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Weaned Calf Growing Options: How Do We Economically Produce a 1,000 lb Steer for Feedlot Entry

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The cattle industry thrived for 50 years on cheap corn. However, cheap corn appears to be "a thing of the past". Because of the unique ability of the ruminant to use forages and fibrous byproducts, the cattle industry has an opportunity to adjust nutrition programs away from "cheap corn" to forages. I believe there are two important myths that need to be discussed. Myth 1 is that forage gains are cheaper than feedlot gains, therefore we should put as much weight as possible on cattle using forage. We produced 1020 lb steers off grass on September 15 at a backgrounding cost of $0.75/lb of gain. Cost of gain in the feedlot was $1.07/lb gain. That is a large and obvious difference so we should put on more gain on forage. However, if those steers had been put in the feedlot as calf-feds, the feedlot cost of gain would have been about $0.85/lb. Because cattle are most efficient in feed utilization when young and light weight, they actually make efficient gain on forage. It doesn't appear to be efficient because of the low energy density of forage but the digestible energy is used very efficiently, primarily for muscle growth. Alternatively, the 1,020 lb steer puts on primarily fat in the feedlot and is quite inefficient. Therefore, cheap backgrounding gains lead to expensive feedlot gains. It is essential to look at the entire system before drawing conclusions about cheap backgrounding gains.

Myth 2 is that we can all calve in the spring and produce 1,000 lb yearlings the next fall. Our feedlots deliver cattle for slaughter daily and need replacement cattle on a continuous basis. In the Northern Plains states most calves are born in the spring so a variety of backgrounding programs are needed to supply the continuous demand for feedlot replacements. The need for feedlot replacements is a primary driver of backgrounding programs, but certainly, the economics of backgrounding and availability of feed resources are very important factors. Calf-feeding, placing calves in the feedlot within a few weeks of weaning, is the alternative to backgrounding. Backgrounding programs are based primarily on use of forages while feedlot programs are based on grains and byproducts. With high commodity prices there is the opportunity to increase emphasis on backgrounding. This assumes forage gains are less expensive than feedlot gains. Because of the continuous need for feedlot replacements, it is not likely that there will be large scale shifts from calf-feeding to backgrounding.

We have been conducting growing-finishing systems research since 1980 using 200 to 300 calves per year in the research. The basic backgrounding system involves corn stalk grazing from late November until mid April. The calves then are placed on pasture until September when they enter the feedlot. The goal is to produce as much gain as possible with forage. The

research is not intended to characterize forage as better or worse than grain feeding but to gather data that allow producers to make choices about backgrounding.

We receive a pool of 2,500 calves into our research program each October and November. The heavier 40% of these calves enter calf-feeding research studies and the remaining 60% are backgrounded, including the systems research cattle. Over an eight year period we compared the long yearling systems cattle to calf-feds. While they were selected from the same pool of cattle, the calf-feds were heavier, larger-framed and possibly older at feedlot arrival. The calf-feds averaged 642 lb and the calves for backgrounding weighed 526 lb. There was a total of 804 calf-feds in 80 pens and 302 yearlings in 18 pens.

Yearlings had heavier final weights, ate more feed/day in the feedlot, and gained more rapidly but less efficiently (Table 1). The yearlings were 116 lb lighter at initiation of backgrounding and were 83 lb heavier at slaughter. Therefore, the yearlings gained 199 lb more than the calf-feds. The yearlings were not as fat as calf-feds but graded as well or better (Table 2). There was a tendency to feed the calf-feds too long (11.9% yield grade 4) to achieve greater final weights and in an effort to avoid overweight carcasses the yearlings were not fed long enough.

Table 1. Animal Performance[1]

Item	Calf-fed	Yearling	Difference
Initial BW, lb	642[b]	526[c]	-116
FIBWT, lb[a]	642[c]	957[b]	315
Final BW, lb	1282[c]	1365[b]	83
DMI, lb/d	21.36[a]	30.56[b]	9.19
ADG, lb/d	3.81[a]	4.53[b]	0.72
F:G	5.63[a]	6.76[b]	1.13
DOF	168[a]	90[b]	-78
Total feed, lb	3592[a]	2754[b]	-838

[1]Griffin et al. (2007).
[2]Feedlot initial body weight.
[a,b]Means within row with different superscripts differ $P < 0.05$.

While the yearlings made over 50% of their gain during backgrounding, they still consumed 77% as much total feed in the feedlot as calf-feds. That calculates to 2 lb feedlot diet per 1 lb final weight for the yearlings and 2.8 lb for the calf-feds. Yearlings make their most efficient growth during backgrounding and are less efficient in the feedlot than calf-feds.

