

Poster M268**EFFECT OF A MIXTURE OF TURMERIC AND CAPSICUM OLEORESINS AND OF A GARLIC BOTANICAL ON BROILER CHICKENS PERFORMANCE AND INTESTINAL HISTOLOGY**

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Our objective was to evaluate the effect of a mixture of turmeric and capsicum oleoresins (PF, Profloa) and of a garlic botanical (GB) on the performances and small intestine villus height and crypt depth of broiler chickens fed a corn soybean meal diet. One day-old male broiler chicks were distributed in a completely randomized block design with 6 treatments, 8 rep. and 20 birds per rep. (floor pen) in the starter (1-21d) and grower/finisher (21-40d) phases. T1 was the non supplemented control (positive control, PC, 3000 kcal/kg ME, 1.263% Lys, 0.574% Met). T2 (negative control, NC) was T1 with reduction of 75 kcal ME/kg and 2% AAs. T3 was T2 + 100 ppm of XT. T4 was T2 + 75 ppm of GB. T5 was T2 + 150 ppm of GB. Birds and feed were weighted at d1, 21 and 40. At d21, 1 bird of each rep. was sacrificed and a portion of jejunum was collected to determine villus height (VH), crypt depth (CD) and villus/crypt ratio (VC). The data were subjected to one-way ANOVA. Treatments effect was tested by the Newman Keul's Test ($P < 0.05$). From d1 to 21, BWG and G:F were decreased by NC (-7.9%, -5.3%), improved by either XT (+5.3%, +3.6%), or 75 and 150 ppm of GB (BWG = +6.5%, +8.8%; G:F = +3.5%, +4.1%) and similar between T3, T4, T5 and PC. From d1 to 40, BWG and G:F were depressed by NC (-4.2%, -2.3%), improved by XT (+1.9%, +1.1%, $P > 0.05$) and by 150 ppm of GB (+5.3%, +3.4%). The NC diet decreased VH (-2.9%) and increased CD (+3.0%, $P > 0.05$). When compared with NC, birds fed XT improved VH (+19.5%) and reduced CD (-5.8%, $P > 0.05$), which was a 20.8% improvement of VC ratio. GB improved VH (-12.2% for 150 ppm, $P > 0.05$) and decreased CD (+8.9% for 75 ppm, $P > 0.05$). The results indicated that broilers on the NC diet had poorer performance and intestinal histology than those fed the PC diets (T1) and the NC plus additives (T3, T4, T5). XT, and GB improved chicks BWG, G:F and intestinal histology to values similar to those fed the PC diets.

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1. OBJECTIVES

- The production of antibiotic free poultry is increasing worldwide.
- This market tendency started a few years ago in some European countries and became compulsory by the ban of antibiotic in European Union in 2006.
- Then, to satisfy the consumer expectations, many countries are now producing significant amounts of broilers without antibiotic growth promoters even if the national regulation still authorizes their use.
- Antibiotic free production need to take care or even to redefine feed technology, farm management, formulation norms, feedstuffs selection, feed additive.
- As far as they are transparent, traceable, safe and efficacious, plant extracts based feed additives can be good solutions and they have been gaining interest in animal nutrition.
- The experiment was run to evaluate the effect of two plant extracts based feed additives on broiler chickens performance from 1 to 40 days of age and on small intestine villus height and crypt depth.

2. MATERIAL & METHODS

Animals

- A total of 960 one day-old male broiler chicks of a commercial strain, COBB-500, with an initial weight of 44.7 g were placed in floor pens (1.0 m x 1.5 m) from 01 to 40 days old, in a masonry broiler house.
- The birds were randomly distributed in a completely randomized block design with 6 treatments, 8 replicates and 20 birds per experimental unit (floor pen).

Products, treatments and diets

- The following products were involved in this trial:
 - XT is a microencapsulated blend of 4 ppm of capsicum oleoresin and 4 ppm of turmeric oleoresin (product XT6986, Pancosma).
 - GB is a garlic extract containing 40% of secondary metabolites of propiin (propyl propyl thiosulfonate, product Pancosma).
- The treatments are described below:
 - T1 = non supplemented positive control (PC),
 - T2 = negative control (NC) with reduction of 75 kcal ME/kg and 2% AAs,
 - T3 = T2 + 100 ppm of XT,
 - T4 = T2 + 75 ppm of GB,
 - T5 = T2 + 150 ppm of GB.

- The starter phase was from day 1 to 21 and the grower / finisher phase was from day 21 to day 40.
- Diets were based on corn-soybean meal (Table 1) calculated according to the Brazilian Tables (Rostagno et al., 2005).

