Use of a Pelleted Corn Residue Complete Feed in Receiving Diets

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Summary

The effects of feeding a complete pelleted feed to newly received steer calves (585 ± 4 lb; n = 1318) was compared to a control ration consisting of 32% (DM basis) wet or modified distillers grains, 32% alfalfa hay, 32% dry-rolled corn, and 4% supplement. The pelleted complete feed consisted of 35% corn residue and a blend of grain byproducts and minerals. Feeding the complete pelleted feed increased DMI but decreased ADG, thereby reducing feed efficiency. The pelleted feed numerically reduced morbidity. Feeding a complete pellet consisting of corn residue appears to be a viable option for receiving calves if it is priced appropriately.

Introduction

A proprietary complete pelleted feed consisting primarily of corn residue (Iowa Agriculture Bio Fiber, Harlan, Iowa) is designed to replace a conventional grain and forage receiving diet, therefore eliminating the need to mix a starter diet. Due to the increased cost and limited availability of forages, alternative sources must be considered. Because of improved corn yields, there is an abundance of available corn residue making it a practical source to incorporate into feedlot diets. Pelleting allows for transport from areas with abundant residue to areas with greater cattle numbers. This pelleted forage source reduces the amount of traditional forages sources typically needed in feedlots. The objective of this study was to compare animal performance and treatment for bovine respiratory disease (BRD) of feeding a complete pelleted feed to a high quality receiving diet consisting of distillers grains, corn, and alfalfa hay.

Procedure

Experiment

The experiment was replicated at the University of Nebraska–Lincoln Agricultural Research and Development Center (ARDC) near Mead, Neb., and the Panhandle Research Extension Center (PREC) in Scottsbluff, Neb. Crossbred steers (ARDC: n=818; BW=582±49 lb, PREC: n=500; BW=581±50 lb) were purchased from sale barns through order buyers in Nebraska. Steers were received over four consecutive days at the ARDC, and two consecutive days at the PREC. Within location, steers were blocked by source within date received, resulting in eight blocks for ARDC and three blocks for PREC. Within blocks, cattle were assigned randomly to 48 pens at ARDC and 60 pens at PREC. There were 11-23 steers per pen at ARDC and 8-11 steers per pen at PREC. The number of steers/pen was balanced by treatment within block. Upon arrival, steers were allowed access to water and were processed, weighed, and allocated to treatment within 12 hours. During processing in both locations, steers were identified with an individual ear tag, individually weighed, vaccinated with Vista® Once and Cydectin® Injectable, and were orally drenched with Safe-Guard®. Initial BW was a single day weight collected at the time of processing.

Treatments included a control receiving diet consisting of 32% wet or modified distillers grains (wet at PREC and modified at ARDC), 32% alfalfa hay, 32% dry-rolled corn, and 4% supplement (DM basis; CON) and a complete pelleted feed (proprietary formulation; provided by Iowa Agricultural Bio Fiber; PelCR) consisting of 35% corn residue and a blend of grain byproducts and minerals. The PelCR contained a combination of plant extracts (RumeNext®, ADM, Quincy, Ill.), whereas CON contained 150 mg/head/day of monensin. Both diets were formulated to contain 125 mg/steer daily of decoquinate. Steers were offered *ad libitum* access to treatment diets for 23, 24, or 25 days at ARDC and 25 days at PREC. Similar bunk-calling protocols were used at both locations. Free-choice hay was not offered in the bunk. Steers were evaluated daily using the DART system (depression, appetite loss, respiratory character change, and temperature elevation). Steers meeting one or more of these criteria were treated with an antibiotic and returned to their pen. At the end of the experiment, steers were limit-fed a diet (50% forage, 50% byproduct) in both locations at 2% of BW for 5-7 days before weighing for ending BW to minimize gut fill variation. Ending BW was an average of 2-day weights collected after limit-feeding.

Statistical Analysis

Performance data (BW, DMI, ADG, G:F) were analyzed using the MIXED procedure of SAS (SAS Institute, Inc., Cary, N.C.) with pen as the experimental unit. Steers that died during the experiment were removed from the analysis. The model included treatment, location, treatment x location interaction, and block nested within location. Morbidity incidence was evaluated as the number of first treatments (number of steers treated in the pen divided by the total number of steers in the pen). Additionally,

Table 1. Performance and health by location for calves fed a complete pelleted feed on performance and morbidity.

