Effects of Combining Nose Flap Weaning with Short-Term Creep Feeding of Beef Calves on Cow and Calf Performance

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Kendi Sayre, graduate research assistant
Katy Lippolis, assistant professor
Department of Animal Science
Chris Clark, beef field specialist

Introduction

The process of weaning calves is a common practice for beef cattle producers. However, the weaning process can be one of the most stressful times for beef calves. Traditional weaning of beef calves includes abruptly separating calves from their dams. Following weaning, calves are often transported, processed, and introduced to a new pen with weaned calves from other sources. Due to these compounded stressors, calves often exhibit decreased feed intake, increased vocalization and pacing, and immunosuppression, leaving calves susceptible to post-weaning disease. Bovine respiratory disease (BRD) is one of the leading causes of economic loss in the U.S. beef industry, and efforts to minimize incidence are crucial to improve profitability and performance. Due to increasing regulations regarding antibiotic usage in livestock animals, development of management strategies for the cow-calf sector, including creep feeding, timing of vaccinations, and weaning strategies to minimize disease incidence, is warranted.

Alternative weaning strategies including the two-step weaning process have been investigated to aid in minimizing weaning stress. During the two-step process, nose flaps are inserted approximately one week prior to separation from the dam. The nose flap prevents nursing, but allows the calf to eat and drink other feed sources while still having physical contact with its mother. The two-step process has been increasing in popularity in the last decade, however, increased labor requirements and concern of decreased calf performance have been reported as reasons producers have been slow to utilize this technique.

Therefore, the objective of this study was to analyze the effects of two-step weaning in conjunction with a short-term pre-weaning period utilizing creep feeding on calf performance and vaccination response.

Materials and Methods

Spring-born, purebred Angus calves (103 head) were ranked by gender, body weight (BW), age, and dam parity, then randomly assigned to one of four pre-weaning treatment groups: nose flaps (NF) used seven days prior to weaning; traditional weaning (TRAD); traditional weaning and fed creep (TRADC) feed for three weeks prior to weaning; and nose flaps used seven days prior to weaning and creep fed for three weeks prior to weaning (NFC). These calves were all born to 2- and 3-yr old cows. The pairs were brought in from pasture on day -28, weighed, and sorted into their allotted pens. The pairs were housed in dry-lot pens and fed ad libitum alfalfa and grass hay (Table 1). Note: weaning is defined as day 0.

From day -21 to 0, TRADC and NFC calves were offered free choice access to a creep feed ration composed of corn gluten, coarse cracked corn, soybean hulls, and rumensin (Table 2). On day -21, all calves were vaccinated with Bovi-Shield Gold 5 and Ultrabac 7/Somubac and dewormed internally with Safeguard and externally with Cyonara Plus. On day -7, NF and NFC calves had nose flaps inserted.

On day 0, the calves were weaned, received a booster vaccine, and moved to new dry-lot pens. Each treatment group was randomly divided into four pens for a total of 16 pens and fed the same ration of dried distillers, whole corn, and ground hay. Throughout the experimental period (day -21 to 28), calves were bled once a week for analysis of vaccination response.

Results and Discussion

For days -28 through -21 there was no difference in calf BW. After offering the creep feed, groups TRADC and NFC had an increase in their average daily gain (ADG) over the TRAD and NF calves. These values are displayed in Table 3. During the week the nose flaps were inserted (week -1), the TRADC and NFC groups had the greatest ADG, and the NFC group tended to have the greater ADG than TRADC calves ($P = 0.10$). Over the course of the experiment, there were no significant differences seen in BW over all treatments. However, TRADC and NFC calves had greater change in calf BW over the pre-weaning period ($P < .0001$) than the TRAD and NF calves. After weaning, there were no significant differences in BW or BW change (Table 4).

Cow performance also was monitored throughout the pre-weaning period. From day -21 to 0, cows with calves in the TRADC and NFC treatments had a greater increase in BW ($P < .0001$) than cows with calves receiving the TRAD and NF treatment (Table 5).

