



Association of Severe Diarrhea and BRD with ADG, feed intake, milk replacer refusal and mortality, in pre-weaned Holstein and BxD calves



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INTRODUCTION

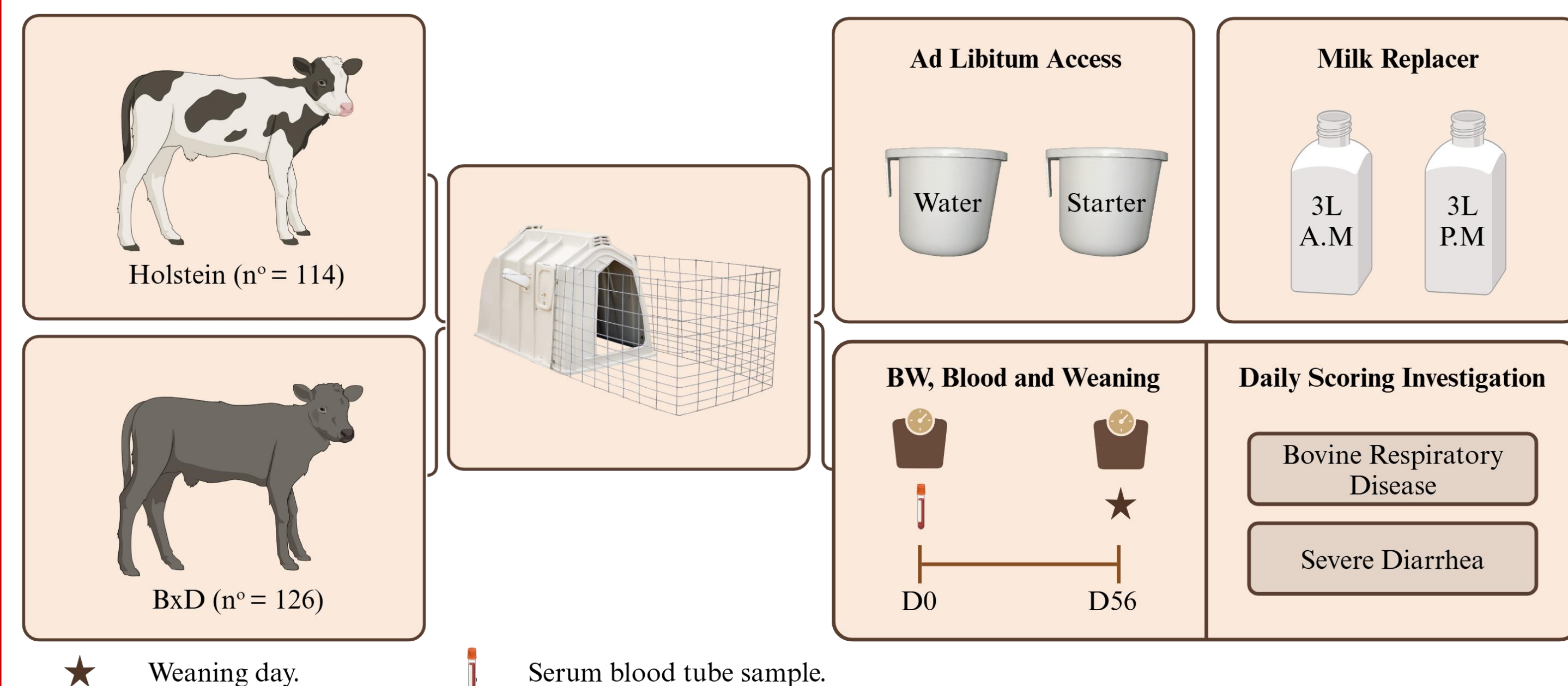
- Severe diarrhea and Bovine Respiratory Disease (BRD) are the most common illnesses affecting calves during the pre-weaning period (USDA-NAHMS 2007).
- The differences in the incidence and risk factors of severe diarrhea and BRD conditions between Holstein and Beef-on-Dairy (BxD) calves have not been extensively studied in veterinary medicine.

