Beef Systems Grazing Strategies: Effect on Backgrounding and Finishing Net Return

Progress Report

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Abstract: Cow-calf pairs, grazing native range, from the NDSU-Dickinson RE Center and the SDSU-West River Ag Center (n = 159) were used to evaluate weaning date and backgrounding method. Treatments were: 1) Normal Wean (Jun-Nov) - feedlot direct (NW-FLT), 2) Early Wean (Aug) – feedlot direct (EW-FLT), 3) Early Wean (Aug) - grazed dryland unharvested corn (Aug-Nov) - feedlot (EW-CN), and 4) Normal wean (Nov) - grazed dryland unharvested corn (Nov-Dec) - feedlot (NW-CN). Feedlot arrival date for finishing at the UNL-Panhandle RE Center feedlot, Scottsbluff, NE was staggered. Harvest end point was based on ultrasound BF depth. Mean differences were determined using the SAS MIXED procedure. For backgrounding, EW-CN and EW-FLT steer growth was similar and more rapid [(Gain: (P = 0.043) and ADG: (P = 0.004)] than NW-FLT and NW-CN. The EW-CN system COG of $1.05/kg was lowest when compared to $1.31, $3.77, and $1.37/kg for the NW-FLT, NW-CN, and EW-FLT, respectively. Stockpiling corn resulted in excessive crop shrink (P = 0.013) reducing days of grazing by 70%. Backgrounding net returns/steer were $87.50, -$33.38, $104.58, and $69.56 for the NW-FLT, NW-CN, EW-CN and EW-FLT, respectively. The value of backgrounded beef produced per acre from corn grazing when expressed as bushels per acre was 87.5 and 26.2 bu/acre for the EW-CN and NW-CN, respectively. For finishing, EW-FLT steers grew slower (P = 0.0011), consumed less DM/d (P = 0.0001), were more efficient (P = 0.008), and COG was lower (P = 0.0002). Carcass closeout values for HCW, FD, dressing %, and YG did not differ; however, EW-FLT steer carcasses had smaller REA (P = 0.053), greater marbling score (P = 0.0005), and numerically greater % Choice quality grade (P = 0.11). EW-FLT steers placed directly in the feedlot at weaning were associated with lower placement cost, more DOF (P = 0.0001), and higher feed and yardage costs. Net return to finishing of $39.62 per head for the EW-FLT was greater, when compared to $3.11, -$84.06, and $0.16 for the NW-FLT, NW-CN, and EW-CN, respectively. Experimental results suggest that greatest beef systems net return will be obtained when EW steers graze dryland unharvested corn and are sold at the end of backgrounding; however, when held through final harvest, early weaning and direct feedlot placement were associated with greatest net return.

Introduction

Previous research has evaluated forage utilization by early (August - EW) vs normal (November - NW) weaned beef cows and the effect of weaning date on cow and calf performance. These studies show that weaning calves early has a positive impact on growth and efficiency during the backgrounding phase, improves cow body condition score, reduces range forage utilization, and shortens the lifetime feeding period of steers held for retained ownership (Landblom et al., 2006). Economic analysis of retained ownership concluded that early weaning improved feedlot production efficiency by reducing daily and per carcass revenue relative to normal weaning (Fausti et al., 2007). And subsequently, Landblom et al. (2008) documented that significantly altering weaning date can have a positive impact on business profitability in the beef cattle enterprise. The objective of this study was to evaluate the effect of weaning date (August vs November) and backgrounding method on backgrounding and finishing net returns.

Materials and Methods

Spring calving cows (Mar-Apr) originating at the South Dakota State University Antelope Station (ANT), Buffalo, SD, and the North Dakota State University Dickinson Research Extension Center (DREC), Manning, ND were used in a 2 x 2 factorial arrangement comparing weaning date (August vs November) and backgrounding method (feedlot vs grazing dryland unharvested corn). Pen or pasture served as the experimental unit and backgrounding, finishing, and carcass data were analyzed using the

SAS MIXED procedure. The protocols used in this study were approved by the North Dakota State University Animal Care and Use Committee.