	ARDC		PREC			*P*-values		
Item	Control	Pellet	Control	Pellet	SEM	Trt	Location	Interaction
Initial BW, lb	582	580	588	589	4	0.82	0.05	0.66
Ending BW, lb	670	652	665	655	4	<0.01	0.88	0.20
DMI, lb/day	14.8[b]	15.5[a]	12.8[c]	13.0[c]	0.15	<0.01	<0.01	0.03
ADG, lb	3.68	3.03	3.11	2.64	0.07	<0.01	<0.01	0.18
Feed:Gain[1]	4.05	5.19	4.15	5.01	0.11	<0.01	0.75	0.17
NEm, Mcal/lb	0.941	0.802	0.971	0.880	—	—	—	—
NEg, Mcal/lb	0.636	0.516	0.656	0.577	—	—	—	—
Morbidity								
First pull, %[2]	20.6	17.4	42.2	38.2	0.02	0.13	<0.01	0.85
Second pull, %[3]	9.5[a]	11.3[a]	9.5[a]	1.0[b]	0.03	0.07	0.03	0.03
Dead, n	1[d]	2[e,f]	0	1[g]	—	—	—	—

[1]Statistics calculated on Gain:Feed.
[2]Percentage of calves treated one or more times.
[3]Percentage of calves treated two or more times expressed as a % of cattle pulled one more times.
[a,b,c]Means within a row without a common superscript are different, ($P < 0.05$).
[d]Death due to Bovine Respiratory Disease (BRD).
[e]Death was non-health related.
[f]Death due to Acute or Atypical Interstitial Pneumonia (AIP).
[g]Death due to congested heart.

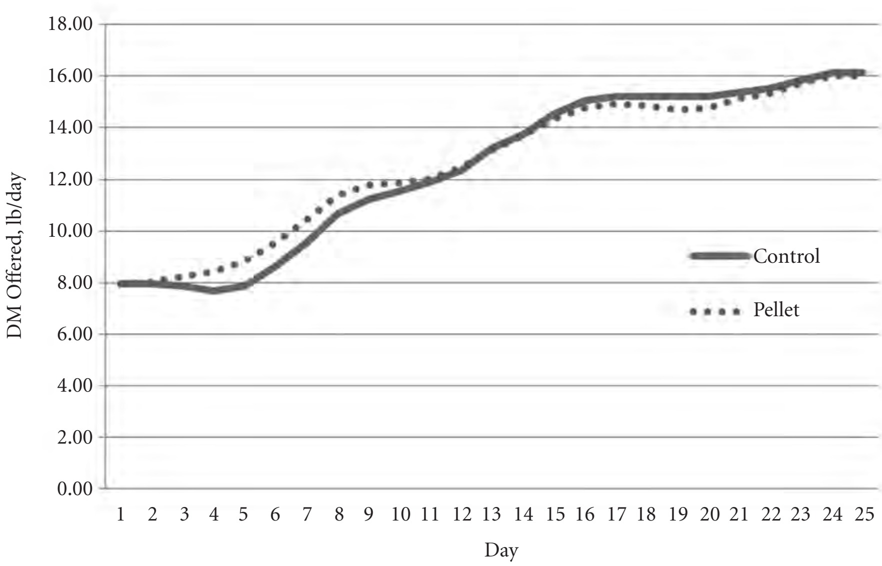

Figure 1. Daily DM offered to steer calves consuming a control diet or a completely pelleted ration at the UNL Agricultural Research and Development Center near Mead, Neb.

the rate of two or more treatments was calculated as the number of steers treated two times divided by the total number of steers treated once. Morbidity data were analyzed with the GLIMMIX procedure of SAS using a binomial distribution and a logit-link function.

