

Alfalfa Leaf Meal Improves Production Performance of Pregnant Sows & Piglets by Facilitating Gut Microbiota

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Keywords: alfalfa leaf meal; pregnant sows; gut microbiota; short-chain fatty acids; inflammatory

In order to alleviate the increasingly prominent conflict between humans and livestock for soybean in China, we processed alfalfa leaf meal (ALM) with high protein content and balanced amino acid, which had potential to replace soybean meal. The experiment of ALM on pregnant sows was designed to verify the possibility of ALM as a new protein source for diets. 60 sows at 70 days of gestation were randomly divided into 5 groups, supplied with replacing 0% (Ctrl), 25% (25% ALM), 50% (50% ALM), 75% (75% ALM), and 100% (100% ALM) soybean meal with ALM, respectively. Backfat thickness and reproductive performance of sows and growth performance of piglets were recorded, while serum biochemistry, fecal microbiome and fecal short-chain fatty acids (SCFAs) were measured. The results showed that substituting soybean meal with ALM during pregnancy had no significant effect on the backfat of pregnant sows. While 100% ALM significantly improved the total born piglets and litter weight at birth, as well as body weight, litter weight at days 28 of piglets. Moreover, 100% ALM significantly reduced the systemic inflammation markers (interleukin-6) and increased the anti-inflammatory marker (interleukin-10) in serum of sows and piglets, respectively. Fecal microbiome showed that, at the phylum level, compared to Ctrl, the relative abundance of beneficial bacteria *Actinobacteriota* was higher in 100% ALM at 105 days of gestation; while the amino acid degrading bacteria *Desulfobacterota* of piglets in the ALM (100%) was significantly decreased. Furthermore, at 105 days of gestation and 28 days of lactation, ALM (100%) significantly increased the content of SCFAs (acetic acid, butyric acid) in feces of sows. Interestingly, ALM (100%) significantly increased the content of SCFAs (acetic acid, propionic acid, butyric acid, valeric acid, isovaleric acid) in feces of piglets. Correlation analysis revealed the *Lactobacillus* were positively related with reproductive performance of sows; while the *Subdoligranulum* was positively related with growth performance of piglets; the *Treponema* was positively related with butyric acid and valeric acid level in feces of piglets. In sum, this study reveals ALM (100%) contributes to improve reproductive performance of sows and the growth performance of piglets and alleviate inflammation of sows and piglets by facilitating gut microbiota. Thus, our findings provide a promising soybean meal alternative used for pregnant sows.

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