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The Comparison of the Effect of Three Commercial Soybean Meal Samples (Iranian, Argentinean and Brazilian) on Performance and Internal Organs Weight of Japanese Quails (*Coturnix coturnix japonica*) and Conducting Urease Test for These Soybeans

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Abstract: This experiment was carried out to compare and evaluate three commercial soybean meal samples (Iranian, Argentinean and Brazilian) and their effects on Body Weight Gain (BWG), Feed Intake (FI), Feed Conversion Ratio (FCR) and visceral organs weight (carcass, liver, pancreas, spleen and heart as percentage of live body weight) of Japanese quails (*Coturnix coturnix japonica*). A completely randomized design was used with three treatments and four replicates and in each, 20 parts were designed. Test treatments include: 1) basal diet + Iranian soybean meal, 2) basal diet + Argentinean soybean meal, 3) basal diet + Brazilian soybean meal. Raising duration was 42 days. Urease test was done on three soybean meal samples before test while results were negative. Also, results of using three commercial soybean samples showed no effect on body weight gain, feed intake, feed conversion ratio, carcass, heart, liver and spleen weight in Japanese ones but results revealed that soybean samples have had significant effect on pancreas weight.

Key words: Soybean meal, performance, quail and feed consumption

INTRODUCTION

The use of soybean products in the feed and food industry has increased steadily. Soybean is an important source of oil (17-25%) and protein (35-45%). It contains large amounts of vitamin B1 and B2 but it is rather low of vitamin C (Nelson *et al*., 1980). The crude protein of Soybean Meal (SBM) ranges from 41-50% (dry matter basis) depending on the amount of hull that is removed and the processing method used (Liener, 1994). While the amino acid profile pattern is probably the main determinant of protein nutritional quality, the digestibility of protein and bio-availability of its constituent amino acids are the next important factors (Oshodi and Ipinmoroti, 1995). SBM has a high level of tryptophan an the highest digestible lysine content which complements the lysine deficiency of cereal grains used in animal feeds. The Anti-Nutritional Factors (ANFs) in soybean are often associated with the low acceptance of soybean products as they also inhibit protein digestibility. The main anti-nutritional factors include trypsin inhibitors, lectins, goitrogens, phytate, oligosaccharides. In order to maximize the nutritional value the soybean meals, anti-nutrition factors should minimize or inactivate (Liener, 1983; Liu, 1997). Most SBM is produced today by the solvent extraction process whereby the soybeans are cracked, heated and flaked before the oil is extracted with the solvent hexane. Once the oil has been removed, the flakes are toasted and ground into meal. During this production process, temperature is critical in order to deactivate the anti-nutritional factors naturally present in raw soybeans. The challenge in SBM produces the most nutritious product (Del Valle, 1981; Skrede and Krogdahhl, 1985). During solvent processing of the soybean, lipids are removed and the meal is heat to eliminate the solvent (usually hexane) and to deactivate anti-nutritional factors such as trypsin inhibitors and lectin. Inadequate heating fails to completely destroy the anti-nutritional factors, which may have a detrimental impact the availability oft lysine (via the Milard reaction) and possibly, to a lesser extent, of other amino acids (Del Valle, 1981; Skrede and Krogdahhl, 1985). Laboratory tests are thus needed to determine whether samples of SBM have received adequate, but not excessive, heat treatment following oil extraction. Of tests commonly used, the evaluate of Urease Activity (UI) is the easiest to perform and is especially useful in detecting under processed SBM. It is less reliable for detecting over processed meal (Caprita *et al*., 2010).

MATERIALS AND METHODS

This experiment was carried out to compare and evaluation three commercial soybean meal samples (Iranian, Argentinean and Brazilian) and their effects on

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performance and visceral organs weight (as percentage of live body weight) of Japanese quails. In this one, it was used of 240 one-day quails. This test was designed based on randomly base design in three treatments and four repetitions and in each, 20 parts were designed. Test treatments include: 1) basal diet + Iranian soybean, 2) basal diet + Argentinean soybean meal and 3) basal diet + Brazilian soybean meal. The urease assay is based on the pH increase from ammonia released from urea by residual urease enzyme in a soybean meal. The urease test was conducted as following: 10 cm^3 buffered urea solution (0.07 M, pH = 7.5) was added to 0.200 g finely grind SBM (test sample); 10 cm^3 phosphate were sample (blank sample). Two solutions were incubated at 30°C for 30 min under stirring. In the presence of significant urease activity, the pH of the test solution increases due to the release of ammonia from urea. After incubation, the pH of the solution should be determined rapidly and the degree of heating was estimated basing on the pH difference between the first and the second solution.

