Nangarhar University
International Journal of Biosciences

Received: 23 Aug 2023
Accepted after revision: 25 Sep 2023
Published Online: 30 Sep 2023

ORIGINAL ARTICLE | Vol 2, Issue 3 (2023) | e-ISSN: 2957-9988

Effects of Mung Bean Residues on the Growth of Broiler Chickens

Momand Khyber[1*], Abozar Faizanullah[2], Jameel Zabihullah[3] and Yousafzai Waliullah[4]

[1] Department of Animal sceince, Faculty of Agriculture, Shaikh Zayed University, Khost, Afghanistan

[2] Department of Animal sceince, Faculty of Agriculture, Kunduz University, Kunduz, Afghanistan

[3] Department of Animal sceince, Faculty of Agriculture, Shaikh Zayed University, Khost, Afghanistan

[4] Department of Plant protection, Faculty of Agriculture, Shaikh Zayed University, Afghanistan.

*Corresponding author email: Khybermomand2010@gmail.com

ABSTRACT

Background: Broiler Chickens are a contributor to protein for humans. In the maintenance of broilers, the cost of feed can reach to 50-60% of the total production expenses. Thus, alternative feeds which are cheap, easy to obtain, and contain good nutrition are needed. Mung bean and its residue are important factors of the broiler chickens feed. The purpose of this research is to evaluate the addition of mung bean and its residue as a feed to increase the growth of broiler chickens.

Materials and Methods: The study conducted over 84 broiler chickens of one-day old during 35 days based on the record of their daily behaviors. The record of the chickens has been divided into four groups and each group divided into three replications. Each replication of a group consisted of seven chickens. Weight gain, feed intake, and feed conversion ratio were the only factors involved for measurement.

Findings: We found that there was no significant differences ($p>0.05$) in the weight gain of chicks during 1-2 weeks of mung bean residue percentage groups compared to the control; however, during the 3-5 weeks, the weight gain of the mung bean residue groups increased and there was a noticeable change between third and fifth weeks. In the fifth week, 2.5% of mung bean residue weighed more than all other groups, which was due to better consumption of feeding and lack of disease.

Conclusion: The study emphasized that by adding 2.5% of mung bean residue to the diet, chickens increase weight by less consumed feed as well as health, and resistance of chickens will be higher. Based on this study, we recommended that 2.5% mung bean residue should be added to the chicken diet after the third week, to gain more weight by consuming a small amount of diet.

Keywords: Broiler chicken, Mung beans, Chicken growth, Khost, Afghanistan

INTRODUCTION

Poultry farming plays an important role in the economy of agricultural countries (Mack et al., 2005). The countries which have contributed a lot in raising chickens have made more progress in raising chickens than other countries and thus earn more income as well as receive a positive response from the community. Chicken meat, on the other hand, is a rich source of protein and energy, which is easily digested and prevents

malnutrition. Beef chickens are highly digestible and are also marketed in a short period for meat production (Kralik et al., 2018).

Khost province is one of the provinces in Afghanistan where the climatic conditions are suitable for raising chickens but their training is facing some difficulties in this province due to a lack of nutrients (Ates et al., 2018). Mung bean is widely grown in the province and its residue is often wasted by farmers. The province is one of the largest agricultural lands in the country and has a relatively warm climate. Mung bean is commonly grown and it is a nutritious food which is high in protein (every 100 grams of fruit contains 23.6 grams of protein, 58.2 grams of carbohydrates, and 1.2 grams of fat) (Yin et al., 2018). Mung bean residue which is not edible for humans is wasted in several cases, thus, it can be converted into a high quality animal protein. Wiryawan et al. (1995) stated that raw mung bean has a higher energy value than many other legume beans. Yogesh and Ali, (2014) studied the effect of raw mung bean and spouted mung bean on the growth delicacy and microbial properties of broiler chickens.

Singh et al. (2013) studied the effect of sprouted mung bean on the performance of broiler chickens. They randomly designed their experiment into three treatments consisted of non-infectious control, infection control, and sprouted mung bean. The growth activity compared to the initial infectious period (0–21 days) was significantly higher and more beneficial based on the provision of sprouted mung bean during the last infectious period (22–35 days). Terms of parasitological parameters fecal score percentage, survival percentage; weight percentage, activity indicator, the average production of oocytes, and percentage of oocyte production reduction indicate a good and beneficial value of sprouted mung bean during mixed emerald infection. The study also showed that 10 grams of sprouted mung bean per day to a hen may be useful for protecting against coccidiosis-induced mutations in broiler growth, and hematological and parasitological parameters.