Table 1: Composition of the diets

Ingredients	PC		NC	
	Starter	Grower / Finisher	Starter	Grower / Finisher
Corn	54.895	60.287	58.191	63.339
Soybean Meal (46%)	38.000	31.570	36.470	30.172
Soybean Oil	3.000	4.250	1.280	2.597
Dicalcium Phosphate	1.830	1.650	1.830	1.654
Limestone	0.900	0.850	0.860	0.852
Salt	0.490	0.470	0.490	0.469
DL-Methionine	0.240	0.240	0.226	0.215
L-Lysine HCl	0.100	0.100	0.108	0.162
L-Threonine	0.010	0.010	0.010	0.0248
Salinomycin (12%)	0.055	0.055	0.055	0.055
Choline Chloride (70%)	0.100	0.100	0.100	0.100
Vitamin Premix	0.120	0.100	0.120	0.100
Trace Mineral Premix	0.050	0.050	0.050	0.050
BHT	0.010	0.010	0.010	0.010
Starch	0.200	0.200	0.200	0.200
TOTAL	100,000	100,000	100,000	100,000
Calculated Values				
Metab. Energy, kcal/kg.	3000	3150	2925	3075
Crude Protein %	21.984	19.415	21.562	19.033
Ca, %	0.902	0.824	0.884	0.824
P Available, %	0.451	0.410	0.451	0.410
Lysine dig. %	1.163	1.050	1.137	1.029
Methionine dig. %	0.544	0.505	0.526	0.487
Met. + Cis. dig. %	0.839	0.775	0.819	0.755
Threonine dig. %	0.755	0.684	0.739	0.669
Tryptophane dig., %	0.246	0.213	0.239	0.207

Table 2: Performance of the broilers

Period	Outcomes	PC	NC	100 ppm XT	75 ppm GB	150 ppm GB	CV (%)
1-21 days	BW (g)	867,8a	802,6b	842,9a	851,4a	870,0a	3,19
	WG (g)	822,8a	758,0b	798,1a	807,4a	825,0a	3,36
	FI (g)	1198,5a	1163,4a	1178,4a	1193,2a	1213,6a	3,09
	F:G	1,457a	1,534b	1,476a	1,479a	1,471a	2,30
21-40 days	WG (g)	1652,6a	1610,5a	1599,2a	1591,7a	1651,9a	3,22
	FI (g)	2938,8a	2947,8a	2879,4a	2802,6b	2944,0a	2,61
	F:G	1,778a	1,831a	1,801a	1,761a	1,782a	2,61
1-40 days	BW (g)	2500,5a	2395,6b	2442,1ab	2442,9ab	2521,9a	2,56
	WG (g)	2456,7a	2351,0b	2397,3ab	2399,1ab	2469,6a	2,70
	FI (g)	4113,7a	4026,8a	4057,9a	3995,7a	4163,1a	2,47
	F:G	1,674a	1,712b	1,693ab	1,665a	1,686ab	1,51

Within a row, means followed by different letters are different by SNK's test ($P < 0,05$).

Table 3: Jejunum Villus Height, Crypt Depth and Villus:Crypt Ratio values (μm) of 21 old broiler chicks fed different additives.

Outcomes	PC	NC	100 ppm XT	75 ppm GB	150 ppm GB	CV (%)
Villus height	725,9b	704,6b	842,0a	767,7ab	734,1b	10,1
Crypt depth	150,0a	154,5a	145,5a	148,6a	135,7a	14,9
Villus : Crypt ratio	5,1a	4,8a	5,8a	5,2a	5,5a	17,6

Within a row, means followed by different letters are different by SNK's test ($P < 0,05$).

Experimental procedures

- Birds and feed were weighted, on a pen basis, at 1, 21 and 40 days of age to determine weight gain (WG), feed intake (FI) and feed conversion (F:G).
- Feed and water was provided *ad libitum* throughout the trial. Mortality and minimum and maximum temperatures were registered daily.
- At 21 day-age, one bird of each experimental unit was humanely sacrificed, to collect a portion of the mid small intestine (Jejunum) to determine villus height (VH), crypt depth (CD) and villus / crypt ratio (VC).

Statistical analysis

- The parameters data obtained in the trial were subjected to ANOVA. Treatments effect was tested by the Newman Keul's Test at 5% probability level.

3. RESULTS & DISCUSSION

- From d1 to 21, BWG and G:F were:
 - decreased by NC (-7.9%, -5.3%),
 - improved by XT (+5.3%, +3.6%),
 - improved by 75 ppm of GB (+6.5%, +3.5%),
 - improved by 150 ppm of GB (+8.8%; +4.1%),
 - similar between T3, T4, T5 and PC.
- From d1 to 40, BWG and G:F were:
 - depressed by NC (-4.2%, -2.3%),
 - improved by XT (+1.9%, +1.1%, $P > 0.05$),
 - improved by 150 ppm of GB (+5.3%, +3.4%).
- For jejunum Villus Height, Crypt Depth and Villus:Crypt Ratio values of 21 old broiler chicks:
 - The NC diet
 - decreased VH (-2.9%),
 - increased CD (+3.0%, $P > 0.05$).
 - When compared with NC, birds fed XT
 - improved VH (+19.5%),
 - reduced CD (-5.8%, $P > 0.05$),
 - which was a 20.8% improvement of VC ratio.
 - When compared with NC, birds fed GB
 - improved VH (-12.2% for 150 ppm, $P > 0.05$),
 - decreased CD (+8.9% for 75 ppm, $P > 0.05$).

4. TAKE HOME MESSAGE

- The results indicated that broilers fed the NC diet had poorer performance and intestinal histology than those fed the PC diets (T1) and the NC plus additives (T3, T4, T5).
- XT, and GB improved chicks BWG, G:F and intestinal histology to values similar to those fed the PC diets.