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How to Estimate the Value of Supplementing Grazing Stocker Cattle

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It is easy to estimate the value of supplemental feeding of grazing stocker cattle in Oklahoma when a few key facts are known. These facts include the value of gain, the cost of gain, and the effect the supplement has on forage utilization.

What would the cattle have gained with no supplement?

This is a critical piece of information that often is not known. All too frequently, the gains of nonsupplemented cattle are unknown, and producers and salesmen try to attribute the total gain of the cattle to the supplemental feed. We must determine "additional gain due to supplement." Once this is known, it is then possible to make calculations to see if it is profitable to supplement.

For example, if steers without supplement would have gained one pound per day and the steers under exactly the same conditions plus supplement gain 1.40 pounds per day, then the additional gain due to supplement would be .4 lbs (1.4-1.0 lbs).

The next important task is to estimate the value of additional gain. The classic mistake is to assume that just because calves of a given weight are selling for $1 per pound, then each pound of added gain is worth one dollar. Most of the time the price of cattle rolls back as weight increases as illustrated in Table 1. Notice that even though cattle sold from an average of $82.25 to $107.33/cwt, the value of gain only averaged $60.30/cwt.

The value of gain varies with a number of factors. A major factor is the cost of grain to feedlots. Cheap grain means cheap feedlot gains, and the feedlots will not pay more for added calf weight than the cost of putting on that weight in their feedlot. The value of added weight has remained remarkably close to $50-$60 per hundred range in recent years. There is one very important exception, and that is contract cattle, where delivery price is agreed upon and premiums or discounts for weight or lack of weight are defined by these terms. In this case, the value of gain will be based on the contract price.

When the gain of nonsupplemented cattle, the added gain from supplementation, and the value of added gain as a result of supplementation are known, the returns from supplementation can be computed as in the following example.

Steers will gain one pound per day during the summer season without supplement. Feeding one pound per day of

Table 1. Prices paid for medium-frame number 1 steers at three selected markets, and computed value of gain.

Weight Class	Amarillo	Okla City	San Angelo	Ave.	Value/ Head	Value of Gain
350	$106.00	$105.00	$111.00	$107.33	$375.67	
450	$96.50	$102.00	$101.00	$99.83	$449.25	$73.58
550	$87.50	$94.00	$92.00	$91.17	$501.42	$52.17
650	$85.50	$86.00	$86.00	$85.83	$557.92	$56.50
750	$84.25	$82.50	$80.00	$82.25	$616.88	$58.96
				Average Value of 100 lbs of Gain.		$60.30

Oklahoma Gold cubes (38% protein supplement containing 200 grams per ton of either monensin or lasalocid) will increase gain to 1.60 pounds per day. If the supplement cost 12 cents per day and the resulting 0.60 pound per day of weight gain was worth 36 cents (0.60 pound per day times 60 cents per pound of gain), the practice would net the cattleman 24 cents per day (36 cents minus 12 cent feed cost).

Predicting the gain response due to supplementation

Supplementation of standing forage is most advantageous if the supplement can correct a nutritional deficiency that is seriously interfering with forage utilization. This is often the case when warm-season forages are deficient in protein. The first symptom of protein deficient diets is a reduction of forage intake. Reduced intake severely restricts potential energy intake and thus, restricts potential animal performance.

Tables 2 and 3 show a high probability of protein deficiency in any of these months when high rates of gain are expected with light weight cattle. By the first of July, most Oklahoma forages will be too low in protein to support gains of over 1.0 pound per day even on cattle over 500 pounds. At this time the forage will be too low in protein to support maintenance in light weight cattle. Because protein limits the utilization of energy, the protein deficiency must be corrected first. Correction for low protein will allow a significant increase in forage intake and cause a slight increase in forage digestibility. For example, supplementing one pound of cottonseed meal (41% protein) to stocker cattle in July will likely increase rate of gain about 0.40 pound per day. Up to the point where protein is adequate it appears that there is a 1 to 1 increase in gain per unit of protein fed (0.41 pound of protein equals 0.40 pound of additional weight gain). Adding low-protein, high energy feed (12-20% CP feeds) to a diet already deficient in protein will not improve animal performance. The protein deficiency is made worse and the added starch can further impede forage digestion.

Table 2. The average protein content of native range grass West of Stillwater, Oklahoma (three years average).

Date	Protein (dry matter basis)
May 15th	13.10
June 15th	10.03
July 15th	7.50
August 15th	7.33
September 20th	7.25

Table 3. Protein requirements for large frame steer calves assuming that dry matter intake is equal to 2.8 percent of body weight.

