Bionatura
Latin American Journal of Biotechnology and Life Sciences

Bionatura Issue 2 Vol 8 No 1 2023

Article

The impact on various growth parameters of Japanese quail of substituting some local grass pea seeds for soybean meal.

Doaa Talib Munshid Kinanah[1], Muhammad Jodi Shahid[2]
[1]Animal Production Department, College of Agriculture and Marshes, University of Thi-Qar, Iraq.
[2]Animal Production Department, Agriculture College, Al-Muthanna University, Iraq.
*Correspondence: Email: jasimgharawi@gmail.com
Available from: http://dx.doi.org/10.21931/RB/CSS/2023.08.02.86

Abstract

This experiment was conducted in the poultry field of the research station at the College of Agriculture and the Marshes of Thi-Qar University from 1/11/2021 to 1/4/2022 to determine the effect of replacement different levels of grass pea seeds instead of soybean meal in the diet, and their effect on the growth parameters of Japanese quail (Coturnix coturnix). 216 Japanese quail birds 45 days old were used, distributed randomly to four experimental treatments and three replicates (18 birds/replicate). The treatments were as follows: T1: control transaction; T2: The birds were fed a diet containing 20% soybean meal with 10% local grass pea seeds; T3: The birds were fed a diet containing 10% soybean with 20% local grass pea seeds; T4: The birds were fed a diet containing 30% local grass pea seeds. The results of the study indicated that feeding quails on diets containing 20% local grass pea seeds did not differ significantly from the control treatment in some growth parameters (body weight, weight gain, feed intake and feed conversion factor) for Japanese quail. Increasing the concentration of succulent plants to 30% in the ration led to a significant deterioration in the growth characteristics.

Keywords: local grass pea, soybean meal, growth parameters, Japanese quail.

Introduction

The feed provided to poultry contains essential components as a source of protein, like soybean meal, and a source of energy, such as corn and wheat, which were considered traditional sources in the diets of domestic birds. These ingredients were in great demand in human nutrition, as well as an increase in the global consumption of poultry products such as meat and eggs. Therefore, it requires increased production, which increases the demand for this feed material, leading to higher production costs. The world population is expected to rise to over one billion by 2050[1].

Grass pea is one of the alternative sources of vegetable protein, which is considered one of the types of legumes. The seeds of Lathyrus sativus are one of the legumes and an excellent alternative to soybean meal because of the similarity in the composition of amino acids, widespread in East and Central Asian countries, especially in Bangladesh, Ethiopia, India and Pakistan[2].

The grass pea is used for various purposes as human food and fodder for farm animals because it contains a high protein content ranging between 18-34% in seeds and more than 17% in mature leaves[3].

Grass pea is considered a food crop and supports the food security of many low-income communities. The protein of the geranium seeds contains albumin, globulin, glutelin and prolamine at concentrations of 14, 66, 15 and 5%, respectively. Therefore, it was used in animal feed in a ground form, but in human nutrition, it is boiled before eating[4].

Studies indicate that using geranium seeds in the diet at limited levels does not significantly affect the performance of domestic birds. However, most of them are used as factors to improve the nutritional value of grass pea seeds due to the presence of limiting factors[5,6]. Tadelle et al.[7] noted the possibility of using grass pea seeds at a rate of 10%. It had no significant effect on the productive performance of broilers, but when the grass pea seeds exceeded this percentage, it led to a significant decrease in production performance. This prompted the researchers to use some nutritional improvement methods when increasing the level of succulent seeds in the diet.

Therefore, this study aims at the effect of replacing different levels of local grass pea instead of soybean meal on some growth parameters of Japanese quail.

Materials and Methods

The study was conducted at the poultry station affiliated with the Department of Animal Production, College of Agriculture, Thi Qar University. The local quail birds were distributed after naturalization into four treatments. Each treatment contains 54 birds with three replications for each treatment (18 birds per replicate), which includes 12 females and 6 males, and the treatments (Table 1) were:

T1: control transaction.

T2: The birds were fed a diet containing 20% soybean meal and 10% local grass pea seeds.

T3: The birds were fed a diet containing 10% soybean and 20% local grass pea seeds.