Steer calves in the EW system were weaned on August 15 and calves in the NW system were weaned the first week of November. At each weaning date, steers from each research facility were randomly assigned to either feedlot or corn grazing backgrounding treatments. Corn grazing steers were held in drylot and fed hay for two weeks before being put into replicated dryland unharvested corn fields. Early weaned steers began grazing unharvested corn on August 25th and the NW steers began grazing corn on November 21st. For the feedlot treatment, EW and NW steers were shipped by commercial truck to the University of Nebraska Panhandle Research Extension Center feedlot, Scottsbluff, Nebraska where they were finished and harvested at a commercial Abattoir. Steer weight and backfat depth of 12.7 mm were used to determine final harvest endpoint. Measurement for backfat depth was conducted 30 – 45 days before final harvest using a SonoVet ultrasound machine and 3.5 MHz probe. Final harvest date was determined by calculating the required number of DOF to attain 12.7 mm BF.

Systems measurements were: corn forage nutrient change, corn forage utilization, backgrounding performance type and economics, treatment effect on animal health, corn grazing grain equivalent value, finishing performance and economics, and carcass closeout values.

Steers in the systems investigation were vaccinated before spring turnout on native pasture and then were vaccinated 3-4 weeks before each weaning date, and again at weaning with modified live IBR, BVD types I and II, PI_3, BRSV + Mannhiema haemolytica, and an inactivated 7-way Clostridial vaccine + H. somunus. In addition, the calves were poured with a parasiticide. After weaning, the calves were observed closely for the onset of health problems and were treated according to the attending veterinarian's recommendation. The following information is being recorded: body temperature, number of pulls, product used for treatment and cost, percent death loss, and system cost due to death loss.

Results and Discussion

Systems Backgrounding - Considering the results of Fausti et al. (2007) in the previous study, the present investigation was conducted to compare calf growing methods for EW and NW calves after weaning that compared feedlot backgrounding with grazing unharvested dryland corn before finishing based on a high quality grid. Standing peak dryland corn forage nutrient quality was determined mid-September and tracked through to mid-January. Corn forage CP declined from Sep to Nov (9.16 to 8.66) and IVDMD declined from 75.2% to 57.0% (Table 1).

Peak DM corn production for the EW steers averaged 2.20 Ton/acre (Table 2) and peak DM corn production for the NW group was 1.93 Ton/acre (Table 3). Early weaned steers utilized an average 1.46 Ton/acre over the 70 day grazing period and NW steers utilized 0.41 Ton/acre. Field loss in stockpiled corn set aside for grazing after normal weaning was excessive averaging 0.90 Ton/acre. Compared to the EW treatment, the large field loss reduced available days of grazing by 70%.

Comparative systems backgrounding performance is shown in Table 4. Steer weight at EW did not differ (P=0.44), but gain among the NW-CN steers was reduced significantly (P=0.043) due to field crop shrink. Average daily gain for EW and NW steers was similar and greater (p=0.004) than the control steers despite significant crop shrinkage. System backgrounding economics are shown in Table 5 where gain value, input costs, net returns, and cost/kg of gain are summarized. The backgrounding cost/lb. of gain was \$0.5933, \$1.71, \$0.5097, and \$0.6564 for the NW-FLT, NW-CN, EW-CN, and EW-FLT, respectively. Net return/steer among the steers in EW-CN system was 33.5% greater than the EW-FLT system and 16.3% greater than the NW-FLT system. Stockpiling corn for grazing after normal weaning was not successful resulting in a net loss/steer of -\$33.38. The stocking rate for early weaned calves that grazed unharvested dryland corn was calculated to be 0.25 acres/calf/month and the stocking rate for stockpiled corn reserved for unharvested corn gazing after normal weaning was determined to be 0.82 acres/calf/month (Table 6). Following grazing by calves, cows grazed stalk residue. Stalking rate for cows expressed in acres/cow/month is shown in Table 6 for 1,000, 1,200, and 1,400 pound cows. The stocking rate for 1,200 pound cows grazing corn stalk residue previously grazed by EW and NW calves was 0.70 and 0.87 acres/cow/month, respectively.