We determined the economics of the calf-feds and yearlings in 2008 when corn prices spiked using $2.50 and $6.50/bu corn (Table 3). We set the purchase price of calf-feds to give $0 profit and used a price slide to calculate feeder price of the yearlings as calves. Yearlings were $35.00 more profitable than calf-feds at $2.50 corn and $58.00 more profitable at $6.50 corn. We expected more than a $23.00 difference with the increase in corn price. However, the yearlings consumed 77% as much feed in the feedlot as calf-feds and the supplements fed in the winter reflected corn price.

Table 2. Carcass Characteristics[1]			
Item	Calf-fed	Yearling	Difference
HCW, lb	808	860	52
YG	2.71	2.60	-0.11
Marbling[2]	510	525	15
Fat thickness, in.	0.53[a]	0.47[b]	-0.06
Choice, %	58.4	65.0	6.6
% Yield Grade 4+	11.9	3.3	-8.6
% Overweight (950 lb)	1.1[a]	11.3[b]	10.2

[1]Griffin et al. (2007).
[2]Marbling = 400 Slight^{o}, 500 = Small^{o}, etc.
[a,b]Means within row with different superscripts differ $P < 0.05$.

Table 3. Calf-fed vs Long Yearlings – Economics[1,2]					
	$0.50/bu corn			$6.50/bu corn	
	Calf-fed	Yearling		Calf-fed	Yearling
Steer cost. $	806	747		806	747
Winter					
Stalks, %	--	48		--	48
Sweet Bran, $	--	35		--	90
Grass, $	--	119		--	119
Feedlot					
Feed, $	188	142		444	334
Yardage, $	67	36		67	36
Interest, $	33	63		33	63
Profit, $	0	35		0	58

[1]Griffin et al. (2007).
[2]Assumes zero profit for calf-feds.

On average, we would expect that calf-feeding and yearling systems would have similar profitability. Otherwise, prices paid for feeders of different weights would reflect differences in profitability. Therefore, to be successful (profitable), it is necessary for a backgrounder to be better than average. That isn't "rocket science" but it is the primary reason for our research and the remainder of our discussion.

There are at least four ways to increase backgrounding gains, and therefore weight of cattle entering the feedlot:

1. Increase forage quality
2. Increase time on forage
3. Implants and ionophores
4. Protein and(or) energy supplements

It seems simple but implementation is not simple relative to forage quality, especially grazed forage. Clearly, the more digestible the forage, the greater the cattle gains. However, grass matures and digestibility declines with time. In the Northern Plains we only have about three months yearly of good quality grass, grass that will produce good gains on yearlings. For warm-season grasses that is mid May to early August and for cool-season-grasses it is mid to late April to early July, with some potential fall regrowth. If you are fortunate enough to have both cool- and warm-season pastures, then the grazing season for good quality forage might be extended by one to two months. If calves are weaned in October and marketed as yearlings in August, seven months of the time for gain or growth is based on lower quality grazed forages. Higher quality forages can be harvested but then there is the harvest expense, as well as the feeding expense.

Extending time on forage can increase final off-grass weights. However, that extra time on forage probably means lower quality forage and supplementation would be required to get, economical gains. This can certainly be accomplished but it does change marketing date which may not be advantageous (moving from August to October or November). Heavy yearling prices typically decline by $6.00 to $7.50/cwt from July to October and November.

Implants and ionophores are excellent means of increasing gains and doing it economically. Implants should increase daily gains by 10 to 14% and return $15 to $20 for each $1.00 spent on the implant. Rumensin can be fed in a supplement or in a mineral mix and should increase daily gains by 7 to 10%. The return should be at least $2.00 to 3.00 per $1.00 invested in Rumensin.

Folmer et al. (2008) wintered calves with and without an implant and Rumensin plus 1 lb additional Sweet Bran (Table 4). The intensively managed steers gained 0.3 lb/day more in the winter and were removed from grass on July 2; while controls grazed until August 25. After finishing, the steers weighed the same and breakeven costs were similar after finishing as well as when steers were removed from grass.

Rate of winter gain affects overall cost of gain depending on feed costs, compensatory gain on grass and final slaughter weight. Two years of data showed calves with 149 lb more weight at the end of winter retained 77% of that weight (114 lb) at the end of summer grazing and 120 lb at slaughter (Jordon et al., 2001b). Our generalizations about compensatory gain on grass are: compensatory gain is difficult to predict; full season grazing gives 35 to 45% compensation and; partial season grazing reduces percentage of compensation.

