

# LOW-INPUT PASTURE VS. HIGH-INPUT DRYLOT BACKGROUNDING: RESEARCH REPORT

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## Introduction

Price premiums for “VAC-45” calves marketed through Superior Livestock Auction video sales increased every year from 2000 to 2004, with annual average premiums ranging from \$3.66 to \$7.91/cwt (King and Seeger, 2005). Justification for such premiums are supported by the analysis of New Mexico Ranch to Rail data which showed that steers weaned 41 days or more before feedlot entry generated greater net income during finishing than steers backgrounded 21 to 40 days, or less than 20 days. Those findings also support the premise that backgrounding programs of 45 days or more improve finishing profit potential. Results of a 2005 Cattle-Fax membership survey revealed that 74% of respondents “weaned” calves for at least 45 days prior to shipping. However, studies evaluating backgrounding calves have typically focused on programs less than 40 days, and controlled experiments evaluating the impact of different backgrounding approaches on performance and profit through harvest are not available. There are significant trade offs between backgrounding systems.

### PASTURE BACKGROUNDING

- + less environmental change
- + less dust or mud
- + lower cost
- often less gain
- not trained to eat from bunk

### DRYLOT BACKGROUNDING

- + often more gain
- + trained to eat from a bunk
- greater environmental change
- more dust or mud
- greater feed cost

Therefore, this study compared a low-input pasture backgrounding system to a high-input drylot system of the same duration (42 to 45 days) to evaluate performance and profit during the backgrounding and finishing phase.

## Experimental Procedures

Over 3 yr, 250 calves (520 lb avg. weaning weight; 133 steers and 117 heifers) were used to compare two backgrounding systems at the New Mexico State University Corona Range Livestock Research Center (CRLRC). Calves originated from the CRLRC spring-calving British cross cowherd, and were born in February, March, or April.

Steer calves were castrated at branding (early May). At branding and 16 to 21 days prior to weaning all calves were vaccinated against bovine respiratory syncytial virus, infectious bovine rhinotracheitis, bovine viral diarrhea, and parainfluenza 3, and were administered a 7-way clostridial vaccine.

## **Backgrounding Phase**

All body weights were measured unshrunk, and a 4% pencil shrink was applied. At weaning, calves were weighed, assigned a market price, and randomly assigned to one of two treatments: 1) high-input drylot backgrounding system (**DLOT**) or 2) low-input pasture backgrounding system (**PAST**). Each treatment was replicated within year. Following vaccination and collecting weaning weight, calves were transported to their respective pen or pasture. The same two native range pastures and drylot pens were used each year. Free choice access to water and a loose mineral mix was provided.

Native range pastures were not grazed during the summer growing season prior to stocking for backgrounding. Average CP, NDF, and ADF content (% DM) of forage samples collected from each pasture at the end of the backgrounding period was 8.3, 67.2, and 42.5, respectively. Forage availability exceeded cattle needs during all three years.

For the first six days following weaning, PAST calves were trained to hand-delivery of protein supplement by enticement with alfalfa hay (max. 1.7 lb/hd), plus protein supplementation with a 32% CP range cube fed at 1.25 lb/day. Starting the 7<sup>th</sup> day post-weaning, protein supplement delivery frequency was reduced to 3×/week, but weekly quantity of 32% range cube delivered remained at 1.25 lb/day. Calves were fed between 10 AM and noon each day feed was delivered.

On weaning day, DLOT calves were fed 10 lb/hd alfalfa hay (92.4% DM; 17.3% CP, 45.8% NDF, and 38.1% ADF of DM). Starting the day after weaning, DLOT calves were offered 5.0 lb/hd of a corn/wheat midds-based backgrounding pellet (Table 1), plus alfalfa hay. Pellets and hay were offered in feed troughs allowing access from both sides. Linear trough space exceeded 12 in/hd. Pellet intake was increased by 1.5 lb/hd when all troughs in a pen were completely empty at 7 AM, and pellet offering was restricted to 3.0% body weight/day. Pellets were increased to 10 lb/hd by day eight. Hay was reduced to 1.5 to 2.5 lb/hd/day by the 13<sup>th</sup> day post-weaning, and maintained at that amount throughout the backgrounding phase.