Animal Weight	Expected Gain in pounds / day.			
	0.50	1.00	1.50	2.00
300	9.17%	11.79%	14.17%	16.31%
400	7.95%	9.82%	11.61%	13.13%
500	7.14%	8.64%	10.71%	11.21%
600	6.61%	7.80%	8.93%	9.88%

Getting ready to determine if feeding is feasible

The following are a series of thoughts that you may want to consider before attempting to calculate the economics of supplemental feeding.

1. **Does supplemental feeding add value in addition to feed induced gain?**
   Reduced shrink at sale time (easy gathering).
   Tame wild cattle.
   Reduce the risk of theft.
   Reduce death loss (easier observation).
   Increases ease of management (antibiotics for foot-rot).
   Include additives such as antibiotics, ionophores etc.

2. **Do I have an adequate supply of forage?**
   Feeding high protein supplements will increase forage digestibility and intake.

3. **What is the gain without supplementation?**
   How much gain do I really need?
   If the difference between what is needed and the gain without supplement is more than 50% or 0.70 pound, then look for an alternative to forage.

4. **What is the best time to supplement forage?**
   (See tables 2 and 3.)

5. **Will the supplement increase forage intake or will supplement replace the forage? A mistake on this question is the most serious error that cattlemen make.**

You have now asked some of the important questions. The following discussion should help answer some of these questions.

Predicting response due to supplement

The higher the forage quality (higher protein, higher energy digestibility, lower fiber content) the greater the intake of the forage without supplementation, assuming there is enough

forage. You now must estimate what the supplement will do to forage intake. There are good reasons for increasing forage intake, but there are also times when you might not be able to afford to increase intake such as when forage is short.

If you remember two numbers, and if you know which direction forage intake is moving, then you can make good estimates of probable feed required per unit of additional gain. The **two numbers are 4 and 9.**

When the forage is slightly deficient in protein, you can expect about 0.4 pound of added weight gain from the **first pound** of high protein **supplement** fed.

When protein in the diet is adequate, you can expect about 0.09 pound of added weight gain from **each pound** of supplemental "energy" feed added.

For example, if you correct a minor protein deficiency, 1 pound of a protein supplement such as cottonseed meal should increase gain about 0.4 pound per day. If the protein level in the diet (forage or forage plus supplement) is adequate, the addition of 1 pound of corn will likely increase gain by 0.09 pound per day.

Further explanation of the "9" rule. This rule will apply only if supplemental feed is limited to 0.75 percent of body weight.

For example, if 500 pound calves were fed 3.75 pounds per day of corn (500 x 0.75%), you can expect about .09 pound gain for each pound of supplemental corn. At lower feeding rates, i.e., one pound of corn per day, the prospect of a slightly more efficient response is a possibility. However, at higher feeding rates, **reduced response is a certainty**. Cattlemen always want to know how much they can bend these rules with regard to energy (lower protein, grain-based) feeds. The answer is not very much. The important point is the direction of change. Even with only one pound of energy feed, there is little evidence suggesting that added gain due to supplement could exceed 0.15 pound per pound of feed. If the feeding rate is over 1 percent of body weight, the response will be less than .09.

Energy feed must be fed daily to maintain the indicated response. Feeding large amounts of grain supplement on a given day must be avoided.

For the purpose of these rules, what is an energy feed? Corn has been the example used thus far, but corn, milo, wheat midds, soybean hulls and a number of low protein commercial formulations would be similar. Remember that the rules have already limited these feed to a feeding rate of no more than 0.75 percent of body weight. There may be a large difference in the safety of the above feeds with the grains having the most potential of killing cattle with acidosis if too much is consumed too rapidly by unadapted animals.

The protein response can be maintained even with extended feeding intervals such as every other day, or three days per week. Our definition of a "protein" feed would be one which was an all natural protein containing at least 38 percent crude protein. Oklahoma experience would limit these to cottonseed meal, soybean meal, sunflower meal, peanut meal, or combinations made up primarily of the previously mentioned protein concentrates. Lower protein mixtures may be useful but should be calculated as "protein-energy mixtures" as illustrated below in the following examples.

With many younger cattle, or with high growth potential cattle, the response due to additional protein may go beyond that supplied by 0.40 pound of supplemental protein. With the "SUPERGOLD" with monensin, fed at a rate of 2.5 pounds per day additional gains of up to 0.90 pounds have been observed.

Summer stocker example:

Base gain without supplement = 1.0 lb/day.

Feed 1 pound of cottonseed meal, add 0.4 lb/day
total is now 1.4 lbs/day.

Add 1 pound of "energy feed" to the 1 lb of CSM.
base 1.0 + 0.4[a] + 0.09[b] = 1.49 lbs/day.
[a] Gain from the first pound of protein supplement.
[b] Gain from each pound of "energy" feed.