For the purpose of comparing beef production from corn grazing during backgrounding with grain production, steer net return value per acre after expenses was converted to a corn grain equivalent yield per acre. Comparative values are shown in Table 7 over a range of corn prices per bushel from \$3.00 to \$5.00/bu. At \$4.00/bu, the corn equivalent value of beef produced among the EW steers was equivalent to 87.5 bushels of corn/ac. The corn equivalent value of beef produced among the NW steers was equivalent to 26.2 bushels of corn/ac.

The effect of alternative weaning date and corn grazing on finishing performance is shown in Table

8. Early weaning and corn grazing backgrounding resulted in variable feedlot starting weights (P = 0001), and a large variation in the number of days on feed (P = 0.0001); however, harvest age (P = 0.27) and 4% shrunk harvest weight (P = .409) did not differ. For gain and FE, EW-FLT steers gained at the slowest rate (P = 0.001), were more efficient (P = 0.008), and feed and yardage cost/lb. of gain were lower (P = 0.0002). By contrast, EW-CN steers that were the most profitable at the end of corn grazing backgrounding were less efficient (P = 0.008) and feed and yardage cost/lb. of gain was higher (P = 0.0002) during retained ownership finishing. The NW-CN steers that grazed stockpiled dryland corn were the least efficient (P = 0.008) and had the highest feed and yardage cost/lb. of gain (P = 0.0002).

The primary health issue was bovine respiratory disease, which has been summarized in Table 9. The incidence of BRD among EW steers sent directly to the feedlot after weaning mid-August was markedly greater than for any of the later arriving treatment groups and treatment cost was 3.5 times greater than either the control or treatment groups that grazed corn during backgrounding.

The effect of alternative weaning date and corn grazing on carcass closeout measurements is shown in Table 10. Carcass closeout values for HCW (P = 0.78), dressing percent (P = 0.51), fat depth (P = 0.243), and yield grade (P = 0.23) did not differ. Corn grazing steers had significantly larger ribeye area (p = 0.053). Days on feed, which varied due to management system, directly affected marbling score (P = <0.0001) and the number of carcasses that grading USDA Choice or better (P = 0.10). The number of days on feed and the percent USDA Choice were 141.5/66.7%, 165.7/79.2%, 192.0/81.1%, and 280.8/94.4% for the NW-CN, EW-CN, NW-FLT, and EW-FLT, respectively.

The combined effect of calf placement cost, ingredient cost, treatment cost, freight, and interest cost affected finishing net return and are shown in Table 11. Calf placement cost had the most influence on net return. Closeout net returns were $3.11, -$84.06, $0.16, and $39.62/head for the NW-FLT, NW-CN, EW-CN, and EW-FLT, respectively.

Implications

Results suggest that greatest beef systems net return will be obtained when EW steers graze dryland unharvested corn and are sold at the end of backgrounding; however, when held until final harvest, early weaning and direct feedlot placement were associated with greatest net return.

This project is scheduled to be repeated during the 2008-2009 production year.

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Table 1.Corn Nutrient Change (Sept. – Jan.)

	C- Prot	*NDF*	*ADF*	*IVDMD%*	*IVOMD*	*Ca*	*P*
	%	%	%	%	%	%	%
Whole Plant/Stalks:							
Sept. 25, 2007	9.16	61.0	30.0	75.2	74.8	0.20	0.16
Nov. 15, 2007	8.66	70.2	40.5	59.0	57.0	0.23	0.12
Jan. 12, 2008(Residue)	4.36	79.8	50.3	43.5	40.9	0.32	0.05
Corn Grain:							
Sept. 25, 2007	14.1	12.2	3.10	90.8	90.4	0.03	0.37
Cobs:							
Sept. 25, 2007	4.33	81.5	39.2	64.1	63.1	0.01	0.12
Litter (trash on ground):							
Jan. 12, 2008	9.57	72.1	36.7	64.7	64.8	0.31	0.11

Table 2. Early Wean Corn Utilization

	Peak	***Calf***	***Cows***
	Production	Utilization	Residual Stalks
	T/Ac	T/Ac	T/Ac
Fields:			
4	2.05	1.11	0.94
6	1.92	1.24	0.68
8	2.64	2.02	0.62
Total Tons	6.61	4.37	2.24
Avg DM, T/Ac	2.20	1.46	0.75

