Effects of feeding a bioactive olive pomace extract from *Olea europaea* on growth performance and the intestinal mucosa integrity in broiler chickens after short-term fasting period

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ABSTRACT

During the past years plant derived feed additives have been gaining interest to increase gut health in poultry. Recent studies have shown that fasting of up to 24h increase intestinal permeability in chickens. The present study aims to investigate the effects of supplementing broiler diets with a bioactive olive pomace extract from *Olea europaea* (OE) on growth performance. In addition, dietary effects on intestinal permeability and mucosa integrity were determined after a 15.5 h fasting period. Cobb 500 one-day-old male broiler chicks (n = 660) were randomly assigned to 5 experimental groups. One group was fed a control diet with no additives ad libitum throughout the feeding trial from 1 to 32 days of age (treatment control no fasted, CNF). The other 4 groups were also fed ad libitum from 1 to 32 days of age except during a short-term fasting period of 15.5 h at 14 d of age. They received the control diet with no additives (treatment control and fasted, CF) or any of the supplemented diets, a positive control with 100 ppm of monensin (MF) or the negative control supplemented with 500 (OE500F) or 1500 ppm (OE1500F) of an OE provided by Lucta S.A. (Madrid, Spain). No significant differences among experimental treatments were observed on average daily gain, average daily feed intake and feed conversion ratio during the different phases of the experiment. The 15.5 h fasting period significantly (P < 0.001) increased intestinal permeability as measured by serum lactulose and mannitol ratio marker. In addition, duodenal crypt depth significantly (P < 0.001) increased in CF birds compared to CNF. Moreover, the expression of the ileal tight junction protein claudin 1 was significantly reduced (P < 0.05) and that of the inflammatory markers TLR4 and IL-8 were significantly up-regulated (P < 0.05) in CF chickens compared to CNF. Birds fed the OE500F showed lower duodenal crypt depth than CF birds (P < 0.05; OE lineal effect). Moreover, birds fed the OE500F showed higher serum mannitol and reduced IL-8 expression compared to the CF and OE1500F groups (P = 0.05). In addition, the inclusion of OE linearly increased the expression of the B cell marker (Bu-1). In conclusion, supplementing broiler chicken diets with up to 1500 ppm of OE does not affect growth performance from 1 to 32 days of age. The 15.5 h fasting period significantly increased intestinal permeability triggering an inflammatory response mediated by TLR4. The addition of 500 ppm of the OE seems to attenuate some of the negative effects of increased intestinal permeability after a short-term fasting period.
Use of acid oils in broiler chicken diets. Effect of dietary free fatty acid level and saturation degree on fat utilization at different ages

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ABSTRACT

In order to optimize the use of acid oils in broiler diets is important to understand how fat is digested and absorbed. The aim of the present study was to assess the effect of dietary free fatty acids (FFA) with different saturation degree, on the fatty acid (FA) digestibility and lipid class content along the gastrointestinal tract, and excreta in young and adult broiler chickens. A total of 528 one-day-old female broiler chickens were randomly distributed in 8 dietary treatments (6 cages / treatment). A basal diet was supplemented at 6% with different fats (crude oils, acid oils, or oil blends) in order to achieve eight dietary treatments, which resulted in a 2 x 4 factorial arrangement: two different fat sources (soybean oil products as unsaturated fat source, and palm oil products as saturated fat source), and four levels of dietary FFA (5, 15, 35, and 50%). At 14d and 37d, samples of digestive content (gizzard, duodenum, jejunum, and ileum), and excreta were collected for the determination of FA digestibility and lipid class content. The results showed that irrespective of the age, the absorption process was more limiting than hydrolysis. Both at 14d and 37d, the better utilization of the unsaturated fat was related to the higher contribution of the ileum in FA absorption, and the improvement on fat utilization as the age increased, was explained by the higher contribution of the jejunum in FA absorption. The dietary FFA level affected the FA absorption process in a different way depending on the dietary fat source, suggesting this that the FA profile of dietary fat determines to a larger extent than the molecular structure does, the efficiency of the FA absorption process. In conclusion, the results suggest that moderate levels of soybean acid oil (with up to 15 or 35% FFA depending on the feeding period) could substitute soybean crude oil without having negative repercussions on both fat utilization and growth performance. Excreta digestibility should be avoided in the assessment of acid oils as it could lead to an undervaluation.

Key words: free fatty acid level, acid oil, fatty acid digestibility, lipid class, broiler