Sci.Int.(Lahore),28(3), ,2985-2988,2016 ISSN 1013-5316;CODEN: SINTE 8

CARCASS AND DIGESTIBILITY PATTERNS FED DIFFERENT LEVELS OF MUSHROOM (*PLEUROTUS OSTREATUS*) IN THE DIET OF BROILER

Rani Abro[1*],[1]Ghulam Ali Changezi, Shahid Hussain Abro[1], Anila Yasmin[2] , Riaz Ahmed Leghari[1], Huma Rizwana[1] and Ghulam Murtaza Lochi[1]

[1]Faculty of Animal Husbandry and Veterinary Sciences, Sindh Agriculture University Tandojam

[4]Departmentof Biotechnology, Sindh Agriculture University Tandojam

*Corresponding Author: Dr. Rani Abro, Department of Animal Nutrition, Faculty of Animal Husbandry and Veterinary Sciences, Sindh Agriculture University Tandojam, Sindh, Pakistan.

Email: abrosau@yahoo.com

Phone: +92 3072671526

ABSTRACT: *The study was performed to determine the inclusion of different levels of mushroom in the diet of broiler on carcass weight, dressing percentage and digestibility. Two hundred, day-old Chicks were randomly distributed into four equal groups (A, B, C and D) with 3 replicates having 16 chicks per replicate. Group A (control) received basal diet while three different mushroom (Pleurotus ostreatus) concentrations were used as diet treatment i.e. 0.5%/, 1.0%, 1.5% for groups. The broilers were studied to evaluate carcass weight, dressing percentage, weight of edible and non-edible organs and digestibility. Carcass weight (1403.43g/b) and dressing percentage (62.5%) remained highest in group D, followed by groups C, B and A. In case of internal organs weight, edible parts, there was non-significant difference among liver, heart and gizzard weight, but it remained higher in treatment groups. While in case of non-edible parts, like proventiculus, spleen, intestine, feather, fat and shank weight was highest in group D followed by C, B and A groups. Digestibility result including digestible crude protein, digestible metabolizable Energy percentages, digestible ether extract and digestible crude fiber in finisher phase remained significant statistically and showed highest percentage in D.Therefore, it is concluded that addition of 1.5% mushroom broiler ration gives comparatively better results in broiler performance for the digestibility patterns.*

Key words: Broiler, mushroom, digestibility, carcass, feed

INTRODUCTION

The global poultry production has been growing very fast during last few decades both in developed and developing countries. Poultry sector of Pakistan contributes a major role in availability of animal protein in order to decrease the demand of animal protein. The continuity in the growth trend can be expected by increasing feed conversion efficiency and reduced production costs [1]. Therefore, alternative feed ingredients/supplements need to be researched, not only to improve broiler growth, but protect the birds from various disease challenges. The growth can be achieved by the use of various alternate feed resources like mushroom [2].

The mushrooms are valuable and natural source of food around the globe. They belong to kingdom fungi, genusPleurotus.*Pleurotus ostreatus*, also called oyster, abalone, or tree mushrooms[3].These mushrooms look like oysters and they have a rich history in herbal medicine since 3,000 years ago as a tonic for immune system [4]. Mushrooms are an important source of food throughout the world. The protein content is 4% in fresh mushrooms. The protein content of dried mushrooms has been found up to 36.7%[5]. Mushroom protein contains amides, important essential and non-essential amino acids. These are considered good source of proteins, riboflavin B12, thiamin B1, biotin, niancin and trace minerals such as iron, sodium and phosphorus. The fat content contributes the fatty acids source as well [6].

Broiler feeding with certain level of mushroom is one of the alternatives receiving much interest with the poultry nutritionists and producers; because mushroom not only has ability to improve broiler growth. But also its inclusion in the feed improves the immune system of the bird to resist against certain diseases because of lectin. Some of the mushroom species have role in immune response and may protect from the infectious diseases in chicken[7].In view of the facts stated above, the proposed study was carried out to observe the influence of different levels of mushroom on on carcass weight, dressing percentage and digestibility of broilers.

MATERIALS AND METHODS

Two hundred day-old broiler chicks were bought from local market. The broiler (*Gallus domesticus*), chicks were initially weighed and divided randomly into four groups i.e. A, B, C and D having 50 chicks in each group. Then each group were further divided into three replicates having 16 birds in each replicate and Poultry ExperimentalHouse at SAU, Tandojam, Pakistan. Treatment plan of mushroom inclusion levels in commercial ratio for four experimental diets were prepared as A 0 %, B 0.5%, C 1 % and D 1.5% mushroom inclusion rates were designed for assessment of broiler growth. Feed compositionof the diet was used as previously described by Abro et al 2016a; 2016b[8-9]. The feed was given to all experimental chicks according to their treatments. Water and feeding management were performed as routine standards for poultry house.

