PRODUCTIVE EVALUATION OF BROILER CHICKENS CONSUMING ARTICHOKE EXTRACT (Cynara Scolymus L.) DURING THE FIRST THREE WEEKS OF LIFE

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Abstract
A study was conducted to evaluate the effects of an artichoke extract on broiler production performance traits by comparing the results of two inclusion rates in broiler diets from 0 to 21 days of age. A total of 2880 day-old male broiler chicks was randomly assigned to 36 floor-pens and raised from 1 to 42 days of age. The CONTROL group received a comsoya meal basal diet. In the treatment diets the basal diet was supplemented with 300 (AE-300) or 600 (AE-600) g/ton of an artichoke extract. During the 42-day old rearing period there were significant differences between diets for feed conversion (p<0.05). Feed conversion of the broilers fed the CONTROL and AE-300 diets was significantly higher than that of broilers which were fed the AE-600 diet. Because gross pathology lesions were found in liver of experimental broilers it was hypothesized that this could explain the need of the highest inclusion rate of artichoke extract (AE-600) to obtain better production results. The Artichoke Extract added to the feed from 1-21 days of age at a 600 g/ton has a positive effect to improve the feed efficiency of 42 day-old broilers.

Introduction
The artichoke extract (Cynara scolymus L.) has been used from ancient times to alleviate the hepatic overload. Saenz Rodriguez et al. (2002) reported an increase in the exogenous hepatic functionality as cholangue and choleretic. At the same time, other authors informed that the Cynara extract resulted beneficial when administered to birds challenged with mycotoxins in the diet (Stoev et al., 2004). Research evidence indicates that it also acts as an inhibitor of the cellular oxidation (Jimenez-Escrig et al., 2003), and acts as hepatic regenerator (Maros et al., 1968). It is widely known both the function of bile salts as emulsifying agents of fats of the intestinal lumen so as to promote their absorption (Adzet et al., 1987), and the fact that during the first days of life, chickens have an immature digestive tract (Mahagna & Nir, 1996). Consequently, bile secretion is insufficient. Azcona et al. (2005) informed that a higher ME was obtained form the diet (73 cal/g from day 7 to the 9th), when adding artichoke extract the first 21 days of life. This would be explained by a higher lipid digestibility due to an increased bile secretion.

In addition to this, the use of artichoke extract during the first weeks of life may increase the productive response of broilers, as chickens have greater...
sensitivity to mycotoxins during their first 21 days of life (Mariani, 1998). The aim of this study is to assess the effect caused in broilers productive parameters when including commercial artichoke extract in the feed from 1-21 days of age.

Materials and Methods
A total of 2880 day-old Ross male broiler chicks was randomly assigned to 36 floor-pens of an experimental farm in Central America and raised from 1 to 42 days of age. Professional farm supervisors from the company advised that signs of hepatic impairment were frequently revealed at necropsy. Consequently, the same ingredients as those used by the integrated farms were also used for the experiment. A Completely Randomized Experimental Design was applied to assign treatments, being water and feed administered ad-libitum. From 0 to 21 days of age, 3 diets were supplied. The only difference among them was the inclusion rates of commercial artichoke extract: 0 (CONTROL), 300 g/ton (AE-300) and 600 g/ton (AE-600). Diets were formulated with the same level of protein, amino acids, vitamins, macro and microminerals. The composition of diets corresponding to the 0-21, 22-35 and 36-42 days of age was, respectively: EMV (Kcal/kg) of 3100, 3150 and 3200; raw protein (%) of 21.00, 19.50 and 18.50; methionine + total cystine (%) of 1.02, 0.97 and 0.83; total lysine (%) of 1.30, 1.25 and 1.05; total threonine (%) of 0.89, 0.82 and 0.71; total tryptophan (%) of 0.27, 0.22 and 0.19; calcium (%) of 0.95, 0.90 and 0.85; digestible phosphorus (%) of 0.50, 0.45 and 0.42. The commercial artichoke extract used was Bedgen 40 Premix (Bedson S.A.), composition of which is as follows: Cynara dried extract, 15 g; choline chloride (70 %), 30 g; calcium carbonate, q.s. 100 g. All treatments received the same basal diet in the following stages (22-35 and 36-42 days of age, respectively). Weekly weight and feed consumption of each pen (and subsequently feed conversion) were calculated. Mortality was recorded daily so as to both adjust feed consumption data of each pen and carry out the analysis of partial and accumulated periods, respectively. An analysis of variance was applied and Bonferroni Method was used to compare mean values. When ANOVA assumptions were not complied with, a Kruskal-Wallis test was performed. All statistical analyses were conducted with INFOSTAT software.

Results and Discussion
Weekly accumulated results indicating Live Weight, Consumption, Conversion and Mortality are shown in Tables 1, 2, 3 and 4, respectively, (results in the same column with different letters: p<0.05; without letters; p>0.05).

No significant differences were observed among diets as regards weekly weight gain, accumulated weight gain and weekly mortality (p>0.05). As regards weekly consumption, important differences were revealed among diets during the second week (p<0.05). In the case of weekly conversions, major differences were recorded in the 0-7, 14-21 and 35-42 weeks of age (p<0.05).

It is most probable that the lower feed intake reflected in those animals receiving 600 grams per ton of AE up to the 21 days of age may have improved their conversion at the 14 and 21 days of age, and at the end of the rearing period.
This coincides with the findings reported by Azcona et al. (2005), who observed a better conversion in those broilers whose diet was supplemented with artichoke extract, due to an improvement in both lipid digestibility and an increase in the ME of animals during their first weeks of life. Nevertheless, these authors inform as regards better production results when adding 300 g/ton instead of 600 g/ton, which may be explained by the existence of hepatic impairment at necropsy being compatible with subclinical mycotoxicosis. Positive results of protection were obtained after administering artichoke extract to chickens (Stoev et al., 2000; 2004).

**Conclusions**

Supplementation of artichoke extract in the diet of 1 to 21 day-old birds evidenced an improvement in the nutritional efficiency not only at the 21 days of age but also at the end of the rearing period (42 days of age). Such improvement would have been explained by a better lipid utilization. Differences in the results shown while supplementing with 600 g/ton instead of 300 g/ton might be due to differences in the degree of challenge when...
compared with other assays, as this one revealed signs of hepatic impairment compatible with mycotoxicosis. The use of artichoke extract in the feed of broilers during their first 3 weeks of life constitutes an alternative to obtain better results of birds production at the end of a 42-day rearing period, as the improvement achieved while administering artichoke extract is maintained until slaughtering.

Bibliography


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