OBJECTIVE

- The objective of this study was to determine the association of diarrhea and BRD with average daily gain (ADG), milk replacer refusal (MRR), starter intake (SI), and mortality of Holstein and beef-on-dairy (BxD) calves.

MATERIALS AND METHODS

- Texas Tech University New Deal Research Facility;
- 240 newborn calves (114 Holstein and 126 BxD);
- Enrolled between September 2023 and March 2024;
- Randomly housed into individual outdoor hutches;
- Daily health evaluation:
 - BRD (Love et al., 2014);
 - Severe Diarrhea (McGuirk and Peek, 2014).



RESULTS

Table 1. Cox's proportional hazard models evaluating the association of severe diarrhea on mortality (Model 1) and time to consume at least 100 g of calf starter for two consecutive days (Model 2). BRD was not retained in any of these models.

Variable	Level	Coefficient (SE)	Hazard ratio (95%CI)	P
<i>Model 1: mortality</i>				
¹ Severe diarrhea	No	Reference	Reference	<0.01
	Yes	1.96 (0.42)	7.10 (3.13 – 16.1)	
<i>Model 2: time to consume at least 100 g of calf starter for two consecutive days</i>				
Breed	Holstein	Reference	Reference	<0.01
	BxD	0.42 (0.14)	1.52 (1.16 – 2.01)	
¹ Severe diarrhea	No	Reference	Reference	0.02
	Yes	-0.50 (0.21)	0.61 (0.40 – 0.93)	
² BW at enrollment		0.03 (0.01)		0.04

¹Severe Diarrhea: presence of watery feces and severe dehydration, and treatment (oral electrolytes or i.v. fluids) was warranted.
²BW at enrollment: Body weight accessed at the day of arrival (day 0).

Table 2. Association of severe diarrhea and bovine respiratory disease BRD with the average daily gain (ADG; kg/d) during the pre-weaning period (within the first 56 days of life).

Variable	Level	Coefficient (SE)	LSM (95% CI)	P
Breed	Holstein	Referent	0.49 (0.45 – 0.52)	0.35
	BxD	0.04 (0.02)	0.51 (0.47 – 0.55)	
¹ Severe diarrhea	No	Referent	0.56 (0.53 – 0.58)	<0.01
	Yes	-0.06 (0.03)	0.44 (0.39 – 0.48)	
² BRD	No	Referent	0.52 (0.50 – 0.55)	<0.01
	Yes	-0.09 (0.02)	0.47 (0.43 – 0.51)	
³ FPT	No	Referent	0.48 (0.45 – 0.51)	0.02
	Yes	0.04 (0.01)	0.52 (0.48 – 0.55)	

¹Severe Diarrhea: presence of watery feces and severe dehydration, and treatment (oral electrolytes or i.v. fluids) was warranted.
²BRD: Diagnosis based on a systematic scoring system based on six clinical signs (eye discharge, abnormal respiration, nasal discharge, ear droop or head tilt, and rectal temperature 39.2C°).
³FPT: Failure on passive transfer.

Table 3: Association of severe diarrhea and bovine respiratory disease BRD with total milk replacer refusals (L) within the first 21 days of life.

Variable	Level	Coefficient (SE)	LSM (95% CI)	P
Breed	Holstein	Referent	1.89 (0.46 – 3.28)	0.05
	BxD	-0.05 (0.26)	2.53 (1.16 – 3.91)	
¹ Severe diarrhea	No	Referent	1.21 (-0.12 – 2.56)	<0.01
	Yes	1.26 (0.50)	3.19 (1.76 – 4.62)	
² BRD	No	Referent	1.89 (0.55 – 3.24)	0.05
	Yes	0.61 (0.31)	2.51 (1.09 – 3.93)	

¹Severe Diarrhea: presence of watery feces and severe dehydration, and treatment (oral electrolytes or i.v. fluids) was warranted.
²BRD: Diagnosis based on a systematic scoring system based on six clinical signs (eye discharge, abnormal respiration, nasal discharge, ear droop or head tilt, and rectal temperature 39.2C°).

