

Effect of using different feed additives on rumen fermentation of dairy beef calves pre and post weaning

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INTRODUCTION

- Pre-weaning dairy beef calves are susceptible to diseases due to immature immune system and undeveloped digestive tract.
- Rumen microbial colonization is influenced by several factors, such as contact with other animals and feeding management.
- Nutritional strategies applied in early-life impact immunity, growth, gut maturation, and long-term health.

OBJECTIVES

- Evaluate the effects of different additive-based nutritional treatments on microbial colonization and growth in dairy beef calves under commercial management conditions.

MATERIAL AND METHODS

- 112 Montbeliarde calves were assigned to **4 treatments**: Control (CTL), Mix of feed additives used in the commercial farm (MIX), a blend of Essential Oils (EO), and a Synbiotic yeast probiotic (SYN). Diets were applied until weaning, then MIX diet was fed to all groups.
- The animals were individually weighed three times throughout their growth period.
- Rumen fluid samples were collected using an esophageal tube both before weaning and two months after weaning to analyze fermentation parameters.



RESULTS & DISCUSSION

Figure 1: Coefficient of variation (%) of individual weights across different periods of time in beef calves.

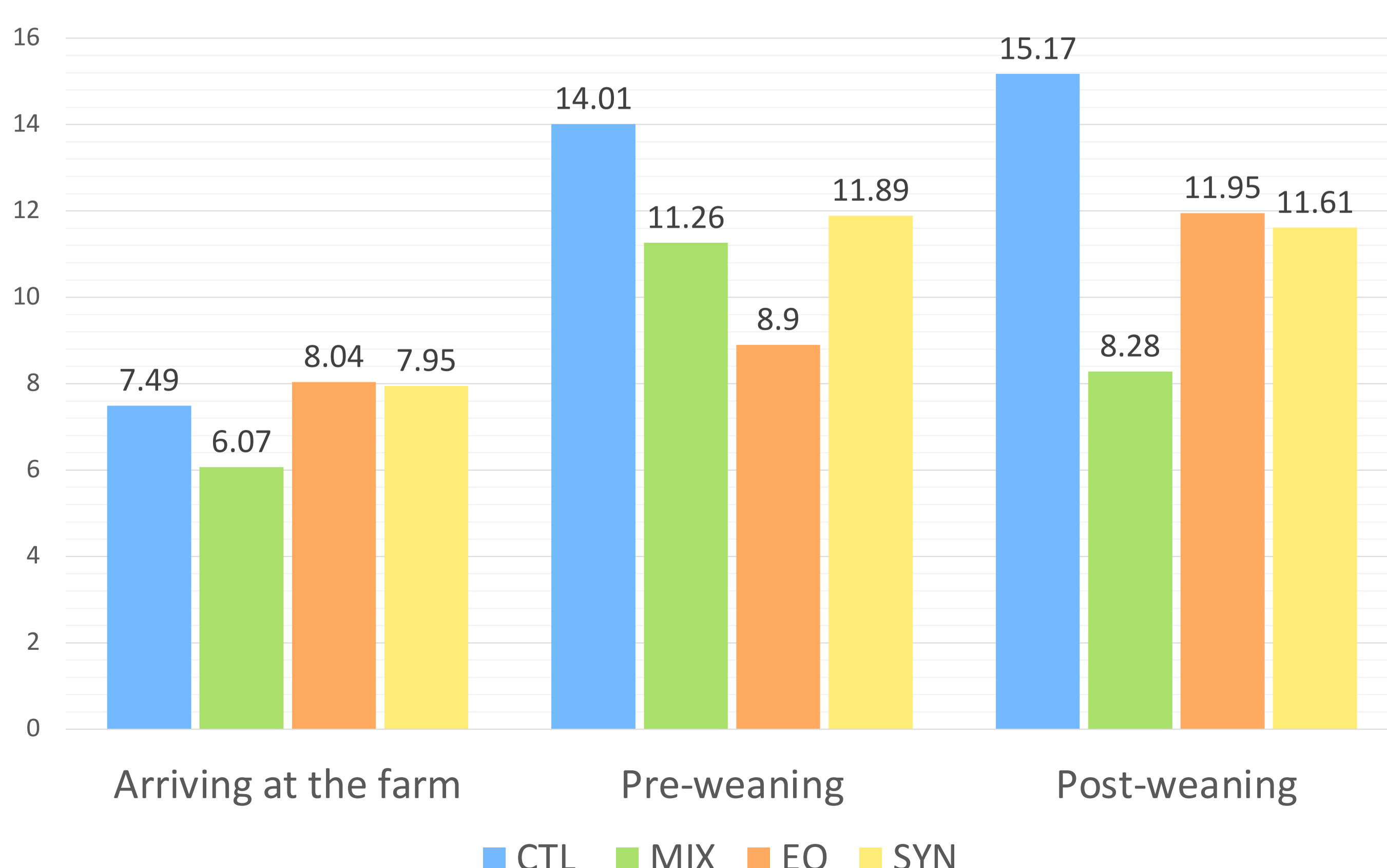


Table 1: Ruminal fermentation parameters in **pre-weaned** beef calves being fed during 35 days with four different diets.

Item	Mean				SEM	P-value
	CTL	MIX	EO	SYN		
Ammonia (NH ₃) (mg N/100ml)	1.20	0.88	0.91	0.84	0.112	0.651
Lactic Acid (µg/ml)	36.3	38.9	37.7	35.6	2.266	0.955
