Critically evaluating alternative cattle handling techniques

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Abstract

Stockmanship, husbandry, and cattle welfare are terms that in many ways overlap, and are all associated with cattle handling. Rarely will you find cattle producers arguing against the value of proper cattle handling. While most in the industry would advocate for proper cattle handling, the question becomes, at what level is "proper" defined? As with many practices (vaccinations, antimicrobials, pen space), more is not always better and there becomes a cost that exceeds the value derived from the practice, in other words, an economic threshold is met. A research trial in beef calves was conducted evaluating a traditional cattle handling (TCH) system to an alternative cattle handling (ACH) system. Health, performance, and carcass characteristics were evaluated. Total mortality was higher ($P = 0.09$) for the TCH treatment compared to the ACH treatment, but this did not translate to fewer realizers or total wastage ($P > 0.10$). No significant differences were observed in cattle performance or morbidity. Numerous alternative cattle handling models exist and future evaluation of these differences is warranted.

Key words: BRD, cattle, feedlot, handling, well-being

Résumé

Les qualités de l'éleveur, les pratiques d'élevage et le bien-être des bovins sont des termes qui se recoupent d'une certaine façon et qui sont tous associés au soin des bovins. Il y a peu de producteurs bovins qui vont dénigrer la valeur de prodiguer des bons soins aux bovins. Bien que l'industrie prône majoritairement pour le bon soin des bovins la question devient comment on définit ce qu'on entend par bon. Comme pour plusieurs pratiques (vaccination, antimicrobiens, taille de l'enclos) en avoir plus n'est pas toujours mieux et les coûts peuvent donc surpasser les bénéfices associés à la pratique. En d'autres termes, un seuil économique a été atteint. Un essai clinique a été mené chez des veaux de boucherie pour comparer un système traditionnel de soin des bovins (STS) à un système alternatif de soin (SAS). On a évalué la santé, la performance et les caractéristiques de la carcasse. La mortalité totale était plus élevée avec le STS que le SAS ($P = 0.09$) mais ceci ne s'est pas traduit par un nombre moins élevé de bovins qui n'ont pas réagi au traitement ou par une réduction des pertes totales ($P > 0.10$). Il n'y a pas eu de différence significative au niveau de la performance des bovins ou de la morbidité. Il existe plusieurs autres systèmes de soin des bovins et leur évaluation plus à fond est justifiée.

Introduction

Bovine respiratory disease (BRD) continues to be the major cause of mortality in confined feeding operations, accounting for 47% of total mortality despite the advancement in applicable vaccines and antibiotics.[6] It is estimated that BRD costs the US beef industry $1 billion annually due to treatment costs, reduced performance and death loss.[3] Bovine respiratory disease is a multifactorial disease caused by environmental conditions, management practices of cow-calf, stocker and feedlot sectors, animal susceptibility, and viral and bacterial pathogens.[4] The stress inflicted on the calf from management and environment can increase the calf's susceptibility by decreasing innate immunity.[1] Observational research looking at alternative cattle handling techniques, has shown positive benefits in cattle health and performance[2] but alternative handling prior to the feedyard has not always translated to improved performance.[5] Since minimal data exist demonstrating the effects of alternative cattle handling techniques in commercial cattle feeding operations, our objective was to evaluate an alternative cattle handling system in a commercial cattle feeding operation on economically relevant health, performance, and carcass traits.

Materials and Methods

Recently weaned (< 2 days), ranch direct, beef steers originating from Florida were transported to a large commercial feedyard in western Oklahoma starting July 12, 2016 and continuing until September 27, 2016. Eight pen blocks (16 pens) totaling 2,115 head with an average weight of 554 lb (251 kg) were utilized for the trial. Upon arrival, randomization was accomplished by using a 5x5 gate sort of animals until the paired replicates were full, ensuring that all treatments within the block had similar cattle composition (source, number, breed, etc.). Calves were then randomly assigned to 1 of 2 treatments: 1) traditional cattle handling (**TCH**) or 2) alternative cattle handling (**ACH**). Cattle handling treatments are described below.

Traditional cattle handling (TCH)

Calves in the TCH treatment were allowed to rest after arriving in their pen. On a daily basis and prior to initial processing, calves were checked from a vehicle in the feed alley for morbidity, and pulled and treated according to standard feedyard protocols. Initial processing was delayed 3 to 5 days post-receiving. Treatment blocks were processed at the same time according to the same processing protocol. After processing, calves were returned to their home pen and observed daily for morbidity and pulled on horseback and treated as required according to standard feedlot protocols until slaughter.