All calves were weighed on a single day each year near the mid-point (day 19 or 21 post-weaning) and at the end of the backgrounding phase (42 to 45 days post-weaning). The day final backgrounding weight was measured marked the end of the backgrounding phase. The backgrounding treatment period was 45 days in year 1, 44 days in year 2, and 42 days in year 3. Prior to shipping, all steers were place in a common drylot pen and fed alfalfa hay to appetite for 5 to 9 days after the treatment period ended. Therefore, steers remained at

**Table 1. Drylot backgrounding pellet<sup>1</sup>**

<b>Ingredient</b>	<b>% of Diet (as-fed)</b>
Corn, ground	34.7
Wheat middlings	32.0
Soybean hulls	15.0
Cottonseed meal	5.8
Cottonseed hulls	5.0
Molasses	5.0
Calcium carbonate	1.5
Potassium Chloride	0.5
Salt, vitamins, trace minerals <sup>a</sup>	0.5
<b>DM analysis</b>	
CP, %	15.8
NE <sub>m</sub> , Mcal/lb	0.83
NE <sub>g</sub> , Mcal/lb	0.50

<sup>a</sup>Includes Rumensin-80 at 0.0125 %.

the CRLRC for 46 to 54 days post-weaning and would have qualified as “VAC-45 calves.”

Each year, weaning price and final backgrounding price was individually applied to each calf based upon prices in the New Mexico Weekly Weighted Average Feeder Cattle Report for the week of the beginning and end of the backgrounding phase. No premium for backgrounding was applied. Purchased feed cost varied by year, with delivered price/ton ranging from \$204 to \$213 for backgrounding pellets, \$244 to \$262 for range cubes, and \$130 to \$165 for alfalfa hay. Feed costs were applied as weight of feed delivered to each pasture/pen times unit feed cost. A grazing fee was charged to PAST calves at \$0.132/hd/day. Time spent delivering feed to calves was recorded for each pasture/pen to calculate labor cost, which was charged at \$6.00/hour.

### **Finishing Phase**

Heifers were not included in the finishing phase. Steers were fed at a commercial feedlot (Double A Feeders, Clayton, NM) where they were entered into the New Mexico Ranch to Rail Program. Final body weight and price of steers from the backgrounding phase was used as the initial body weight and price of steers for the finishing phase.

Steers were received at the feedlot on a single day in mid-November each year, and were managed according to standard procedures in place at the feedlot at the time of finishing. Steers were diagnosed as morbid based on subjective visual appraisal by feedlot staff. Upon arrival, all steers were administered a growth-promoting implant and preventive pharmaceuticals based on the judgment of feedlot management at receiving. Steers were housed in pens of varying sizes, but all pens allowed more than 100 ft<sup>2</sup>/hd and 16 inches/hd linear bunk space.

Steers were processed for secondary application of growth-promoting implants in late January or early February, thus days on feed (DOF) to secondary processing date ranged from 74 to 94. At that time, steers were weighed (interim BW) and individually assigned to marketing groups using the ultrasound technology and computer software of the Cattle Performance Enhancement Co. Once the optimum market date for each steer was estimated, steers were assigned to marketing groups harvested between March and early July. Cattle were harvested at National Packing Co. Hot carcass weight was collected at slaughter, and longissimus muscle area, fat thickness, calculated yield grade, and marbling score were evaluated by an independent data collection service following chilling.

At the completion of finishing, steers were sold on an individual carcass basis through the National Beef Grid. Premiums and discounts were applied using hot carcass weight and USDA quality and yield grade.