Table 4. Intensive Versus Extensive Backgrounding[1]				
		Extensive[2]		Intensive[3]
Winter ADG, lb		1.66		1.96
Weight[4], lb		769		813
Grass ADG, lb		1.72		1.98
Date off grass		8/25		7/2
Weight[5], lb		986		968
Feedlot ADG, lb		4.27		3.96
Weight, lb		1372		1371
DOF		90		102
Breakeven, $/cwt				
Winter		$118.5		$115.80
Grass		$105.70		$106.30
Feedlot		$108.30		$109.70

[1]Folmer et al. (2008); initial wt. = 542 lb.
[2]5 lb Sweet Bran during stalk grazing, no implant or Rumensin.
[3]6 lb Sweet Bran during stalk grazing, implanted and fed Rumensin.
[4]Weight of stalks, [5]Weight of grass.

In the Northern Plains, we have three basic forage resources for backgrounding calves in the winter: cornstalks; winter range and, harvested hays and silages. In all of these situations it is necessary to supplement protein and probably energy. In the Northern Plains the most economical source for supplementation of protein and energy is typically corn gluten feed or distillers grains. Figures 1 and 2 show the gain response to levels of Sweet Bran or DDGS from calves grazing cornstalks. Similar gains were made by calves grazing winter range and supplemented with DDGS (Table 5). In this case, comparisons were made to drylot with hay and winter range, each supplemented with a corn and soybean meal supplement.

Ethanol byproducts offer excellent opportunities to minimize supplement costs. Both corn gluten feed and distillers grains supply protein, phosphorus and energy at a price less than corn. Because of the absence of starch, the byproducts minimize negative associate effects with the forages. Both wet and dry DGS have 25 to 40% greater energy value in forage diets than corn (Loy et al., 2008; Ahern et al., 2011). Wet corn gluten feed also has greater energy than corn in these forage diets (Oliveros et al., 1987). Cost of gain for drylot on the farm using hay and WDGS was $0.90/lb gain. This is high because of yardage costs and the cost of harvesting feed. Cost of gain for drylot on the ranch was $0.93/lb and on range $0.82/lb using corn and SBM because of the greater need for supplement compared to hay. Cost of gain for winter range with DDGS was $0.65/lb gain. Cost of gain for cornstalk grazing with WDGS was very competitive at $0.63/lb gain. The reduction in cost of gain is because of the low cost of cornstalks and relatively low yardage cost.

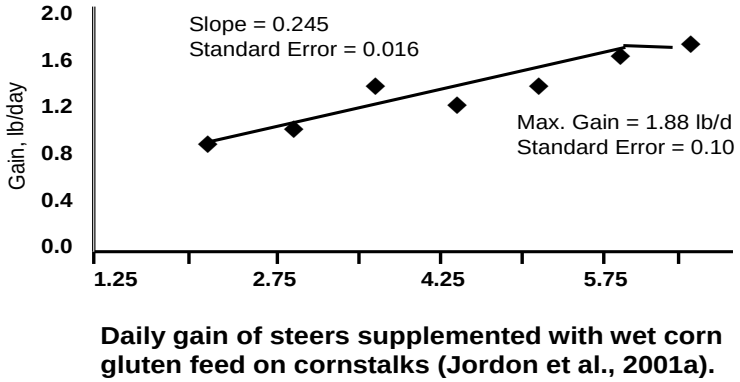

Figure 1.