Alternative cattle handling (ACH)

Calves in the ACH treatment were allowed to rest after arriving in their pen. Resting time was terminated when approximately 90% of the calves were up and walking around. After calves rested, acclimation procedures were initiated. The first acclimation procedure included walking the calves to all corners of the pen after the acclimating person had loosely grouped the calves and stopped erratic behavior. Groups of calves that ran or left the loose group were re-gathered and walked around the pen until running or group breaking behavior had ceased. Acclimation began by pushing calves away from the feedbunk so that returning to feedbunk was perceived to be a reward. The second acclimation period began 6 to 12 hours after the first period. This acclimation period began with loose grouping of calves and walking around the pen similar to the first training. After calves had walked around the pen they were asked to freely move out of pen and into the drover's alley. Initial processing was delayed 3 to 5 days post-receiving.

Treatment blocks were processed at the same time according to the same processing protocol. After processing, calves were returned to their home pen. Calves continued to be acclimated daily in the pen for the first 3 to 5 days post-processing using the same protocol previously described. Following the acclimation period, calves were observed daily for morbidity and pulled and treated as required according to standard feedlot protocols until slaughter.

All calves were processed using a standard feedyard operating protocol (SOP). Calves were vaccinated with a combination infectious bovine rhinotracheitis, bovine viral diarrhea virus types 1 and 2, parainfluenza-3 virus, bovine respiratory syncytial virus, and *Mannheimia haemolytica*[a] vaccine and received a 7-way clostridial vaccine.[b] Calves were treated for parasites with ivermectin[c] (1 mL/110 lb (50 kg) bodyweight (BW) subcutaneously) and oxfendazole[d] (1 mL/110 lb (50 kg) bodyweight (BW) orally). All calves received tulathromycin[e] at 1.13 mL/100 lb (45.4 kg) BW subcutaneously with a 7-day post-metaphylaxis respiratory disease moratorium. A trenbolone acetate (TBA), estradiol, and tylosin tartrate implant[f] was placed subcutaneously in the caudal ear. Calves were booster vaccinated against infectious bovine rhinotracheitis and bovine viral diarrhea virus types 1 and 2[g] and received a terminal TBA-estradiol implant[h] approximately 90 days after initial processing.

All growth and carcass traits were analyzed using the Mixed procedure of SAS (Version 9.4, SAS Institute, Cary, NC) as a randomized complete block design study with pen as the experimental unit and block as a random effect. Health traits were analyzed as a randomized complete block design study using the GLIMMIX procedure of SAS. Treatment was included as a fixed effect. Block was included as a random effect, and pen served as the experimental unit.

Data were modeled with a binomial distribution of outcomes in an events/trials analysis with number of reactors (morbidity, mortality, etc.) for each lot as the events and original lot head count (population at-risk) as trials. Least squares means were then extrapolated back to percentages for the purpose of presentation. Statistical differences were reported at $P < 0.10$, and trends were described at $P < 0.15$.

Results and Discussion

Cattle close-out performance did not differ ($P > 0.10$) for average daily gain or feed conversion on a deads-in, deads-out, and carcass adjusted basis (Table 1.). On a carcass adjusted basis, cattle had an average daily gain of 3.04 and 3.06 for the TCH and ACH treatments, respectively ($P = 0.55$). Minimal differences existed for carcass characteristics with the exception of heavyweight (> 1,000 lb) carcasses (Table 2). Cattle receiving the TCH treatment had 6.18% of carcasses that were heavy compared to 4.67% for the ACH treatment ($P = 0.08$). No other statistical differences were observed for carcass characteristics, including dark cutters ($P > 0.10$).

Total morbidity was 29.5% and 26.0% for the TCH and ACH treatments, respectively ($P = 0.11$; Table 3). Respiratory morbidity, including percent of respiratory cases that had a rectal temperature ≥ 104.0° F (40° C), did not differ between treatments. Total mortality was 2.19% and 1.19% for the TCH and ACH treatments ($P = 0.09$), respectively. When looking at specific categories of mortality, no statistical differences were observed ($P > 0.10$). No statistical differences were observed for total and BRD realizers or wastage (realizers + moralities).

Conclusions

Cattle producers have numerous factors to manage which include labor resources, cattle types, health risk, and

Table 1. Effects of cattle handling method on close-out cattle performance.

