Winter Grazing

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In Nebraska, most of our calves are born in the spring and weaned in the fall. In order to get the calves to grass the following spring, it is obviously necessary to feed them through the winter (not rocket science). There are about as many ways to winter calves as there are producers. However, we will limit our discussion to three basic systems. The first is drylotting calves by feeding harvested feeds. The second is grazing native range with appropriate supplements. The third uses corn residue for grazing along with appropriate supplements. The same principles hold for cows as well.

Drylotting provides unlimited opportunities for use of feedstuffs. This would include hays, silages, harvested crop residues, protein sources and ethanol byproducts. Diets can be developed that will provide any target rate of gain. Producers are in control by feeding proportions and amounts necessary for the targeted gains and can least cost the diet based upon ingredient prices. Drylotting minimizes weather effects and cattle transportation costs. The downside of drylotting is cost of harvested feeds and cost of yardage.

Grazing winter range is as old as cattle production in the Sandhills. Range grass quality is low in the winter. While it may maintain a gestating cow, it will not give acceptable calf gains without protein and energy supplements. Availability and cost of supplements delivered to the ranch are critically important. Cattle do the harvesting and there is no maintenance (cost) of a drylot.

Cornstalk grazing offers excellent opportunities for wintering calves. The ethanol industry's use of corn and the subsequent increase in corn price has resulted in pasture being plowed up for corn production. While this reduces grazing and haying availability, the corn residue is a large supply of alternative forage.

We will produce about 10.3 million acres of corn this year in Nebraska, producing over 40 million tons of residue. If all of our cows and 1.0 million calves grazed corn residue, plus it was used as the roughage source for all of the feedlot cattle in the state, we would only use 2.8 million of the 40 million available tons of corn residue. Thus, we won't soon run out of corn residue.

Calves or cows grazing cornstalks eat primarily the husk, leaf and residual corn. Corn produces 15 to 16 lb of husk and leaf per bushel of corn grain produced. UNL research measurements suggest about 50% harvest efficiency by the cattle. Therefore, the cattle will consume about 8 lb of dry matter for each bushel (15.5% moisture) corn. At a 200 bu yield, that is 1,600 lb of leaf and husk consumed, which is equivalent to 2.35 AUM.

We estimate that 0.5% of corn ears remain in the field post-harvest; this may be higher in some situations. Using 0.5% of corn ears left, that amount of grain would increase diet digestibility by about 2.5 percentage units (example 50% to 52.5%). The husk is above 60% digestible and very palatable, and of course the grain is essentially all consumed. Stocking rate has a large impact on diet quality. The greater the grazing pressure, the more leaf that is consumed, and the leaf is much less digestible than corn ears (≈ 45%). For example, at a lower stocking rate and with only six of the eight potential pounds of husk and leaf being consumed and all of the grain being consumed, the digestibility of the diet will be 52%. If all 8 lbs are consumed (an additional 2 lb leaf), then the overall diet digestibility would be only 50%.

The obvious advantage to stalk grazing is the low cost of this grazed forage. Disadvantages are weather risk, potential transportation expense, lack of water and fencing. Unfortunately, the stalks may also not be near the backgrounding enterprise. Before we discuss these three options further, we want to discuss the effect of rate of winter gain on system economics.

All of these backgrounding options work well when ethanol byproducts are used as the supplement. The byproducts are excellent energy sources and provide good protein and phosphorus for calves (or cows) in addition to the energy. The energy value of distillers grains is about 130% that of corn, and for gluten feed at least 120% that of corn, in these forage-based feeding systems. Distillers grains are currently priced at about the price of corn grain, so they are quite economical considering the feeding value.

Figures 1 and 2 show the gain responses 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 1). In this case, comparisons were made to drylot with hay and winter range each supplemented with a corn and soybean meal supplement.

Backgrounding systems can utilize readily available, inexpensive forages. By nutritionally restricting animals to varying degrees, available feed resources can achieve various calf gains to create yearlings for summer grazing, target different marketing windows, and create a year-round beef supply. Historically, backgrounding systems have centered on utilizing compensatory growth to minimize winter input costs, but then attain increased summer grazing gains during a period of higher nutrient intake. This philosophy may not have considered the benefits of a high supplementation level when cattle are retained through the finishing system, or when ethanol byproducts are available as a supplement. With the advent of readily available ethanol byproducts, it may be profitable to supplement growing cattle at a higher level than was previously believed. In addition, corn prices have risen considerably in recent years, thus changing previous economic analyses and potentially increasing the value of backgrounding programs. The objective of our study was to compare the economics of winter supplementation levels in a forage-based backgrounding system, using distillers grains as a winter supplement.