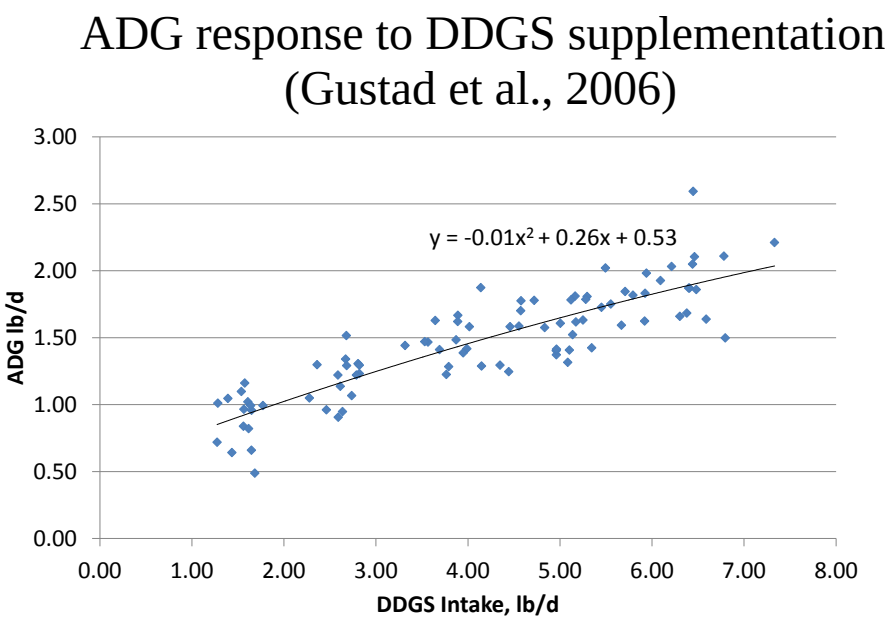

Figure 2.

Supplementation offers an alternative way to increase pasture gain. Even though forage quality is high during early season grazing, the yearlings are likely limited by metabolizable protein. As the season progresses, the energy value of the grass declines and ruminally degradable protein may be limiting as well. Ethanol byproducts can meet these nutrient deficiencies and over the past 10 years as the price of byproducts have declined relative to corn and soybean meal, byproducts have become economical supplements for grazing yearlings. We have conducted a number of experiments where we supplemented DDGS to yearlings on grass ranging from brome to warm-season. As one would expect, cattle gains respond in a quadratic manner to increasing levels of DDGS (Figure 3). Response varies

depending upon grass type and maturity, cattle weight (maturity) and previous cattle performance (compensatory gain).

Table 5. Weight and Daily Gain of Steers Fed a Corn/Soybean Based Supplement in a Dry Lot or While Grazing Native Winter Range or Fed Dried Distillers Grains While Grazing Range 6 Days Per Week[1]

	Treatment[2]		
	Drylot	Corn/SBM	DDG
Initial BW, lb	468	468	470
Final BW, lb[3]	562	570	558
ADG, lb	1.51	1.65	1.42

[1]Stalker et al. (2006).
[2]Drylot-grass hay plus 4.2 lb/d supplement, Corn/SBM 6 lb/day on range and DDG 4.2 lb/day.
[3]Adjusted 4% for fill.

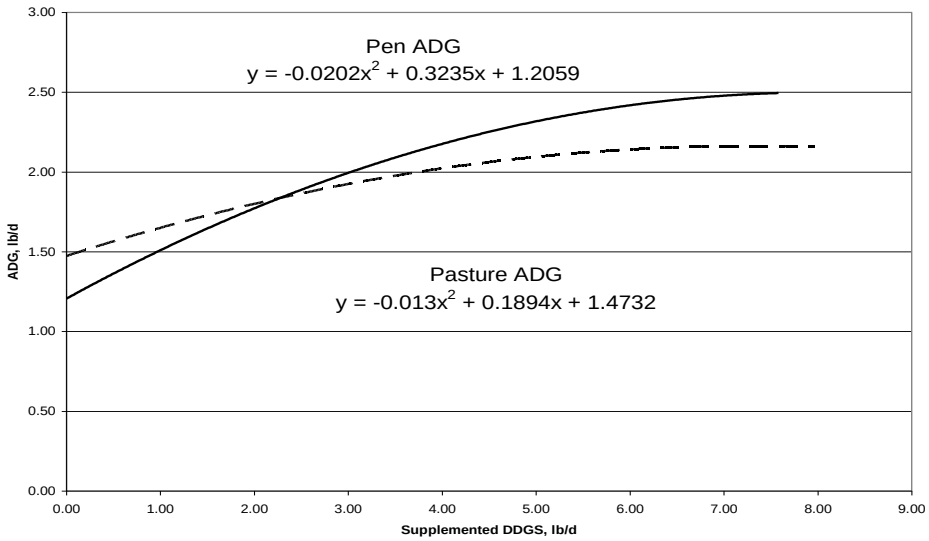

Figure 3. Summary of grazing trials using DDGS supplementation (Griffin et al., 2007).

We have conducted two fairly long term and extensive studies that evaluate the response of cattle on pasture and subsequent feedlot performance. A summary of five years of supplementing about 5 lb DDGS daily on brome pasture shows a .55 lb/d gain response over a 160 day grazing season (Table 6). In this experiment the DDGS is being used as a replacement for N fertilizer. Controls are fertilized and non-fertilized pastures. Fertilization did not affect cattle performance, but did reduce acreage needed per animal by about 40%. At current prices, cost of gain on the fertilized pasture would be about $0.63/lb gain. Because the DDGS substitutes for N fertilizer, the cost of gain for the supplemented yearlings would be about $0.51/lb gain.

