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# Effect of Winter Supplementation Level on Yearling System Profitability

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## Summary

*Calves backgrounded in a forage-based system at a high winter supplementation level maintained a performance advantage through finishing. High level supplemented cattle gained an additional 0.2 lb daily during finishing, consumed less total feed in the feedlot, required fewer days on feed to reach a common finish point and produced an additional 85 lb of saleable live weight compared to cattle backgrounded at a low supplementation level. High level supplemented cattle returned \$56.01 more than cattle fed a low level of supplementation during the winter backgrounding phase.*

## Introduction

Backgrounding systems utilize readily available, inexpensive forages. By nutritionally restricting animals to varying degrees, available feeds can be used to achieve various levels of 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 minimizing winter input costs to achieve a low rate of gain, but then attaining increased summer grazing gains (compensatory growth) during a period of higher nutrient intake (1998 *Nebraska Beef Cattle Report*, pp. 63). This philosophy may not have considered the benefits of a high supplementation level when cattle are retained through finishing, or when ethanol byproducts are available as a supplement. With ethanol byproducts readily available, it may be profitable to supplement growing cattle at a higher level than was previously believed.

Corn prices have risen considerably recently, changing previous economic analyses and potentially increasing the value of backgrounding programs. This study compared winter supplementation level economics in a forage-based backgrounding system, with distillers grains as a winter supplement.

## Procedure

Five 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 backgrounded on corn residue with varying supplementation levels, grazed through the summer, and then finished. Data from studies 1, 2, 4, and 5 were adjusted to an equal fat thickness to equitably compare studies. Within studies, treatment groups had identical implant procedures and finishing diets.

In study 1, each year for two years, 60 British breed yearling steers (initial BW = 522 lb) were wintered 106 days on crop residues beginning in early January. Different levels of supplemental protein and alfalfa hay were fed to achieve a high (1.09 lb) or low (0.62 lb) daily gain. Cattle then grazed cool-season followed by warm-season pastures 116 days until mid-August, and were then finished 113 days (1989 *Nebraska Beef Cattle Report*, pp. 34-35).

In study 2, 80 British-breed steers (initial BW = 497 lb), were fed to achieve winter gain levels of approximately 0.7 lb/day and 1.7 lb/day. Steers grazed corn residue and then were fed bromegrass hay and corn gluten feed during the 163-day winter period. Steers then grazed eastern Nebraska bromegrass or Sandhills range 124 days from May 6 until Sept. 6 (1998 *Nebraska Beef Cattle Report*, pp. 63-65).

In study 3, a design similar to study 2 was used with steers fed 163 days

with 16 head per treatment. Steers then grazed Sandhills range or bromegrass pasture 124 days (1999 *Nebraska Beef Cattle Report*, pp. 26-28).

In study 4, 108 crossbred steers (initial BW = 535 lb) were wintered on cornstalks from Dec. 4 through Feb. 19 during phase I. In phase I, high level supplemented steers were fed 5 lb/head/day (DM basis) of wet corn gluten feed, and low level supplemented steers were supplemented with 1.4 lb/head/day (DM basis) of wet corn gluten feed. In phase II, steers were drylot from Feb. 20 through April 28 with both treatments fed ad-libitum ammoniated wheat straw and HI steers also fed 5 lb/head/day (DM basis) of wet corn gluten feed (2000 *Nebraska Beef Cattle Report*, pp. 23-26).

In study 5, 118 heifer calves (initial BW = 455) grazed corn residue 138 days and were supplemented with 2 lb (LOW) or 5 lb (HI) wet distillers grains with solubles (WDGS) on a DM basis. Following the winter phase, spayed yearling heifers grazed smooth bromegrass 30 days, grazed native Sandhills range 128 days, and were then fed a common finishing diet. Study 5 data have not been previously reported, thus are included separately and in average performance values.

Performance values from each of the five studies were averaged and current economic assumptions (as of April, 2012) were applied to the two backgrounding gain levels to compare supplementation level profitability. Initial feeder calf cost was \$170/cwt for a 500 lb calf. Grazing costs were assumed to be \$0.31/day on cornstalks and \$0.80/day for summer pasture. 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, and assigned a cost of \$0.12/lb DM fed, to include equipment and labor costs. Finishing costs were

(Continued on next page)

assumed to be \$0.13/lb of diet DM and yardage \$0.45/day. Sale price was \$120/cwt.

