

## Tributyryn and lactitol synergistically enhanced the trophic status of the intestinal mucosa and reduced histamine levels in the gut of nursery pigs

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This study determined whether tributyrin and lactitol could synergistically facilitate the transition from milk to solid feed in nursery pigs. At 21 d after birth, 64 piglets were moved from the piggery to a production barn and fed a medicated diet. At 28 d after birth, the piglets were weighed and allotted into four groups and fed a standard nonmedicated diet (control) or the control diet with tributyrin (butanoic acid 1,2,3-propanetriyl ester; 10 g/kg), or with lactitol (beta-D-galactopyranosyl-(1-->4)-D-sorbitol; 3 g/kg), or with tributyrin (10 g/kg) plus lactitol (3 g/kg). On d 0, 14, and 42 after being fed the control or experimental diets, the animals were weighed, and animal health, feed intake, and feed conversion ratio were determined. On d 42, four piglets from each treatment were killed to measure the empty and full weight of the gut, as well as the weights of the liver and kidneys. The jejunum and cecum were sampled to analyze the luminal concentrations of lactic acid; short-chain fatty acids; and mono-, di-, and polyamines and to assess the mucosal status. Mortality after 42 d ranged from 19% for animals fed the control diet, to 6% for animals fed the tributyrin or lactitol diets, and to 0% for animals fed the tributyrin+lactitol diet. After 14 d, the ADG was 127% greater ( $P < 0.05$ ) in animals fed the tributyrin+lactitol diet than in animals fed the control or tributyrin diets. After 42 d, animals fed the tributyrin+lactitol diet were heavier ( $P < 0.05$ ) than animals fed the tributyrin diet. At slaughter, no differences ( $P > 0.05$ ) in organ weights were observed. With the exception of animals fed the lactitol diet, wherein cecal lactic acid levels increased threefold ( $P < 0.01$ ), the luminal concentrations of lactic acid and short-chain fatty acids were not different ( $P > 0.05$ ). Among the various amines analyzed, the only response ( $P < 0.05$ ) was a 66 and 49% decrease in histamine levels in the jejunum and cecum, respectively, in animals fed the tributyrin+lactitol diet compared to the control diet. In the jejunum of animals fed the lactitol or tributyrin+lactitol diets, the length of the villi was increased by 12% ( $P < 0.05$ ) compared to animals fed the control diet, whereas the tributyrin diet did not have any effect on the villi ( $P > 0.05$ ). In the cecum, the depths of the crypts were reduced ( $P < 0.001$ ) by 18% in animals fed the lactitol diet and 45% in animals fed the tributyrin or tributyrin+lactitol diets compared to animals fed the control diet. In conclusion, a diet containing tributyrin and lactitol as nutraceuticals resulted in lower histamine levels in the jejunum and cecum, as well as longer jejunal villi and shallower cecal crypts.

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