Overall, it was observed that utilizing a creep feed for three weeks prior to weaning can improve ADG and overall pre-weaning gain in BW as compared with no added feed source. Further, utilizing nose flaps combined with creep feeding tends to improve ADG over calves that do not receive a nose flap and are creep fed, and over calves that only receive a nose flap and do not receive creep. This suggests providing creep feed prior to placing nose flaps allows calves to be familiar with and improve intake of feed once nose flaps are placed. However, creep feed intake was not measured in this study. Additionally, the impact of utilizing creep feed prior to weaning indicates providing an additional feed source to calves, with or without nose flap weaning, can alleviate pressure put on the cow and prevent loss in BW.

From day -21 to 0, there was no difference in the antibody response for bovine viral diarrhea (BVD) for all treatment groups (Figure 1). On day 7, a week after the booster was administered, TRADC calves had a greater immune response for BVD over TRAD calves ($P = 0.03$). On day 14, TRADC calves had a greater response for BVD over TRAD and NFC calves ($P < 0.001$). Antibody responses for infectious bovine rhinotracheitis (IBR) showed no significant differences across all treatments (Figure 2).

Although antibody titer concentration against IBR was the same across all treatments, calves fed creep feed and weaned traditionally had greater overall response against BVD. This is interesting, although NFC calves had greater pre-weaning ADG, they had decreased immune response to vaccination against BVD. Although it is unclear why this response occurred, it should be noted antibody titers are only one measurement of immune function. Additional research is necessary to further examine the physiological responses of alternative pre-weaning and nutritional strategies, and the ultimate impact on morbidity and disease incidence in the feedlot.

In summary, providing short-term creep feed prior to placing nose flaps can improve pre-weaning calf and cow performance compared with traditional and nose flap weaning without creep feed supplementation.

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Table 1. Nutrient profile on a dry matter basis of alfalfa and grass hay offered ad libitum to pairs daily throughout the pre-weaning period.

Item	Alfalfa hay, % DM	Grass hay, % DM
Nutrient		
Moisture, %	16.5	16.6
Crude protein, %	17.4	11.1
ADF, %	39.6	41.5
NDF, %	55.3	65.6
Fat, %	2.4	2.7
Calcium, %	1.0	0.2
Phosphorus, %	0.3	0.2
Magnesium, %	0.3	0.1
Potassium, %	2.7	2.1
Sulfur, %	0.2	0.1

Table 2. Ingredient composition and nutrient profile of creep feed mix fed ad libitum to TRADC and NFC calves for three weeks pre-weaning.

Item	Diet, % DM	Nutrient analysis, % DM
Ingredient		
Corn gluten feed	31.7	
Corn - course cracked	30.1	
Soybean hulls	30.9	
Supplement[1]	5.3	
Molasses - cane	2.1	
Nutrient		
Crude protein, %		15.0
Moisture, %		10.4
Feedlot NEm, mcal/cwt		89.1
Feedlot NEg, mcal/cwt		60.2
Fat, %		3.0
Calcium, %		1.3
Phosphorus, %		0.5
NDF, %		34.9
ADF, %		18.6
NFC, %		40.1
Sulfur, %		0.2
Monensin, g/ton		41.8

[1]Vitamin and mineral balancer with rumensin.

Table 3. Calf ADG throughout the experimental period.