T4: The birds were fed a diet containing 30% local grass pea seeds.

Items	T1	T2	T3	T4
Maize	39.00	39.00	39.00	39.00
Wheat	18.00	18.00	18.00	18.00
Soybean meal (48%)	30.00	20.00	10.00	0.00
Protein concentrate (50%)	8.00	8.00	8.00	8.00
Premix (6%)	0.30	0.30	0.30	0.30
Limestone	3.90	3.90	3.90	3.90
Salt	0.30	0.30	0.30	0.30
Local grass pea seeds	0.00	10.00	20.00	30.00
Sunflower oil	0.50	0.50	0.50	0.50
Total	100.00	100.00	100.00	100.00
Chemical analysis				
Crude protein (%)	23.05	21.35	19.65	17.95
Metabolize Energy (Kcal/ kg diet)	2884.50	2914.39	2944.29	2974.18
C/ P ratio	1250.14	136.50	149.83	165.69
Crude fiber (%)	3.77	3.90	4.03	4.16

Calcium (%)	2.11	2.10	2.10	2.10
Available phosphorus (%)	0.37	0.37	0.37	0.37
Lysine (%)	1.28	1.42	1.56	1.70
Methionine (%)	0.48	0.48	0.48	0.49
Methionine+ Cysteine (%)	0.94	0.81	0.69	0.56

• Protein concentrate: Produced by the Dutch Brocon Company, it contains 50% crude protein and 2500 (kcal/kg) representative energy, 6.5% calcium, 3% available phosphorous, 3.70% methionine, 0.66% cysteine, 3.85% lysine, 3.5 fibers. Raw, 12.4% methionine and cysteine.

• Premix produced by the Iraqi Laymix Company in Erbil Governorate. It contains 6% crude protein and 4331.57 kcal / kg represented energy, 1.50% lysine, 5.90% methionine, 5.00% methionine and cysteine, 24.05% calcium, and 10.20% phosphorous available.

• The chemical composition of the feed materials included in the composition of the rations was calculated according to the recommendations[8].

Table 1. Basal diet ingredients and their chemical composition.

The birds were placed in locally manufactured wooden wire cages of three floors, each measuring 120×60×40 cm. With sawdust as a bed, water and fodder were freely available. The cages were placed inside a closed room with dimensions of 40×10 meters. After fumigation with paraformaldehyde gas, clean the maintenance holes, troughs and used equipment before starting the experiment. It provided the appropriate environmental conditions for raising quails, such as heat, ventilation and lighting. The vacuum was used to obtain the required ventilation. No fatalities were recorded during the duration of the experiment at this stage.

Use the local grass pea seeds obtained from local markets. After it was crushed using a special grinder, it became crushed and ready to be added to the feed material for the duration of the experiment.

Growth parameters:

Live body weight, weight gain, feed intake and feed conversion factor.

Results

Table 2 shows the effect of the partial replacement of local grass peas instead of soybean meal on some growth parameters of Japanese quail. It was noted that T1 (control treatment), T2 (birds fed on a diet containing 20% soybean meal with 10% local grass pea seeds), and T3 (quail birds fed on a diet containing 10% soybean meal with 20% local grass pea seeds) was significantly ($P \leq 0.05$) superior to the average body weight of the Japanese quail compare with the T4 (birds were fed on a diet containing 30% local grass pea seeds), there were no significant differences between the coefficients T1, T2 and T3 in the same trait. The average body weight of quail was 170.73, 170.65, 170.46 and 159 gm for T1, T2, T3 and T4 treatments, respectively.

In the weight gain of quails, the same significant effect ($P \leq 0.05$) was observed for the three treatments (T1, T2 and T3) compared to treatment T4, the average weight gain of quail was 161.76, 161.68, 161.49 and 150.19 gm for treatments T1, T2, T3 and T4, respectively.

As for feed intake, the statistical analysis results did not indicate any significant differences between all the experimental treatments. The total feed intake was 493.36, 497.43, 497.40 and 496.09 gm for T1, T2, T3 and T4 treatments.