Table 3. Normal Wean Corn Utilization

	Peak Production Sept	***Start Graze Nov***	***Field Loss***	***Calf Utilization***	***Cows Residual Stalks***
	T/Ac	T/Ac	T/Ac	T/Ac	T/Ac
Field					
5	2.11	1.18	0.93	0.54	0.64
7	1.6	0.89	0.71	0.27	0.62
9	2.08	1.02	1.06	0.41	0.61
Total Tons	5.79	3.09	2.70	1.22	1.87
Avg DM, T/Ac	1.93	1.03	0.90	0.41	0.62

Table 4. Alternative Beef System Backgrounding Performance

	NW-Control Pasture	*NW – Corn Grazing*	*EW – Corn Grazing*	*EW – Feedlot*	*SE*	*P-Value*
Weaning Date	Nov 7	Nov 7	Aug 15	Aug 15		
No. Steers	54	24	24	57		
Pre-Unhvsted Corn Grazing (Drylot):						
Days in Drylot[a]	----	13	13	----		
Drylot St. Wt.(Aug 15, Nov 7), lb	----	627	468	----		
Drylot End Wt., lb	----	639	481	----		
Drylot Gain, lb	----	12.0	13.0	----	2.91	0.52
Drylot ADG (Drylot), lb	----	0.923	1.00	----	0.22	0.53
System Days	84	21	70	86		
System Wt at Ely Wean (Aug 15) lb	436	457	468	405	22.1	0.44
System End Wt., lb	600	693	662	611	33.19	0.15
Gain, lb	164[ab]	54[b]	181[a]	206[a]		0.043
ADG, lb	1.95[b]	2.57[a]	2.59[a]	2.40[a]	0.126	0.004

[a]Weaned steers were held in drylot for 13 days before placement in the corn fields to get over weaning.

Table 5. Alternative Beef System Unharvested Corn, Pasture, and Feedlot Economics (2007)

	NW- Ctrl Pasture/ Feedlot	*NW – Corn Grazing*	*EW – Corn Grazing*	*EW – Feedlot*	*SE*	*P-Value*
No. Steers	54	24	24	57		
Gain Value [a,b,c,d]	$9,979	$1,413	$4,724	$10,980		
Input Cost:						
Pasture (Rent @$14.00/ac)[e]	$5,254					
Corn ($164/ac)		$2,214	$2,214			
Feedlot				$7,302		
Backgrounding Net Return	$4,725	-$801	$2,510	$3,678		
Backgrounding Net Return/Head	$87.50	-$33.38	$104.58	$69.56		
Cost/Lb. Gain	$0.5933	$1.71	$0.5097	$0.6564		

[a]NW Control Gain Value (8,910lb@$112/cwt)
[b]NW Corn Grazing Gain Value (4,334lb@$109/cwt)
[c]EW Gain Value (1,296lb@$109/cwt)
[d]Gain Value (9,804lb@$112/cwt)
Pasture Rent Calculation: 2.78 months, 2.5 AUM; = 6.95 Ac/AUM @ $14/Ac; = $97.30 x54 = $5,254.20

Table 6. Steer and Cow Stalking Rate for Unharvested Corn and Stalk Residue Grazing

	Normal Weaned Cows	*Normal Weaned Steers*	*Early Weaned Cows*	*Early Weaned Steers*
Steer Unharvested Corn, Ac/Steer/Month		0.82		0.25
Corn Residue, T/Ac	0.624		0.748	
Stalk Residue Requirement, Ac/Cow/Month				
1,000 Lb Cow	0.73		0.59	
1,200 Lb Cow	0.87		0.70	
1,400 Lb Cow	1.02		0.82	
Residue Value @$40/Ton Hay Equivalent	$337.00		$420.00	

Table 7. Corn Grazing Grain Equivalent, Bu/Acre

	Corn Bushel Price	*Early Wean – Grain Yield Equivalent*	*Normal Wean – Grain Yield Equivalent*
Steer Grazing Gain Value	$3.00	116.6	34.9
	$4.00	87.5	26.2
	$5.00	70.0	20.9
Corn Stalk Residue Grazing (Cows)	$3.00	10.4	8.3
Based on $40/Ton Hay	$4.00	7.8	6.2
	$5.00	6.2	5.0
Combined Steer Gain and Cow	$3.00	127.0	43.2
Stalk Grazing Value	$4.00	95.3	32.4
	$5.00	76.2	25.9