Mohan et al. (2020) conducted a research on the mung bean diet based on specific chemical analysis and said that mung bean contains 22.9 grams of protein, 1.2 grams of fat, 68.8 grams of total carbohydrates, 4.4 grams of crude fiber and 3.5 grams of the nutrients of a product left over after burning. Dahiya et al., (2015) conducted a nutritional evaluation of mung bean for young broiler chickens in Bogor, Indonesia. The scientist randomly designed two treatments for broiler chickens. The results of the study showed that the 21-day daily weight and feed conversion ratio (FCR) of both trials and treatments were identical and had no specific nutritional value ($p > 0.05$). Mortality was lower in both treatments. A study conducted by Yogesh and Ali, (2014) examined the effect of raw mung bean and sprouted mung bean on the growth, tenderness, and microbial properties of broiler chickens. The results showed that compared to the controls in the raw mung bean and sprouted mung bean treatments, the chicken breast meat was more tender and in good health. It denoted that mung beans had a positive effect on the growth of broiler chickens.

In addition, Bayz Saeed conducted a study in 2016 on the effects of mung bean growth on broiler chickens in a research farm at Bakrajo Sulaimaniyah University, where he brought one-day-old chicks from the market and randomly divided it into three groups (control, 5%, and 10%). The results of the study showed that the 5% and 10% factors had no significant effect on weight and FCR and were notable for observation.

Shortage of poultry meat in the country, the rising price of meat, and shortage or lack of food raw materials are some of the major problems, due to which Afghan farmers are facing serious problems and are unable to get enough meat that produces important nutrients (energy and protein). Since mung bean is a valuable source of protein for broiler chickens and is widely grown in the agricultural lands of Khost province, the remains of

mung bean are being wasted by farmers. The purpose of this study is to evaluate the feeding characters of mung bean on the growth of broiler chickens.

MATERIALS AND METHODS

Research site and design

The study was conducted at a research farm at Sheikh Zayed University's Faculty of Agriculture during 18 March 2021 to 2 April 2021. The study was conducted in a complete randomized design (CRD) with a 4 × 3 factorial design. Thus, 84 chickens were divided into four groups and each group into three replications. Each group consisted of 21 chickens and 7 replications. Each group chickens were fed the same routine for 35 days. Mung bean residue mixed with feed and water at 1%, 2.5%, and 5%. Each day, based on the treatment, the feed was added to the chickens. This record was collected every day for up to 35 days. The research period was 35 days.

Work plan

In this study, a total of 84 chickens, which were one day old and belonging to a local company (Sahra Bagh Poultry Hatchery, Khost Province), were taken from the market. Before bringing chickens to the farm, the farm provided lime disinfection per hygienic conditions and provided the same facilities for bedding, lighting, ventilation, and heating for the chickens. Then we put a sawdust for each replication of the four related groups on the farm and spread the newspaper on top of it, the chickens were randomly divided into four groups, the first control and the other three were specific percentage groups of mung bean residues (1%, 2.5%, and 5%), Each group had three subgroups and each subgroup had 7 chickens. The farm was covered with newspaper, after the application of sawdust in the ground. This is because the chickens were small and did not know how to eat grains, so in the first place the same newspaper is spread so that they does not eat the wood dust from the ground floor and does not get diarrhea or jaundice.

At first, when the chickens were brought from Sahara Bagh Hatchery, a local manufacturing company; the chickens were under stress, and also their stomach was inactive. To get rid of the stress on one side and start the stomach function on the other side, we had prepared sweet sugar syrup before bringing it to him. After coming to the farm we gave them the same sweet syrup for three hours and after three hours we changed it and put clean water in it instead. The controls were then given a net balanced small numbered seed (R4) and the other three were given a small numbered seed with a specific percentage of fruit residue, which was fed to them for three weeks. After three weeks up to the thirtieth day, the net balance was controlled and the other three were given special percentages (R9), Grower and then the last numbered seed or last numbered seed till the last day. (Finisher) was given. The food given each day and the remaining food would be weighed and the amount of food consumed would be determined from it. We used a sensitive scale to weigh the chickens, the food, and the food leftovers. We watered the chickens two or three times a day and fed them once in the morning for the first four weeks and then in the morning and the afternoon. We weighed the leftover food each day and recorded it with ourselves and added the remaining food to the chickens in grams. The study also used vaccines against several viral diseases, including on the sixth day, chickens were vaccinated with ND + IB in the form of eye drops, ND with B1 strain, and IB with H-120 strain was possessed. On the twelfth day, chickens were given a diagonal implant in the eye of Gambor (IBD). On the 18th day, chickens were also vaccinated against the ND Lasota strain, which was giving in the form of eye drops.