When studying the feed conversion factor, it is noticed that there is a significant improvement ($P \leq 0.05$) in treatments T1, T2 and T3 compared to treatment T4. However, there were no significant differences between the three treatments (T1, T2 and T3). The average feed conversion ratio for quail was 3.05, 3.07, 3.08 and 3.30 gm diet/ gm weight gain for treatments T1, T2, T3 and T4, respectively.

Treatments	Body weight (gm)	Weight gain (gm)	Feed intake (gm)	Feed conversion (gm diet/ gm weight gain)
T1	0.75±170.73 a	0.75±161.76 a	2.81±493.36	0.015±3.05 a
T2	0.49±170.65 a	0.49±161.68 a	2.75±497.43	0.017±3.07 a
T3	0.77±170.46 a	0.77±161.49 a	4.85±497.40	0.015±3.08 a
T4	1.82±159.16 b	1.82±150.19 b	4.90±496.09	0.008±3.30 b
Sig.	*	*	N.S	*

Table 2. Effect of replacement local grass pea seeds instead of soybean meal on some growth parameters of Japanese quail (mean ± standard error).

Feeding quail birds on a diet containing either 10 or 20% of the grass pea seed powder did not differ significantly from the control treatment, to which the local grass pea seed powder was not added in the productive characteristics of quail, represented by body weight rate, weight gain and food conversion factor. However, no substances were used to improve the nutritional value of grass pea seeds. Increasing the level of grass pea seeds in the bush led to a deterioration in the productive characteristics of Japanese quail. There needed to be a precise explanation for these results. However, it may be attributed to the work of digestive enzymes in quail birds, which reduced the inhibitory factors of nutrition in the grass pea seeds. Increasing the level of grass peas in the diet led to a deterioration in the productive performance of quails.

Concentrations were more significant than 10 and 20% due to the multiplicity of protein sources in the two treatments, T2 and T3. To get the right combination of amino acids, it was sourced from soybean meal and safflower seed powder, which may contribute to enhancing growth performance.

Discussion

[9] showed that feeding quails on sorghum seeds and forage legumes at low levels did not affect the productivity of Japanese quail due to the lack of influence of the inhibitors in it. The grass pea seed powder contains many amino acids, making it a source of vegetable protein [10]. The milling process for the seeds of grass peas may have slightly reduced the anti-viral effect of phytic acid, as the heat may affect its anti-nutritional qualities and reduce its association with nutrients. The negative effect of phytate on protein in the diet of monogastric animals is limited [11].

There were no significant differences for treatment T2 and T3 compared to the control treatment. It may be due to the effect of the active antioxidant compounds, which stimulate the production of the hormone thyroxine, improving the body's metabolic state. As for the decrease, it may be attributed to the increase in soap compounds. It has a bitter taste, which leads to loss of appetite and a decrease in the rate of feed consumption [12].

This result did not agree with what [13] found that adding fodder beans to broiler diets at a rate of 25 and 50% replaced barley, led to a decrease in body weight and weight gain due to a decrease in feed intake, attributed to nutritional inhibitors in forage beans. It was also noted that untreated fodder beans caused a deterioration in the productive characteristics of broilers compared to treated fodder beans [14، 15، 16].

Conclusions

The study results indicated that feeding quails on diets containing 20% local grass pea seeds did not differ significantly from the control treatment in some growth parameters (body weight, weight gain, feed intake and feed conversion factor) for Japanese quail. Increasing the concentration of succulent plants to 30% in the ration led to a significant deterioration in the growth characteristics.