Table 6. Animal Performance on brome pasture[1]				
	Treatment			
	CONT	FERT	SUPP	SEM
Days	160	160	160	---
Initial BW[2]	726	724	726	6.6
End BW, lb[2]	968[a]	961[a]	1049[b]	8.8
ADG, lb	1.50[a]	1.47[a]	2.02[b]	0.04

[1]Greenquist et al. (2009) and Watson et al. (2011).
[2]Limit fed BW.
[a,b]Means without a common superscript differ ($P < 0.01$).
No TRT x Year interaction ($P = 0.65$).

In a three-year study, 720 yearlings have been used to evaluate MDGS supplementation on Sandhills range. The calves were wintered on cornstalks with 5 lb (DM) of Sweet Bran daily. They grazed brome from about April 20 to May 20 when they were shipped to the Sandhills. The yearlings entered the feedlot about September 15. The MDGS was supplemented on the ground with a feed wagon at 0.6% BW (DM). Gains on range increased from 1.36 to 2.02 lb/d due to supplementation (Table 7).They entered the feedlot 106 lb heavier then unsupplemented cattle. We fed the unsupplemented cattle 24 fewer days to achieve similar slaughter weights. The feedlot efficiency was not statistically different between supplemented and unsupplemented steers. When sold at a similar finish endpoint, the unsupplemented steers did not exhibit compensatory gain or efficiency.

We have collected diet samples on the ranch (Barta Bros.) where the yearlings grazed but not from the same pastures. Based on protein analysis, including the mobile bag technique, it appears the unsupplemented steers were deficient in ruminally degradable protein during August and early September. While the MDGS supplies ruminally undegraded protein, it is fed in excess of MP needs which allows for urea recycling to supply ruminally degradable protein. It is ironic that within just a few years time we would be using a “bypass protein” source to economically supply ruminally degradable protein. Alternatively, many commercial producers remove yearlings from Sandhills range in mid July, likely because of relatively poor gain due to low protein and energy in the grass.

We are currently in the middle of a two-year project where spayed heifers are supplemented with extra WDGS while grazing stalks or are fed MDGS on the ground while grazing Sandhills range in the summer or both (Table 8). Winter gains increased from 0.51 to 1.35 lb/d by adding 3.5 lb (DM) of wet distillers grains. Summer gains increased by supplementing 4.3 lb (DM) of modified distillers grains in the summer. Response in the summer was slightly better for heifers not supplemented in the winter. Compensation in the summer was 25% for calves not supplemented in the winter and 40% for those supplemented. It is too early for a good economic analysis, but it appears supplementing in the winter may be more economical than in the summer.

Table 7. Modified Wet Distillers Grains (MDGS) During Summer Grazing[1]		
Item	CON	SUPP
Initial BW, lb	498	497
Spring BW, lb	697	697
Summer BW, lb	915	1021
Summer ADG, lb	1.36	2.02
Feedlot BW, lb	1432	1431
Feedlot DMI, lb	30.2	29.9
Feedlot ADG, lb	3.99	3.88
Feedlot GF	0.132	1.30
Feedlot DOF, d	130	106
Fat thickness, in	0.51	0.50
Marbling	613	557
Profit, $hd	6.41	71.08
[1]Rolfe et al. (2011).		

Table 8. Distillers Grains Supplemented in Winter Summer or Both[1]				
	WDGS supplement[2]			
	--	-+	+-	++
Winter ADG, lb	0.51	0.51	1.33	1.37
Grass ADG, lb	1.50	1.89	1.24	1.57
Weight diff.	-119	-112	--	--
	-89(25%)	-63(44%)	--	--
[1]Gillespie et al. (unpublished); 454 lb spayed heifers. [2]1.5 or 5 lb (DM) if wet distillers grains during stalk grazing. Zero or 0.6% BW modified distillers grains during grazing.				

There are opportunities for producers to be better than average at producing long yearlings. Important considerations are:

1. Match cattle to system.
2. Make effective use of grazed forage.
3. Maximize use of grazed cornstalks.
4. Use implants and ionophores.
5. Make strategic use of byproducts- protein, energy, P.
6. Optimize pasture management for good cattle gains.
7. Sell high (best month to market).

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