Item	Cattle handling		SEM†	*P*-value
	Traditional	Alternative		
Number of pens	8	8	-	-
Head enrolled	1,058	1,057	-	-
Initial body weight, lb[a]	554	554	12.4	0.97
Dry matter intake, lb	16.2	16.2	0.21	0.42
	Live basis			
Final body weight, lb[a,b]	1,257	1,258	18.7	0.96
Average daily gain, lb - Deads-Out	2.92	2.94	0.05	0.51
Dry matter conversion - Deads-Out	5.54	5.54	0.06	0.93
Average daily gain, lb - Deads-In	2.87	2.90	0.06	0.32
Dry matter conversion - Deads-In	5.64	5.60	0.07	0.63
	Carcass-adjusted basis			
Final body weight, lb[c]	1,265	1,267	4.4	0.68
Average daily gain, lb	3.04	3.06	0.05	0.55
Dry matter conversion	5.32	5.31	0.07	0.90

†Standard error of mean
aPen weights from cattle weighed in 1 or more drafts on a platform scale
bFour percent (4%) "pencil shrink" applied
cCalculated from hot carcass weight and an average dressing percentage (63.82%)

Table 2. Effects of cattle handling method on carcass characteristics.

Item	Cattle handling		SEM†	*P*-value
	Traditional	Alternative		
Number of pens	8	8	-	-
Hot carcass weight, lb	807.4	808.6	11.8	0.68
Dressing percentage	63.89	63.76	0.19	0.61
USDA Choice or greater, %	64.8	69.2	4.7	0.39
USDA Sub-Select, %	0.50	0.68	0.25	0.57
Yield Grade 1 and 2, %	39.2	39.6	5.4	0.90
Yield Grade 4 and 5, %	8.55	6.89	1.59	0.20
Hot carcass weight > 1,000 lb, %	6.18	4.67	1.46	0.08
Dark cutters, %	0.00	0.18	0.13	0.35

†Standard error of mean

overall operational efficiency. A key part of cattle production is cattle handling. Numerous cattle handling systems exist and in this study; we compared a traditional system to an alternative cattle handling system. We observed an improvement in overall mortality (P = 0.09) with the alternative cattle handling system, but minimal difference in cattle performance, carcass characteristics, respiratory mortality, or respiratory and total wastage.

Our goal was to evaluate a specific cattle handling system in an objective and scientific manner. Since numerous cattle handling systems exist, further research should be explored to determine the overall cost:benefit that differing cattle handling systems offer compared to current systems.

Endnotes

[a]Pyramid® 5 + Presponse® SQ, Boehringer Ingelheim, St. Joseph, MO
[b]Vision® 7 with Spur®, Merck Animal Health, Madison, NJ
[c]Noromectin®, Norbrook Laboratories, LTD, Corby, Northamptonshire, Ireland
[d]Synanthic®, Boehringer Ingelheim, St. Joseph, MO
[e]Draxxin®, Zoetis, Kalamazoo, MI
[f]Component® TE-IS with Tylan®, Elanco Animal Health, Greenfield, IN
[g]Titanium® 3, Elanco Animal Health, Greenfield, IN
[h]Revalor®-XS, Merck Animal Health, Madison, NJ

Table 3. Effects of cattle handling method on cattle health characteristics.

Item	Cattle handling*		
	Traditional	Alternative	*P*-value
Number of pens	8	8	-
BRD morbidity, %†	27.2 (7.2)	24.1 (6.6)	0.15
BRD morbidity >104°F, %	12.7 (3.5)	13.3 (3.6)	0.66
Total morbidity, %	29.5 (7.4)	26.0 (6.9)	0.11
Mortality, %			
BRD	0.15 (0.14)	0.18 (0.17)	0.74
Digestive‡	----	----	----
Musculoskeletal§	0.47 (0.21)	0.38 (0.19)	0.80
Other	0.85 (0.28)	0.38 (0.19)	0.41
Total	2.19 (0.55)	1.19 (0.37)	0.09
Realizers, %			
BRD	0.46 (0.25)	0.61 (0.31)	0.60
Total	1.18 (0.38)	1.63 (0.47)	0.38
Wastage (mortalities + realizers), %			
BRD	0.64 (0.35)	0.84 (0.44)	0.54
Total	3.37 (0.71)	2.82 (0.63)	0.47

*Standard error of mean reported in parentheses

†BRD = bovine respiratory disease

‡Ruminal tympany (bloat), ruminal acidosis, liver abscess, and enteritis. Model failed to converge so data is omitted.

§Injuries or diseases related to skeletal structures of the feet, limbs, back, shoulder, and hip. In some cases these animals may have been humanely euthanized in accordance with BQA guidelines.

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