Alternative Beef Systems Grazing Strategies

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# Progress Report

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## Introduction

Although beef cattle producers have experienced an average net return of $109 per cow during the ten-year period from 1998 to 2007 (range: $40 -$212/cow) (ND Farm & Ranch Business Management Program, 2007), ever increasing production costs, price volatility, unprecedented corn and energy prices, and drought combine to challenge profitability.

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 has been determined. These studies show that weaning calves early has a positive impact on growth and efficiency during the backgrounding phase, improves cow body condition score entering the wintering period, 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 weaning early improved feedlot production efficiency by increasing feed efficiency and reducing the cost per pound gained in the feedlot relative to the normal weaning alternative (Fausti et al., 2007). However, early weaned steers were marketed at a lighter weight, resulting in lower revenue per head relative to normal weaned steers. The net outcome for an early weaning effect on profitability was not statistically significant. 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 current and third-phase in this long-term evaluation of alternative beef production systems addresses two questions regarding the viability for increasing the use of native range and other locally grown annual forages: 1) Do early- vs normal-weaned and low- vs high-input winter feeding programs elicit effects on cow performance that may influence ranch profitability? And 2) Can backgrounding steer calves by fall grazing of unharvested standing corn reduce feed costs, increase net backgrounded steer value and/or improve finished steer closeout values when steers are held for terminal marketing? At the ranch level, we hypothesize that greater reliance on direct grazing, in lieu of hay feeding, will reduce input costs for cows and early weaned calves. In addition, we hypothesize that disbursal of calves grazing unharvested corn will reduce respiratory disease and be more environmentally friendly by distributing manure across pastures and fields.

## Materials and Methods

All procedures used in this investigation were approved by each state's Institutional Animal Care and Use Committee.

Spring calving cows originating at the South Dakota State University Antelope Station (ANT), Buffalo, SD, and the North Dakota State University Dickinson Research Extension Center (DREC) ranch headquarters, Manning, ND are being used in a 2 x 2 factorial arrangement comparing the effect of weaning date (August vs November) and winter feeding method (hay vs extensive grazing of stockpiled range or corn stalks). Post-weaning calf management is also being evaluated in a 2 x 2 factorial treatment arrangement comparing delivering calves directly to the feedlot as calf-feds with calves that graze unharvested corn before delivery to the feedlot.

Early weaned calves were weaned on August 15, 2007 and the normal weaned calves were weaned November 7, 2007 at the ANT and DREC research facilities. At each weaning date, steers from the ANT and DREC research facilities were randomly assigned to either feedlot or corn grazing backgrounding treatments. For the feedlot treatment, steers were weaned and shipped directly to the University of Nebraska Panhandle Research Extension Center feedlot, Scottsbluff, Nebraska

where they were backgrounded and subsequently finished. To insure the calves were completely weaned and to eliminate fence crawling, the corn grazing steers were held in drylot and fed hay for two weeks before being put into the corn fields. Early weaned steers were put into the corn fields on August 25th and the NW steers were put into corn fields on November 21st. When most of the leaves, husks, and ears had been grazed off, the steers were shipped to the UNL Panhandle Feedlot for growing and finishing. Steer weight, frame size, and backfat depth of 0.50 inch are being 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. Growth performance, health events, and closeout values were recorded.

Tracking calf health is an important component of this beef systems investigation. Calves involved in the investigation from the ANT and DREC research facilities received initial immunization before spring turnout on native pasture and then were re-vaccinated 3-4 weeks before each weaning date and again at weaning with modified live vaccine preparations that included IBR, BVD types I and II, $PI_3$, BRSV plus Mannhiema haemolytica, and a 7-way Clostridial vaccine that included 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 treatment prescribed by the attending veterinarian at each facility was followed. The following health 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.

Cows from the ANT and DREC research facilities were assigned in a 2 x 2 factorial arrangement to two weaning date groups, i.e. early (150 days of age) and normal (225 days of age) weaning grazing groups, and after normal weaning in November, one-half of the cows from each weaning group were randomly assigned to one of two winter management groups: High Input (HI: Hay) or Low Input (LI: Winter grazing of stockpiled native range or corn stalks). The LI group is being wintered on stockpiled winter range in South Dakota and the LI group in North Dakota is being wintered grazing corn stalks after calves have sufficiently grazed out the unharvested corn in a "Leader-follower" program. All cows are switched to hay prior to calving and hay feeding continued until the cows and calves were turned out on spring pasture. Metabolizable protein intake was maintained with distillers grain supplementation.

Results and Discussion

This multiple-year alternative beef systems investigation seeks to measure the effect of greater direct animal harvesting as a replacement for mechanically harvested feeds. Intuitively, one would expect direct animal harvesting would reduce input cost associated with producing backgrounded calves. Weaning spring-born calves in August as compared to weaning at a more typical date in November has result in an energy allocation shift. During a typical 7-month lactation period in the northern Great Plains, nutritional value of native range declines over time until the cow's nutrient requirements for maintenance and lactation cannot be met, and body reserves are drawn down. Terminating lactation after a shortened 5-month nursing period has been beneficial for both cows in the investigation and the range resource (Landblom et al. 2008).

