A METABOLITE OF LEUCINE (B-HYDROXY-B-METHYLBUTYRATE) GIVEN TO SOWS DURING PREGNANCY ALTERS INTESTINE DEVELOPMENT OF THEIR NEWBORN OFFSPRING

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The effects of dietary β-hydroxy-β-methylbutyrate (HMB) supplementation during gestation on intestinal tract development in newborns were determined. Leucine (LEU) is the essential branched-chain amino acid, a potent regulator of protein metabolism, which shows anti-catabolic action. Moreover, animal studies show that prenatal administration of HMB has a positive impact on postnatal growth and development. Adaptive, functional, structural or metabolic changes occurring during prenatal development as an effect of the interaction between genes and different factors, generate permanent alterations in the homeostasis in foetus. To our knowledge there is a lack of studies conducted on prenatally HMB programmed offspring concerning intestinal track.

The present study was conducted to test the influence of maternal HMB treatment on the development of the gastrointestinal tract of newborn piglets. At 70th day of gestation, a total of 12 sows (Large White Polish breed) were randomly assigned to two groups, with each group receiving either a basal diet or the same diet supplemented with 0.2 g/day HMB until the 90th day. Maternal HMB supplementation resulted in the wider myenteron, submucosa and mucosa thickness compared with the control group. Further, it resulted in significantly longer and wider villi, and the deepest crypts. The increase of total crypt number was observed after

HMB supplementation. The absorptive surface of the small intestine was higher in newborn offspring from the HMB group.

Obtained results indicated that the diet supplemented with HMB given to pregnant sows influence the development of their newborn offspring including intestinal tract. The reduction of the thickness of myenteron could have an adverse effect on the function of the gastrointestinal tract. Contractions of the myenteron of the gastrointestinal tract help in the mixing and moving of chyme along the digestive tract. Additionally, the reduction of sub-mucosa and the increase of the thickness of mucosa are observed. Changes in the mucosa may affect secretion, digestion, absorption and excretion. Our study showed that although maternal HMB treatment decreased crypts depth, but increased crypts number and villi parameters resulted in the enhance of intestine absorptive surface. Any change in the parameters of the villi can affect the absorption process changing the risk of diarrhea, dehydration and intestinal infections later in life. On the other hand, it is well known that even mild growth of intestinal crypts can cause mucus membrane formation or polyps of the intestine. Therefore, further studies should be carried out on the prenatal effects of HMB on mucosal growth in the postnatal period, particularly at the most critical time in the development of piglets, at the weaning when liquid food such as mother milk is replaced by solid food. In summary, maternal HMB supplementation in the mid-gestation period significantly influenced intestinal tract development in the offspring.

Keywords: LEUCINE, METABOLITE, SOWS, PREGNANCY, INTESTINE.