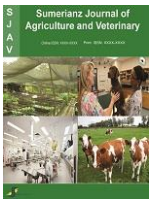
Sumerianz Journal of Agriculture and Veterinary, 2023, Vol. 6, No. 1, pp. 1-5
ISSN(e): 2617-3077, ISSN(p): 2617-3131
Website: https://www.sumerianz.com
DOI: https://doi.org/10.47752/sjav.61.1.5



Original Article Open Access

The Effect of Graded Levels of Soya Bean Meal on the Performance, Some Hematological and Physiological Parameters in Broiler Chickens

Khalid E. Mohamed
Department of Animal Production, Faculty of Agriculture and Natural Resources, University of Bakht Elruda Sudan
Email: Khaidabusga25@gmail.com

Wafaa Babiker Zomrawi*
Department of Animal Production, Faculty of Agriculture and Natural Resources, University of Bakht Elruda Sudan
Email: wafaazomrawi@gmail.com

Alfadol Muataz Fadol
Department of Animal Production, Faculty of Agriculture and Natural Resources, University of Bakht Elruda Sudan
Email: muatazpoult@gmail.com

Ahmed Salih Musa Bakheit
Department of Animal Production, Faculty of Agriculture and Natural Resources, University of Bakht Elruda. Sudan
Email: Ahmed5050salih@gmail.com

Sana Alfadel Adeam
Department of Animal Production, Faculty of Agriculture and Natural Resources, University of Bakht Elruda Sudan
Email: wzmarawy@gmail.com

Article History

Received: 2 January 2023

Revised: 5 March 2023

Accepted: 15 March 2023

Published: 20 March 2023

How to Cite

Khalid, E. Mohamed. Wafaa, Babiker. Zomrawi. Alfadol, Muataz. Fadol. Ahmed, Salih. Musa. Bakheit. And Sana, Alfadel. Adeam. 2023. The Effect of Graded Levels of Soya Bean Meal on the Performance, Some Hematological and Physiological Parameters in Broiler Chickens. *Sumerianz Journal of Agriculture and Veterinary,* Vol. 6, pp. 1-5.

Abstract

An experiment was conducted to evaluate the effect of soya bean meal on broiler performance, some hematological and physiological parameters, using 96 one day old broiler chicks in a completely randomized design with four replicates (24 chicks/ treatment). Four experimental diets were formulated to meet nutrient requirements of the broilers chicks which included different levels of soya bean meal as follow: 0, 1, 3, and 5%. Results showed that significant ($p<0.05$) improvement of live body weight (kg) was noted in group fed 5% soya bean meal. Body weight gain (kg) increased significantly ($P<0.05$) in group fed 0% soya bean meal compared to treated groups. Feed conversion ratio (FCR) significantly ($P<0.05$) improved for group fed 1% soya bean meal. Feed intake was significantly ($p<0.05$) increased for group fed 3% soya bean meal. RBC, Hemoglobin, MCHC and WBC values were higher for birds received 3% soya bean meal. PCV value was higher for birds received 1% soya bean meal. MCV value was higher for birds received 0% soya bean meal. MCH value was higher for birds received 5% soya bean meal. No significant ($P>0.05$) differences observed for carcass components. Inclusion of soya bean meal in the diet improves growth performance, blood parameters and serum metabolism.

Keywords: Soya bean meal; Broiler.

1. Introduction

Globally, there is an insatiable yearning for increased food production, basically due to significant rise in human population which is unfortunately not proportional to the food supply. In addition, livestock industry in the tropics is characterized by many nutritional problems. Increasing competition between man and animals for available grains, inadequate supply of feedstuffs, poor quality feeds among others have been recurring problems in livestock production. The shortage of feed, particularly energy and protein feed has been reported to be more severe in non-ruminant production which depends to a great extent on compounded feed [1]. The global emphasis on ethanol production has diversified significant proportion of grain away from animal production, thus increasing the cost of feed. This has forced in the pig and poultry industries to scrutinize their production methods, investigating alternative feed ingredients together with methods of improving productivity and efficiency in order to survive (http://www.allaboutfeed. net/news/id102-43411). An important part of raising poultry is feeding, which makes up the major cost of production and good nutrition is reflected in the bird's performance and its products [2]. Poultry production is vital in economy of Nigeria as the sustained achievement of this will immensely help in the diversification and reshaping of our oil dependent economy.