At the time this progress report was prepared, the cow wintering component comparing either winter grazing of stockpiled native range or corn stalks that remained after calves fall grazed the unharvested corn has not been completed and will be included in the next progress report.

In an economic analysis of our previous research with EW and NW, Fausti et al. (2007), analyzed post-weaning performance and identified that EW steers arrived at the feedlot approximately 80 days younger and 170 pounds lighter than their NW counterparts. The EW steers spent an average 31 days longer in the feedlot, but were 50 days younger and 92 pounds lighter at final harvest (live weight basis). Early weaned steers gained more weight in the feedlot, but ADG was not affected by weaning treatment. There was no statistical evidence that weaning treatment affected carcass YG, fat depth, or dressing percent. However, NW dressed carcasses were an average 53 pounds heavier. This HCW advantage explains a majority of the $55 dressed carcass revenue differential advantage NW steers had relative to EW steers. Regression analysis was used to evaluate the effect of early weaning on total slaughter steer revenue. The analysis indicated that early weaning does have a positive effect on carcass revenue once other influences are accounted for. This finding is consistent with the LS means result that normal weaned steers had a higher level of per head carcass revenue than early weaned steers once you consider that carcass weight explains 82% of the variability in the regression equation. The

results suggested that early weaning will have a positive effect on carcass revenue if early weaned steers are sold at heavier weights.

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 included either direct shipment to the feedlot or extensively fall grazing unharvested corn before shipment to the feedlot and then finishing the steers based on a high quality carcass merit grid. Standing corn forage nutrient quality was measured over time and the results are shown in Table 1. During the period from September 25, when peak corn production was measured, to January 12, when cows were removed from corn stalk grazing, crude protein declined from 9.16% to 4.36% and invitro dry matter digestibility declined from 75.2% to 43.5%.

Unharvested corn utilization by calves and residual corn stalk utilization by cows for EW and NW groups are shown in Tables 2 and 3. Peak dry matter corn production for the EW steers averaged 2.20 tons/acre and peak corn production for the NW group was 1.93 tons/acre. Early weaned steers utilized an average 1.46 tons/acre over the 70 day grazing period and cows utilized an average 0.75 tons/acre of corn stalk residue. Field losses in the unharvested stockpiled corn fields, set aside for grazing after the NW steers were weaned, was high and averaged 0.90 tons/acre. Large field losses and lower peak corn production in the fields that the NW steers were assigned to resulted in only 21 days of grazing, which was 59 days less than the EW steers. Based on this limited data, stockpiling unharvested corn for grazing was unsuccessful.

Backgrounding steers by grazing unharvested corn either early or late was compared to a control group that grazed native pasture. Backgrounding steer performance for the two systems is shown in Table 4. Average daily gains for steers that grazed corn either early or late after normal weaning, or were assigned directly to the feedlot were 2.59, 2.57, and 2.46 lb/head/day, respectively. The control steers that grazed native pasture gained 1.38 lb/head/day from the time the EW group was weaned in August until normal weaning the first week of November. Feed cost per pound of gain shown in Table 5 was lowest for non-weaned control steers that grazed native pasture and highest for late weaned steers that grazed stockpiled unharvested standing corn. Backgrounding feed cost per pound of gain was $0.38, $1.71, $0.51, and $0.66 for the NW-feedlot (control), NW-corn grazing, EW–corn grazing, EW-Feedlot, respectively.

The effect of health complications resulting from bovine respiratory disease (BRD), which is the most common post-weaning disease, is far reaching; reducing animal growth and efficiency, reducing carcass quality grade, and increasing system cost due to death loss. The effect of alternative weaning date and management systems on health has been summarized in Table 6. Due to treatment weaning date (EW vs NW) and backgrounding method (feedlot vs fall grazed unharvested corn) the steers in the investigation arrived at the University of Nebraska Panhandle Feedlot, Scottsbluff, Nebraska, on different dates. Arrival dates are as follows: EW-feedlot (August 15), EW-corn grazing (December 3), NW-feedlot (November 7), and NW-corn grazing (January 3). The EW-feedlot steers shipped August 15$^{th}$ experienced the greatest number of BRD feedlot pulls, i.e. 17.5%, 8.77%, and 3.51% 1$^{st}$, 2$^{nd}$, and 3$^{rd}$, pulls, respectively. The treatment cost for these multiple pulls averaged $9.92 per steer. Death loss for this EW-feedlot group was 5.26% and was calculated to cost the system $62.50/steer marketed based on a finished steer value of $1,125.00 (1,250 lb @ $90.00/cwt). Bovine respiratory disease in all of the other later arriving groups was very low. It is interesting to note that none of the EW-corn grazing steers shipped to the feedlot on December 3 have been diagnosed with BRD, none have required treatment of any kind, and none of the steers in EW-corn grazing system have died. This set of data completely disagrees with our own data and the data of others that has shown EW calves to experience less BRD problems.

