

Effect of Tannic Acid on Muscle Protein Composition of Chickens Fed a Raw Field Bean (*Vicia faba* L.) Diet

It is well known that tannin content of many plant foods has outstanding effects on the nutritional value and mineral bio-availability both in animals and humans (4). Tannins —leucoanthocyanidins and catechins— are especially abundant in raw legumes (9) and constitute one of the main antinutritive compounds that may limit the use of such plants as relatively good and inexpensive protein supplies (3). Several research works have been carried out both in our laboratory (8, 13) and others (5, 6) in order to investigate the effects of tannins on several physiological and biochemical parameters in growing rats and chickens. However, there is little, if any, information available on the action of these compounds on muscle protein metabolism and composition. Taking into account that skeletal muscle is one of the largest tissues in the body of birds, we thought it would be of interest to study how and to what extent growth rate and skeletal muscle composition of growing chickens might be altered by orally administered tannic acid or feeding the animals on a field bean (*Vicia faba* L.) diet, this being the purpose of this communication.

Thirty white Leghorn male chickens, 1-day old and weighing about 40-60 g were randomly assigned into three dietary groups of 10 animals each and grouped and housed in battery brooders with raised floors: one group was fed *ad libitum*

over a period of 7 weeks on an adequate heated soybean (HSB) 20% protein diet (control), and the others were fed either the same diet with 2.5% tannic acid added (Sigma) or a 20% protein *V. faba* diet for the same period of time. Similar doses of tannic acid have been used by other investigators (7). Diets were prepared as previously reported (10). Body weight changes were weekly recorded. At the end of the experimental period, all birds were killed by decapitation. Pectoral muscles were then rapidly excised and prepared for the separation and assessment of the nitrogenous fractions according to the method of HELANDER (2) slightly modified (10). Statistical evaluation of the data was carried out by conventional one-way analysis of the variance.

Results of the experiment are summarized in table I. As compared to HSB-fed chickens, those fed the tannic acid or the legume diets showed a significant reduction both in the rate of growth and sarcoplasmic nitrogenous fraction; however, the non-protein nitrogenous fraction was significantly higher in the tannic acid treated and legume fed birds. No differences were observed either in the myofibrillar or total nitrogen muscle fractions, which agrees with previously reported evidence (11). These findings suggest that tannic acid and the tannin content of *V. faba* seeds (8, 13) may have a catabolic

Table I. *Body weight changes and pectoral muscle nitrogen fractions of male growing chickens fed ad libitum for seven weeks on 20% protein diets containing either heated soybean (HSB), with or without tannic acid added (2.5 %) or raw field bean. (Vicia faba L.) as the main sources of protein. Both diets were isocaloric. Entries are mean values (\pm SEM) from 10 animals in each group for the entire experiment.*

Treatment	HSB	HSB + tannic acid (2.5%)	Vicia faba 20%
Growth rate (g/day)	30.5 \pm 0.6	13.5 \pm 0.3*	18.4 \pm 0.5*
Pectoral muscle nitrogen fractions (mg/g fresh tissue)			
Non-protein	4.70 \pm 0.05	5.80 \pm 0.04*	5.49 \pm 0.05*
Sarcoplasmic	12.40 \pm 0.06	11.56 \pm 0.04*	11.60 \pm 0.04*
Myofibrillar	18.71 \pm 0.05	18.60 \pm 0.05*	18.47 \pm 0.04
Total nitrogen	36.5 \pm 0.2	36.9 \pm 0.3	36.1 \pm 0.4

* $p < 0.01$, as compared to the HSB-fed chickens (one-way analysis of the variance).

effect on skeletal muscle protein, especially on the soluble sarcoplasmic protein content; the increased non-protein muscle fraction correlates with such an effect. The mechanism (s) by which tannins cause these effects on growth rate and muscle composition of chickens is not, as yet, fully understood, although it could be explained, at least partly, by the facts that these compounds are able to reduce the intestinal absorption of nutrients (8), and could be involved in the increased muscle and liver protein degradation (12) and reduced muscle protein synthesis (1) observed in raw legume fed animals.

Key words: Growth, Skeletal muscle, Tannins, Legumes.

Palabras clave: Crecimiento, Músculo esquelético, Taninos, Legumbres.

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