Carcass weight

On completion of experimental period of 42 days, two birds from every group were weight and slaughtered. Carcass weight was measured after dressing and its dressing percentage was determined by the following formula:

$$\text{Dressing (\%)} = \frac{\text{Total carcass weight (kg)}}{\text{Total live body weight (kg)}} \times 100$$

Weight of edible and non-edible parts

After slaughtering one broiler from each replicate, the liver, heart, gizzard, proventriculus, spleen, intestine, feather and abdominal fat contents were removed, weighed on electric weighing balance and recorded. The edible and non-edible organs were measured and comparative weights were

2986 ISSN 1013-5316;CODEN: SINTE 8 Sci.Int.(Lahore),28(3), ,2985-2988,2016

calculated as percentage of live body weight (organ weight / Total live body weight×100).

Digestibility

Fecal Sample Collection

Feces samples were collected at the end of 39th day for three sequential days and stored at −20℃ till analysis. Fecal material was dried at 65 °C for 48 hours and grindedto get similar size of particles for proximate chemical analysis.

Crude Protein (CP) was performed as 5 gm sample was taken into micro-kjeldhal digester along with a catalyst, (0.2 gm Copper Sulfate and 2 gm Sodium Sulphate) where sulfuric acid (20-30 ml) taken as an oxidizing agent. Digested feed sample was diluted to definite volume with distill water. A known aliquot of the diluted feed sample was mixed with 40% NaOH solution to an excess alkaline reaction and mixture was distilled with steam in micro-kjeldahl apparatus. Stream from the process was distilled over with 5 ml of 2% boric acid for 3 minutes, containing an indicator. The ammonia trapped in solution of boric acid was determined by titration against 0.1 N solutions of HCl. The nitrogen percentage was calculated using following formula.

$$N\ (\%) = \frac{1.4\ (V1-V2) \times \text{Normality} \times 250}{\text{Samples weight}}$$

Protein % =N % X Conversion Factor (100/N% X 6.25)

The Digestibility % for CP was calculated by using following formula:-

CP/ ME Absorbed= CP/ ME Provided-Amount of CP/ ME Excreted

Digestibilty % (CP) =CP Absorbed X 100/Total CP Supplied

Metabolizable Energy (ME) was calculated by putting samples into boom calorie meter

The Digestibility % ME was calculated by using following formula:-

ME Absorbed= ME Provided-Amount of ME Excreted

Digestibility % (ME) =ME Absorbed X 100/Total ME Supplied

The fat was removed using soxhlet apparatus. Performance of the ether extract was calculated with the following formula:

EE (%)= Weight of ash × 100/ Weight of sample

RESULTS AND DISCUSSION

The effect of mushroom in the diet of broiler was evaluated on the carcass weight, dressing percentage and digestibility of broilers. Statistical results of the study are shown in Table -1. The results show significantly higher carcass weight 1403.43 g/ bird in group D and the lowest carcass weight (1200.37 g/bird) was observed in group A fed 1.5% mushroom level.

Table-1.The effect of feeding different levels of mushroom on digestibility, carcass weight, and dressing percentage of broiler.

Parameters	Group				p-value	S.E	LSD
	A	B	C	D			
Carcass weight (g/bird)	1200.37 ^{D}	1273.5 ^{C}	1341.3 ^{B}	1403.43 ^{A}	0.0001	5.3565	17.468
Dressing percentage	57.97	60.48	61.75	62.5	0.1955	1.4192	4.6282
Digestibilty of nutrients (%)							
C.P %	51 ^{D}	54.33 ^{C}	58.34 ^{B}	62.3^{A}	0.0000	0.6496	2.1184
M.E%	82.6 ^{B}	83.73 ^{B}	85.33 ^{A}	86.56 ^{A}	0.0015	0.4577	1.4925
E.E%	12.83	14.46	16.6	17.5	0.0000	0.2972	0.9693
C.F%	33.5 ^{C}	34.6 ^{BC}	35.8 ^{AB}	36.76 ^{A}	0.5698	0.0179	1.8584

S. E (Standard Error), LSD (Least significant difference) , A (Control diet), B (0.5% mushroom level), C (1.0% mushroom level), D (1.5% mushroom level), CP (Crude protein, M.E (Metabolizable energy), E.E (Ether Extract), C.F (Crude fiber)

Table-2. The effect of feeding different levels of mushroom on internal organs of broiler.

