acre by the number of days that the pasture was grazed. For example, if an average of 1.1 steers grazed the pasture for 150 days, there would be 165 steer grazing days per acre (150 x 1.1 = 165).

Table 1. Effect of Feeding Supplemental Grain to Stocker Cattle on Small Grain Pastures (Rye-Wheat)

	Grain /day	Steer Grazing days/acre	Daily gain	Lb beef per acre	Efficiency[1]
Year 1					
Pasture		213	1.30	276	
Pasture + grain	5.4	253	1.75	442	8.2
Year 2					
Pasture		150	1.35	202	
Pasture + grain	6.0	175	1.60	280	13.5
Year 3					
Pasture		196	1.49	292	
Pasture + grain	5.0	248	1.79	443	8.2
Year 4					
Pasture		154	1.50	231	
Pasture + grain	6.0	200	1.82	364	9.0
4 Year Averages					
Pasture		178	1.41	250	
Pasture + grain	5.6	219	1.74	382	

[1]Pounds of feed required/lb of increased gain.

Example calculation of feed conversion using values for 4-year average (Table 1):

219 grazing days per acre × 5.6 lb grain/day = 1226 lb grain fed per acre

382 − 250 = 132 lb extra beef/acre by feeding grain

so that $\frac{1226}{132}$ = 9.3 lb grain for each pound extra beef.

A summary of the results presented in Table 1 is as follows:

	Average advantage from grain feeding
Carrying capacity (steer grazing days/acre)	+ 25%
Daily gain	+ .33 lb/day
Beef/acre	+ 53%
Feed efficiency (lb grain/lb gain)	9.3
Feed efficiency if no advantage were taken of the increased carrying capacity	$\frac{5.6}{.33}$ = 17.0

It is apparent that the carrying capacity, daily gain, and total beef production per acre were increased by supplemental grain feeding as would be expected. The key figure, however, and by far the most meaningful one in the table, is the feed conversion value of 9.3. This figure can be used as a guide to determine the potential profitability of supplemental grain feeding. If supplemental grain can be purchased for $6.75/cwt (6.75¢/lb), then the cost of increased gain would be $.0675 × 9.3 lb grain/lb gain =$.628/lb of added gain. If the value of the extra weight were approximately 50¢/lb, then it would not be profitable to feed grain. In cases where the gain is worth more than 63¢/lb, it is possibly profitable. Feeding supplemental grain to sell more beef can actually result in a monetary loss.

In the previous discussion the feed conversion was 9.2 because advantage was taken of the increased carrying capacity. If, however, a stocker operator did not take advantage of the increased stocking rate, then the feed conversion would become 17.0 (5.6 lb grain to raise gain .33 lb; therefore 5.6 ÷ .33 = 17.0). In this case, if grain cost 6.75¢/lb, the cost of gain would be 1.15¢/lb (17.0 × 6.75¢). This is obviously not profitable. It should be obvious why 1) the anticipated feed conversion, 2) the cost of the grain, and 3) the value of the gain are the key figures in determining potential profitability.

Table 2. Feeding Supplemental Grain on Bermudagrass During July, August, September, and October (200-80-80 Fertilizer/Acre Annually)

	Steer Grain per day	Grazing day/acre	Daily gain	Lb beef per acre	Feed conversion
Year 1					
Pasture	____	206	0.66	135	
Pasture + grain	5	257	1.12	288	8.4/1
Year 2					
Pasture	____	230	0.55	127	
Pasture + grain	5	288	1.00	288	9.0/1
Average					
Pasture		218	.61	132	
Pasture + grain	5.0	273	1.06	288	8.7/1

Table 2 contains information about feeding supplemental grain on bermudagrass pastures during the summer. A summary of the grain feeding responses is as follows:

	Average advantage from grain feeding
Carrying capacity (grazing days/acre)	+ 25%
Daily gain	+ .45%
Beef/acre	+ 118%
Feed efficiency	8.7
Feed efficiency (if no advantage taken of increased carrying capacity)	$\frac{5.0}{.45}$ = 11.1

The increase in stocking rate is again about the same as that observed on small grain (wheat or rye) pasture. In general, bermudagrass in the summer is a lower quality pasture than wheat or rye in the winter and thus will

support somewhat lower gains. Consequently, grain feeding at 1% of body weight will enhance daily gain slightly more than when cattle are grazing small grain pasture and beef/acre will be increased by about twice as much. But the key figure is that the anticipated feed conversion is still nearly the same as previously (8.7 *vs* 9.3 to be exact). If advantage is not taken of the approximately 25% increase in stocking rate, then the feed conversion is 11.1.