Table 8. Effect of Alternative Weaning Date and Corn Grazing on Steer Finishing Performance

	NW- Control Pasture/F-lot	*NW – Corn Grazing*	*EW – Corn Grazing*	*EW – Feedlot*	*SE*	*P-Value*
Start Wt., lb	600.0[c]	747.7[b]	690.3[d]	404.8[a]	0.00	<0.0001
Shrunk Finished End Wt., lb[a]	1186.9	1224.0	1249.9	1203.1	23.01	0.409
Days on Feed	192[d]	141.5[b]	165.7[c]	280.8[a]	3.44	<0.0001
Kill Age, Days	408.1	415.1	404.6	412.1	3.17	0.270
Gain, lb	586.9[c]	476.3[b]	559.6[d]	798.3[a]	9.46	0.0001
ADG, lb	3.06[b]	3.37[c]	3.38[c]	2.85[a]	0.056	0.0011
Fd/Head/Day (As Fed), lb	29.7[b]	36.0[d]	33.0[c]	27.0[a]	0.749	<0.0001
Fd/Head/Day (Dry Matter), lb	20.2[b]	24.5[d]	22.4[c]	17.8[a]	0.506	<0.0001
DM Feed:Gain, lb	6.60[b]	7.27[c]	6.62[b]	6.27[a]	0.157	0.008
Fd & Yard Cost/Day, $	$2.096[b]	$2.723[d]	$2.383[c]	$1.715[a]	0.053	<0.0001
Fd & Yard Cost/Lb of Gain, $	$0.6850b	$0.8080c	$0.7050b	$0.6017a	0.016	0.0002

[a] 4% Shrink

Table 9. Alternative Production Effect on Health Pulls and Treatment Costs

	NW- Control Pasture/Feedlot	*NW – Corn Grazing*	*EW – Corn Grazing*	*EW – Feedlot*
Pulls: 1	3.7%	3.75%	0.0%	17.5%
2				8.77%
3				3.51%
Avg. Treatment Cost/Head	$1.72	$3.87	$0.0	$9.92

Table 10. Effect of Alternative Weaning Date and Corn Grazing on Carcass Measurements

	NW – Control Pasture/F-Lot	*NW – Corn Grazing*	*EW – Corn Grazing*	*EW – Feedlot*	*SE*	*P-Value*
Hot Carcass Wt., lb	737.8	745.3	762.9	745.5	14.77	0.78
Carc. Dressing Percent, %	62.0	60.6	61.1	60.6	0.72	0.51
Ribeye Area, sq. in.	11.51[b]	12.3[a]	12.3[a]	11.7[b]	0.17	0.053
Fat Depth, in.	0.586	0.547	0.581	0.638	.0304	0.243
Yield Grade[a]	3.46	3.35	3.45	3.59	0.075	0.229
Marbling Score	442[b]	438[b]	453[b]	539[a]	12.75	0.0005
% Choice Carcasses	81.1	66.7	79.2	94.4	6.32	0.109

[a]Yield Grade correlation to percentage of boneless, closely trimmed retail cuts: 1 = 54.6%, 2 = 52.3%, 3 = 5.0%, 4 = 47.7%, and 5 = 45.4%

Table 11. Effect of Alternative Weaning Date and Corn Grazing on Finishing Economics

	NW – Control Pasture/ F-lot	*NW – Corn Grazing*	*EW – Corn Grazing*	*EW – Feedlot*
Expenses:				
Calf Value	$666.00	$783.22	$724.50	$566.72
Feed and Yardage	$402.06	$384.85	$394.52	$480.34
Treatment Cost	$1.72	$3.87	$0.0	$9.92
Freight ($4.5/mile; 425 miles)	$23.90	$29.88	$27.71	$16.20
Interest @ 6.0%	$34.18	$27.55	$30.90	$49.00
Total Expense	$1,127.86	$1,229.37	$1,177.63	$1,122.18
Carcass Value	$1,130.97	$1,145.31	$1,177.79	$1,161.80
Profit (Loss)	$3.11	-$84.06	$0.16	$39.62