## **Results and Discussion**

### **Backgrounding Phase**

There were no differences in weaning weight, price, or value between PAST and DLOT calves. During the first three weeks of backgrounding (weaning to interim weight), PAST calves had higher ADG. This likely occurred because PAST calves experienced less environmental and nutritional change following weaning. From interim weight collection to the end of backgrounding, DLOT calves had greater ADG, which

was expected because the preconditioning ration provided DLOT calves a higher plane of nutrition than pasture forage supplied the PAST calves. Overall, DLOT calves had greater ADG during backgrounding, resulting in heavier final backgrounding weight for DLOT calves.

Final backgrounding price was higher for the PAST calves because they were lighter, but the final value was \$6.90/hd less for PAST than DLOT calves. The higher value of DLOT calves was offset by a \$52.76 difference in total costs. Feed and labor cost were 5-fold and 2-fold greater, respectively, for DLOT than PAST. Consequently, net income during backgrounding was \$44.59 greater for PAST calves. These results support the findings of St. Louis et al. (2003) that showed lower feed cost and greater net return (\$43.17) for a 30-day ryegrass pasture backgrounding program compared to a 30-day drylot backgrounding program. A final price premium of \$5.00/cwt would have been required for the DLOT system to be profitable; however, the PAST backgrounding system was profitable without a premium.

### **Finishing Phase**

Initial weight, price, and value of DLOT and PAST steers were similar (Table 3), even though weight of steers and heifers combined collected at the end of backgrounding was different. This disparity indicates that there was greater difference in heifer weight between the two treatments, or that there was less variation among heifers. Nonetheless, PAST steers had greater ADG through interim weight at reimplanting, but subsequent ADG was the same for both treatments. Higher ADG during the first 74 to 94 DOF among PAST steers supports the findings of Choat et al. (2003) who reported greater feedlot ADG from 15 to 70 DOF among steers previously wintered on native range with supplement compared to contemporary steers wintered on irrigated wheat pasture that entered the feedlot heavier. However, there were no differences in interim finishing weight, total ADG, estimated final body weight, DOF, calculated yield grade, or any measured carcass characteristics in this study. Additionally, the distributions of USDA quality and yield grade were similar (data not shown).

The proportion of steers treated for sickness and medicine cost/hd were similar; however, DLOT steers had greater death loss. Even though morbidity was not different, the 7.6 percentage unit difference in death loss (all due to BRD complex) indicates that DLOT steers likely experienced some degree of suppressed immune function as compared to PAST steers.

The DLOT steers had lower feed cost, but average price received for carcasses sold was not different. Gross income was \$111 greater for PAST steers because they had no mortalities and numerically higher carcass weight and carcass price. Consequently, PAST steers garnered \$103/hd more net income than DLOT steers. Approximately \$70/hd of the profit difference between treatments resulted from death loss, the remaining \$38 difference occurred primarily because PAST steers had numerically greater carcass weight and prices than DLOT steers. To achieve the same finishing phase net income for DLOT and PAST steers, price of DLOT steers at the beginning of the finishing phase would need to be reduced by \$17/cwt.

## Implications

Backgrounding programs that conform to “VAC-45” marketing requirements can vary in intensity and cost. However, the additional gain achieved with higher-input systems may not offset higher costs; and stress associated with dietary change and confinement immediately following weaning may impact subsequent death loss. Low-input pasture backgrounding systems can be more profitable than drylot systems of the same duration during the backgrounding and finishing phases.

## Literature Cited

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**Table 2. Backgrounding performance and profitability of mixed steers and heifers backgrounded in a drylot or pasture**

