

Efficiency of toasted fullfat soybeans utilization in broiler feeding

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Abstract

The partial replacement of soybean meal by toasted full fat soybeans was studied for levels of 50% and 75% in protein equivalence.

The investigated product was analyzed chemically and calorimetrically with the classical methods..

The biological test was performed on a total of 270 day-old Sena broilers assigned randomly to three experimental groups. The chicken were fed in two phases with isocaloric isoproteic diets, 12.75 kJ GE/kg and 22.7% CP (1-28 days) and 12.75 kJ GE/kg and 20% CP during the second period. In E2 and E3 soybean meal was replaced in proportion of 50 and 75% respectively with toasted full fat soybeans, with no addition of fat or antioxidants.

The results show the following chemical and calorimetric composition of the full fat soybeans expressed in g/kg DM: 319 CP, 196 EE, 123 CF, 293 NFE and 23.02 kJ GE; the enzymatic activity was 0.13 mg N/g/min. at 30⁰C.

The production performance showed 1956±138 g body weight at 49 days for the 50% replacement group and 2062±117 g (75%) compared to 1960±17g (control); the average daily gains were 39.08, 41.25 and 39.18 g respectively. Feed conversion ratio was 1.89 kg/kg in group C and 2.03 (50%) and 2 (75%) respectively. In all cases, the difference is not significant, which yields the conclusion that full fat soybeans are a good source of energy and protein.

Keywords: *toasted fullfat soybeans, broiler, feeding*

Introduction

Due to its chemical composition, soybean is a legume with high crude protein and lipid levels. The nutrients are readily digestible and the protein has a high biological value placing it on top of vegetal concentrate feeds (Popa et al., 1980, Burlacu 1983).

Raw soybeans can not be used in poultry feeding due to some active biological compounds with antinutritional activity. Thermal treatment proved to be enough to remove the antinutritional factors,

while protein quality and the fat content vary according to the used technology.

The present paper determined the chemical composition of soybeans treated thermally with the dry method and the effect of including it in broiler feeding.

Material and method

The treated soybeans were assayed in laboratory and "in vivo".

The soybean treated by the dry thermal method were ground and introduced in the compound feed.

The feed was analyzed chemically with the standard Weende analyses. Urease activity was determined by potentiometric titration, while the gross energy was determined with an adiabatic calorimetric bomb.

The product was tested in vivo on 180 day-old Sena broilers randomly assigned to two experimental groups (5 chicks \times 12 replicates \times 2 groups) and a control group (5 chicks \times 12 replicates \times 1 group). The birds were raised in battery cages, chick density in the cage being according to the used technology. The experiment lasted 49 days, with two periods, 1-28 and 29-49 days.

The birds were fed in two phases, on three formulations for each period. The control group was fed on diets based on corn, soybean meal, fish meal, synthetic amino acids, macroelements and a vitamin-mineral premix, which provided for the quality parameters of the formulation at norm level. The energy allowance of the diets was provided by 2% oil during the two growth phases (12.75 kJ GE/kg and 22.7% CP for 1/28 days and 12.75 kJ GE/kg and 20% CP during the second period).

The formulation for E1 group consisted of the same ingredients as for C group, plus ground soybeans replacing, as protein content, 50% of the soybean meal of group C. The energy and protein levels were similar with group C. No fat was added, the energy being supplied by the fat content of the tested soybeans.

The formulation for E2 included the same ingredients and soybean meal was replaced 75% in protein equivalence compared to group C. No oil was added either, and the energy and protein levels were similar to groups C and E1 (isocaloric and isoproteic diets).

Results and discussion

Chemical composition and gross energy content of the toasted fullfat soybeans

Related to kg dry matter (DM), soybeans have 319 g CP, 196 g EE, 123 g CF and 23.02 MJ GE. Dry matter content of the tested soybeans was 927 g/kg compound feed.

Soybean meal had 455 g CP, 23 g EE, 67 g CF and 19.76 MJ GE, values consistent with the literature (Burlacu 1983, Grossu et al., 1996, Borcea et al., 1996).

The results obtained with the toasted soybeans are close to the literature, which gives (by kg DM) and average 387 g CP, 207 g EE and 24.20 MJ GE (Burlacu 1983, Larbier and Leclercq 1994).

The values for urease activity were 0.13 mg N/g/min at 30°C. In the soybeans toasted by classical methods urease activity was maximum 0.20 mg N/g/min at 30°C, while in the overtoasted soybeans urease activity was up to 0.05 mg N/g/min at 30°C (Larbier and Leclercq 1994).

After 50 days of storage, Kreis reaction was negative for the toasted soybeans, the peroxide index being 0.295 mg tiosuphate/g fat, while fat acidity was 22.493 mg KOH/g, these values showing a proper preservation of the fat.

Production performance

At 49 days, the average weight was 1960.60±172.43 in group C, 1956.25±138.5 g in group E1 and 2062.47±117.46 in group E2, the difference not being significant ($p \geq 0.05$). Average daily gain was 39.18 g/broiler in C, 39.08 g in E1 and 41.25 g in E2. The overall compound feed intake was 74.05 g/broiler/day in C, 79.34 in E1 and 82.69 in E2. the difference between groups not being significant ($p \geq 0.05$). Feed conversion ratio (kg CF/kg gain) was 1.89 in C, 2.03 in E1 and 2.00 in E2.

The production performance is comparable to the literature concerning the same hybrid fed (Sena) on a similar diet with group C (Grossu et al., 1996, Borcea et al., 1996, Grossu et al., 1998).

Broiler livability was 95% in all groups, mortality being recorded during the first three days of life.

Conclusions

The soybean treated thermally with the dry method may be used in broiler feeding, replacing, in protein equivalent, up to 75% of the soybean meal. The toasted soybeans may be used as energy source for broiler diets, replacing completely the fat added to compound feed formulations.

The chemical composition of the toasted soybeans expressed by kg DM was 319 g CP, 196 g EE, 123 g CF and 23.02 MJ GE/kg DM.

No antioxidants were used in CF formulation, the feeds for the overall period being produced in the beginning of the experiment.

Broiler performance between 1-49 days was quite similar in groups C and E1 (50% replacement) and E2 (75% replacement of soybean meal), the difference not being statistically significant ($p \geq 0.05$).

Final weight was 1960.60 in group C, 1956.26 g in E1 and 2062,47 g in E2. Feed conversion ratio (kg CF/kg gain) was 1.891 in C, 2.03 in E1 and 2.00 in E2.

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