Treatment	NF[2]	NFC	TRAD	TRADC	SE	P - value
ADG, lb/day[1]						
Week -4	1.51	2.26	2.07	2.18	0.43	0.30
Week -3	1.86[a]	4.26[b]	1.21[a]	3.63[b]	0.43	<.0001
Week -2	2.37	2.74	2.71	3.39	0.43	0.12
Week -1	0.48[a]	2.70[b]	0.55[a]	2.01[b]	0.43	<.0001
Week 1	1.45[a]	0.10[b]	1.20[a]	-0.24[b]	0.43	<.0001
Week 2	3.20[a]	4.36[b]	4.25[b]	4.48[b]	0.43	0.01
Week 3	1.26	0.49	1.30	0.60	0.43	0.11
Week 4	1.90	2.25	1.82	2.54	0.43	0.30

[1]Week is presented in relation to weaning at day 0. ADG = average daily gain.
[2]NF = nose flaps used seven days prior to weaning, NFC = nose flaps used seven days prior to weaning and creep fed for three weeks prior to weaning, TRAD = traditional weaning, TRADC = traditional weaning and fed creep feed for three weeks prior to weaning.
[a,b]Means with different superscripts differ ($P \leq 0.05$).

Table 4. Calf BW throughout the experimental period with change in BW over the pre-conditioning period and post-weaning period.[1]

Treatment	NF[2]	NFC	TRAD	TRADC	SE	P - value
BW, lb						
4 weeks pre-weaning (day -28)	342	342	343	340	17.91	0.99
Day of weaning (day 0)	388	426	389	418	17.91	0.07
4 weeks post weaning (day 28)	443	477	449	470	17.91	0.18
Change in BW, lb						
Pre-weaning	43.5[a]	83.7[b]	46.3[a]	78.4[b]	4.71	<.0001
Post-weaning	54.7	50.4	60.0	51.7	5.12	0.24

[1]BW = body weight.
[2]NF = nose flaps used seven days prior to weaning, NFC = nose flaps used seven days prior to weaning and creep fed for three weeks prior to weaning, TRAD = traditional weaning, TRADC = traditional weaning and fed creep feed for three weeks prior to weaning.
[a,b]Means with different superscripts differ ($P \leq 0.05$).

Table 5. Cow BW change over the pre-weaning period.[1]

Treatment	NF[2]	NFC	TRAD	TRADC	SE	P-value
BW, lb						
3 weeks pre-weaning (day -21)	1010	994	1045	1014	33.33	0.47
Day of weaning (day 0)	981	1008	1023	1021	32.16	0.56
Change in BW, lb						
Day -21 to 0	-30.0[a]	14.2[b]	-22.8[a]	7.3[b]	8.12	<.0001

[1]BW = body weight.
[2]NF = nose flaps used seven days prior to weaning, NFC = nose flaps used seven days prior to weaning and creep fed for three weeks prior to weaning, TRAD = traditional weaning, TRADC = traditional weaning and fed creep feed for three weeks prior to weaning.
[a,b]Means with different superscripts differ ($P \leq 0.05$).