Since protein is generally one of the most expensive feed ingredients, the chicken industry uses targeted rations and reduce the amount of protein in the diet as the birds grow (chickens require less and less protein as they age), however, it may not be cost-effective for small scale producers to have different diets for starters, growers and finishers [2].

The use of local, cheap and readily available material, particularly those that are not directly utilized by man has received particular attention as the only viable alternatives to the use of conventional feed stuffs [1, 3]. The ability of a feed to supply energy for the numerous metabolic processes within the animal's body is of great importance in determining the nutritive value of that feed [4]. The metabolic processes are associated with the maintenance of the body functions, the construction of body tissues, and the synthesis of such products as milk and eggs, and energetic transformations for work done by the animal [5]. As these metabolic processes require a transfer of energy, it follows that the ability of feed to supply energy will be a measure of its nutritive efficiency. Soya bean meal serves as the world standard in regard to protein meals for livestock production [6, 7]. It is palatable, nutrient dense, highly digestible, and cost effective. Similarly, full fat soya bean (FFSB) was said to possess the same features, but in addition, it is an excellent source of energy and fatty acids [7]. Properly processed full fat soya bean may represent valuable material in diets used within the modern poultry industry because it may make a significant contribution to overall dietary energy level when incorporated with low quality ingredients in the diet of poultry [1]. Legumes generally contain anti- nutritional factors such as tannins, saponin, trypsin inhibitors, mycotoxin and several others. Initial studies regarding the use of whole soya bean in animal feed were carried out on poultry, specifically with broilers and laying hens, during the nineteen sixties. Recent review on the subject has been carried out by Liener [8], Kumar [9], Coon, *et al.* [10] and others. These investigations indicate that soya beans are an excellent source of protein and energy for poultry, however, the raw grain contains anti-nutritional factors that inhibit productivity, and as a result, prior heating is required. The processing conditions, especially those relating to the milling size, the use of steam, the temperature and the pressure applied, in addition to the process duration, all influence the quality of the final product and define its nutritional value to a large extent in addition to defining advisable levels of use in commercial diets. Recent studies have involved the use of yeast on raw soya bean and encouraging results have ensued. The inclusion of yeast (Saccharomyces cerevisiae) to the milled soya bean has been found to reduce the harmful effect of raw soya bean. Yeast is a naturally rich source of proteins, minerals and B-complex vitamins. In addition, yeast or yeast cell walls can also be used as adsorbents for my cotoxins. Approximately 40% of the weights of dried yeast consist of protein. As a feeding-stuff, yeast is of particular value for the growth of poultry and cattle. The quality of yeast protein is excellent for a vegetable protein and is about equivalent in quality to soya bean protein there is need to determine experimentally at what levels yeast inclusion will be ideal in mixture with crushed raw soya bean [11].

2. Materials and Methods

2.1. Experimental Birds

Ninety six, one – day old commercial unsexed broiler chicks (hubbard), were reared in an open house, The chicks were selected on the basis of approximately same weight and were assigned randomly for each dietary treatment, twenty four chicks/treatment with four replicates in complete randomize design. The initial body weight for birds 40.0g was recorded.

2.2. Experimental Diets and Management

Soya bean seeds sample (Table 1) was analyzed for proximate composition according to AOAC [12]. Four experimental diets were used. The diets were formulated to meet nutrient requirements as outlined by [13], and were approximately isocaloric and isonitrogenus. Diet A Control with 0% soybean, diet B Contained 1% soybean, diet C 3% soybean and diet D 5% soybean. The dry ingredients of each treatment were mixed in the mixture. The composition, determined and calculated chemical composition of experimental died were presented in Table (2).

3. Results

Effects of soya bean in the performance of Hybrid chicken is shown in table (3); group A as control soya bean(0)% and group B soya bean (1% ,group C soya bean 3 % and group D soya bean 5 % respectively. A significant

improvement ($p<0.05$) of Ave live body weight (kg) was noted at the end of experiment in group D than the other three groups (A ,B and C), also Ave body weight gain (kg) increased significantly ($P<0.05$) in group A when compared with group B , C and D. Feed conversion ratio (FCR) was significantly ($P<0.05$) improved for group B followed by group A while group C and D showed significant ($p<0.05$) the poorest (FCR) Feed intake was significantly ($p<o.o5$) increased for group C flowed by group A and group B respectively.

