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Title: EFFECT OF the supplementation with a BLEND containing short and medium chain fatty acid monoglycerides in MILK REPLACER ON RUMEN papillae DEVELOPMENT IN weaning CALVES

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EFFECT OF THE SUPPLEMENTATION WITH A BLEND CONTAINING SHORT AND MEDIUM CHAIN FATTY ACID MONOGLYCERIDES IN MILK REPLACER ON RUMEN PAPILLAE DEVELOPMENT IN WEANING CALVES.

Summary

Feeding of neonates with artificial milk formulas is a popular trend towards early weaning of newborn dairy calves. These milk replacers (MR) should accelerate the rumen development, determining early solid feed intake and leading to better performances in cattle. Previous research demonstrated that sodium butyrate supplementation in MR can affect both small intestine and rumen development. Also acetate and propionate showed similar properties, while only a few studies indicate some potential benefit of monoglycerides on gut functions. The present study is aimed to determine the effect of the supplementation of a blend containing short and medium chain fatty acids monoglycerides (SMCFA) in milk replacer on rumen papillae development and growth performances in weaning calves.

Twenty bull calves (about 2 weeks old, weighing around 43 Kg) were randomly allocated into two groups: Control (C) and Treated (T). Besides MR and starter diet, the latter offered *ad libitum*, T calves received 0.2 % SMCFA in MR. Animals were slaughtered after 56 days from the beginning of the trial.

No difference was found between groups either in growth performances or in mean number of papillae/cm² of mucosa, total surface of papillae (mm²)/cm² of mucosa or papillary size. In both groups, the morphology of the rumen epithelium was typical of parakeratosis. The cells of the stratum spinosum were directly transformed into swollen, ovoid, still nucleated keratinocytes, particularly at the papillary tip, probably as a result of unphysiological osmolarities caused by high concentrate intake. Degenerated squamous horn cells covered the "balloon like" cells forming several layers, particularly in the places of the rumen mucosa more protected from an abrasive action of solid feed. This was more evident in C animals. The squamous cells covering the papillary tip showed cytoplasmic protrusion, representing remains of the attachment sites of desmosomes, which increased the total absorptive surface and were more numerous and higher in T compared to C animals. It might be hypothesized that SMCFA supplementation in MR could better regulate epithelial cell proliferation and probably have an "emollient effect" leading to an easier "peeling" that might increase efficiency for nutrient transport across the epithelium.

Keywords: rumen papillae, calves, short and medium chain fatty acids monoglycerides, histology, SEM, TEM

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