SHORT COMMUNICATION

Faecal score and dry matter content after feeding synbiotics to neonatal Jersey crossbred calves

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Received: 01 March 2020 / Accepted: 17 April 2020 / Published online: 12 July 2020
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Abstract: In order to observe the effect of synbiotic feeding to neonatal calves (treatment group) for 42 days, the fecal score ranged from 1 to 3 with weekly variation ($p < 0.01$) among the calves. No difference was found in the fecal score and dry matter percent in both the groups control (synbiotic not fed) and treatment (synbiotic fed) calves. However, the faecal score was negatively correlated ($r = -0.564$, $P < 0.01$) to the dry matter percent in faeces. Bacterial (*Lactobacillus sp.*) load count recovered from faeces was negatively correlated ($r = -0.072$) to the FS (faecal score improved) and positively correlated ($r = 0.012$) to the DM percent in faeces. Therefore, faecal score and dry matter in faeces was better in calves fed synbiotics and *Lactobacillus sp.* persist ($P < 0.01$) to be recovered from feces even after the post feeding period of synbiotics (43- 90 days).

Keywords: Faecal score, Fecal dry matter, *Lactobacillus rhamnosus* NCDC 298, Synbiotics,

Calves are susceptible to diarrhoea predominantly during the second week of life (Moran 2002). On feeding synbiotics, it is known to increase feed intake, body weight gain, milk digestibility, improve faecal consistency (Pranckute et al. 2016; Marcondes et al. 2016) with decreased coliform count and increase in IgG level in neonatal calves (Roodposhti and Dabiri, 2012). Accordingly,

L. rhamnosus NCDC 298 in combination with FOS was found to be effective against toxin produced by *E. coli* (Anand et al. 2017) and was effective in preventing secretory diarrhoea in vitro (Mandal and Anand 2016). Therefore, subjective observation has been an important tool to assess severity of diarrhoea in young calves. Faecal scoring on 1 to 4 point scale increases numerically with the fluid content widely been used in a variety of studies (Moore et al. 2003 and Le Jambre et al. 2007). Faecal consistency scores of 1, 2, 3 and 4 had a dry matter percent of 20.9, 16.3, 9.6 and 5.8 respectively (Bellosa et al. 2011). The combination of the probiotic (*Streptococcus faecium*) and prebiotic (MOS) increased the feed intake and faecal consistency in calves (Morrison et al. 2010). The objective of the present study is to determine faecal consistency by means of scores and analyzing dry matter percent in faeces after feeding synbiotics to the young calves.

The study was carried out during the month of September to November 2017 at National Dairy Research Institute (NDRI), Eastern Regional Station, Kalyani, West Bengal, India. The latitude and longitude position of Kalyani is 22° 58'30"N and 88° 26'4"E, respectively with hot and humid climatic conditions. The average annual maximum and minimum temperatures is 39°C and 12°C, respectively with average annual rainfall of 1250 mm and relative humidity of 90%.

Twelve Jersey crossbred calves born in September to November 2017 were selected randomly and divided into two groups: treatment and control, consisting of 6 calves each. All the calves selected were separated immediately after birth from their mother. Animal in the treatment (T) group was offered synbiotics @ 100 ml/calf/day, dissolved in whole milk for 42 days while the control (C) group received only whole milk without synbiotics. The calves were fed colostrum and whole milk @ 1/10th of the body weight through feeding bottles. Besides milk the calves were offered *ad lib* supply of concentrate, green fodder and water. Synbiotic was formulated using *Lactobacillus rhamnosus* NCDC 298 (3.4×10^9 CFU/ml) and Fructo oligosaccharides (FOS) (10%), in skimmed milk. It is then incubated for 12-16 h to get the final product. Feed intake and growth of the calves were recorded on weekly basis throughout the study period. Faecal quality (faecal score, dry matter and *lactobacillus* count) was analysed during

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the synbiotic feeding period and post feeding period of synbiotics. Faecal scour was recorded daily as 1= normal faeces, 2= slight liquid consistency, 3= denoted moderate diarrhoea and 4 indicated severe diarrhoea (Morrison et al. 2010). For estimating dry matter (%) and bacterial load count in faeces (log, CFU/g), faecal sample was collected from rectum by using sterile rubber gloves Bacterial load (*Lactobacillus* sp.) was recovered in the faeces by total plate count in MRS (HiMedia®) (Hasunuma et al. 2011). The colonies were further confirmed by bacterial morphology and gram staining techniques (Ewaschuk et al. 2004).