Table 1: Percentage composition of experimental diet during 1-42 d of age

Ingredients	%
Corn grain	53.30
Soybean meal	42.17
Soybean oil	1.34
Oyster shell	1.55
DCP	0.78
Common salt	0.25
Vitamin premix[a]	0.25
Mineral premix[a]	0.25
DL-Methionine	0.07
L-Lysine HCL	0.04
Calculated nutrient content	
ME (kcal/kg)	2850.00
Crude protein (%)	23.58
Calcium (%)	0.80
Available P (%)	0.30
Met + Cys (%)	1.80
Lysine (%)	1.30
Tryptophan (%)	0.35

[a]Vitamin and mineral mix supplied/kg diet: vitamin A, 11000 IU; vitamin D_3, 1800 IU; vitamin E, 11 mg; vitamin K_3, 2 mg; Vitamin B_2, 5.7 mg; Vitamin B_6, 2 mg; vitamin B_{12}, 0.024 mg; Nicotinic acid, 28 mg; folic acid, 0.5 mg; pantothenic acid, 12 mg; choline chloride, 250 mg; Mn, 100 mg; Zn, 65 mg; cu, 5 mg; Se, 0.22 mg; I, 0.5 mg; Co, 0.5 mg

RESULTS AND DISCUSSION

According to the lack of practical experiments to compare commercially soybean meal in the world, this research was done.

The results relating to Urease tests shown in Table 2 indicated that the difference between soybean meal samples is negative (Iranian, Argentinean and Brazilian). According to the Urease test, the lake of difference more than one unit between test sample pH (control) and blank sample pH represents a great enrichment of three samples of soybean meal. Therefore our test indicates that the results are exactly to the food standard. The results of the Urease testing related to Caprita *et al.* (2010) for determining great achievement of soybean meal are as equal as our test results and experiment method.

Performance: The mean effect of soybean meal samples on performance of Japanese quails are shown in Table 3. Results show that soybean meal samples have not had effect on performance of Japanese quails in raising period (1-42 days).

Due to the lake of meaningful effect on body weight gain an feed intake as well as feed conversion raito and as for as there was a negligible difference between experimental the soybean meal protein ration and also the appropriate processing and performance feathers of soybean meal are the same, therefore no experimental treatments were observed.

Internal organs weight: Results for visceral organs weight are shown in Table 4. Results showed that three

Table 2: pH from urease test for three soybean meal samples

Sample	pH (Control)	pH (Sample)
Iranian soybean meal	5.0	5.1
Argentinean soybean meal	4.8	5.0
Brazilian soybean meal	4.7	5.0

Table 3: The mean effect of several of soybean meal on the body weight gain, feed consumption and feed conversion ratio of broilers (1-42 days)

Treatments	Body weight gain (g)	Feed Intake (FI) (g)	Feed Conversion Ratio (FCR)
Basal diet + Iranian soybean meal	218.5000	824.5400	3.8700
Basal diet + Argentinean soybean meal	210.8800	791.0600	3.8900
Basal diet + Brazilian soybean meal	215.6300	808.5400	3.8600
Standard Error of Mean (SEM)	4.2941	14.6922	0.0668
p-value	0.4775	0.3194	0.9566

Table 4: The mean effect of several of soybean meal on visceral organs (as percentage of live body weight) weight of Japanese quails

Treatments	Heart	Spleen	Pancreas	Liver	Carcass
Basal diet + Iranian soybean meal	0.9000	0.0400	0.2800b	2.0600	68.070
Basal diet + Argentinean soybean meal	0.9900	0.0400	0.2500b	1.8100	66.570
Basal diet + Brazilian soybean meal	0.8900	0.0400	0.3800a	2.0200	66.460
Standard Error of Mean (SEM)	0.0463	0.0057	0.0245	0.1739	0.8026
p-value	0.2582	0.6531	0.0118	0.5653	0.3299

was no meaningful difference among there soybean meal samples on trial in relation to weight, heart, liver, spleen and carcass while this difference was meaningful in the case of pancreas weight. Results showed that the effect of three soybean meal samples on pancreas weight was significant ($p<0.05$), which the most weight reduction is related to Argentinean soybean meal.

Considering that lack of appropriate processing of soybean meal causes delayed growth and loss of methionine through increasing trypsin and chymotrypsin production in pancreas during growth period which causes pancreas overworking and the increase of its size. Since Argentine soybean meal had the least pancreas weight compared with other oil meals on trial, it is inferred that maintenance conditions, processing procedure and anti-feeding materials, has been in better conditions compared with Iranian and Brazilian soybean meal.

Rackis (1981) suggested that trypsin inhibitor in soybean meal causes pancreas size increasing and animal growth decreasing.

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