Statistical analysis

In this study, primary data collected by experimental trajectory method and we used SPSS for statistical analysis of broiler chickens along with the daily feed intake, weekly weight and FCR .The results obtained by analyzed of one-way ANOVA that's general confidence interval and the variable ($p < 0.05$) varies considerably. We have been using graph pad, excel representative such as line and scatter plot.

RESULTS

The results and figures obtained from the research will be explained as follows based on the comparison of related factors:

Weekly weight gain

Weekly weight, which is an important factor in this study, was recorded separately for each week. Based on the statistical analysis, first the weekly comparison of the four groups will be shown in the form of a table and then in the form of a graph:

Table 1 shows the live weight of broiler chickens in weeks. According to the statistical analysis, no significant change ($p > 0.05$) in the live percentage of chickens during 1-2 weeks was observed in the control percentage of the remaining mung bean groups, Significant changes were observed during the 5–2 weeks ($p < 0.05$) in the remaining mung bean survival percentage groups. This means that the live weight of the remaining mung bean percentage groups increased over five weeks, but there was also a noticeable change between the remaining mung bean percentage groups from the third to the fifth week. In the fifth week, the remaining 2.5% of the mung bean group weighed more than all the other groups. This was due to a decrease in the number of diseases caused by the disease in the control and other percentages of mung bean survival groups, which were more prevalent in the control than in other groups.

Table 1. Shows weigh gain (gr) in different weeks (average ± Standard deviation) *

Treatment	Weight gain				
	1st week	2nd week	3rd week	4th week	5th week
Control	125±5^{a}	389±1^{a}	759±39.66^{a}	1270±26.4^{a}	1673.33±6.1^{a}
1%	129.3±1.16^{a}	392.3±2.52^{a}	764±44.19^{b}	1371.6±10.4^{b}	1775±5^{b}
2.50%	135.3±4.5^{a}	376.66±2.88^{a}	755±47.69^{b}	1392.33±4.9^{b}	1855±5^{b}
5%	132.7±2.52^{a}	382.33±2.51^{a}	816.66±35.11^{a}	1338±8.01^{a}	1797.66±2.5^{b}

Different English letters in the same column have significant differences from each other. Significant differences between the averages are shown at the $P < 0.05$ level.
* Average weight of seven chickens± standard deviation.

The following graphs (Figure 1) show the live weight of chickens, usually at 1-5 weeks, with no significant changes ($p > 0.05$) in each of the four groups during the first two weeks. But over 2-5 weeks there are noticeable ($p<0.05$) variations with each other. According to the results, the different groups of mung bean residue percentage control did not notice a significant change in the first two weeks, but the ratio from the third to the fifth week had a noticeable change in the ratio relative to each other.

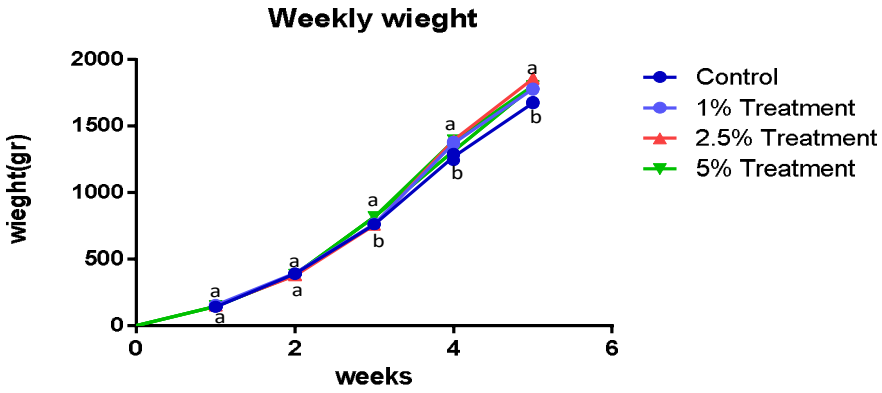

Figure 1: The above figure shows the difference between the weights of different groups over five weeks. Different English letters in the same week show significant differences between averages. The difference is considered significant, when P <0.05. The averages represent the average weight gain of six chickens per week. The error bar indicates the standard deviation of averages.