All the data were analyzed using SPSS software (Version 20) and Analysis of variance (ANOVA) was carried out accordingly. Pearson's linear correlation method (Steel and Torrie 1980) was used to correlate faecal score to faecal quality (percent faecal dry matter and faecal *lactobacillus* count).

Feeding synbiotic to the calves had no significant effect on dry matter intake (Table 1). The result was in compliance with the study of Simon et al. (2001). They stated that the non-significant finding was may be due to variations in the individual reactions of the animals. However, significantly higher ($P<0.05$) total body weight gain and average daily gain (Table 1) were found in the synbiotic fed group (29.08 ± 0.90 kg and 323.14 ± 0.01 g, respectively) during 90 days experimental period. The result was in close correspondence to the findings of Dar et al. (2017) and they stated that higher weight gain may be due to better intestinal

microbial balance which leads to efficient digestion and absorption of nutrients from the gastrointestinal tract.

The faecal consistency score of 1 to 3 was reported from both the treatment and control groups which had a median percent dry matter of 22.23, 17.66 and 8.72 respectively. The median for *lactobacillus* count (CFU/g) for faecal consistency scores in both the groups were 1, 2 and 3 was 1.1×10^7 , 3.2×10^7 and 2.7×10^8 , respectively. The faecal sample with higher numeric scores (3) had high water content, indicating diarrhoea in calves. However, Bellosa et al. (2011) has reported faecal dry matter percent for scores of 1, 2, 3 and 4 as 20.9, 16.3, 19.6 and 5.8 respectively when the calves infected with *C. parvum*. Table 2. Represents the faecal scoring, percent dry matter and *Lactobacillus* load count in synbiotic fed calves at weekly intervals. No difference in faecal score and dry matter percent has been observed in treatment and control group (Table 2). On the contrary, Kehoe et al. (2008) reported lower faecal scores and scour incidence when probiotics was offered to the calves. No differences were observed for faecal score and percent dry matter in faeces between the treatment and control groups. But, faecal bacteria load count was higher in the calves in the treatment group while *Lactobacillus* count in faeces was higher ($P<0.01$) than the control group even after 42 days of feeding (Table 3, 4). The findings are in agreement to Heinrichs et al. (2009) who also reported an increase in *Lactobacillus* count in faeces of calves when the respective synbiotic formula were fed.

Table 1 Dry matter intake and body weight gain of the experimental calves up to 90 days period

S.N	Parameters	Control	Treatment
1	DMI/100 kg Body weight	3.06 ± 0.19	3.01 ± 0.16
2	Total body weight gain in 90 days (kg)	23.58 ± 2.38^x	29.08 ± 0.90^y
3	Average daily gain in 90 days (g)	262.03 ± 0.03^x	323.14 ± 0.01^y

^{xy}Differences in superscript in row indicate significance at $P<0.05$

Table 2 Weekly changes in the faecal scoring (1 to 4), faecal dry matter (%) and bacterial load in faeces (CFU/g) of the experimental calves