## Results

In study 1, HI steers gained more during finishing (3.84 vs. 3.62 lb/d,  $P < 0.05$ ) and had heavier final weights (1,193 vs. 1,159 lb,  $P < 0.05$ ) than LOW. In study 2 during finishing, HI steers off summer bromegrass, had a greater ADG (5.03 vs. 4.48 lb/day,  $P < 0.05$ ), greater DMI (31.7 vs. 28.6 lb/d,  $P < 0.05$ ), and greater final weight (1,323 vs. 1,249 lb,  $P < 0.05$ ) than LOW steers during finishing. For steers that grazed Sandhills summer range, there were no differences during finishing. In study 3, HI steers had greater final weights (1,375 vs. 1,236 lb,  $P < 0.05$ ) and (1,371 vs 1,259 lb,  $P < 0.05$ ) than LOW steers, for cattle from range and bromegrass summer treatments, respectively. In study 4, final weights were 51 pounds greater for HI steers (1,353 vs. 1,251 lb,  $P < 0.05$ ) than LOW steers with no significant ADG, DMI, or efficiency differences during finishing.

In study 5, winter gains were greater for HI heifers (1.4 vs. 0.48 lb/day,  $P < 0.01$ ) and summer gains were greater for LO heifers (1.42 vs. 1.18 lb/day,  $P < 0.01$ ; Table 1; 25% compensation). Final BW was 111 lb greater for high level supplemented heifers; ( $P = .0103$ ; Table 1). Finishing phase ADG was numerically greater for HI heifers at 3.97 lb compared to 3.79 lb for LO heifers ( $P = 0.21$ ). Total DMI and efficiency were similar between treatments.

Cattle developed on a higher nutrition plane during the winter backgrounding phase had a 0.20 lb greater ADG during finishing and required five fewer days on feed to reach finish (Table 2). Total DMI was 20 lb less, resulting in \$2.50/head lower total feedlot diet cost. The performance advantage of cattle supplemented at a high level resulted in an additional 85 pounds of saleable product, which provided \$102.96 of additional revenue over the low level supplemented

**Table 1. Backgrounding and finishing performance of spayed heifers fed two levels of WDGS during winter backgrounding (study 5).**

	Treatment		SEM	P-value
	Low	High		
Backgrounding phase				
Initial BW, lb	452 <sup>a</sup>	453 <sup>a</sup>	4.7	0.9600
Winter ADG, lb	0.48 <sup>a</sup>	1.40 <sup>b</sup>	0.04	<0.0001
Summer phase				
ADG	1.42 <sup>a</sup>	1.18 <sup>b</sup>	0.03	<0.0001
Finishing phase				
DOF	125 <sup>a</sup>	126 <sup>a</sup>	4.67	0.9199
ADG, lb	3.79 <sup>a</sup>	3.97 <sup>a</sup>	0.07	0.2084
Feed/gain	7.14 <sup>a</sup>	6.94 <sup>a</sup>	0.00	0.2155
Total DMI, lb	3391 <sup>a</sup>	3468 <sup>a</sup>	77.26	0.5517
Final BW, lb	1227 <sup>a</sup>	1338 <sup>b</sup>	8.00	0.0103

<sup>ab</sup>Means with different superscripts differ ( $P$ -value < 0.01).

Cattle supplemented at low level (2# WDGS/head/day) during backgrounding phase on cornstalks, then grazed bromegrass 30 days.

Cattle supplemented at high level (5# WDGS/head/day) during backgrounding phase on cornstalks, then grazed bromegrass 30 days.

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

	Low	High
Winter phase		
Initial BW, lb	500	500
Days	143	143
ADG, lb/day	0.49	1.41
Summer phase		
Days	135	135
ADG	1.46 (25%) <sup>1</sup>	1.09
Finishing phase		
DOF	112	107
ADG, lb/day	4.15	4.35
DMI, lb/day	28.2	29.2
Final BW, lb	1240	1325

Low = cattle supplemented during the winter phase for a low daily gain.

High = cattle supplemented during the winter phase for a high daily gain.

<sup>1</sup>Percent compensation, calculated as difference in total pounds of summer gain divided by difference in total pounds of winter gain.

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

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

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

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

cattle. Profitability 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).

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