Total Volatile Fatty Acid (mM)	92.24	105.46	101.57	90.43	2.587	0.126
<i>Fatty acids (%)</i>						
Acetate	45.6 ^a	42.9 ^b	46.5 ^a	45.4 ^a	0.381	0.009**
Propionate	37.3	39.9	35.9	37.8	0.549	0.091
Butyrate	10.9	10.8	11.1	10.6	0.394	0.983
i-Butyrate	0.76 ^{bc}	0.58 ^c	0.86 ^{ab}	0.99 ^a	0.039	0.003**
Valerate	4.71	5.37	4.84	4.39	0.213	0.429
i-Valerate	0.71 ^{ab}	0.47 ^b	0.74 ^a	0.86 ^a	0.043	0.016*
A:P	1.26 ^a	1.10 ^b	1.33 ^a	1.24 ^{ab}	0.026	0.016*

Table 2: Ruminal fermentation parameters in beef calves 65 days after weaning.

Item	Mean				SEM	P-value
	CTL	MIX	EO	SYN		
Ammonia (NH ₃) (mg N/100ml)	0.65	0.71	0.52	0.79	0.102	0.814
Lactic Acid (µg/ml)	39.5	40.4	42.3	41.3	1.598	0.936
Total Volatile Fatty Acid (mM)	73.1 ^d	92.1 ^{bc}	104.1 ^{abc}	97.8 ^c	2.418	0.000**
<i>Fatty acids (%)</i>						
Acetate	44.8	44.9	44.8	44.8	0.318	0.999
Propionate	42.6	41.5	41.5	42.9	0.403	0.495
Butyrate	7.64	8.96	9.25	8.37	0.248	0.105
i-Butyrate	0.78 ^a	0.57 ^{bcd}	0.68 ^{abc}	0.46 ^d	0.025	0.000**
Valerate	3.38	3.53	3.14	3.07	0.111	0.443
i-Valerate	0.72 ^a	0.50 ^{bc}	0.64 ^{ab}	0.43 ^c	0.030	0.003**
A:P	1.06	1.10	1.11	1.06	0.020	0.691

Table 3: pH values of rumen fluid per treatment in beef calves.

	Mean				SEM	P-value
	CTL	MIX	EO	SYN		
Pre-weaning	6.18	5.93	6.19	6.38	0.085	0.314
Post-weaning	6.90 ^b	6.42 ^a	6.59 ^{ab}	6.32 ^a	0.058	0.002**

CONCLUSIONS

- The study found no significant effect on individual weights, but observed **greater homogeneity** in the MIX, EO and SYN groups.
- Increased total **VFA concentration** and **altered fermentation pattern** were observed in MIX and SYN treated groups, suggesting increased microbial activity and potential long-term benefits for animal development.

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