Feed Conversions When There Is More Grass Than Needed

Tables 3 and 4 illustrate anticipated feed conversions when there is more grass than needed for the number of cattle being grazed or when high levels of grain are fed. Note in this case that the level of daily grain fed/head was 9.3 and 10.7 lb, respectively—higher than the 5.5 level cited previously. Also, in this case there was ample pasture with no advantage taken of any increased carrying capacity.

Table 3. Supplemental Feed on Wheat Pasture[1]

	Grain/ day	Daily gain	Feed efficiency[2]
Pasture (114 Days) 11/21-3/14	____	1.37	17.5
Pasture + grain	10.66	1.98	

[1]Grain self fed.
[2]F/E = 10.66 / .61 = 17.5/1

Table 4. Supplemental Feed on Wheat Pasture[1]

	Grain/ Day	Daily Gain	Feed Efficiency[2]
Pasture (88 Days)	____	2.22	29.2
Pasture + grain	9.34	2.54	

[1]Grain self fed
[2]F/E 9.34 / .32 = 29.2/1

Under these types of grazing conditions, feed conversions will be poor and rarely, if ever, profitable. The feed conversions were 17.5 and 29.2 in these experiments. In the previous summary of four grazing years (Table 1), the average feed conversion was 16.6 when no advantage was taken of the increased carrying capacity (more grass than cattle). This agrees quite well with the 17.5 lb feed/lb gain observed in Table 3. Thus, it can be summarized that when *pasture quality is good* and when there is *more grass than needed for the number of cattle* anticipated, feed conversions *will invariably be very poor from supplemental grain feeding,* usually ranging from a low of 15 to a high of 30. This simply means that a producer will have to feed from 15 to as much as 30 lb of grain to increase gain 1 lb.

Protein vs Energy Supplements on Bermuda and/or Range

In mid-summer many native or bermuda-grass pastures become quite unpalatable to cattle. It can be expected that the protein and phosphorus contents of these grasses will drop. How, or even if, an attempt should be made to supplement these pastures is not clear, based on many experiments. In many cases gains and feed intake may be improved by feeding a small amount of a high protein supplement. Feeding a larger daily amount may increase gains more but frequently not enough to pay for the feed.

In an Oklahoma test with yearling steers, conducted from April 28 through August 19, 4.54 lb per day of corn increased gain 0.14 lb while the same amount of cottonseed meal increased gain .46 lb. In this case it took 32 lb of corn or 9.87 lb of cottonseed meal per pound of additional weight gain.

Preliminary research at OSU suggests that much lower amounts of soybean meal or cottonseed meal per day (3/4 - 1½ lb/day) may give much more efficient gain increases to calves grazing native range than seen with 4.5 lb/day as in the older research.

The Importance of Daily Gain

The concern for increasing daily gains of grazing cattle is valid. Many cattlemen are surprised to learn that non-feed costs associated with pasture cattle may contribute more to the cost of gain than the feed or pasture costs. There is, then, a minimum daily gain needed just to cover the fixed costs of owning the animal. Table 5 shows a budget for a 180-day grazing program for 400 lb steers on small grain pasture. Costs are shown on a daily basis and then converted to a cost per pound of gain at the end of the budget. The budget illustrates the effect of rate of gain on cost of gain and, in most cases, will define the minimum rate consistent with acceptable cost levels. It should be apparent that programs that produce low level gains are likely to be unprofitable regardless of cattle prices.

If a budget such as the one constructed in Table 5 shows that daily gains without supplemental feed will not adequately cover the daily costs incurred on the cattle, another budget should be figured with supplemental feed. The value of the expected additional gain from grain feeding as well as additional stocking rate, fleshing condition of the cattle, and expected performance of the cattle in the feedlot must all be considered in the new budget.

What About Creep Feeding?