Feed intake

Food consumption, which is the second main factor for studying the effect of the four groups, the results of this study clarified which training group consumed more food, and this comparison is also based on the statistical analysis of the table and the figure is illustrated. Table 2 shows the weekly feed intake of broiler chickens over five weeks, with statistical analysis showing no significant (p <0.5) changes in all four groups during the first two weeks. But, from the 3rd to 5th week, however, different percentage groups of mung bean residues had a noticeable change in their controls, but no significant change (p> 0.5) was observed between the different percentages groups of mung bean residues. Thus there is not much difference between the repetitions.

Table 2. Shows feed intake in different weeks(average ± standard deviation) *

Treatment	Feed intake in different weeks				
	1st week	2nd week	3rd week	4th week	5th week
Control	202.32±0.90^{a}	661.88±2.5^{a}	1284.05±3.85^{a}	2328.4±3.11^{a}	3034.6±0.39^{a}
1%	191.57±0.67^{a}	602.083±2.08^{a}	1177.65±2.38^{b}	2081.02±3.06^{b}	2743.45±4.95^{b}
2.50%	191.92±0.42^{a}	600.7±3.08^{a}	1173.58±1.74^{b}	2085.85±1.45^{b}	2773.61±7.12^{b}
5%	191.2±1.12^{a}	602.43±5.36^{a}	1174.98±5.57^{b}	2094.16±8.04^{b}	2778.11±6.18^{b}

Different English letters in the same column are meaningfully different from each other. Significant differences between means are indicated at the P<0.05 level.
* Feeding average of seven chickens± standard deviation

The following graph (Figure 2) shows the control and feeding of four different groups of mung bean chickens over five weeks, according to which the different percentage groups of mung bean residues in the first two weeks There was no noticeable difference in controls but from the third week to the fifth week the different percentage groups of mung bean residues had a noticeable change in control. However, there were no significant differences between the mung bean residue groups (1%, 2%, and 5%), But we must remember that the 2.5% treatment of mung bean residue was more uniform and healthy, that is, Uniformity is high and there are no

noticeable changes among themselves. Based on the results, different percentage groups of mung bean residues did not show a significant change in their control in the first two weeks but did notice a change in their ratio in the last 3 weeks. However, the different percentage groups of mung bean do not vary significantly from one another.

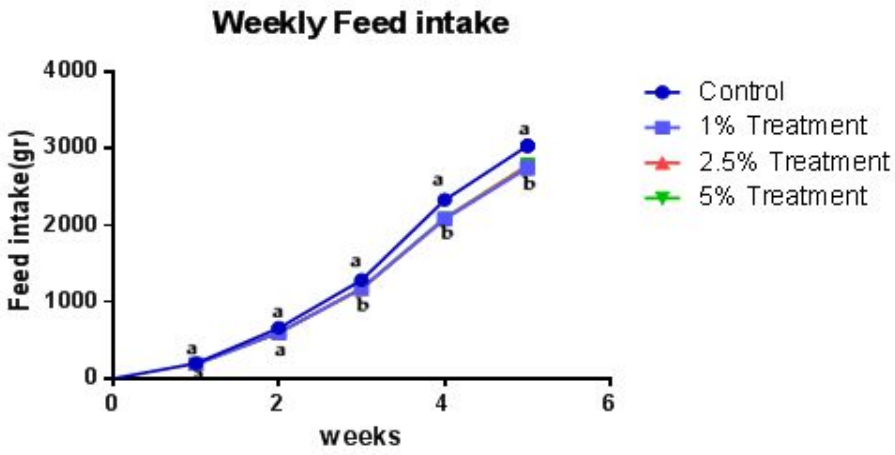

Figure 2. The above figure shows the differences between the different groups over five weeks. Different English letters in the same week show significant differences between averages. A significant difference was considered when P<0.05. Averages per week represent the average feed intake of seven chickens. Error bars indicate the standard deviation of the averages.

Feed conversion ratio (FCR)

Another important factor is the ratio of food conversion to meat, based on statistical analysis, firstly in the form of a table and then in the form of a figure, it will be clear in each group and compared with each other: Table 3 shows the FCR of broiler chickens with different percentages of mung bean residue and control during 1-5 weeks. There was a significant difference ($p < 0.05$) between the different percentage of mung bean residue and control groups. There were no significant ($p < 0.05$) variations between the different percentages of mung bean residue.