Table (4) indicates the Erythrocyte indices of Hubbard chicks as affected by soya bean levels reported that the RBC value were higher in group C ($6.6^{a}\pm0.22$), group B ($6.3^{b}\pm0.05$), group D ($5.9^{c}\pm0.02$) and group A ($4.98^{d}\pm0.10$) respectively. The Hemoglobin value were higher in group C ($15.03^{a}\pm0.09$), group A ($13.9^{b}\pm0.82$), group B ($13.56^{d}\pm0.05$) and D ($13.56^{d}\pm0.05$) respectively. The PCV value were higher in group B ($33.7^{a}\pm0.03$), group A ($33.5^{b}\pm0.70$), group D ($32.8^{c}\pm0.12$) and C ($31.9^{d}\pm0.44$) respectively. The MCV value were higher in group A ($134.6^{a}\pm0.01$), group D ($128.94^{b}\pm0.04$), group B ($116.06^{c}\pm0.32$) and C ($110.42^{d}\pm0.51$) respectively. The MCH value were higher in group D ($41.92^{a}\pm0.01$), group A ($41.85^{b}\pm0.90$), group B ($37.98^{c}\pm0.21$) and C ($33.90^{d}\pm0.98$) respectively. The MCHC values were higher in group C ($46.00^{a}\pm0.98$), group B ($44.18^{b}\pm0.77$), group D ($43.33^{c}\pm0.54$) and group A ($41.55^{d}\pm0.43$) respectively. The WBC values were higher in group C ($22.6^{a}\pm0.43$), group B ($21.4^{b}\pm0.11$), group A ($18.6^{c}\pm0.02$) and D ($16.14^{d}\pm0.33$) respectively.

Table (5) shows the effect of soya bean on the carcass components as a percentage of body weight. There was no significant ($P>0.05$) difference in all the parameters measure among the experimental treatments group.

4. Discussion

Overall performance feed consumption of broiler chicken by soya bean as percent in feed intake of body weight (BWT) were higher for the group C (4.29) than group D (4.12) than group A (4.07) and B (4.04) respectively. Although there is significant difference between the four groups, the result were in agreement with the finding of Al-Daraji and Salih [14] who noted that for the same breed the DMI% of body weight ranged between 2.3% of Body weight. However, the obtained results were higher than that reported by Charray, *et al.* [15] who stated that the DMI% were 2.5% of Body weight for Desert goats. The findings of the weight gain in this study were significantly higher for group A 1.86 than group C 1.66 than group B 1.51 and group D 1.42 respectively. The highest body weight gain of broiler chicken in group A support earlier findings that soya bean energizing body Cho, *et al.* [16]. In table 4, 5, indicates the Erythrocyte indices of males broiler chicken as affected by soya bean report revealed that hematological constituent always a reflection of broiler chicken responsiveness to their initial and external environment [17], hence this constituent are important in diagnosing the functional status of an exposed broiler chicken to suspected oxican. In erythrocytes indices the Red Blood Cells (RBCs). Showed high significant in group C ($6.6^{a}\pm0.22$) when compared with other three group B ($6.3^{b}\pm0.05$), D ($5.9^{c}\pm0.02$), A ($4.98^{d}\pm0.10$) respectively. Hemoglobin, packet cells volume (PCV), mean corpuscular volume, mean corpuscular Hemoglobin (MCH) and mean corpuscular Hemoglobin concentration (MCHC) demonstrated high significant in group C than three groups (B,D, and A) Red Blood Cell (RBCs) counts were also high and followed and trend similar to that observed for Hb ; indicating that none of the four types of soy bean used for groups has effected in the a result of hemoglobin, they have been described by Smith, *et al.* [18], However The obtained (Hb) value of group A ($13.9^{b}\pm0.82$), B ($13.8^{c}\pm0.07$), C ($15.03^{a}\pm0.09$), D ($13.56^{d}\pm0.05$) respectively, fell within the normal range values (13.00 to 15.00gIdI) as respected by Tambuwal, *et al.* [19] for west the overall performance feed consumption of broiler chicken to posses relatively High Hb values, and this in an advantage in terms of the oxygen carrying capacity of the blood as observed by Ali, *et al.* [20]. A deficiency of hemoglobin in the red blood cell decrease blood oxygen carrying capacity, leading to symptoms of broiler chicken [21].