Five different studies, completed from 1987 through 2011, examined a high (HI) and low (LOW) winter supplementation level within a forage-based backgrounding system, and subsequent feedlot performance. Four studies utilized long yearling steers, and one study used spayed heifers. Cattle were first backgrounded on corn residue with varying supplementation levels, grazed throughout the summer, and then entered the feedlot for finishing.

In each study, animals were assigned randomly to treatment. Initial weights and weights between system phases were an average of two consecutive days' weight. Final weights were calculated from hot carcass weights adjusted to a 62% dressing percentage on steer studies, and to a 63% dressing percentage on the spayed heifer study. Data from four of five studies were adjusted to an equal fat thickness. Within studies, treatment groups had identical implant procedures and finishing diets.

Average performance values of the five studies were calculated and current economic assumptions (as of April, 2012) were applied to the two treatments to compare supplementation level profitability (Table 2). Initial feeder calf cost was $170/cwt for a 500-pound medium-framed British based calf. Grazing costs were $0.31/day while on cornstalks and $0.80/day for summer pasture. In this scenario, modified distillers grains (MDGS) was the winter supplement fed at two lb/head daily for the low supplementation level and five lb/head daily for the high supplementation level, on a DM basis. Winter supplement, MDGS, was assigned a cost of $0.12/lb DM fed. Finishing costs were assumed to be $0.13/lb of diet DM and yardage was assessed at $0.45/day. Sale price was set at $120/cwt on a live weight basis.

Cattle developed on a higher nutrition plane during the winter backgrounding phase had 0.20 lb greater ADG during the finishing phase and required 5 fewer days on feed to reach their equal fat finish point (Table 3). Total DMI was 20 lb less, resulting in $2.50/head lower total feed cost. In addition, the performance advantage of cattle supplemented at a high level was maintained through the system, resulting in an additional 85 lb of final wt, which provided $102.96 of additional revenue over the low level supplemented cattle. Total profitability in this scenario resulted in a $9.48 loss when backgrounding cattle at a 2 lb/head/day MDGS supplement level, and a $46.53 profit when backgrounding cattle at a 5 lb/head/day supplementation level (Table 3). These data show that 1.41 lb/day winter gain is better than .49 lb/day, when viewing entire system profitability. It does not show that 1.41 lb/day is optimal, however.

We did some simple economics on the three wintering systems (Table 4). We assumed 1.4 lb/day gain for all the calves. Cost of gain was just $0.73/lb for calves on stalks while it was $1.14 to 1.26 for drylotting. Range was intermediate. Of course, the economics depend upon our assumptions. New baled stalks may be $115/ton this year because of drought compared to the $80/ton from the past few years, which includes grinding and shrink. Baling is expensive, so it is unlikely stalks will be less expensive in the future. Baled wheat straw would be similar to corn stalks in quality. Yardage adds to the cost of drylotting.

Range cost is difficult to predict. We assumed equal yardage and distillers grains cost for range and stalk grazing. We also assumed winter range is half the cost of summer range. If it could be used at higher value for summer grazing, then half may not be enough to charge. If we expect grass lease rates to increase, this makes range less competitive.

Does this mean stalk grazing offers the greatest opportunity? Probably it does. Remember we will be using less than 10% of all the corn residue, so supply certainly exceeds demand. Will stalk grazing leases increase? Likely. How much? That answer we don't know.

