

STUDY REGARDING THE QUALITY OF SOYBEAN GRIST OBTAINED IN AN UNIT FROM IAȘI COUNTY

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Abstract

Given its qualities, soybean grist is the most important source of vegetable proteins which can be used in all the growth stages of pigs and birds. Lately more and more composite fodder factories from Romania opted for the production of soybean grist and less for importing. One of the many factories which develop such an activity is the studied unit. In this unit soybean grist is obtained for production of composite fodder for broiler chicks. The purpose of this study is to establish the brute chemical composition and the urease value of grist's produced in the studied unit and to compare the obtained results with the data from national and international specialty literature. The results of the study reported the following: Moisture% - $9,02 \pm 2,12$; CP% - $43,81 \pm 3,01$; Crude ash% - $6,05 \pm 0,37$; CF% - $4,38 \pm 3,00$; urease activity - $0,066 \pm 0,07$. The presented values highlighted the fact that the analyzed grist are of good quality and meet all the quality standards, both American and European, also recommending them in the alimentation of monogastric animals.

Key words: soybeans, soybeans grist, quality

INTRODUCTION

Known and cultivated thousands of years ago, soybean was considered, in areas of origin, in Asia, as the „holy” plant. Worship of the time was transformed during the acknowledgment of its value among the important agricultural plants and beyond.

In our country soybean was introduced late in 1909 when the plant is grown in gardens as a rare plant [3].

Nutrition experts consider that soybean is „the future plant”, having high protein content (32-35%), fat (16-20%), non-nitrogen extracts (24-30%) and not too much content in crude fibre (8-9%) [13].

Raw or unprocessed soybean cannot be used effectively as animal feed. The reason is the existence of many non-nutritional factors which are contained in soybeans grains. The most important non-nutritional factors from unprocessed soybeans and negative effects it generates are: *inhibitors of trypsin and chymotrypsin*. These are non-nutritional factors most commonly found in unprocessed soybeans. The existence of these factors impedes protein digestion by trypsin and chymotrypsin deactivation, proteins essential for the release of enzymes for young animals. It is estimated that almost 40% of the reduction in livestock growth fed with raw

soybean is caused by trypsin inhibitors [11], [12]. To remove these shortcomings, soybean grains are subjected to treatments aimed at specific technology: non-nutritional factors inactivation, detoxification, increased availability of amino-acids in the small intestine. Under these treatments can be obtained soybean grist, soybean oil and soybean full fat.

Soybean grist has a very important role for feeding, unable to conceive the keeping of pigs or poultry in intensive system without this product [9], [10].

Given those presented by the present study we aimed to study the quality of soybean grist obtained in a mixed fodder factory in Iași county.

MATERIALS AND METHODS

To conduct this study, were gathered samples of soybean grist obtained in the work unit in 2009, harvesting being done twice a month.

Samples were analyzed for physico-chemical demands fixing the gross chemical composition and urease activity.

Gross chemical composition involving determinations such as: moisture (H%), crude protein (CP%), crude ash (CAsh%), crude fat

(CF%). These determinations were made in the Fodder Quality Control laboratory from Faculty of Animal Science Iași by usual techniques (moisture - drying in oven, crude protein - technical determination of total nitrogen - Kjeldahl, crude ash - calcinations at 550⁰C, crude fat - extraction in continuous flow of lipids with organic solvents - Soxhlet).

It was also made the urease test - laboratory procedure commonly used in compound feed industry in the United States, but also in Romania. This test is performed to determine whether soybean grist was treated properly for destruction of non-nutritional factors (*inhibitors of trypsin and chymotrypsin*) that are found in heat unprocessed soybeans grains.

Urease is used to determine quality, because it is destroyed by heat at a rate similar to that of trypsin inhibitors.

Conformity assessment of urease measured the increase of pH value in a solution of ammonia. For crude soybean, growth is about 2.0 pH units. The pH values for soybeans which were processed correctly are between 0.05 and 0.2 units. Some studies have shown that an increase of pH with 0.5 units is acceptable for broiler, turkey and swine [2], [7].

Evaluation of urease is an effective method used to demonstrate that processed soybean was properly heated. However, the method does not determine whether soybean product was overheated and if lysine became unavailable.

All data were statistically processed by calculating the mean, standard deviation of the mean and variation coefficient.

RESULTS AND DISCUSSIONS

After assessing the quality of soybean grist obtained in the work unit have been recorded similar values to those presented in the literature consulted.

Thus, moisture of the analyzed samples had limits of variation 6.95-12.5% and an average of 9.02% (table 1). The average value found has exceeded with 28.85% SF 3/2006 (Standard business of working unit, standard formulated under ASA standard - American Soybean Association) and was 24.83% lower than the dates specified in presented literature [5], [8], [9], [14] (figure 1).

The samples analyzed showed high variability (V% = 23.5) because the raw material came from different sources.