Table-1. proximate analysis (%) of soybean

Parameter	**Soy bean %**
DM	97
CP	16.63
EE	2.20
CF	11
ASH	5
NFE	62.17
ME(Kcal/kg)	3

Table-2. Composition (%) of the experimental diets (As fed): Soya bean levels %

Ingredients	**0**	**1**	**3**	**5**
Sorghum	62	62	61	61
Groundnut cake	15	15	14	13
Sesame cake	15	15	15	14
Soya bean	0	1	3	5
Concentrate	5	5	5	5
Di Calcium	1.46	1.46	1.46	1.46
Nacl	0.25	0.25	0.25	0.25
Laysin	0.04	0.04	0.04	0.04
Premix	0.25	0.25	0.25	0.25
Filler	1	0	0	0
Total	100	100	100	100

Table-3. Overall performance and feed consumption of broilers chicken

Parameters	**Control**	Treatments		
	Group A	**Group B**	**Group C**	**Group D**
Experimental period (days)	45	45	45	45
Number of animals	8	8	8	8
Ave. Live body weight (kg)	2.42^{a}	2.40^{a}	2.52^{b}	2.54^{b}
Ave. body weight gain (kg)	1.86^{a}	1.51^{a}	1.66^{c}	1.42^{b}
Ave. Feed intake.(kg)	4.07	4.04^{b}	4.29^{a}	4.12^{c}
Feed conversion ratio (FCR)	1.49^{c}	1.44^{c}	1.59^{a}	1.59^{b}

a, b,c and d: means in the same row with different superscripts are significantly (P<0.05) different.

Table-4. Effects of soya bean on hematological profiles and constituents of Hubbard chicken (means± Std)

Parameters	**Control**	**Treatments**		
	Group A	**Group B**	**Group C**	**Group D**
RBCs. ($\times 10^{6}$ / µL)	4.98^{d}±0.10	6.3^{b}±0.05	6.6^{a}±0.22	5.9^{c}±0.02
Hemoglobin (g/dl)	13.9^{b}±0.82	13.8^{c}±0.07	15.03^{a}±0.09	13.56^{d}±0.05
PCV (%)	33.5^{b}±0.70	33.7^{a}±0.03	31.9^{d}±0.44	32.8^{c}±0.12
MCV (fl)	134.6^{a}±0.01	116.06^{c}±0.32	110.42^{d}±0.51	128.94^{b}±0.04
MCH (pg)	41.85^{b}±0.90	37.98^{c}±0.21	33.90^{d}±0.98	41.92^{a}±0.01
MCHC (g/dl)	41.55^{d}±0.43	44.18^{b}±0.77	46.00^{a}±0.98	43.33^{c}±0.54
WBCs ($\times 10^{3}$/ µL)	18.6^{c}±0.02	21.4^{b}±0.11	22.6^{a}±0.43	16.14^{d}±0.33

a, b,c and d: means in the same row with different superscripts are significantly (P<0.05) different

Table-5. Body weight and organ proportions of broiler Hubbard chicken carcasses treated with

Parameter	**A**	**B**	**C**	**D**
Final body weight (kg)	2.42	2.40	2.52	2.54
Abdominal fat as % of body weight	1.86	1.51	1.66	1.42
Liver as % of body Weight	0.55	0.51	0.50	0.40
Heart as % of body Weight	0.35	0.30	0.40	0.31

a, b,c and d: means in the same row with different superscripts are significantly (P<0.05) different

References

[1] Akande, T. O., Adeyeri, M. K., Longe, O. G., and Odunsi, A. A., 2007. "Response of laying chickens to graded levels of tephrosia bracteolata leaf meal fed with soya bean meal or full fat soya bean meal." *Livestock Research for Rural Development,* vol. 19, p. 8.

