An observational study to assess incidence of dairy calf diarrhea and subsequent recovery

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Introduction

Diarrheal disease (Scour) is a multifactorial disease resulting from the synergistic activity of both infectious and non-infectious factors in calves. Multiple enteric pathogens (*e.g.*, viruses, bacteria, and protozoa) are implicated in the development of this disease in neonatal calves. Co-infection is frequently observed in diarrheic calves although a single primary pathogen can be the cause in some cases. To date, the key biological mechanisms correlated to disease manifestation are unclear. A lack of knowledge regarding the composition and functions of microbiota impedes the development of new management strategies for improving resilience and disease resistance during the neonatal calf period.

Objective

To assess the incidence rate of calf diarrhea and subsequent recovery during the pre-weaning period in a population of Holstein-Friesian and Jersey heifer calves.

Materials and Methods

Calves

51 spring born **Holstein (HO)** and **Jersey (JE)** cross heifers were fed 8.5% of birth weight (bw) in colostrum from their dam or from a pooled* source with in 2 hours of birth

Category	Subset	# of calves	% total
Breed	HO	29	56.9
	JE	22	43.1
Colostrum Source	Dam	28	54.9
	Pooled	23	45.1
Treatment	Healthy	24	47.1
	Scours	27	52.9

*pooled = colostrum stored in a refrigerator, comprised of colostrum from 2 or less freshly calved cows (within a 24-hour period). Colostrum is warmed before feeding.

Clinical Assessment

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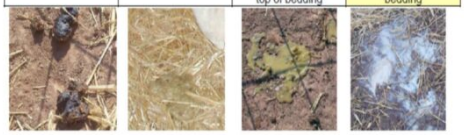
Calf Health Scoring Criteria			
0	1	2	3
Rectal temperature			
100-100.9	101-101.9	102-102.9	≥103
Fecal scores			
Normal	Semi-formed, pasty	Loose, but stays on top of bedding	Watery, sifts through bedding



Statistics

Data were analysed using the PROC MEANS and PROC MIXED procedures in SAS (9.4).
The model included fixed effects (calf breed, dam breed, disease status, and colostrum source) and random effects (shed and lactation number)

Results

The mean day post-birth for scour presentation was 23 (SEM 1.04) days (d) and 22 (SEM 0.88) d for HO and JE calves, respectively. There was no effect of disease incidence (P = 0.61), colostrum source (P = 0.95), dam breed (P = 0.40) or calf breed (P = 0.85) on ADG.

Enrolled and sampled calves, and diarrhoea incidence by breed and colostrum source. The values are expressed as mean (SEM).

Breed	Treatment	Colostrum Source	Age at assessment (days- d)	Mean Lactation	Litres of Colostrum Received	Colostrum Score (Brix)	Birth Weight (kg)	21d Weight (kg)	Age at weaning (d)	Weaning Weight (kg)	Average Daily Gain (kg/d)
Holstein	*Healthy*	Dam	**21.4** (0.9)	**1.4** (0.24)	**2.8** (0.09)	**26.5** (1.11)	**33.3** (1.07)	**47.2** (1.96)	**78.4** (2.20)	**79.9** (2.20)	**0.6** (0.03)
		Pooled	**19.9** (1.7)	**3.2** (1.06)	**2.9** (0.14)	**27.2** (2.64)	**36.6** (1.75)	**47.7** (1.16)	**77.7** (2.83)	**84.9** (1.97)	**0.6** (0.03)
	Scours	Dam	**25.4** (2.10)	**1.9** (0.31)	**2.9** (0.10)	**26.2** (1.27)	**34.2** (1.13)	**49.7** (1.30)	**77.5** (1.88)	**85.1** (2.28)	**0.7** (0.02)
		Pooled	**22.7** (1.69)	**2.3** (0.62)	**2.9** (0.12)	**25.8** (1.93)	**34.5** (1.31)	**48.6** (2.23)	**85.0** (1.59)	**88.1** (4.23)	**0.6** (0.04)
Jersey	*Healthy*	Dam	**21.7** (2.0)	**3.6** (1.21)	**2.3** (0.09)	**27.6** (1.54)	**27.3** (0.99)	**41.1** (1.58)	**84.4** (1.91)	**81.3** (1.67)	**0.6** (0.02)
		Pooled	**20.0** (2.17)	**2.9** (1.09)	**2.4** (0.11)	**25.4** (1.25)	**28.0** (1.30)	**39.9** (2.51)	**87.0** (1.95)	**81.2** (4.48)	**0.06** (0.03)
	Scours	Dam	**22.6** (0.87)	**5.4** (1.40)	**1.9** (0.12)	**25.5** (0.71)	**22.7** (1.35)	**34.4** (2.49)	**81.2** (12.42)	**74.5** (3.74)	**0.6** (0.04)
		Pooled	**23.6** (1.57)	**2.5** (0.63)	**2.1** (0.19)	**25.5** (0.92)	**24.9** (2.27)	**39.0** (2.47)	**88.6** (1.69)	**75.5** (1.67)	**0.6** (0.02)

Conclusion

Average daily gain, used to quantify growth performance as a proxy for recovery, was not affected by disease incidence or colostrum source. Analysis of colostrum quality and passive transfer of immunity to calves is ongoing. All calves were raised on the same farm, under similar management practices (with the exception of colostrum source), leading to the supposition that further investigation is required to determine why some calves developed scours and others did not. Further studies will utilize next-generation sequencing to monitor the time-dependent dynamics of the gut microbiota of dairy calves before weaning and further investigate the microbiome changes caused by diarrhoea.

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