Table 1. Gross chemical composition of analyzed soybean grist

Specification	Moisture (%)	Crude protein (%)	Crude ash (%)	Crude fat (%)
$\bar{X} \pm s_{\bar{x}}$	9.02 ± 2.12	43.81 ± 3.01	6.05 ± 0.37	4.38 ± 3.00
V%	23.5	6.87	6.11	68.49
Variation limits	6.95 – 12.5	40.20 – 46.50	5.50 – 6.60	1.85 – 8.80

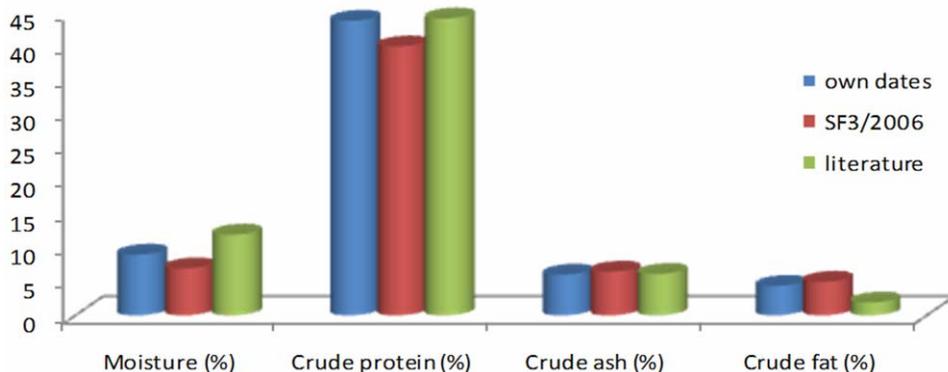


Fig. 1. Comparing data of gross chemical composition

The determinate crude protein values had narrow limits of variation (40.20-46.5%), and the average was 43.81%, which is with 9.52% above the minimum of SF 3/2006 and very close to the average cited in literature (with 0.77% lower) [5], [8], [9], [10], [4], [15].

Lots examined had relatively low variability (6.87%) due to dilution of mass product by using husks resulting from soybeans husking.

As crude ash, has averaged 6.05%, fits in standard business (6-7%) and the one presented in literature (6.0-6.3%) [5], [8] [9], [10], [1], [15]; the limits of variation were 5.50 and 6.60%.

And for this parameter there was a good homogeneity of samples, since V% was 6.11.

In the case of crude fat contained in analyzed soybean grist were found limits of variation between 1.85 to 8.30% and an average of 4.38%, which is 12.4% lower than SF 3/2006 and 119% higher than the maximum found in the literature consulted [5], [8], [10], [4], [15], [6], and [14].

This shows the increased interest of firm to get grist of soybean with higher levels of energy and lower interest for soybean oil. Resulting variability proved to be very high, a situation caused by adjustment of oil presses less accurate from batch to batch.

Urease activity (table and figure 2) meet the standards closely, showing an average of 0.066 to 0.15, 0.12 respectively, representing average values comparable standards [5], [8], [9]. However, it noted a high variability (V% = 106.06) of the samples, indicating an inconsistent manufacture of soybean grist in presented unit.

Table 2. Urease activity of analyzed soybean grist

Specification	Values of urease activity
$\bar{X} \pm s_{\bar{x}}$	0.066 ± 0.07
V%	108.06
Variation limits	0.040 – 0.098

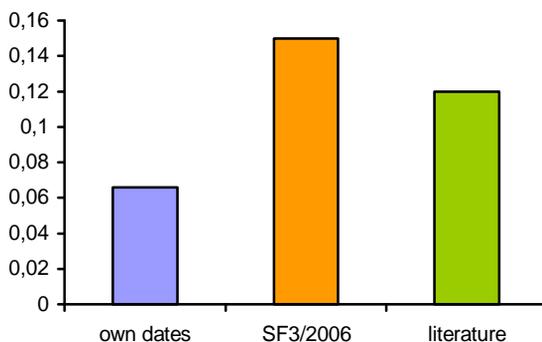


Fig. 2. Comparing data of urease activity

Given the set we conclude that soybean grist obtained in the work unit is part of the quality demands specified in the literature consulted, so:

- ✓ average percentage of moisture was 9.02%, with limits of variation between 6.95 and 12.5%;
- ✓ in terms of protein, there was a uniformity of batches, with the specification that in some cases the results exceed the limits cited in literature, the top of variation was 46.5%;

- ✓ crude ash was within the limits provided in the literature, being not recorded major fluctuations;
- ✓ crude fat record large oscillations, a phenomenon due to the fact that the raw materials are provided from different sources and different varieties. In this case were observed very broad limits of variation (from 1.5 to 8.8%) face to 1.8 to 2.0%, percentage quoted in the literature;

- ✓ urease activity also showed normal levels, although the coefficient of variation showed a high variability for this parameter.

Having its own processing plant for soybeans, the work unit, managed to avoid fluctuations in terms of soybean grist quality and at the same time get good quality mixed fodder, which trigger the production of good and very good performance in farms.

CONCLUSIONS

1. Due to its qualities, soybean grist is the most important source of vegetable protein that can be used at all stages of growth for swine and avian youth.

2. By using soybean grist in maize-based mixed fodder and with the addition of oils rich in linoleic and linolenic acid, such as flax, can hope to obtain some enriched chicken carcasses in $\omega 3$ and $\omega 6$ fatty acids to meet current requirements to domestic and global market.

3. It can be said that soybean grist obtained in the unit have a good quality and can be used according to the prescriptions in mixed fodder recipes for all categories of monogastric animals.

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