



Effects of Feed Additives on Productive and Reproductive Performance of Khaki Campbell Duck in Kuliarchor Upazilla, Kishoreganj District, Bangladesh

**Md. Riadul Hasan¹, Saiful Islam², Razib Das³, Mowdudul Hasan Talha⁴,
MaHFuz Rahman Adnan⁴, Mamun Ur Rahman⁴, Md. Emdadul Haque⁵,
Md. Matiur Rahman^{6*} and Md. Matiar Rahman Howlader²**

¹ACI Animal Health, ACI Ltd, Bangladesh.

²Department of Physiology, Sylhet Agricultural University, Bangladesh.

³Department of Livestock Services, Bangladesh.

⁴MS Fellow, Sylhet Agricultural University, Bangladesh.

⁵Agrovet Division, Square Pharmaceuticals Ltd, Bangladesh.

⁶Department of Medicine, Sylhet Agricultural University, Bangladesh.

Authors' contributions

This work was carried out in collaboration between all authors. Author MRH designed the research methodology and wrote the whole entire manuscript. Authors SI and MMRH were jointly supervised the whole research work from the beginning to finish and also check the final draft. Authors MHT, MRA and MUR were collected the data from the field. Authors RD and MEH were performed the statistical analysis of the manuscript. Author MMR was corresponded with the journal for publication of this manuscript and also re corrected all revised draft. All authors were read, check and finally approved the final manuscript.

Article Information

DOI: 10.9734/AJAAR/2017/36351

Editor(s):

- (1) Rajesh Kumar, Department of Veterinary and Animal Husbandry Extension, College of Veterinary Science & A.H., Junagadh Agricultural University, Junagadh, India.
- (2) Wuyi Liu, Professor, Department of Science & Technology Research, Fuyang Normal College (West), Anhui Province, China.

Reviewers:

- (1) Akapo Olajetemi Abiola, Federal University of Agriculture Abeokuta, Nigeria.
- (2) Kanan Tyohemba Orayaga, Federal University of Agriculture Makurdi, Nigeria.
- (3) Hazem Mohammed Ebraheem Shaheen, Damanhour University, Egypt.
- (4) Jiwuba, Peter-Damian Chukwunomso, Federal College of Agriculture, Nigeria.
- (5) Nelson Pérez Guerra, University of Vigo, Spain.

Complete Peer review History: <http://prh.sdiarticle3.com/review-history/22164>

Original Research Article

Received 24th August 2017
Accepted 29th November 2017
Published 5th December 2017

ABSTRACT

To study the effects of feed additives on productive and reproductive performance of Khaki Campbell in Kuliarchar Upazilla, Kishoreganj district of Bangladesh. The study was carried out between August, 2014 to May, 2015 at Kuliarchar Upazilla, Kishoreganj district of Bangladesh. A total of 120 female day-old Khaki Campbell ducklings were procured from local market from Kuliarchar Upazilla. The ducklings were randomly distributed into 4 treatment groups A; Digester[®], B; Vitapoultry[®], C; Alqurzim[®] and D; control) and the additives were included in diets at 2g/kg feed. Body weight, egg production, fertility%, hatchability% were increased in treated groups with the helping of feed additives compared with untreated group. Among with others minerals, the group B treated by Vitapoultry[®] gave significantly good result compared with others. Feed additives had tremendous result both productive and reproductive performance of Khaki Campbell ducks. So, it will be better to use vitamin, mineral and amino acid containing feed additives with basal feed for enhancing the productive and reproductive performance of Khaki Campbell ducks for enhancing the elimination of poverty in these haor area by increasing the daily income of the farmers. Further molecular and serological studies need to develop specific diet chart for breed to breed in haor area.

Keywords: Duck; feed additives; performance; Kishoreganj; Bangladesh.