Numerous studies have been done at the University of Nebraska over the years to determine the effect of grazing crop residue on grain yields in the subsequent years. In 1996 a grazing trial was started on a linear move irrigation field in a corn-soybean rotation looking at the time of the year that crop residue is grazed and its effect on subsequent yield. This 100-acre field is divided into two sections with half of the field in corn and half in soybeans every year. Each year they switch sides so the soybean yields reflect the direct impact of the grazing of corn residue and the corn yields are a year removed from the grazing treatment. Grazing has been initiated at two different times: fall/winter grazing and spring grazing. The fall/winter grazing typically is from November until February and is the time that most cattle are on crop residue. The field is typically frozen, and mud and compaction due to cattle in the field are at a minimum. Spring grazing in this field is typically from February through mid-April. This was designed to be the worst possible situation for grazing crop residue, as the soil is thawing and spring rains will cause the fields to be muddy and the amount of compaction and trampling should be at its highest. To increase the possibility of trampling and compaction, starting in 2000, calves have been stocked at 2.5 times the normal level (3 hd/3 ac). The three treatments -- fall/winter grazed, spring grazed, and ungrazed -- have been maintained in the same area since 1996.

Fall/winter grazing of corn residue on the linear move irrigation field showed a significant (P = 0.001) increase in soybean grain yields of 2 bu/ac due to grazing the year before. Corn residue grazing had no statistical effect (P = 0.1808) on corn yields, but there was a numerical increase of about 3 bu/ac for the fall/winter grazed treatments (Table 5).

Corn yields the second year of the spring grazing show no significant difference (P = 0.1808) but a 1.2 bu/ac numerical increase in yield on the grazed treatment. Soybean yields, planted the year following grazing of the corn residue, show a significant increase in grain yield (P = 0.0010) with a numerical increase of 1 bu/ac.

Irrigated corn grain yields in either a continuous corn or a corn-soybean rotation show no effect of grazing on grain yields, and soybeans planted the year following corn residue grazing show a significant increase in yields due to grazing treatment. Timing of grazing, fall grazed or spring grazed, seems to have little effect on grain yields. Since the treatments in the linear move irrigation field have been maintained over an extended period of time, any detrimental effects from grazing would have been picked up. With the statistical increase in yields of soybeans, especially in the spring grazing treatment, cattle grazing corn residue actually help the grain yields by working some of the nutrients and residue into the ground and removing some of the excess residue so the ground can warm up faster. In an article by Wilhelm et al. (2004, Agronomy J., 96:1), the authors suggest that the removal of 20-30% of the corn residue will have little effect on the structure and fertility of the soil, and leaving 70-80% of the residue will provide enough organic matter to add carbon back into the soil and maintain the integrity of the soil structure.

We find that the average digestibility of residue consumed is no more than 55%, meaning that the cattle utilize less than 55% of the organic matter and the remaining 45% of the organic matter is returned to the soil surface where it can be reincorporated into the soil, supplying organic matter for the soil microbes. Cattle remove less than 20% of residue unless the corn residue is overgrazed. This is an economical practice for wintering calves as well as cows.

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

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

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

Table 2. Performance summary of five winter supplementation trials at two supplementation levels

	Low[1]	High[2]
Winter phase		
Initial BW, lb	500	500
Days	143	143
ADG, lb/d	0.49	1.41
Summer phase		
Days	135	135
ADG	1.46	1.09
Finishing phase		
DOF	112	107
ADG, lb/d	4.15	4.35
DMI, lb/d	28.2	29.2
Final BW, lb	1240	1325

[1]Low = cattle supplemented during the winter phase for a low daily gain
[2]High = cattle supplemented during the winter phase for a high daily gain

Table 3. Profitability analysis of high and low winter supplementation levels

	Low[1]	High[2]
Initial purchase cost, $/hd	850.34	850.34
Winter phase		
Cornstalk grazing cost, $/hd	45.76	45.76
MDGS cost, $/hd	34.32	85.80
Summer phase		
Grazing cost, $/hd	107.68	107.68
Finishing phase		
Finisher diet cost, $/hd	408.72	406.22
Feedyard yardage, $/hd	50.18	48.15
Total revenue, $/hd	1487.52	1590.48
Profit, $/hd	-9.48	46.53

[1]Low = cattle supplemented during the winter phase for a low daily gain with 2 lb MDGS/head daily

[2]High = cattle supplemented during the winter phase for a high daily gain with 5 lb MDGS/head daily

Table 4. Winter Costs[1]

Expenses	Drylot[2]	Range[3]	Stalks
Forage $/d	.58 (.40)	.36	.12
DG $/d[4]	.84	.70	.70
Yardage $/d	.35	.20	.20
Total $/d	1.77 (1.59)	1.26	1.02
$/lb gain	1.26 (1.14)	.90	.73

[1]Estimated 1.4 lb/day gain.