Figure 1. The association of severe diarrhea (A) and bovine respiratory disease (B) with average daily gain (ADG) during the pre-weaning period for H and BxD.

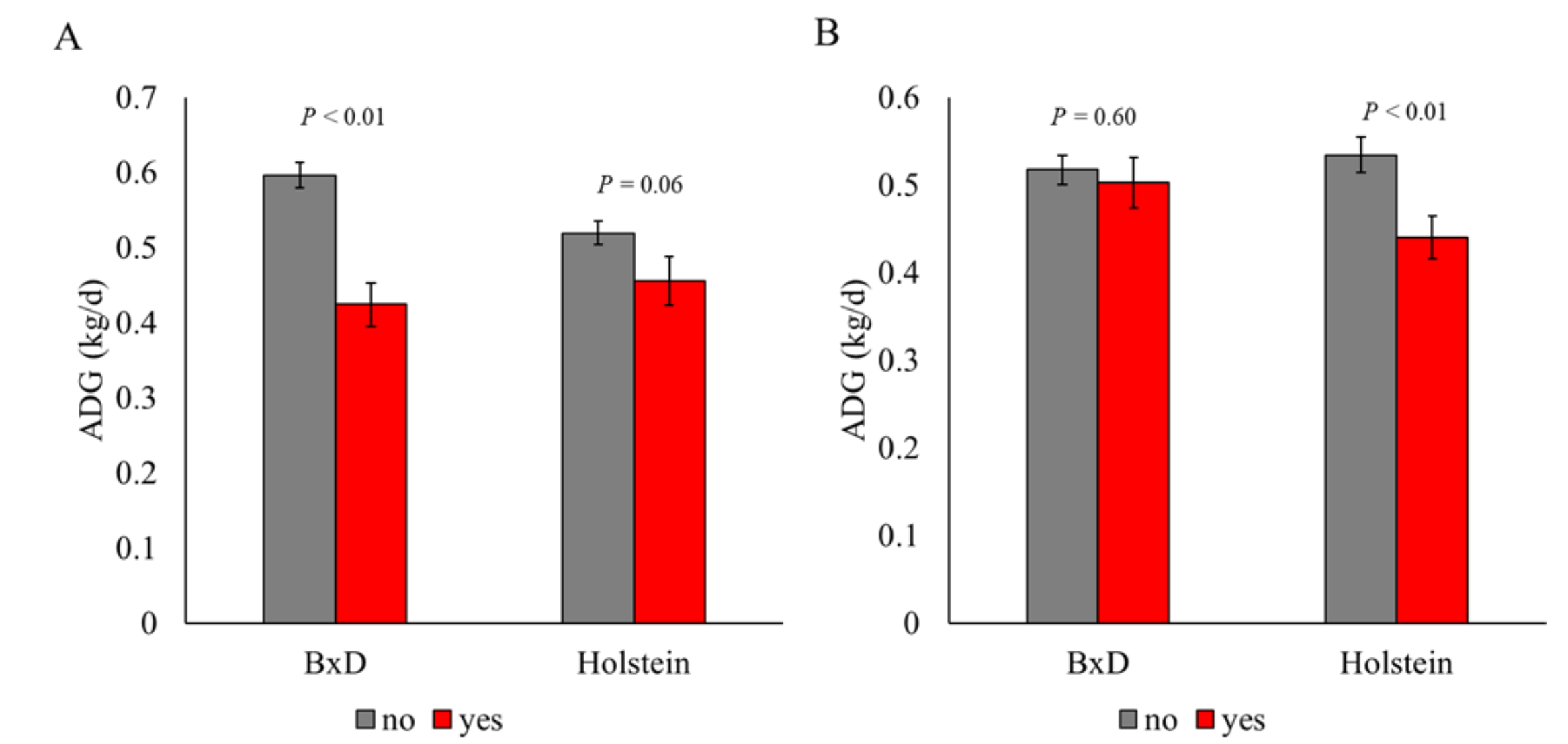


Figure 2. The association between diarrhea and total milk replacer refusal within the first 21 days of life for H and BxD calves.