The net energy equations in the NRC (1996) were used to determine the energy concentration of the CON and PelCR. Dietary TDN of CON was estimated by applying known TDN values (alfalfa, 50%; dry-rolled corn, 90%; MDGS, 108%) to the dietary components. Then, the energy adjusters were manipulated so that calculated animal performance of CON matched observed animal performance. Subsequently, the energy adjusters used for CON were held constant, and the TDN of PelCR was adjusted until calculated animal performance matched observed animal performance. Therefore, the NEm and NEg values for PelCR are relative to CON.

Results

A treatment x location interaction was observed for DMI ($P = 0.03$; Table 1). At PREC, no difference ($P = 0.45$) in DMI was observed. However, DMI was increased ($P < 0.05$) by feeding PelCR compared to CON at ARDC. The use of PelCR resulted in decreased ADG ($P < 0.01$) when compared to the control diet at both locations. Therefore, F:G was increased with PelCR ($P < 0.01$) compared to CON. An increase in F:G resulted in reduced estimates of NEm and NEg for PelCR.

The interaction between treatment and location was evaluated by graphing the amount of DM offered daily at each location. Figures 1 and 2 show daily DM offered to CON and PelCR at ARDC and PREC, respectively.

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At ARDC, DMI remained the same over the first 14 days, then PelCR intakes continued to increase while CON remained constant (Figure 1). However, at PREC (Figure 2), DMI for both treatments remained comparable throughout the trial.

The number of calves pulled and treated for BRD one time tended to be less ($P = 0.13$) for PelCR compared to CON. A treatment x location interaction was observed for the percentage of steers pulled two or more times ($P = 0.03$; Table 1). There were no differences ($P = 0.72$) in the percentage of calves treated two or more times at ARDC. However, a decrease ($P < 0.05$) in second pulls at PREC was observed where calves experienced a higher morbidity rate, although the number of steers requiring a second treatment was low. The greater incidence of morbidity at PREC may have influenced DMI.

Receiving calves on PelCR may have a positive effect on DMI, but a negative effect on ADG and F:G compared to a high-quality receiving diet similar to CON. The energy value of PelCR averaged 86% of CON based on estimates of dietary NEm and NEg. Use of PelCR may result in reduced morbidity for high-risk calves. While steer performance was less desirable compared to the high quality CON fed in this experiment, steers fed PelCR gained over 2.5 lb/day with a F:G of approximately 5.0-5.2. Therefore, receiving calves on a complete feed consisting of pelleted corn residue may be a viable option for producers if it is appropriately priced.

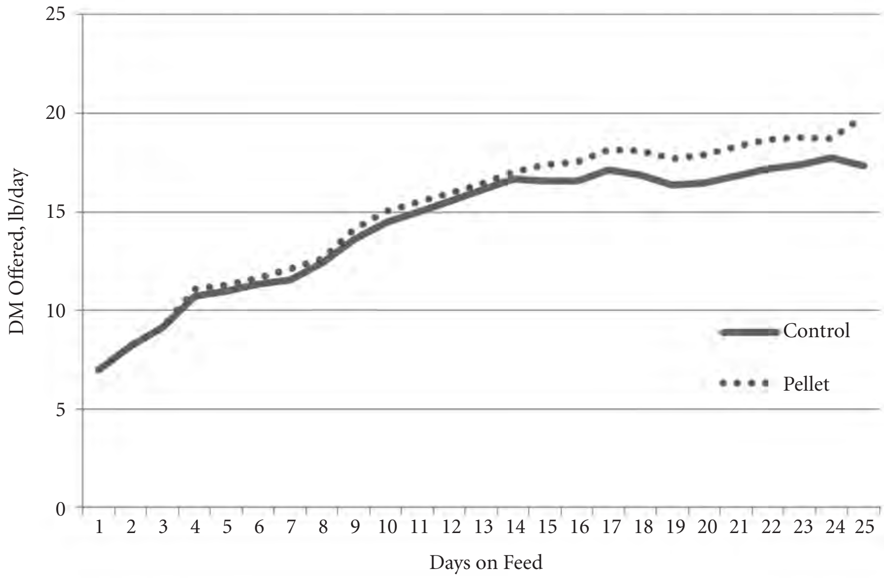

Figure 2. Daily DM offered to steer calves consuming a control diet or a completely pelleted ration at the UNL Panhandle Research and Extension Center, Scottsbluff, Neb.

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