Wheat pasture example (assuming adequate forage):

Base gain is 1.75 lbs day (no supplement).
Feed grain @ 1% of body weight to 450-pound steers.
4.5 lbs grain x 0.09 = .41 lb added weight gain.
1.75 lbs + 0.41 = 2.16 lbs / Day.
Feed per pound of added weight gain = 11.1 lbs.

Supplementation with feed only is unlikely to ever increase daily gain sufficiently to be profitable when calves have access to adequate supplies of high quality, high protein forages such as wheat pasture or clovers. When forage supply is adequate, forage intake will be near maximal and the cattle will have a very good rate of gain (often exceeding 2.0 lb/day) from forage alone. When supplements are fed, especially at rates close to 1.0 % of body weight, the cattle respond by reducing forage intake. As a result, daily gain is increased very little and available forage was replaced with purchased supplement. In fact, valuable forage may be wasted by increased trampling.

How about ionophores?

Ionophores and other feed additives have tilted the advantage of feeding to the point where many grazed cattle should never spend a day on pasture without some supplemental feed. With energy feed such as wheat midds, 2 pounds per day would be expected to increase gain .18 pound per day. An additive may easily add another .20 pound of gain per day. Two pounds of feed only costing 14 cents per day boosting gain .18 pound or

(.18 x .60= 10.8 cents) worth of gain is not a good investment. But 15 cents worth of feed including an ionophore giving 22.8 cents worth of gain (.38 lb added gain x $.60/lb) plus fringe benefits is worth considering.

How do we figure the value of ionophores and antibiotics in these formulas? The key point is to think about these as being additive with the feed and forage.

The following increases in gain due to the ionophore itself can be expected with grazing animals when the ionophores are fed at the recommended levels and frequency and daily gains are adequate to permit a response:

On summer grasses with base gains over 1#/day.
With daily feeding, .20 lb/day increased gain.
Feeding every other day, .15 lb/day.
With less frequent feeding = little or no value.

The ionophore response on wheat pasture appears to be less than with the summer grasses. An estimate of 0.15 lb/day increased gain may be used instead of 0.20.

For dry wintering stocker steers gaining less than 0.75 pounds per day, we doubt that there is much growth response due to an ionophore. Addition of the ionophore would depend on other concerns such as coccidiosis.

Antibiotic feeding to grazing cattle has not been extensively studied, but in Kansas and Oklahoma tests with cattle grazing native range, boosts of 0.20 pound per day have been observed. Data indicate that 350 mg/day of Aureomycin in Oklahoma Gold (38% protein) cubes may increase gains 0.20 lb/day.

Feeding examples using supplement and ionophores

Cattle grazing season-long native range.

Base gain (no feed) = 1 lb/day.
Add 1 pound 38% protein supplement + .40 lb/day.
Add Rumensin @200 grams/ton to above + .20 lb/day.
Gain now is 1.60 lbs/day.
Feed/added gain = 1.66 lbs.

If this feed costs 11 cents per pound, the cost of added gain will be 18 cents per pound.

Since feeding 1 lb of 38% protein supplement gives such an efficient increase in gain, what will happen if you feed 3 pounds of Oklahoma Gold per day? (Assume the concentration of Rumensin or Bovatec is reduced to provide the proper level per calf.)

Base gain with no supplement	= 1.0 lb/day.
Add 1 pound 38% protein Gold Cube	= .60 lb/day.
Add 2 more pounds (2 lbs x .09 lb/day)	= .18 lb/day.
Total gain	= 1.78 lbs/day.
Supplement/added gain (3 lbs feed / .78 lb gain)	= 3.85 lbs

Summary

When evaluating the potential for feeding on grass, remember the potential gain from correcting protein deficiencies is large with most summer forages. However, after protein requirements are met, additional protein is no more efficient than additional energy (grains). High protein feeds have about the same value as grains on wheat pasture, again because protein is already high. Following the advantages of protein is the large potential for increasing gain with ionophores (Rumensin or Bovatec fed at a rate of 100-200 mg per head per day). One hundred milligrams of either of these two ionophores (one cent/head) may increase gain 0.15-0.20 lb per day when used properly. Antibiotics are used to both stimulate gain and to prevent disease problems. Energy feeds are often the carriers for ionophores or antibiotics when additional protein is not needed. Energy feeds alone have a small potential margin for profitability and must be calculated carefully.

Energy feeds give about .09 pound of gain per pound of feed fed, or stated the other way, require about 10-15 pounds of feed per pound of added weight gain.

The first pound of protein supplement is both a protein and an energy supplement. If you are mathematical and like to derive your own formulas, assign the first pound of protein supplement a one time value of 0.31 lb of added gain for protein. Then each pound of protein including the first should result in 0.09 pound of added gain per pound fed.

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