[2]10 lb baled stalks, 6 lb distillers grains (dry matter); stalks @$115/ton ground or $80/ton ( ).

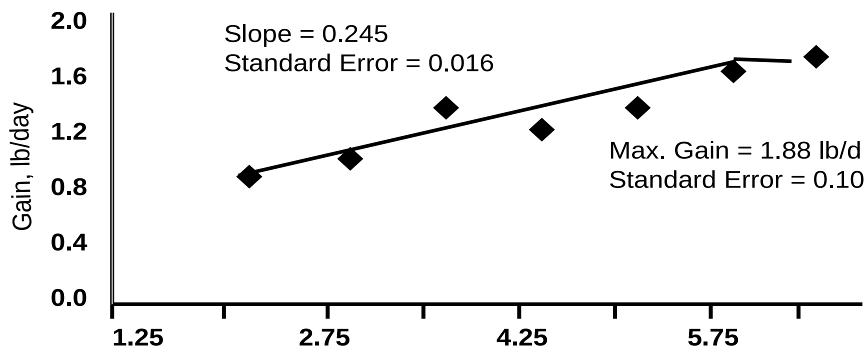
[3]Range at $33/AUM × .5, to equal half of summer cost.

[4]Priced equal to corn @ $6.50/bu ($.14/lb dry matter).

Table 5: Grain Yields

Years of Study[1]	Cropping System[2]	Crop	Grazed Yield	Ungrazed Yield	SEM	P value
93-95	Irrigated Continous Corn[3]	Corn	185.33	181.67	27.3272	0.5766
96-11	Fall Grazed Corn-Soybean[4]	Soybeans	62.4	60.4	2.1056	0.001
96-11	Fall Grazed Corn-Soybean[4]	Corn	208.9	205.8	7.8359	0.1808
96-11	Spring Grazed Corn-Soybean[4]	Soybeans	61.7	60.4	2.0156	0.001
96-11	Spring Grazed Corn-Soybean[4]	Corn	207.2	205.8	7.8359	0.1808

[1] Starting and ending year that the study was conducted
[2] Type of cropping system that the field was managed in.
[3] Was maintained in a continuous corn system
[4] Fields are from linear move irrigation field and maintained in corn followed by soybean rotation for 14 years.



Daily gain of steers supplemented with wet corn gluten feed on cornstalks (Jordon et al., 2001a).

Figure 1.

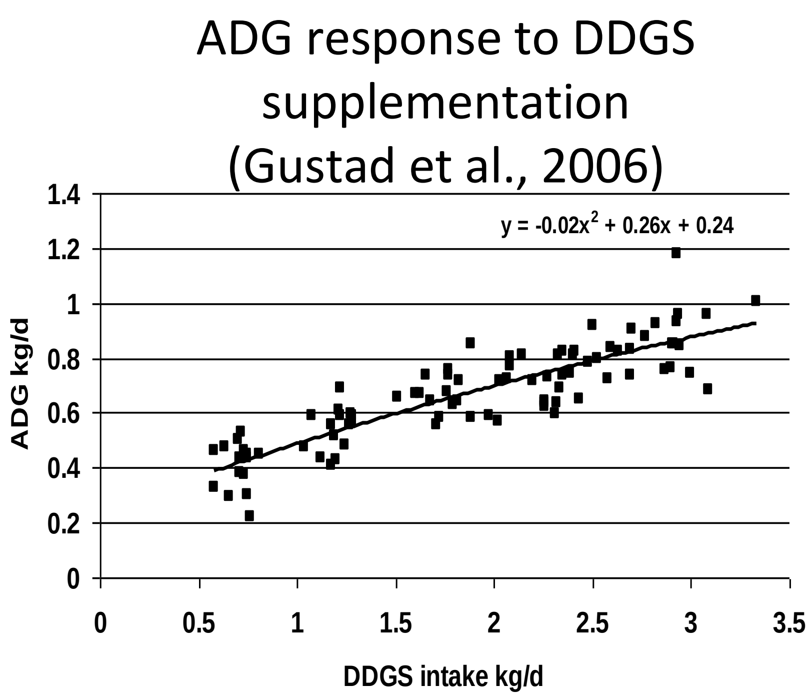


Figure 2.