

PROPIONIC ACID-BASED ADDITIVE ON AEROBIC STABILITY OF TOTAL MIXED RATION – I: DAIRY COWS PERFORMANCE AND FEED FREQUENCY

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Introduction & Objective

Tropical climates present environmental challenges to the stability of total mixed ration (TMR) in the feed bunk throughout the day. Increasing feeding frequency is a typical suggested strategy to compensate for TMR deterioration and to prevent refusal by animals. However, treatment with a propionic acid-based additive could stabilize the TMR enough to allow a reduction in daily feeding frequency.

Material and Methods

A preliminary trial was performed to select the most effective dose of the additive (**Fresh Cut™ Plus**, Kemin South America, Brazil) based on the monitoring of the aerobic stability of TMR. The additive was effective on improving aerobic stability of TMR compared to the control treatment, and our results suggested the dose of **2 mL/kg FM** as the most effective, so this dose was selected for the Additive strategy in the animal performance trial. Twelve Holstein cows (mean $\pm$ SD; 612 $\pm$ 158 kg of body weight, 27 $\pm$ 6.5 kg/d milk yield, 178 $\pm$ 60 days in milk, and 3.0 $\pm$ 0.5 of BCS) were assigned to a switch-back design to evaluate the effect of two feeding management strategies: **Control**, with two daily feeding of a control TMR; and **Additive**, with cows receiving a single daily feeding of a TMR treated with the additive at 2 L/t FM. The animals were housed in a free-stall barn equipped with individual feed bunks (Intergado Ltda, Brazil). The cows were subjected to two daily milkings, at 5 am and 5 pm. At the afternoon feed delivery for the Control diet, the TMR was manually mixed in the feed bunks for both treatments throughout three minutes, immediately before the animals had access to it, in order to stimulate consumption randomly.

TMR composition

Ingredient	% DM
Whole plant corn silage	44.59
Tifton wilted silage	6.40
Rehydrated corn grain silage	21.11
Citrus pulp	9.25
Soybean meal	16.33
Mineral-vitamin mix	2.32