Parameters	GROUPS				*P*- Value	LSD
	A	B	C			
Liver (%)	2.20	2.30	2.29	2.31	0.3887	0.1545
Gizzard (%)	1.93	1.99	1.98	2.01	0.3131	0.0977
Heart (%)	0.32	0.39	0.51	0.54	0.0733	0.1028
Provent (%)	0.42	0.51	0.56	0.59	0.06467	0.2420
Spleen (%)	0.08	0.09	0.11	0.36	0.4679	0.4449
Intestine (%)	4.59	4.91	4.95	4.97	0.3646	0.5215
Feather (%)	13.51	13.71	14.14	14.23	0.0874	0.5242
Fat (%)	1.63	1.64	1.70	1.70	0.8752	0.2644
Shank (%)	9.12	9.33	10.01	10.66	0.1007	1.0193

P -value significant level at 0.05, LSD (Least significant difference) , A (Control diet), B (0.5% mushroom level), C (1.0% mushroom level), D (1.5% mushroom level)

Dressing percentage of various treatment groups of broiler was non-significant (P>0.05). Dressing percentage in groups A, B, C and D was 57.97, 60.48, 61.75 and 62.5, respectively. These findings are in accordance with the findings of Pacsi(2012), who found out there is non-significant difference on its statistical analysis[10]. The control treatment had an average dressing percentage of 76.33 while the birds fed commercial feeds.

+ 50 grams raw mushroom has 71.86 followed by commercial feeds + 100 grams raw mushroom which is71.56 and lastly commercial feeds + 150 grams raw mushroom with 70.56 average. Numerically better Dressing percentage was observed in broiler chicks of group D.

In order to examine the effect of various levels of mushroom on Edible parts , the weight of liver, gizzard, heart, was recorded at the end of experiment shown in Table-2, which indicated that the relative organs weight was non-significant (P>0.05) in all groups. Further findings of Buwjoon and Kohen [11], Abolfazl *et al* [12]described that bursa and liver weights of broiler chicks were significantly increased (P<0.05) fed 2% mushroom matched to control. The breast, thigh, spleen and heart weights as a percentage of live weight and intestine length of broilers were not significantly inclined by the supplementary treatments.Numerically increased weight of edible parts was observed in group D. The weight of proventiculus, spleen, intestine, feather, fat and shank, was recorded at the end of experiment. Results regarding relative organ weight were non-significant.

The difference in digestible crude protein of broiler chicks among all groups were highly significant (P<0.000). The average digestible crude protein of broiler chicks was (62.3%) in group D, followed by group-C (58.34%), B (54.33%) and A (51%), respectively. Digestibility percentage for CP, ME and ether extract for finisher phases was recorded maximum in group D. All treated groups showed a better digestibility in comparison to control. The weight of the internal organs of the slaughtered broilers was increased in direct proportion, in

relation to the administration of the mushroom. This study proved that mushroom has a significantly positive effect on broiler digestibility**.** According to Ajala *et al.,* (2003) reported that decreased nutrient absorption in broiler chicken's fed with highly fibrous diet[13].

The difference in digestible metabolized energyof broiler chicks among all groups were highly significant (P<0.0015). The average digestible metabolized energyof broiler chicks was (86.56%) in group D, while the broiler chicks in group-C (85.33%), B (83.73%), A (82.6%), respectively. The higher feed consumption of broilers on mushroom might contain high fibre which had reduced other nutrient contents in diet, therefore to fulfil their energy requirements [14].

The difference in digestible ether extractof broiler chicks among all groups were highly significant (P<0.0000). The digestible crude fiber was lower in broiler chicks of group-A (33.5%) than the broiler chicks in group D (36.76%) (Table-2). Furthermore, broiler chicks in group-D showed significantly higher digestible crude fiber (36.76%) .Similar findings were observed by Khan *et al*., (2005) who demonstrated that heat treatment of diet enhanced texture, taste and nutritive value of mushroom[15]. It was already reported that various physical treatments may influence diet chemical composition, texture and palatability. Particular palatability had been shown to improve feed consumption, thus improve the overall performance of broilers[16-17]. There was non-significant effect of dietary supplementation of mushroom on gastro intestinal tract (GIT) that indicates that GIT can possibly tolerate mushroom without causing any physiological abnormality to main constituents of the digestive tract. This justified there report of Hetland *et al.,* [18] and Svihus *et al.,* ([19]that may be due to the rough nature of mushroom which was able to create a digesta with appropriate chemical and physical features suitable for enzymatic degradation that needed stimulationfor upper digestive tract for proper organ growth and function. High level of mushroom amount to increase level of fiber resulted in major decrease in cost of feed per cost kg weight gain.

CONCLUSION

From the current findings, it was concluded that the addition of 1.5% mushrooms influenced carcass weight, dressing percentage and digestibility of broilers.