Based on corn forage production and disappearance stocking rates for steers that grazed unharvested corn and cows that grazed the remaining stalk residue have been summarized in Table 7. Carrying capacity for steers that grazed corn early was calculated to be 0.24 acres/steer/month and for stockpiled corn reserved for steers after normal weaning in November the carrying capacity was 0.80 acres/steer/month. And for 1,000, 1,200, and 1,400 pound cows corn stalk residue carrying capacity was 0.59, 0.70, and 0.82, and 0.73, 0.87, and 1.02 acres/cow/month for the EW and NW systems, respectively.

Actual corn grain yield in the EW and NW corn fields was estimated to be 21.3 and 14.1 bushels/acre, respectively. Whole plant grazing value, when converted to beef, has much higher value, but can be further converted and can be

expressed in corn grain equivalents (Table 8). Recent corn grain volatility has been extreme; therefore, Table 8 shows the value of beef gain from grazing unharvested corn expressed over a range of corn prices from $4.00 to $6.00 per bushel. And the value of corn stalk reside grazed by cows was valued at $40.00 per ton and also converted to a corn grain equivalent. The combined corn grain equivalent value of beef from calves and grazing for cows was calculated for $4.00, $5.00, and $6.00/bushel corn to be 95.3, 76.2, and 63.5 bushels/acre for the EW system, and 32.4, 25.9, and 21.6 bushels/acre for the NW system, respectively.

Implications:

Results provided in this beef systems progress report are for the first year of the investigation and all components of the study were not completed when this report was submitted for publication in the annual report; therefore, the information presented here is considered to be preliminary, but shows some promising trends. Statistical inference and conclusions will be added to the final report when the second year of data collection has been completed and analyzed.

Table 1.Corn nutrient Change (September 25, 2007 to January 12, 2008)

| | 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 (2007)

| | Peak Production T/Ac | Calf Utilization T/Ac | Cows Residual Stalks 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 (2007)

| | 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 Backgrounding Steer Performance (2007)

| | NW- Control Pasture/Feedlot | NW – Corn Grazing | EW – Corn Grazing | EW – Feedlot |
|---|---|---|---|---|
| **No. Steers** | 24 | 24 | 24 | 57 |
| **Feedlot or Grazing Days** | 85 | 21 | 70 | 70 |
| **Wt. at Early Wean, lb** | 553 | 670 | 472 | 441 |
| **Grazing Start Wt., lb** | ---- | 639 | 481 | ---- |
| **End Grazing Wt., lb** | 670 | 693 | 662 | 613 |
| **Gain, lb** | 117 | 54 | 181 | 172 |
| **ADG, lb** | 1.38 | 2.57 | 2.59 | 2.46 |

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

| | NW- Control Pasture/Feedlot | NW – Corn Grazing | EW – Corn Grazing | EW – Feedlot |
|---|---|---|---|---|
| **No. Steers** | 24 | 24 | 24 | 57 |
| **Gain Value (2,808lb@$109/cwt)** | $3,061 | | | |
| **Gain Value (4,334lb@$109/cwt)** | | | $4,724 | |
| **Gain Value (1,296lb@$109/cwt)** | | $1,413 | | |
| **Gain Value (9,804lb@$112/cwt)** | | | | $10,980 |
| **Input Cost:** | | | | |
| **Pasture (Rent @$18.29/ac)** | $1,058 | | | |
| **Corn ($164/ac)** | | $2,214 | $2,214 | |
| **Feedlot** | | | | $7,015 |
| **Backgrounding Net Return** | $2,003 | -$801 | $2,510 | $3,965 |
| **Cost/Lb. Gain** | $0.38 | $1.71 | $0.51 | $0.66 |

Table 6. Alternative Production Effect on Health Pulls and Treatment Costs (2007)

| | 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 |
| **Death Loss** | 0.0% | 0.0% | 0.0% | 5.26% |
| **Death Loss Cost/Head** | $0.0 | $0.0 | $0.0 | $62.50 |

Table 7. Steer and Cow Stalking Rate for Unharvested Corn and Stalk Residue Grazing (2007)

| | Normal Weaned Cows | Normal Weaned Steers | Early Weaned Cows | Early Weaned Steers |
|---|---|---|---|---|
| **Steer Unharvested Corn, Ac/Steer/Month** | | 0.24 | | 0.80 |
| **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 8. Whole Plant Corn Grazing Grain Equivalent, Bu/Acre (2007)

| | Corn Bushel Price | Early Wean – Grain Yield Equivalent | Normal Wean – Grain Yield Equivalent |
|---|---|---|---|
| **Steer Grazing Gain Value** | $4.00 | 87.5 | 26.2 |
| | $5.00 | 70.0 | 20.9 |
| | $6.00 | 58.3 | 17.4 |
| **Corn Stalk Residue Grazing (Cows) Based on $40/Ton Hay** | $4.00 | 7.8 | 6.2 |
| | $5.00 | 6.2 | 5.0 |
| | $6.00 | 5.2 | 4.1 |
| **Combined Steer Gain and Cow Stalk Grazing Value** | $4.00 | 95.3 | 32.4 |
| | $5.00 | 76.2 | 25.9 |
| | $6.00 | 63.5 | 21.6 |

## Literature Cited


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