[2] National Center for Appropriate Technology NCAT, 1998. Available: http://www.thepoultrysite.com/articles/94/feeding-chickens-for-best-health-and-performance

[3] Akpodiete, O. J., Ologbobo, A. D., and Ayodale, O. G., 1997. "Replacement value of maggot meal for fish meal in broiler Chicken diets. In livestock products." In *Proceedings of 2nd Annual conference.*

[4] Akinumutimi, H. A., Okah, U., Akinmutimi, H. A., and Onwudike, O. C., 2004. "Determination of metabolizable energy values of bambara groundnut (Voandzeia subterranean) meals." In *Proceedings of the 11th Annual Conference of Animal Science Association of Nigeria.*

[5] Akanno, E. C., Okah, U., Akinmutimi, H. A., and Onwudike, O. C., 1998. "Determination of metabolizable energy values of bambara groundnut (Voandzeia subterranean) meals." In *Proceedings of the 11th Annual Conference of Animal Science Association of Nigeria.*

[6] Leeson, S., Summers, J. D., Akande, T. O., Adeyeri, M. K., Longe, O. G., and Odunsi, A. A., 1997. "Response of laying chickens to Acta agriculturae Slovenica, 100/1 – 2012 57Growth response of broil er chic kens fed ... levels of yeas t treated raw so ya bean and full fat so ya bean graded levels of Tephrosia bracteolata leaf meal fed with soya beans meal or full fat soya bean meal." *Livestock Research for Rural Development,* vol. 19, p. 8.

[7] Kohlmeir, R. H., 1990. "World production, storage, and utilization of various defatted animal and vegetable mid-high protein meals in:D R Erickson (Editor)." In *World conference on edible fats and oil processing. Basic Principles and Modern Practices, 1989 P 390, Maastrieht, Netherlands*. *American Oil Chemist Champaign II.*

[8] Liener, I. E., 1985. *Anti-nutritional factors. In: Legumes, chemistry, technology and human nutrition. Mathews R.H. (ed.)*. New York: Marce Dekker Inc., pp. 339–382.

[9] Kumar, R., 1990. "Anti-nutritional factors, the potential risks of toxicity and methods to alleviate them." Available: http://www.fao.org/docrep/003/to632e10.htm

[10] Coon, C., Leske, K. L., Akavanichan, O., and Cheng, T. K., 1990. "Effect of oligosaccharide-free soya bean meal on true metabolizable energy and fiber digestion in adult roosters." *Poultry Science*, vol. 69,

[11] Stone, C. W., 1998. "Yeast products in the feed industry. Apractical guide for feed professionals." Available: http:/www.diamondv.com/articles/booklet/booklet.html

[12] AOAC, 1990. *Official Methods of analysis*. Washington DC. USA: Association of Official Analytical Chemist.

[13] NRC National Research Council, 1994. *Nutrient requirements of poultry*. 9th Rev. ed. Washington, DC: National Academy Press.

[14] Al-Daraji, H. J. and Salih, A. M., 2012. "The influence of dietary arginine supplementation on blood traits of broiler chickens." *Pakistan Journal of Nutrition*, vol. 11, p. 258.

[15] Charray, J., Humbert, J. M., and Levif, J., 1992. *Manual of sheep production in the humid tropics of Africa*. CAB International.

[16] Cho, J. H., Farson, D. F., Milewski, J. O., and Hollis, K. J., 2009. "Weld pool flows during initial stages of keyhole formation in laser welding." *Journal of Physics D: Applied Physics*, vol. 42, p. 175502.

[17] Omoikhoje, S. O., Eguaoje, S. A., Ekpenisi, F., Osayande, E., and Edonije, J., 2020. "Haematology and serum biochemical indices of broiler chickens fed varying levels of indomie waste meal based diet." *Sustainability, Agri, Food and Environmental Research*, vol. 7, pp. 251-260.

[18] Smith, M. A., Riby, L. M., van Eekelen, J. A. M., and Foster, J. K., 2011. "Glucose enhancement of human memory: a comprehensive research review of the glucose memory facilitation effect." *Neuroscience and Biobehavioral Reviews*, vol. 35, pp. 770-783.

[19] Tambuwal, F. M., Agale, B. M., and Bangana, A., 2002. "Haematological and biochemical values of apparently healthy Red Sokoto goats." In *Proceeding of 27th Annual Conference Nigerian Society of Animal Production (NSAP)*. pp. 50-53.

[20] Ali, S. N., Arif, A., Ansari, F. A., and Mahmood, R., 2022. "Cytoprotective effect of taurine against sodium chlorate-induced oxidative damage in human red blood cells: an ex vivo study." *Amino Acids*, vol. 54, pp. 33-46.

[21] Hossain, M. E. and Akter, N., 2022. "Further insights into the prevention of pulmonary hypertension syndrome (ascites) in broiler: a 65-year review." *World's Poultry Science Journal*, vol. 78, pp. 641-688.