1. INTRODUCTION

The economy of Bangladesh largely depends on agriculture and it is the principal occupation of the rural people. The Government has identified agriculture and rural development as the topmost priority sector for rapid poverty reduction. The rural economy as a whole contributes more than 56% of total GDP where the contribution of rural non-farm sector is 36.71% [1]. Agriculture generates 48.4% of total employment, contributes a quarter of total export earnings and provides food security for the increasing population [2]. The supply and demand gap of animal protein can be met by increasing the production of poultry meat. Among poultry, raising of ducks is more profitable in Bangladesh. Ducks can be easily brooded, considerably cheaper to raise, do not require any elaborate and expensive housing and equipment, needless care and they are more resistant to diseases and have no cannibalism and agnostic behavior [3,4]. Duck population in Bangladesh has been reported to be 45.12 million [2] mostly of indigenous type although genetic dilution in some regions has occurred due to distribution of high yielding breeds or strains. Ducks in Bangladesh are traditionally reared as family poultry following free range scavenging system. Farmers, who cannot afford to keep large animals because of the big investment required, can easily maintain a few chicken or ducks within their homestead premises [5]. Ducks rank second, next to chicken in the country in terms of total egg and meat production [4]. It has been stated that national share of egg production from

commercial and family poultry is almost equal and that of meat production is 60:40 [6] in Bangladesh. Ducks being an important poultry species, can contribute efficiently in increasing egg and meat production in the haors or low laying areas of north-eastern districts. Ducks are natural foragers and thus help to control weed and pests that attack field crops, particularly rice which ultimately helps the farmer [7]. Ducks ranked 2nd place as the supplier of eggs and meat and about 98% of ducks in Bangladesh are traditionally reared under the existing scavenging system [8]; 90 to 95% of which are of Desi (native) type [4]. In Bangladesh, the available duck genotypes are Khaki Campbell, Indian Runner, Jinding, Pekin, Muscovy and Desi [4]. The haor basin located in the north-eastern region of Bangladesh is a wetlands ecosystem considered to be of international ecological importance due to the extensive waterfowl population that uses the basin as its habitat. There are altogether 423 small and large haors in Bangladesh [1] comprising an area of about 8000 km² dispersed in the districts of Sunamgonj, Sylhet, Moulvibazar, Hobigonj, Netrokona and Kishoreganj [9]. Despite the economic importance of the Haors, people in the region are poorer than any other parts of the country. More than 28% of the total population here lives below the lower poverty line and development potentials are huge, but need an integrated approach for maximizing the utilization of resources, both human and natural resources [10]. Ducks in the haors area of Bangladesh provides self-employment for landless and small farmers. There is a great potentiality of improving

the productivity of ducks in coastal and *haor* (large marshy land) areas through supplementary feeding. Recently, Pervin et al. [11] reported that the growth performance of *desi* ducklings could be improved by supplementation of improved diets under scavenging system of rearing. Duck keeping is an integral part of the rural farming system that provides family income for the small, marginal and landless poor. It was found 78 per cent of egg and 86 per cent of poultry meats are produced by the smallholders under scavenging condition. Rearing of ducks gives maximum return with minimum cost. Ducks are efficient converter of agricultural by-products; kitchen wastes, seeds, grains, garden left over, insects, green grasses and all other human refuse that would otherwise waste. Ducks occupy second place in comparison with chicken in producing meat and egg in the country. Ducks are traditionally raised under scavenging [8] by the smallholders in haors and low-lying areas with little or no feed supplementation. Duck production in the Kishoreganj districts of Bangladesh provides self-employment for landless and small farmers. There is a great potentiality of improving the productivity of ducks in low-lying and haors areas through supplementary feeding. Khaki Campbell duck being an important poultry species can contribute efficiently in increasing egg and meat production than chicken in the haors or low lying areas in Kishoreganj districts. No systematic study has yet been done to assess the potentiality of existing duck rearing system in the haor area. In consideration of these factors, this study was designed to study the effects of feed additives on productive and reproductive performance of Khaki Campbell ducks in Kuliarchar Upazilla, Kishoreganj district, Bangladesh.

2. MATERIALS AND METHODS

2.1 Study Area

The study was carried out in Ramdi, Kuliarchar upazilla, Kishoreganj district. Kuliarchar is located at 24.1542°N 90.9000°E. It has 26143 units of house hold and total area 104.01 km². It is in north east side of Bangladesh [11]. As of the 1991 Bangladesh census, Kuliarchar has a population of 133327. Males constitute 50.61% of the population, and females 49.39%. This Upazila's eighteen up population is 67006. Kuliarchar has an average literacy rate of 21.6% (7+ years), and the national average of 32.4%

literate. Kuliarchar has 6 Unions and 1 Proshaba, 46 Mauzas/Mahallas and 131 villages.