Table 3. Shows FCR in different weeks (average ± standard deviation)*

Treatments	FCR in different weeks				
	1st week	2nd week	3rd week	4th week	5th week
Control	1.62 ± 0.05^{a}	1.70 ± 1.70^{a}	1.69 ± 0.09^{a}	1.83 ± 0.03^{a}	1.8 ± 0.006^{a}
1%	1.48 ± 0.009^{b}	1.53 ± 1.59^{b}	1.5 ± 0.08^{b}	1.51 ± 0.009^{b}	1.54 ± 0.003^{b}
2.50%	1.419 ± 0.05^{b}	1.594 ± 1.59^{b}	1.5 ± 0.09^{b}	1.49 ± 0.004^{b}	1.49 ± 0.01^{b}
5%	1.44 ± 0.019^{b}	1.57 ± 1.57^{b}	1.44 ± 0.06^{b}	1.56 ± 0.05^{b}	1.5 ± 0.005^{b}

Different English letters in the same column are meaningfully different from each other. Significant differences between means are indicated at the P<0.05 level.
* Average deviation ratio of seven chickens

The Figure 3 shows the FCR of broiler chickens of different percentages of mung bean residue and control treatments in broiler chickens during 1-5 weeks. According to which, there are significant ($p<0.05$) changes compared to the treatments of different percentages of mung bean residues, and there are no significant ($p<0.05$) changes between different percentages of mung bean residues. But only in the third week, 5% of mung bean the diseases occur suddenly, the FCR is small and they consume less food. There are considerable variable ($p<0.05$) variations in the ratio of different percentages of mung bean treatments. Also, there are no significant ($p<0.05$) variations between different percentages of mung bean residues. However, in the third week alone, 5% of those with a sudden onset of the disease had FCR and consumed smaller and less food.

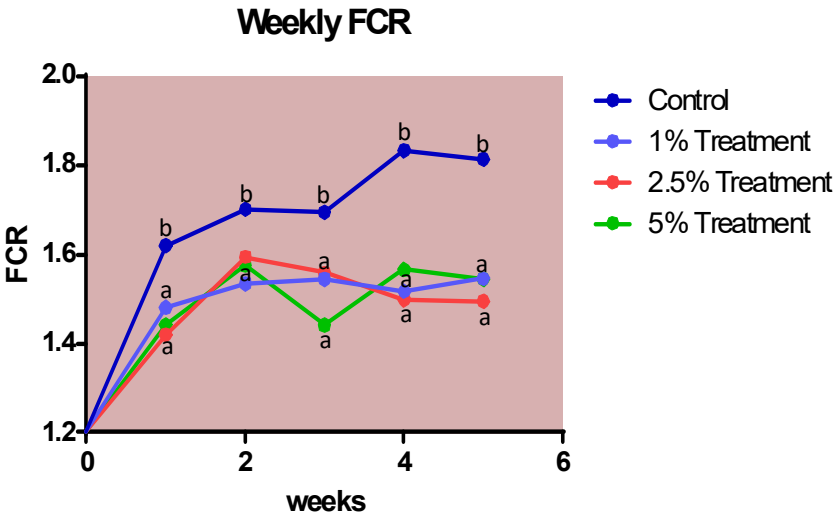

Figure 3. The figure above shows the difference between the different residues of mung bean over five weeks and the ratio of controlled diet changes. Different English letters in the same week show significant differences between averages. A significant difference is calculated when $P < 0.05$. Each week represents an average of seven chickens changing their diet. The error bar indicates the standard deviation of averages.

DISCUSSION

In this study, the daily feed, daily weight and health of the chickens were taken into consideration. The 2.5% mung bean residue had a significant impact on the daily weight, FCR and health of chickens as compared to the feed that was given to them in the control treatment. This research was different from the research of Bayz Saeed, (2016), who studied the effects of mung bean on the growth of broiler chickens. In this study, final weight, daily weight, and dietary changes were considered. However, the results of this study were recorded during the study (0-5 weeks), in the group of 2.5% more weight gain and better diet were observed. However, in the 1% and 5% groups, good and adequate diet and adequate weight gain were achieved but most of the chickens became infected. By the second week, there was no noticeable difference in weight and diet between all groups. But after the third week, there was a noticeable change.

This research was somewhat similar to the study by Yogesh and Ali, (2014) in which, control, raw mung bean and germinated mung bean were three treatments. The results showed that compared to the control, raw mung bean and germinated mung bean and broiler breast meat tenderness was more and had better health in the

treatments, finally it had a positive effect on broiler growth. From the results of this study, it was found that 2.5% FCR in all weeks was better and better than other groups, which is due to better food intake and the absence of diseases such as hydrosis (Hou et al., 2019).

