Effects of Oxidated Fat and Vitamin E Inclusion on Resistance to Haemolysis, Intestinal Microbiota, Faecal Coccidia Counts and Epithelium Structure of Broiler Chicken

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Introduction

Unsaturation level decrease oxidative stability of dietary lipids, generating oxidation products which may be harmful for animals and its intestinal microbial population

The aim of the present trial was to study the resistance to haemolysis, ileal microbiota, faecal coccidian concentration and epithelial structure in relation to different oxidation level and stabilization of the added fat.

Materials and methods

Animals.- A total of 48 commercial Ross broiler chicken were allocated to one of three pens from 4 to 18 days of age

Experimental diets.- Soybean and corn basal diet added with:

SO: 6 % sunflower oil

OO: 6 % of sunflower oil oxidized by eating at 185ºC for 18 hours.

OE: SO + 200 ppm α-tocopherol acetate

Experimental Procedures

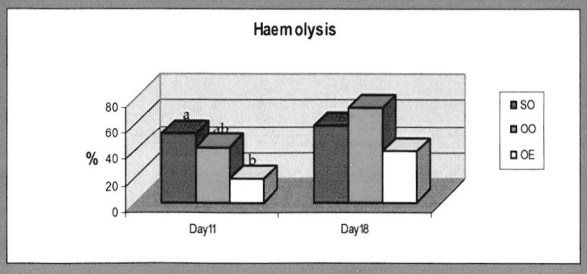
At 11 and 18 days chickens were sacrificed (day 11: 5 samples of two pooled chickens/treatment, and day 18: 6 individual units/treatment) and samples of blood, ileal content, faeces and jejunal mucosa were processed for haemolysis, microbiological and histological measurements respectively.

Laboratory analyses

Red blood cells haemolysis; culture of microrganisms; coccidian oocyst count in faeces; inclusion and staining of histological samples of jejunal epithelium.

Results

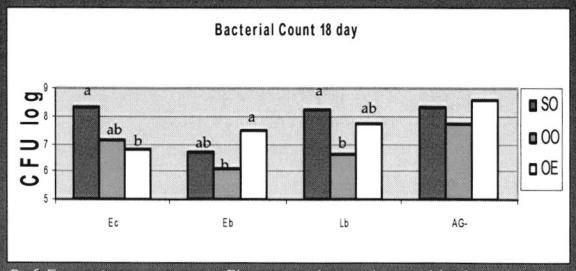
Resistance to haemolysis was increased by vitamin E inclusion at days 11 (P = 0.007) and 18 (P = 0.150) compared to SO, but was not affected by oxidated fat.



Concerning microbial counts, no significant differences were found at day 11, but at day 18 each diet promoted a totally different microbial population.

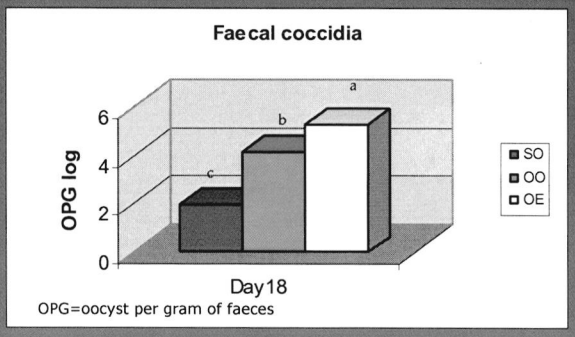
In particular, OO promoted lower counts for studied bacteria; enterococcus (P = 0.082), enterobacteria (P = 0.350) , lactobacillus (P = 0.006) and gram negative anaerobes (P = 0.292). compared to SO.

On the other hand, OE diet promoted only a decrease in enterococcus (P = 0.017).



Ref:Ec=enterococcus; Eb=enterobacterias; Lb=lactobacillus AG-=anaerobes gram negative;CFU= logarithm of colony-forming units per gram.

Concerning coccidiosis both oxidated fat and vitamin E inclusion promoted and increase in the coccidia counts been more pronounced in the case of the OE diet (P = 0.0005).



OPG=oocyst per gram of faeces

Villi height, crypt depth and intraepithelial lymphocytes were not affected by the treatments.

Conclusions

The erythrocyte membrane resistance against oxidative agents was increased by stabilization of the fat with the inclusion of vit E.

Oxidized oil had inhibitory effect in some bacterial groups in the period of microbial population's stabilization in the gut.

Both oxidized fat and vit E inclusion increased coccidian counts.

No effect on epithelium was detected for any treatment.

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