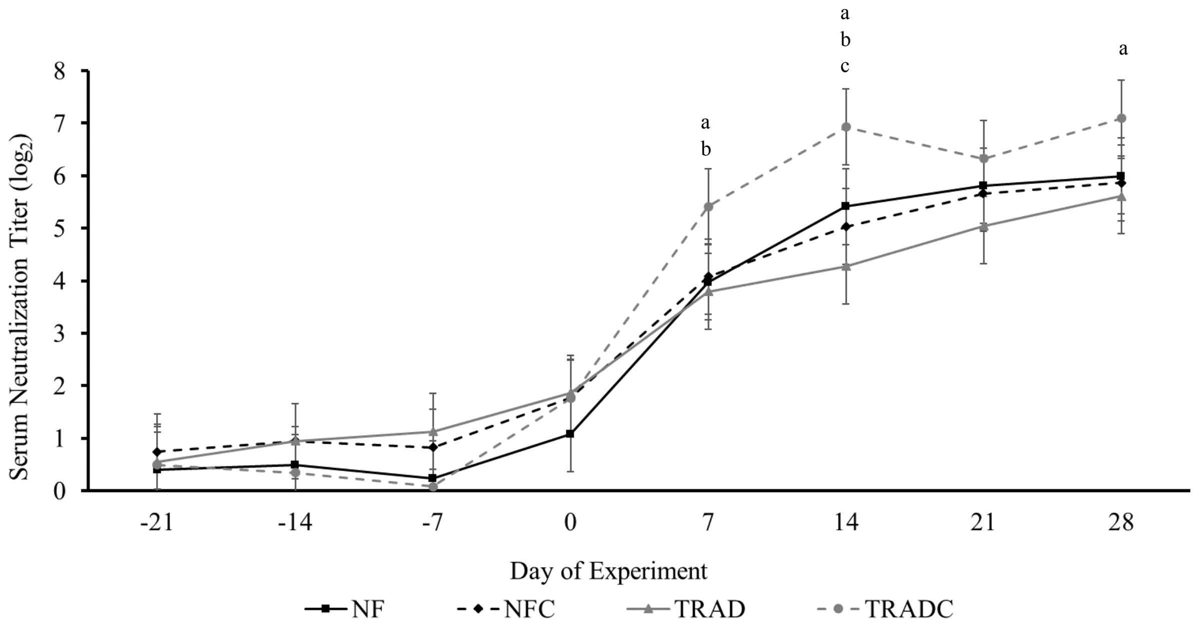

Figure 1. Antibody titer response to bovine viral diarrhea (BVD) with concentrations transformed by log_2. Within days letters indicate (P ≤ 0.05) [a]TRAD vs. TRADC, [b]NF vs. TRADC, [c]NFC vs. TRADC (see tables for pre-weaning definitions).

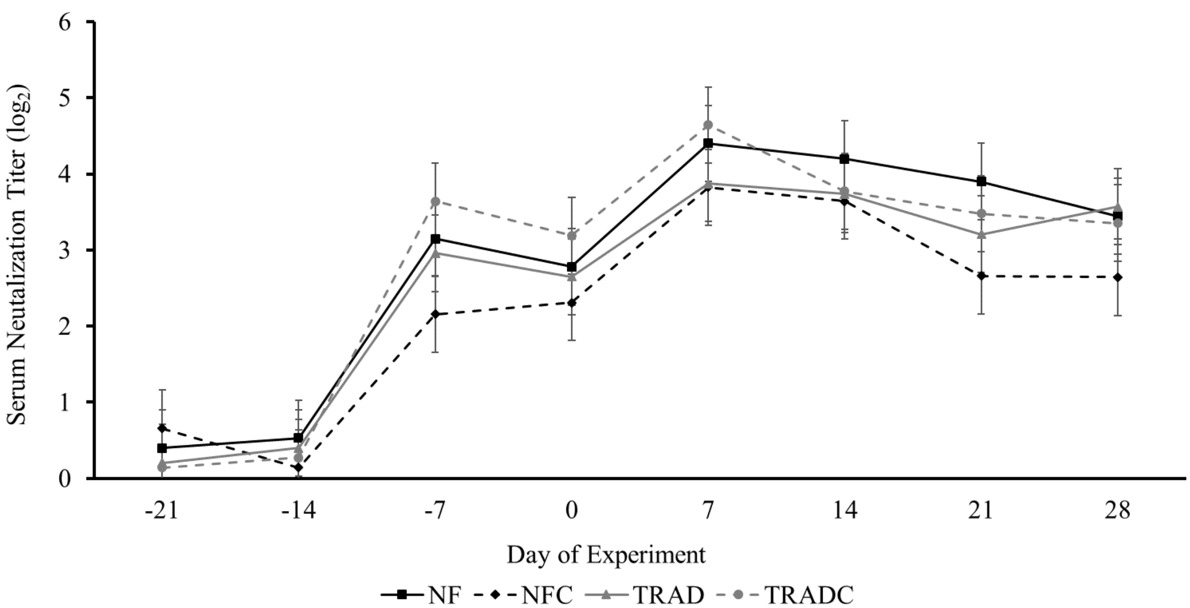

Figure 2. Antibody titer response to infectious bovine rhinotracheitis (IBR) with concentrations transformed by log_2. No statistical differences were seen across all treatments (P = 0.32) (see tables for pre-weaning definitions).