INTESTINAL ACTIONS OF AO-BIOTICS™ IN IMMUNOLOGICALLY CHALLENGED PIGLETS

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Inclusion of AO-Biotics in drinking water improves the barrier function and immune competence of the intestine of immunologically stressed piglets. This action is associated with improved growth uniformity during the first week after weaning.

SUMMARY

DOSE OF AO-BIOTICS USED
0.611 mL/L

Administering AO-Biotics through the drinking water to weanling piglets that were immunologically challenged with an intraperitoneal injection of lipopolysaccharides (LPS) from Escherichia coli attenuated the LPS-induced increase in intestinal permeability ($P < 0.04$) while increased gut production of interleukin 1 ($P < 0.05$) and nitric oxide ($P < 0.14$), two major components of the innate immune response. These gut-protective actions were preceded by a reduction in body weight variance of 26% during first week post-weaning.

VALUE

This study showed that in immunologically challenged (diseased) pigs AO-Biotics improves the barrier function (barrier against entry of pathogen and toxins found in the gut) and stimulates the innate immune response of the intestinal epithelium. These actions correlate with more uniform growth, indicating that AO-Biotics enhances the capacity of pigs to cope with stressors that compromise gut health (such as weaning).

PROTOCOL

Type of Animals/Experimental Units

- Weaned male piglets (21 days of age, 6.0 kg)/48 animals individually housed.

Number of animals/experimental units

- Total of 12 pigs (experimental unit) per treatment.

PROTOCOL (CONTINUED)

Trial Design

- Complete randomized design. The model include treatment as a fixed variable and pig within treatment as random variable.

Treatments

- Control with 0 mL/L of AO-Biotics™ + saline injection; Control with 0 mL/L of AO-Biotics + LPS injection (150 µg/kg BW of E. Coli serotype 0111:B4); AOB with 0.611 mL of AO-Biotics per liter of drinking water plus saline injection; and AOB with 0.611 mL of AO-Biotics per liter of drinking water plus LPS injection (150 µg/kg BW of E. Coli serotype 0111:B4).

Diet Information (general)

- 23% corn, 22% wheat, 19% full fat soy, 13.6% soybean meal (47% CP), 8.6% lactose, 6% barley, 3.6% soy oil, 0.86% calcium carbonate, 0.56% lysine, 0.4% trace mineral/vitamin mix, 0.38% salt, 0.24% methionine, 0.22% threonine, 0.09% valine, 0.06% tryptophan.

Data Collection

- Feed and water intake, body weight, intestinal and systemic inflammation, intestinal concentration of cytokines and nitric oxide, transepithelial electrical resistance in ileum (Ussing chambers), and transepithelial flux of FITC-dextran in ileum (Ussing chambers).

DISCUSSION OF RESULTS

- Challenge with LPS is a very well established model of immunological stress that causes gut leakiness (barrier dysfunction) and impairs animal growth via suppressed feed intake and increased nutrient utilization to sustain the associated inflammatory response. Based on such a model, this study demonstrates that AO-Biotics improves gut barrier function and immune response in immunologically stressed piglets.
- Protection of the intestinal barrier function and stimulation of the intestinal innate immune response emerge as mechanistic components of AO-Biotics mode of action.
- Confirming results from a previous study with healthy piglets, the gut-protective actions of AO-Biotics were preceded by reduced variability in body weight.
- Collectively, results indicate that AO-Biotics can improve the ability of pigs to coping with immunological stress that compromise gut health. Therefore, animals that are at a higher risk of suffering enteric disorders may benefit the most.

DISCUSSION OF RESULTS

Points to Consider

Under controlled experimental conditions (like the ones used in this study), the likelihood of detecting significant changes in body weight is rather small because of the relatively low number of replications and better than commercial rearing conditions. Therefore, the improvement in body weight uniformity caused by AO-Biotics™ is noteworthy.

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