Western Beef Development Centre
Division of PAMI

Backgrounding Calves on Annual Forages

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Introduction

Backgrounding refers to the feeding and managing of beef calves from weaning until they are placed on a high concentrate finishing ration. Today, with rising input costs and variable market conditions, beef producers are looking for alternative strategies to grow weaned calves prior to entry into a feedlot.

Annual forages are well suited to provide quality feed as swath-grazed crops for beef backgrounding systems. Swath grazing saves the costs of baling or chopping, hauling, stacking or packing, and feeding. Swath grazing may also save the cost of manure removal. Golden German millet (GGM), a warm season annual, is ideally suited to swath grazing as it produces optimum yield and quality in late August when planted in June. GGM cut at the boot or early-heading stage will have a feed value of approx. 14% CP and 60% TDN with a 60% neutral detergent fibre. Ranger barley, a smooth-awned cool season annual cereal, is well suited for grazing when cut at the soft-dough stage.

Backgrounding systems which can eliminate confined pen feeding for a shortened period may provide a tool to reduce costs, yet provide adequate nutrient requirements. New knowledge is needed on the costs of growing and grazing annuals with weaned calves compared to pen feeding. Potentially by incorporating the use of low-cost field feeding systems into backgrounding programs, western Canadian beef producers can manage risk more effectively.

Objectives

This study evaluated two different annual forages for productivity, nutritive value, and economics in backgrounding systems for weaned beef calves. The objectives of this study were to (1) determine the effects of grazed annual forage type on beef calf performance; (2) evaluate cost of gain for calves grazing swathed annuals compared to drylot feeding; (3) monitor calf health in each of the backgrounding systems; and (4) evaluate calf performance during the finishing phase.

Study Site Description

The study was conducted at the Termuende Research Ranch located at Lanigan, Saskatchewan. The study site was a 40-acre field, sub-divided into four 10-acre replicate paddocks. Two 10-acre paddocks each of forage barley (Ranger) and foxtail millet (Golden German) were seeded mid-June along with 50 lb of nitrogen per acre. Crop areas were sprayed at four-leaf stage with 2-4 D amine for broad-leaf weed control. In late August, dry matter yield (DMY) was estimated by clipping replicate (n=25) 0.25 m^2 quadrat samples. Barley (soft-dough) and millet (30% heading) were swathed early September 2007 to facilitate a balance between yield and quality and grazing management.

Trial Management

The field was perimeter fenced with permanent high-tensile wire and further sub-divided into smaller paddock areas using portable electric fence. In mid-October, one hundred twenty (120) spring-born cross-bred calves (mixed sexes) stratified by initial body weight (BW) were assigned to one of three backgrounding systems. Systems were (1) grazing windrowed

millet (cv. Golden German) swaths and supplement; (2) grazing windrowed barley (cv. Ranger) swaths and supplement; (3) calves fed a dry-based ration (ground hay and supplement) in drylot pens. Water was provided every other day and portable wind breaks were supplied in each paddock. Following the backgrounding phase, all calves were placed on a finishing ration at the University of Saskatchewan feedlot where performance was evaluated during the finishing phase.

Swathed forages were allocated on a three-day grazing period and pen calves were fed daily. Calves were weighed on two consecutive days at start and end of study, and every 21 days throughout the trial. Field crops were grazed for 98 days from mid-October 2007 to the end of February 2008.

Results

Forage yield and chemical composition of swathed millet, swathed barley, ground hay and protein supplement are presented in **Table 1**. Field crops, hay, and supplements were tested for nutrient content, and rations formulated to provide calves adequate energy and protein for both maintenance and a targeted gain of 1.8 lbs per day.

Table 1. Dry matter yield and chemical composition of feeds (dry matter basis)

Item[z]	Millet	Barley	Hay	Supplement
Lb/acre	8087	7188	-	-
Ton/acre	4.1	3.6	-	-
CP (%)	15.4	13.5	12.1	15.7
TDN (%)	58.5	64.6	52.8	79.3
DE (Mcal kg)	2.56	2.83	2.31	3.49
NDF (%)	62.5	53.6	68.9	27.6
ADF (%)	37.6	31.9	42.9	14.5

[z]CP=crude protein; TDN=total digestible nutrients; DE=digestible energy; NDF=neutral detergent fibre; ADF=acid detergent fibre

Background Performance

Growing cattle have energy requirements for both maintenance and gain. Energy and protein requirements for a 500 lb growing calf are 11.0% crude protein and 62.0% TDN to achieve an estimated 1.8 lbs/day gain. Calves will consume 3.5% of initial body weight on a high-forage backgrounding diet over the feeding period. In this study, average supplementation level for all calves was 0.615% body weight. Differences were observed in body weight change at day 21, day 43, day 65, and day 98 during the backgrounding period **(Table 2)**.

Table 2. Performance of stocker calves in backgrounding systems

	Background System		
Item[z]	Drylot	Swathed barley	Swathed millet
Body Weight, lb			
Day 0	514	513	513
Day 21	571	537	522
Day 43	637	594	566
Day 65	654	634	602
Day 98	676	705	639
ADG, October to February, lb/day	1.6	1.9	1.3

[z]ADG=average daily gain

Weight differences were observed for calves bunk fed in drylot pens compared to calves grazing millet swaths **(Table 2).**

However, calves grazing windrowed forage barley gained 46% and 19% more than millet-grazed and drylot calves, respectively. Quality analysis indicated energy level was greater in whole plant barley swaths compared to millet or ground hay **(Table 1)**. Calves grazing barley swaths were observed to select more barley heads than whole plants. Finally, there were no differences for calves treated for respiratory ailments between treatment groups.