As a result, this study showed that the different percentages of mung bean residues compare to control, showed different results such as: This study showed that in the first two weeks, there were no significant changes ($p>0.05$) between the growth of broiler chickens in all groups, but there was a significant difference in the third week. Broilers in the other groups were fed more food than the control group, and more food was lost and consumed. There were no significant differences ($p>0.05$) between the feed intake of all groups of broiler chickens in the first two weeks, but there was a significant difference compared to the control in the third week. However, there was no significant difference ($p>0.05$) between groups with different percentages of mung bean residues.

Significant differences ($p<0.05$) were observed in FCR between all groups. Overall, this study shows that if 2.5% of mung bean residue is added to the food, that is, 2.5 grams of mung bean residue is added per 100 grams of food; therefore, the weight, health and resistance to diseases of broiler chickens will increase or increase. Based on this study, it is recommended that 2.5% mung bean residue should be added to the chicken diet after the third week, to gain more weight by consuming a small amount of diet. That is, you can get more benefits with less consumption, but if a large percentage of mung bean residue (5% or more) is added to the diet, it will cause some diseases that were mentioned earlier.

CONCLUSION

The study emphasized that by adding 2.5% of mung bean residue to the diet, chickens increase weight by less consumed feed as well as health, and resistance of chickens will be higher. Based on this study, we recommended that 2.5% mung bean residue should be added to the chicken diet after the third week, to gain more weight by consuming a small amount of diet.

Acknowledgment: I am grateful to my beloved parents, who took every difficulty for me and encouraged me to achieve my education goals. I would also like to thank the lecturers of my department, who helped me with the implementation of this research.

Conflict of Interest: All authors express no conflict of interest in any part of the research.

Funding: This research received no external funding.

Authors Contributions: The first author conducted the study, collected and analyzed the data, the remaining authors helped with the visualization, manuscript writing and proofreading.

REFERENCES

Ates, S., Hassan, S., Soofizada, Q., Biradar, C., Esmati, H., & Louhaichi, M. (2018). The status of forage production in Afghanistan. *Internatonal Center for Agricultural Research in the Dry Areas (ICARDA): Amman, Jordan*.

Bayz Saeed, R. O. Z. H. G. A. R. (2016). Effects of feeding mung beans (vignaradiate) on the broiler performance. *Assiut Veterinary Medical Journal*, *62*(151), 107-112.

Dahiya, P. K., Linnemann, A. R., Van Boekel, M. A. J. S., Khetarpaul, N., Grewal, R. B., & Nout, M. J. R. (2015). Mung bean: Technological and nutritional potential. *Critical reviews in food science and nutrition*, *55*(5), 670-688.

Hou, D., Yousaf, L., Xue, Y., Hu, J., Wu, J., Hu, X., ... & Shen, Q. (2019). Mung bean (Vigna radiata L.): Bioactive polyphenols, polysaccharides, peptides, and health benefits. *Nutrients*, *11*(6), 1238.

Kralik, G., Kralik, Z., Grčević, M., & Hanžek, D. (2018). Quality of chicken meat. *Animal husbandry and nutrition*, *63*.

Mack, S., Hoffmann, D., & Otte, J. (2005). The contribution of poultry to rural development. *World's poultry science journal*, *61*(1), 7-14.

Mohan Naik, G., Abhirami, P., & Venkatachalapathy, N. (2020). Mung Bean. *Pulses: Processing and Product Development*, 213-228.

Singh, V. S., Palod, J., Vatsya, S., Kumar, R. R., & Shukla, S. K. (2013). Effect of sprouted mung bean (Vigna radiata) supplementation on performance of broilers during mixed Eimeria species infection. *Veterinary Research International*, *1*(2), 41-45.

Wiryawan, K. G., Dingle, J. G., Kumar, A., Gaughan, J. B., & Young, B. A. (1995). True metabolisable energy content of grain legumes: Effects of enzyme supplementation. *Rec. Dev. Anim. Nutr. Aust.(1995)*, 196.

Yin, Z., Guo, W., Xiao, H., Liang, J., Hao, X., Dong, N. & Yin, F. (2018). Nitrogen, phosphorus, and potassium fertilization to achieve expected yield and improve yield components of mung bean. *PloS one*, *13*(10), e0206285.

Yogesh, K., & Ali, J. (2014). Effect of mung bean and sprouted mung bean (Vigna radiata) powder on chicken breast meat tenderness, microbial and sensory characteristics. *Journal of food science and technology*, *51*, 1411-1415.