

Effects of long-term postbiotic supplementation on dairy heifer calves: Performance and metabolic indicators

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Introduction

- The use of **postbiotics** could be beneficial due to the fact that a postbiotic combines the microorganism (probiotic) and fermentation products (prebiotic).
- **Little is known** on the effects of postbiotics in dairy ruminants.
- **The hypothesis** was that Postbiotics induce changes in gut microbiota and will improve calf growth performance, immune system, rumen development, and nutrient utilization in newborn calves.

Objective: to evaluate the effect of a novel postbiotic (**Probisan®**; a lactic acid bacteria and non-bitter fermented yeast) on **growth performance and blood metabolites** of dairy heifer calves.

Materials & Methods

Animals and Treatments:

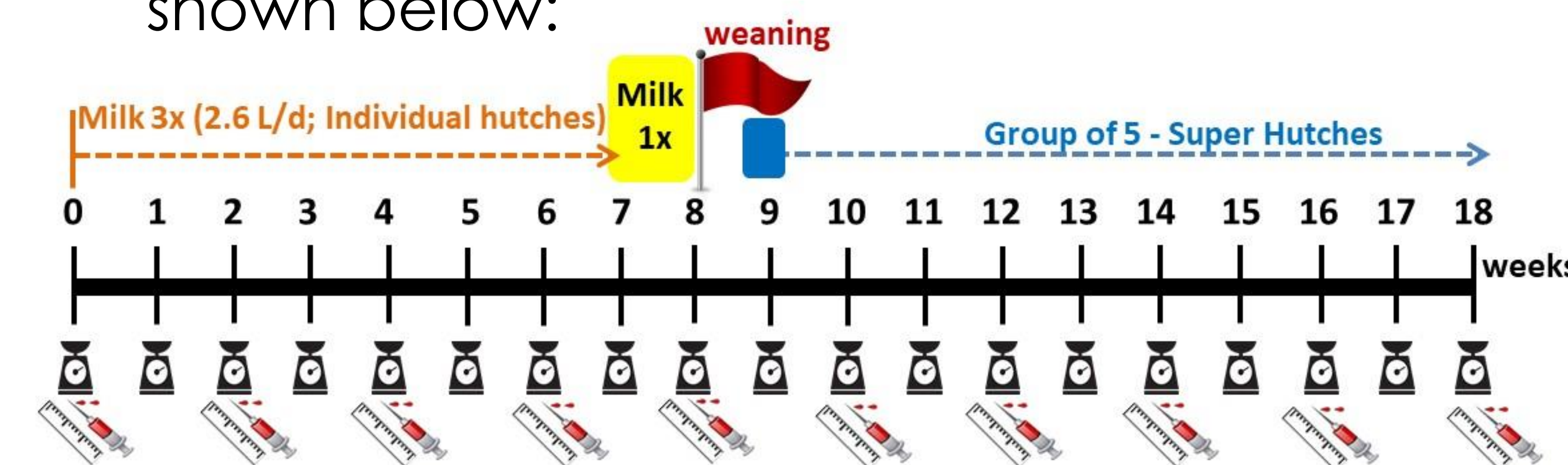
- Jersey-Holstein **dairy heifer calves** (n = 70)
- 2 treatments:
 - No supplementation; control (**CON**; n = 35)
 - Supplementation with **Probisan® (PRO)**; n = 35
 - **3.0 g/d** from d 3 until weaning at wk 8 (Pic 1a)
 - **1.5 g/kg** concentrate mixture from wk 9 to 18 (Pic 1b)



Picture 1. Postbiotic supplementation: a) hutches; b) super hutches

Procedures & Sampling:

- Individual body weight & BCS () , hip height & width () , intake (daily) & blood sample () were performed as shown below:



Picture 2. Body weight (a) and hip height (b) measurements

Laboratory Analyses:

- Plasma concentrations of glucose (Liquid Glucose Oxidase Reagent kit, Ponte Scientific, Inc., Canton, MI, USA), β -hydroxybutyrate (BHBA; β -Hydroxybutyrate Reagent kit, Ponte Scientific, Inc.), and triglycerides (Triglycerides (GPO) liquid kit, Ponte Scientific, Inc.) were determined.

Statistical Analyses:

- BCS, body measurements, feed intake and blood metabolites data were analyzed by MIXED procedure (SAS 9.4) with repeated measures.

Results

- **Body weight:** No significant differences from wk 0 to 8 (68 ± 0.8 kg) and from wk 9 to 18 (137 ± 1.6 kg) as shown in Table 1. Body weight gain (785 ± 11 g/d) did not also vary.
- **Body measurements:** Body condition score (3.13 ± 0.03 ; $P = 0.43$), hip height (87.8 ± 0.3 cm; $P = 0.47$) and hip width (20.1 ± 0.1 ; $P = 0.21$) did not vary between groups (Table 1).
- **Feed intake:** Groups consumed similar ($P > 0.10$) amount of starter from wk 3 to 5 (226 ± 67 g/d), but from wk 6 to 10, PRO calves consumed less ($P = 0.043$) amounts (CON = 926 ± 51 and PRO = 804 ± 50 g/d).
- **Plasma samples:** Glucose (103.5 ± 1.21 mg/dL), BHB (0.648 ± 0.035 mmol/L), and triglycerides (13.20 ± 0.71 mg/dL) did not vary ($P > 0.10$) between groups and no interaction between treatment and week was detected (Table 1).
- **Blood metabolites** varied ($P < 0.001$) between wk 0 and 18: glucose (110 vs. 94 mg/dL), BHB (0.448 vs. 1.015 mmol/L), and triglycerides (21.8 vs. 7.5 mg/dL), in accordance with the development of rumen functions throughout time.

Item	Treatment			P-values		
	CON	PRO	SEM	Trt	Wk	Trt \times wk
Body Weight, kg	71.9	71.8	1.6	0.96	< 0.01	0.92
Body Condition Score	3.15	3.12	0.03	0.37	< 0.01	0.43
Hip Height, cm	88.0	87.6	0.7	0.47	< 0.01	0.94
Hip Width, cm	20.16	19.97	0.18	0.21	< 0.01	0.10
Feed intake, kg						
Wk 6 to 10	0.93	0.80	0.06	0.04	< 0.01	0.45
Wk 11 to 18	3.54	3.67	0.12	0.30	< 0.01	0.38
Blood metabolites						
Glucose, mg/dL	104	103	1.2	0.55	< 0.01	0.69
BHB, mmol/L	0.648	0.651	0.045	0.76	< 0.01	0.78
Triglycerides, mg/dL	13.4	13.0	1.0	0.71	< 0.01	0.88

Table 1. Performance and metabolic indicators of calves without supplementation (CON) or supplemented with Probisan (PRO).

Conclusion

Despite the lower consumption of solid feeds intake from wk 6 to 10 by PRO calves, no differences were detected in growth performance. Blood metabolites were similar between groups and their pattern change over time indicated similar rumen development.

Implications

Although no clear effects on performance of dairy calves were observed, positive effects on the immune system are possible, but these effects should be tested.

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