Feedlot Performance

In March of 2008, calves were sent to the University of Saskatchewan's Beef Research Feedlot in Saskatoon and placed on a finishing ration. Calves were divided into replicate groups (n=4) according to backgrounding treatment. The calves were adapted to a diet consisting of 60% silage up to a finishing ration consisting of 20% silage and 80% barley grain and were fed twice daily at 0800 and 1600. All calves were slaughtered when ultrasound backfat reached an endpoint of 11-12 mm. Feedlot performance of calves is presented in **Table 3**.

After 85 days in the feedlot, heifers backgrounded on millet, barley or drylot were gaining 4.2, 3.7 and 3.8 lbs per day, respectively. Steers backgrounded on millet, barley or drylot were gaining 4.1, 3.9 and 4.0 lbs per day, respectively. After 85 days in the feedlot, all calves backgrounded on millet, barley or drylot were gaining 4.2, 3.8 and 3.9 lbs per day, respectively. Finally, after 182 days, feedlot performance of calves backgrounded in pens or swathed barley or millet gained 3.6, 3.5 and 3.8 lbs per day, respectively.

Table 3. Effect of backgrounding management on subsequent feedlot performance.

Item[z]	Drylot	Barley	Millet
DMI, lb/d	25.6	25.4	25.6
Body weight, lb			
Start of test	743	770	707
End of test	1388	1373	1338
ADG, lb			
Days 0 to 85	3.9	3.8	4.2
Days 86 to 182	3.6	3.5	3.8
Feed:Gain	7.1	7.3	6.7

[z]DMI=dry matter intake; ADG=average daily gain

There were no background treatment effects on DMI as intakes were 25.6, 25.4 and 25.6 for drylot calves, calves grazing millet and calves grazing barley, respectively. However, calves backgrounded on millet swaths had 7% greater feed:gain conversion compared to those grazing barley during the finishing phase. Calves backgrounded on millet swaths had a 9% greater ADG compared to calves grazing barley over the 182 day period. This indicates that the effects of a millet backgrounding program on ADG and feed:gain observed during the finishing period was likely due to compensatory growth by the calves after entry into the feedlot.

Cost of Production

Input costs for each background system and cost of gain are presented in **Table 4**. The costs associated with the study include infrastructure establishment, feed including pasture costs, and yardage which includes labour, fuel, equipment use, maintenance, and depreciation.

A rate of $15.00 per hour was used for labour. Equipment rates were obtained from the Saskatchewan Ministry of Agriculture rate guide. Total production costs for drylot, barley and millet calves were $1.86, $1.20, and $1.15 per head per day, respectively. Costs per pound of weight gain for drylot, barley and millet calves were $1.17, $0.63, and $0.87, respectively.

Table 4. Backgrounding system costs.

	Drylot ($/hd/d)	Barley ($/hd/d)	Millet ($/hd/d)
A. Feed Costs			
Ground hay	0.33	-	-
Supplement	0.20	0.20	0.20
Mineral and salt	0.05	0.05	0.05
Barley swath	-	0.35	-
Millet swath	-	-	0.30
TOTAL Feed Costs	0.58	0.60	0.55
B. Other Direct Costs (bedding, veterinary)			
TOTAL Other Costs	0.16	0.08	0.08
C. Yardage Costs			
Machinery	0.90	0.40	0.40
Labour	0.15	0.10	0.10
Repairs	0.01	0.01	0.01
Depreciation	0.02	0.01	0.01
Manure Cleaning	0.04	-	-
TOTAL Yardage Costs	1.12	0.52	0.52
TOTAL COSTS (A+B+C)	1.86	1.20	1.15
TOTAL GAINS	1.60	1.90	1.30
COST OF GAIN	1.17	0.63	0.87

Overall, backgrounding calves on swathed barley or millet resulted in an average of 35% reduced cost of gain compared to confined-pen feeding. The resulting difference is from a 54% savings in total yardage costs and no manure removal costs.

Conclusions

Cool- and warm-season annual forages have good potential for winter grazing as swathed crops in backgrounding systems. However, in order for producers to include these crops as part of a backgrounding system, the price of growing the crop and input costs must not exceed the cost of gain in a drylot pen.

Utilizing swathed millet or barley can result in similar or increased animal performance when compared to bunk feeding a ration with similar nutrient density. When grazing annual forages with growing beef calves, provision of adequate nutrients is essential (maximizing intake) for achieving targeted gains, thereby reducing cost of gain during winter months. Potentially, these savings can be passed on during the finishing period reflected as reduced feed intake, better feed:gain ratio, and less days on feed. Economically it appears to be advantageous to swath graze annuals with feeder calves; however, good utilization (consumption) of the crop needs to occur in the field. In conclusion, grazing annual forages appears to be a viable option for beef cattle on forage-based backgrounding diets.

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