References

1. FAO. How to feed the world in 2050. Food and Agriculture Organization of the United Nations (FAO). Rome, Italy. 2009.
2. Lambein, F., S. Travella, Y.H. Kuo, M. Van Montagu and M. Heijde. Grass pea (Lathyrus sativus L.): orphan crop, nutraceutical or plain food. Planta, **2019**. 250:821-838.
3. Rizvi, A.H., A. Sarker and A. Dogra. Enhancing grass pea (Lathyrus sativus L.) production in problematic soils of South Asia for nutritional security. Indian J. Genet. Plant Breed, **2016**. 76:583–592.
4. Enneking, D. The nutritive value of grass pea (Lathyrus sativus) and allied species, their toxicity to animals and the role of malnutrition in neurolathyrism. Food Chem Toxicol **2011**. 49:694–709.
5. Rotter, R., R. Marquardt and C. Campbell. The nutritional value of low Lathyrus lathyrogenic (Lathyrus sativus) for growing chicks. British Poultry Science, **1991**. *32(5)*:1055-1067.
6. Al Salman, N.T.Sh. and J.K.M. Al-Gharawi. Effect of Eucalyptus leaves water extract on some productive traits of broilers. Plant Archives Vol. 19, Supplement 1, **2019** pp. 920-923.
7. Tadelle, D., Y. Alemu, D. Nigusie and K.J. Peters. Evaluation of processing methods on the feeding value of grass pea to broilers. Int. J. Poult. Sci., **2003**. *2 (2)*: 120-127.
8. NRC (National Research Council). Nutrient Requirements of Poultry. 9th ed .*National Academic Press*, Washington, DC. **1994**.
9. Johnson, K., D. Elmore and L. Goodman. A Guide to Plants Important for Quail in Oklahoma. Oklahoma Cooperative Extension Service Division of Agricultural Sciences and Natural Resources Oklahoma State University. PP 164. **2017**.
10. Hussien, S. .; Doosh, K. S. . Production And Characterization Of B-Galactosidase Enzyme In The Plant Extract From (Ziziphus Spina-Christi) And Its Application In Milk. Journal of Life Science and Applied Research. **2021**, 2, 1-8..
11. Othman Ghazi Najeeb Alani , Yassen Taha Abdul-Rahaman and Thafer Thabit Mohammed. Effect Of Vêo® Premium and Vitamin C Supplementation on Lipid Profile Before and During Pregnancy in Some Local Iraqi Ewes During Heat Stress. *Iraqi Journal of Science*.**2021**, Vol. 62, No. 7, pp: 2122-2130.
12. Al-Ani, A.K.A. and M.I. Al-Nuaimi. Improving the nutritional value of seeds of local sage (Lathyrus sativus L.) used as a partial substitute for soybean meal in broiler diets. *Iraqi Journal of Veterinary Sciences*. **2009**. *23(2)*: 535-544.
13. Shukri, M.M.., F.K. Ibrahim S.A.A. Mukhlis and Q.A. Qasim. Effect of Use Faba bean (Minor) and Barley Soaked Water as a Partial Substitute for Soybeans and Maize in Starter and Finisher Broiler's Diets. *Journal of University of Babylon for Pure and Applied Sciences*, **2019**. *27(6)*: 33-50.
14. Al-Athari, A. K. and A. Hussain. The effect of substitution treated and untreated Vicia Faba bean instead of soybean on broiler performance. IPA Agric. J. **2000**. *15(1)*: 41-59.
15. Almujami, R. I. Improving of Nutritive Value of Locally Broad Bean As Substitution for Soybean Meal in Broiler Diet. M.Sc. Thesis, Coll. of Agric., Univ. of Baghdad.
16. Alrseetmiwe, D. S. .; Almayah, A. A. .; Nasser, A. A. .; Alnussairi, M.; Zadeh, H. A.; Mehrzi, F. A. . Cloning And Expression Of An Optimized Interferon Alpha 2b In Escherichia Coli Strain Bl21 (De3). *Journal of Life Science and Applied Research*. **2020**, 1, 40-44.
17. Gangwar, S. K., A. Ebrahim and H. Gebremariam. Evaluate the performance of broiler chicken on substituting bean meal with soya bean meal. Asian J. Exp. Biol. Sci. **2010**. *1(4)*: 881-885. 2002.

Received: May 15, 2023/ Accepted: June 10, 2023 / Published: June 15, 2023
Kinanah, D.T.M.; Shahid, M.J.; Al-Gharawi, J.K. The impact on various growth parameters of Japanese

quail of substituting some local grass pea seeds for soybean meal. Revis Bionatura 2023;8 (2) 86. http://dx.doi.org/10.21931/RB/CSS/2023.08.02.86