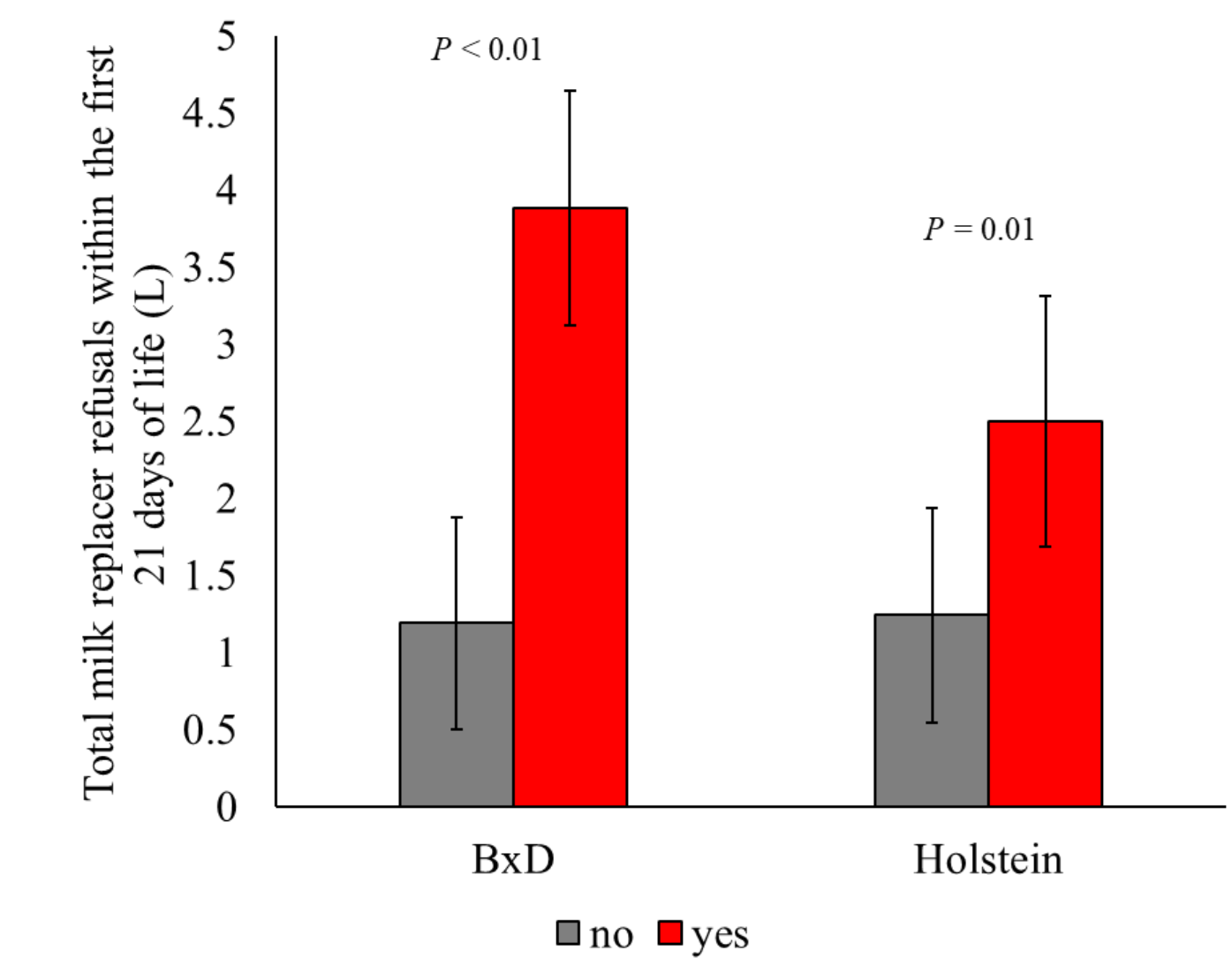
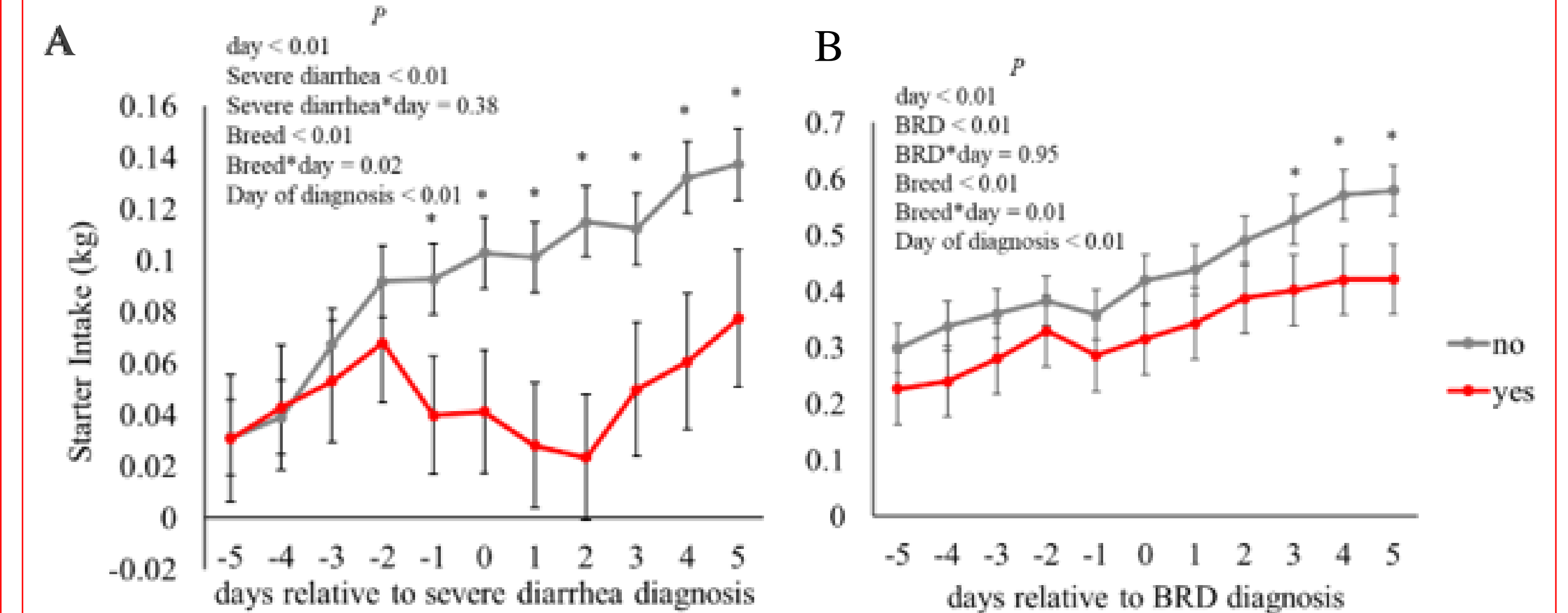


Figure 3. The dynamics of starter intake from 5 days before until 5 days after the diagnosis of severe diarrhea (A) and bovine respiratory disease (B) in pre-weaned calves.



CONCLUSIONS

- Our findings suggest that the association of BRD and severe diarrhea in some outcomes related to growth performance of pre-weaned calves may be conditional to breed.