Item	Backgrounding System		SE <sup>a</sup>	P
	Drylot	Pasture		
Number of head	125	125		
Performance <sup>b</sup>				
Weaning Wt., lb	519	521	2.5	0.56
Interim Wt., lb <sup>c</sup>	538	553	2.8	<0.01
Final Wt., lb <sup>d</sup>	579	568	2.8	0.03
ADG, Wean to Interim, lb/day	0.95	1.57	0.06	<0.01
ADG, Interim to Final lb/day	1.85	0.65	0.08	<0.01
Total ADG, lb/day	1.42	1.10	0.04	<0.01
Financial				
Weaning Price, \$/cwt	109.31	109.08	0.34	0.65
Weaning Value, \$	564.88	566.16	1.96	0.66
Final Price, \$/cwt	104.39	105.35	0.27	0.04
Final Value, \$	602.79	595.89	1.72	0.03
Feed Cost, \$	60.84	11.91	0.09	<0.01
Drylot Pellet	54.52	0		---
Hay <sup>e</sup>	6.31	0.61		---
Range Cube <sup>f</sup>	0	5.55		---
Grazing Fee <sup>g</sup>	0	5.70		---
Labor <sup>h</sup>	5.93	2.10	0.04	<0.01
Total Cost, \$	66.77	14.01	0.10	<0.01
Net Income, \$	(28.87)	15.72	1.71	<0.01

<sup>a</sup>SE = standard error; an estimate of variation.

<sup>b</sup>A 4% pencil shrink was applied to all weights.

<sup>c</sup>Interim Wt. collected d 21 in yr 1 and 3, and d 19 in yr 2.

<sup>d</sup>Final Wt. collected on d 45, 44, and 42 during yr 1, 2, and 3, respectively.

<sup>e</sup>Hay fed to PAST steers during initial week to train steers to range cubes.

<sup>f</sup>Range cubes (32% CP) provided to PAST steers at 1.25 lb/day; delivered 3×/wk.

<sup>g</sup>Grazing fee charged to PAST steers \$0.132·hd/day.

<sup>h</sup>Labor cost based on \$6.00/h.

**Table 3. Feedlot performance, carcass characteristics, and profitability of steers backgrounded in a drylot or pasture**

Item	Backgrounding System		SE <sup>a</sup>	P
	Drylot	Pasture		
Number of steers	66	67		
Performance				
Initial Wt., lb <sup>b</sup>	603	596	3.9	0.27
Interim Wt., lb <sup>c</sup>	796	799	6.8	0.78
Final Wt., lb <sup>d</sup>	1087	1108	13.6	0.34
Days on Feed	168	173	2.9	0.26
ADG, Entry to Interim, lb	2.37	2.79	0.07	<0.01
ADG, Interim to Harvest, lb	3.30	3.33	0.06	0.68
Total ADG, lb	2.93	2.97	0.03	0.32
% Treated for sickness <sup>e</sup>	47.6	34.3		0.14
% Death loss <sup>e</sup>	7.6	0.0		0.02
Carcass				
Hot Carcass Wt., lb	683	698	9.0	0.29
Fat Thickness, in	0.53	0.55	0.02	0.59
Longissimus Area, in <sup>2</sup>	12.5	12.3	0.20	0.54
Marbling Score <sup>f</sup>	472	481	6.5	0.35
Calculated Yield Grade	2.90	3.06	0.06	0.12
Financial				
Initial Price, \$/cwt	105.94	106.65	0.53	0.38
Initial Value, \$	636.36	631.78	3.02	0.32
Medicine cost, \$	28.32	23.01	3.54	0.33
Feed Cost, \$	220.53	238.18	4.67	0.04
Total Cost, \$	932.60	941.40	7.90	0.46
Carcass Price, \$/cwt	133.48	135.67	0.82	0.11
Gross Income, \$	834.27	945.64	15.54	<0.01
Net Income, \$	(98.33)	4.68	10.64	<0.01

<sup>a</sup>SE = standard error; an estimate of variation.

<sup>b</sup>Initial Wt. and Price = Final backgrounding Wt. and Price of steers; 4% pencil shrink applied.

<sup>c</sup>Interim Wt. occurred at 74, 77, and 94 DOF during yr 1, 2, and 3, respectively; 4% pencil shrink applied.

<sup>d</sup>Final Wt. is an estimate calculated as carcass weight ÷ average dressing % of marketing group.

<sup>e</sup>Chi-square analysis; a tool to statistically analyze categorical data.

<sup>f</sup>Marbling score: Small 00 = 500.