Results of creep feeding under different pasture conditions are shown in Table 6. The results are not only interesting but perhaps a bit shocking to some. Nevertheless, the data illustrated is typical of that seen in other creep feeding experiments. Note that when creep feeding was practiced during the winter months with *poor pasture conditions* (pasture quality for promoting calf growth) and presumably marginal milk production, the feed conversion was quite good, namely, 6.8 (275 lb feed ÷ 40 lb gain = 6.8). However, during the spring and early summer months of *good grass quantity and quality,* the feed conversion

Table 5. Relationship Between Rate of Gain, Daily Costs, and Cost of Gain

Costs of 400 lb steer @ $69/cwt for 180-day ownership		
	Total dollars	*$/day*
Interest on steer @ 18% × 180 days	24.84	.138
Death loss × 2%	5.52	.031
Vet and med at $5.00/hd	5.00	.028
Care and Labor, 180 days @ 7¢/day	12.60	.070
Salt and mineral	1.50	.008
Receiving ration, 14 lb × 21 days @ $180/ton	26.46	.147
Hay, 1 lb × 159 days @ $80/ton	6.36	.035
Operating capital @ 18% for 90 days	2.34	.012
Non-pasture cost totals	84.62	.470
Pasture costs, $2/cwt/mo.	48.00	.267
Total cost	132.62	.737

Cost Per Pound Gained				
Rate of Gain	*Total Gain*	*Non-Pasture Cost,$*	*Pasture Cost,$*	*Total Cost of Gain,$*
.50	90	.94	.53	1.47
.75	135	.63	.36	.99
1.00	180	.47	.27	.74
1.25	225	.38	.21	.59
1.50	270	.31	.18	.49
1.75	315	.27	.15	.42
2.00	360	.23	.13	.36

from creep feeding was very poor; it took 25.8 lb of creep to increase weaning weight 1 lb (619 lb feed ÷ 24 lb gain = 25.8). The feed conversion of 6.8 lb feed/lb gain would stand a chance of being profitable if grain is reasonable in price, but the conversion of 25.8 lb feed/lb gain would rarely, if ever, be profitable.

Again with creep feeding as in feeding supplemental grain to stockers, the poorer the pasture conditions, the better the anticipated feed conversion. Conversely, the better the pasture conditions, the poorer the feed conversion from supplemental grain. In brief, the response can be thought of as a rainbow with the anticipated feed conversions varying from as low as 4/1 to as high as 30/1. To reiterate, the poorer the grass conditions, the better the feed conversion from supplemental grain and vice versa.

Why do we observe such a phenomena? It is probably due largely to feed substitution. A calf on good grass will probably be standing at a feeder eating grain when he should be out eating more grass instead. In either case, he will gain reasonably well. On the other hand, a calf on poor pasture conditions (quality and/or quantity) will gain very poorly on grass only, and, thus, any supplemental grain will enhance gain favorably, resulting in a potentially profitable feed conversion. When pasture conditions deteriorate to the point that a producer is operating under virtually drylot conditions, the anticipated feed conversions will also approach those observed under dry lot conditions.

Table 6. Creep Feeding Fall Born Calves on Native Pasture

	Weaning weight	Increased weight	Pounds creep/calf	Feed efficiency[1]
No creep	360		——	
		40	275	6.8/1
Creep until Spring	400	275		
		24	619	25.8/1
Creep until weaned (July)	424	894		
Overall		64	894	14.0/1

[1] $\frac{275}{40} = 6.8$

$\frac{619}{24} = 25.8$

Summary

It should be apparent that throughout this fact sheet the marginal concept was used. Why? Because this is the way the data must be analyzed from a dollars-and-cents profit potential standpoint. In other words, *How much supplemental grain needs to be fed to sell one more pound of beef?*

Table 7. Summary of Anticipated Performance of Stocker Cattle Fed Supplemental Grain on Grass or Small Grain Pasture

Stocker Cattle		Anticipated Performance
Anticipated feed conversion:		
More grass than needed for number of cattle	=	15 - 30/1
Too many Cattle for available grass, or cattle and grass well balanced	=	8 - 9/1
Carrying capacity[a]	=	+ 25 - 30%
Daily gain[a]	=	+ 0.3 - 0.5
Pounds beef/acre[a]		
On small grain forage	=	+ 50%
On bermuda	=	+ 100%
Use of growth promoters	=	+ .2 lb/day

[a]Grain fed at about 1% of body weight.

In general, feed conversions will be very poor (15-30/1) from supplemental grain feeding when:

1) An excess or sufficient quantity of good quality forage is available for stocker steers.

2) Creep feeding is practiced for calves obtaining good forage and/or milk supplies (e.g. months of May, June, etc. or on wheat pasture).

In general, potentially good feed conversions (5-9/1) might be anticipated when:

1) There are too many cattle for available grass in stocker programs, or cattle and grass are well balanced.

2) Creep feeding is conducted when calves are receiving a forage of low quality and/or low levels of milk (e.g. fall-born calves during winter months).

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