Results

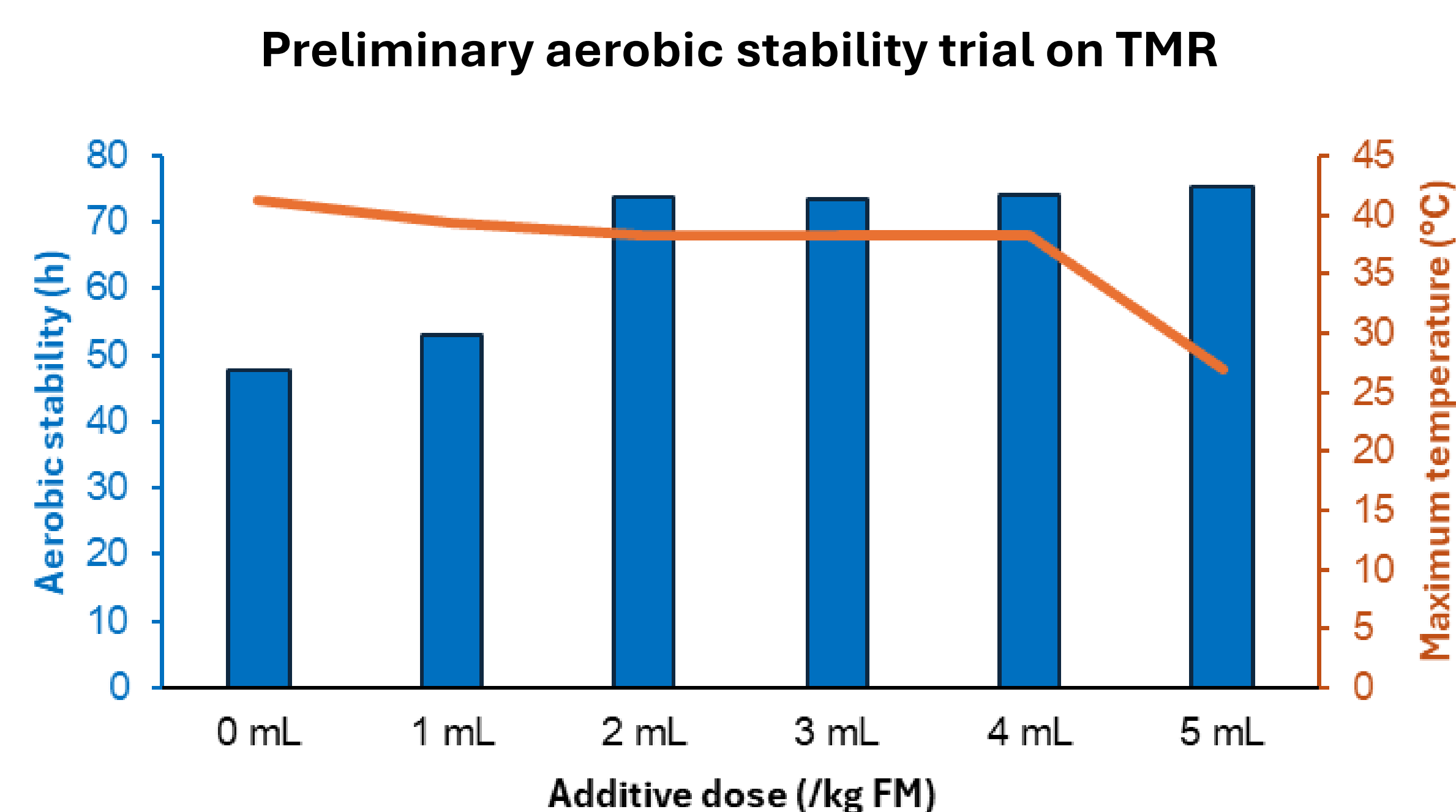


Table 1. Performance of dairy cows fed the experimental total mixed rations.

Item	Treatment		SEM	P-value
	Control	Additive		
Dry matter intake, kg/d	21.6	22.3	0.89	0.59
Milk, kg/d	23.5	25.9	1.34	0.01
Feed efficiency	1.15	1.22	0.08	0.42
Energy-corrected milk, kg/d	23.2	25.1	1.16	0.03
Fat, %	3.41	3.28	0.07	0.01
Crude Protein, %	3.26	3.26	0.06	0.92
Lactose, %	4.48	4.44	0.03	0.06
Milk NE _L , Mcal/kg	0.67	0.66	0.01	0.12
NE _L , Mcal/d	15.6	16.8	0.77	0.04
Somatic cell count (SCC), mil/mL	41.8	99.3	8.10	<0.01
Milk urea nitrogen, mg/dL	13.1	12.5	0.27	0.27
Particle sorting index, % as fed				
> 19 mm	84.2	114.3	3.53	<0.01
8-19 mm	101.4	97.2	0.66	<0.01
4-8 mm	98.8	98.3	0.72	0.76
< 4 mm	102.4	98.6	0.73	<0.01
Ingesting, min/d	258	188	9.2	<0.01
Ruminating, min/d	546	599	10.1	<0.01
Idleness, min/d	621	625	12.6	0.82
Water intake, min/d	21	27	2.1	0.05
Meal frequency, meals/d	8.9	6.1	0.27	<0.01
Meal size, kg	2.8	3.4	0.19	0.03
Meal length, min	20.8	20.0	1.00	0.49
1 st meal (morning feeding), kg	4.4	4.4	0.32	0.84
1 st meal (morning feeding), min	32.3	21.7	2.21	<0.01
1 st meal (afternoon feeding), kg	3.4	3.7	0.29	0.42
1 st meal (afternoon feeding), min	28.0	20.3	2.02	<0.01

Conclusions

The treatment of TMR with the propionic acid-based additive improved its aerobic stability and enabled the strategy of a single daily feeding to dairy cows with an increased milk yield by 10.2%. The additive-treated TMR promoted a shift in the sorting behavior in favor of longer particles, increasing the time spent on rumination by 9.7%, and decreased the number of daily meals (31.5%) at the expense of larger meal size (21.4%), without changes in dry matter intake. Cows fed the Additive TMR also spent less time with first meal post-milking, rendering them more susceptible to teat contamination and resulting in higher SCC.

Acknowledgments

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