REFERENCES

1. Taha, F.A. 2003. "The Poultry Sector in Middle-income Countries and its Feed Requirements: The Case of Egypt". Outlook Report No.WRS03-02.Economic Research Service, USDA. Http: // www.ers. usda.gov / publications.
2. Giannenas, I., I.S. Pappas, S. Marridis, G. KontoPidis, J. Skoufos and I. Kyriazakis.2012. Performance and antioxidant status of broiler chickens supplemented with dried mushroom (*Agaricusbisporus*) in the diet. *Poultry.Science*, **89**: 303-311.
3. Chang, Shu-ting; Miles, Philip G. 2004. Pleut a mushroom of broad adaptability. Mushroom cultivation, nutritional value, medicinal effect and environmental impact. 2nd Ed. CRC, Press, USA, 325-385
4. Carson, T.2014.Oyster Mushroom Health Benefits pp: 1 http: // www. livestrong.com / article /348755 -oyster-mushroom-health-benefits.
5. Khan, D.A. 1975.Prosperous of mushrooms growing in Pakistan. In: proceeding of Seminar on Mushroom Research and Production ARC, Printing Corporation of Pakistan Press, Karachi. P. 1-7.
6. Crisan, E.V. and A. Sands. 1978. Nutritional value in the biology and cultivation of edible mushrooms. Academic Press New York. Pp. 137-168.
7. Willis, W. L., D.C. Wall1, O.S. Isikhuemhen, S. Ibrahim, R.C. Minor,J. Jackson, S.L. Hurley and F.2012. Effect of Different Mushrooms Fed to *Eimeria*-ChallengedBroilers on Rearing Performance. International *Journal of Poultry Science***11**:(7): 433-437.
8. Abro, R., Z.A.Sahito, N. Rajput, SH.Abro, H. Wagan wagan and B.Wagan. 2016. Feeding yacca extract diets influence the live body weight, carcass characteristics,

feed and water intake in broiler chickens.*Sindh University Research*

9. *Journal***48***:145-148*
10. Abro, R., A. Ghaffar, S. H. Abro,H. Wagan, B. Wagan, A.N. Tunio , J.A. Gandahi and M.U. Goraya, H. Rizwana. 2016. Inclusion of Blend of L-lysine, DL-methionine and Vitamins D3, E in Diets for Broiler; Effects on Growth Performance, Feed intake and Conversion and Water Intake. *Journal of Basic and Applied Sciences.***12**:185-191.
11. Pacsi, F. 2012. The effect of raw oyster mushroom (*Pleuotusostreatus*) on thecarcass yield and quality of broilers. Benguet State University, La Trinidad, Benguet
12. Buwjoom, T. andY. Kohen. 2005. Effects of Shiitake Mushroom Stalk Meal on Growth Performance, Carcass Yield and Blood Composition in Broilers. *Journal of Poultry Science***42** : 283-290.
13. Abolfazl, A.D., H.A. Shahryar, A.T. Shaddel, N.S. Maheri, J.G. Ghalehkandi. 2014. Effect of common mushroom (*Agaricus. bisporus*) levels on growth performance and carcass yields of broiler (*Coturnixcoturnix Japonica*). Bull. *Env.Pharmacol. Life Science*, **3**: 01-05.
14. Ajala K, J.O. Agbede and V.A. Aletor. 2003 Influence of roxaxyme G supplementation on the utilization of wheat offal or rice bran by broilers .Proceeding 8th
21. *Science***45**: 55–60.

Annual Conference Animal Science Association of Nigeria (ASAN) Sept 16th-18th2003 University of Technology Minna

15. Aderemi F.A. Tewe O.O. Iyayi E.A and Ladokun O.A 2003. Metabolizable energy and nutrient digestibility of growing pullets fed enzyme supplemented cassava root sieviate (CRS) as a replacement to wheat bran in cassava based diet.*Tropical Animal Production Investigation***6** :135-142.
16. Khan M.A. Jacobsen I.and Eggum B.O. 2005. Nutritive value of some improved varieties of legumes. *Journal of the Science of Food and Agriculture* **30**:395-400
17. Holness D.H.2005. Pigs the Tropical Agriculturist C.T.A. (Technical centre for Agricultural and Rural Co-operation) Editors Rene Coste and Anthony J. Smith).Revised Ed.Macmillan publishers Ltd Oxford pp 152
18. Jurgens, M.H 2002 Animal feeding and nutrition 9th ed Kendall/Hunt pub Coy.IOWA USA pp144-146.
19. Hetland, H., Svihus, B., Krogdahl, Å. 2003. Effects of oat hulls and wood shavings on digestion in broilers and layers fed diets based on whole or ground wheat. *British Journal of Poultry Science***44**: 275–282.
20. Svihus, B., Juvik, E., Hetland, H., Krogdahl, Å. 2004. Causes for improvement in nutritive value of broiler chicken diets with whole wheat instead of ground wheat. *British Journal of Poultry*