Days	Fecal score (1-4)		Dry matter (%)		Bacterial load (log, CFU/g)	
	Control	Treatment	Control	Treatment	Control	Treatment
7	1.40 ± 0.32	1.02 ± 0.16	23.37 ± 3.44	26.02 ± 2.75	5.39 ± 0.20	6.56 ± 0.71
14	1.07 ± 0.04	1.00 ± 0.22	30.67 ± 1.65	25.63 ± 3.33	5.62 ± 0.69	6.82 ± 0.52
21	1.33 ± 0.25	1.35 ± 0.16	21.99 ± 2.03	22.44 ± 3.63	4.60 ± 0.61	5.98 ± 0.46
28	1.14 ± 0.07	1.25 ± 0.17	31.20 ± 4.47	21.06 ± 1.13	4.40 ± 0.54	5.63 ± 0.38
35	1.45 ± 0.18	1.21 ± 0.02	19.40 ± 0.79	22.39 ± 1.62	4.97 ± 0.70	7.02 ± 0.48
42	1.30 ± 0.14	1.19 ± 0.01	21.64 ± 1.20	23.86 ± 1.73	5.21 ± 0.67	6.25 ± 0.39
49	1.07 ± 0.04	1.38 ± 0.32	21.64 ± 1.28	20.34 ± 0.89	5.44 ± 0.35	6.88 ± 0.25
56	1.21 ± 0.15	1.33 ± 0.22	23.42 ± 2.14	20.60 ± 1.25	5.04 ± 0.31	6.11 ± 0.51
63	1.19 ± 0.16	1.19 ± 0.15	19.68 ± 0.63	22.28 ± 2.25	4.71 ± 0.31	5.71 ± 0.53
70	1.69 ± 0.20	1.16 ± 0.16	18.27 ± 0.70	24.28 ± 2.16	4.61 ± 0.31	5.12 ± 0.43
77	1.38 ± 0.19	1.50 ± 0.20	20.39 ± 0.70	19.04 ± 1.02	5.22 ± 0.40	5.56 ± 0.22
84	1.57 ± 0.18	1.16 ± 0.21	20.02 ± 1.72	20.71 ± 0.85	4.58 ± 0.37	5.26 ± 0.25
90	1.33 ± 0.21	1.16 ± 0.16	21.37 ± 1.03	20.65 ± 0.69	3.17 ± 0.45	4.86 ± 0.12
Overall	1.32 ± 0.05	1.24 ± 0.44	22.54 ± 0.67	22.25 ± 0.05	4.84 ± 0.40	5.98 ± 0.13

Table 3 Faecal characteristics of the experimental calves during synbiotic feeding period of (42days) and after 42 up to 90 days period

Parameters	Faecal score (1-4)		Dry matter (%)	
	Feeding period (4-42 days)	Post feeding period (43-90 days)	Feeding period (4-42 days)	Post feeding period (43-90 days)
Control	1.35±0.06	1.27±0.06	20.68±0.50	21.13±0.54
Treatment	1.28±0.07	1.21±0.08	24.71±1.25	23.57±1.00
Overall	1.32±0.05	1.24±0.45	22.54±0.67	22.25±0.05
Sig.		NS		NS

**P<0.01 significance

Table 4 Faecal *Lactobacillus* load count (log CFU/g) during synbiotic feeding period and post feeding period in experimental calves

Parameters	Faecal <i>lactobacillus</i> load count (log CFU/ml)	
Days	Feeding period (4-42 days)	Post feeding period (43-90 days)
Control	4.68±0.16	5.64±0.16
Treatment	5.03±0.23	6.38±0.20
Overall	4.84±0.40	5.98±0.13
Sig.	**	

**P<0.01 significance

Table 5 Correlation between Faecal score with percent dry matter and bacterial load

Parameter	Faecal score	Dry matter	Bacterial load
Faecal score	1		
Dry matter	-0.564**	1	
Bacterial load	-0.072	0.012	1

**P<0.01

Not only between groups, weekly variation ($p<0.01$) in percent dry matter in faeces and faecal *Lactobacillus* load count has been found within the groups.

The faecal score was negatively correlated ($r=-0.564$, $P<0.01$) to percent dry matter content in faeces while bacterial (*Lactobacillus* sp.) load count recovered in faeces was negatively correlated ($r=0.072$) to the faecal score and positively correlated ($r=0.012$) to the dry matter percent in faeces (Table 5). The lower dry matter percent in faeces reflects the incidence of diarrhoea in calves. Similar trend was reported by Bellosa et al. (2011) and Agazzi et al. (2015) in calves fed probiotics and synbiotics, respectively. The faecal score was found to be higher in the first two weeks of life which then decreased at 3rd week and became normal by 4th and 5th week of age. Similar findings were reported by Bayatkouhsar et al. (2013) however, Quezadamendoza et al. (2011) did not find any effect of probiotics on diarrhoea.

Conclusions

Hence faecal quality (faecal score, faecal dry matter and bacterial load) improved when synbiotics was fed to the neonatal calves. Further investigation with larger sample size over extended period of synbiotic feeding is necessary to give us the true picture of the trial.

Acknowledgements

The authors are thankful to the Head, ICAR- National Dairy Research Institute, Eastern Regional Station, Kalyani, West Bengal, India for providing necessary facilities for conducting the study.

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