2.2 Study Time

The study was carried out in Kuliarchar Upazilla, Kishoreganj district during the period of August 2014 to May 2015.

2.3 Sampling Pattern

The data were collected from farmers directly face to face interview and measurements were taken by own self with the help of a weigh balance. In order to evaluate effects of feed additives on productive and reproductive performance of Khaki Campbell duck the parameters were well thought-out that was body weight, egg weight, egg production, onset of puberty, fertility (%), hatchability (%).

2.4 Materials and Facilities Used in the Study

A total of 120 female day-old ducklings (Khaki Campbell) were procured from the local farmer of Kuliarchor Upazilla. The ducklings were randomly distributed into 4 treatment groups that is group A, group B, group C and group D (untreated control) and each group contained 30 ducks. Group A, group B, and group C were treated by Digester[®], Vitapoultry[®], Alqurzim[®] respectively which is marketed by ACI animal health Limited. All ingredients were supplied 2 g/kg feed daily.

2.5 Experimental Programme

The experiment was carried out for a period of 40 weeks to study the effects of feed additives on body weight, egg production, egg weight, puberty, fertility, hatchability of Khaki Campbell ducks. One hundred and twenty female day-old ducklings of Khaki Campbell were divided into four treatment groups. There were 30 ducklings in each treatment group. During experimental period all Khaki Campbell ducks were provided with a balanced diet and feed additives with abundant fresh water.

2.6 General Management

Before the onset of experiment the house was cleaned, disinfected and dried thoroughly. Virocid[®] was used as a disinfectant to kill the organisms at the of the brooder house. Feed and water was provided adlibitum during the brooding

period. To facilitate *ad lib* intake, fresh feed and water was provided daily in the morning and afternoon. The left over feed was collected,

weighed and dried to know the daily feed intake. Routine management practices were adopted for all treatment groups.



Fig. 1. Day old Khaki Campbell ducklings after hatching



Fig. 2. Feeding of Khaki Campbell ducks and ducklings with feed additives riched feed



Fig. 3. Feed additives used in my study



Fig. 4. Adult laying duck during feeding in dry season

2.7 Statistical Analysis

Mean value (MV) and standard errors (SE) for different traits were estimated with the help of SPSS version 13 [12].

3. RESULTS AND DISCUSSION

3.1 Results

The productive performance i.e body weight, egg weight, egg production were shown in Table 1 and reproductive performance i.e onset of puberty, fertility (%) hatchability (%) were shown in Table 2.

3.2 Discussion

The body weight of Khaki Campbell ducks recorded at day one, 4 weeks, 8 weeks, 12 weeks, 16 weeks, 20 weeks, 24 weeks and 40 weeks of age during the experiment (Table 1). Body weight of all groups reduced at 40 weeks of age. This down ponderal weigh in lay period by comparison with breeding period is essentially caused by an intensity of lay. The weight was higher in group B treated by Vitapoultry® in every stage of weighing compare with other. The body of control group was lower than the treated group. There was a significant ($p < 0.01$) difference between the treated group and control group. The present findings were almost similar with the Chakravarti and Mohan [13]. They recorded the body weight of Khaki Campbell duck at 8 weeks, 12 weeks, 20 weeks and 72 weeks of age were 448.97 ± 0.81 , 921.86 ± 0.60 , 1359.11 ± 7.03 and 1590.86 ± 1.74 g respectively. They also reported that during lay period ducks

have given a weight of 1760 ± 151.6 g and 1715 ± 159.5 g respectively for witness and experimental diets. They found the final body weight and body weight gain were highest in subgroups feed *ad-libitum* with weak significant difference with the group of control. The egg production of Khaki Campbell ducks recorded (Table 1). There was a significant difference ($p < 0.01$) between the treated group and control group in 32-36 weeks of age. The feed additives enhance the increasing of egg production in duck. The present findings were almost similar with the findings of Chakravarti and Mohan [13]. The reported that Khaki Campbell had high egg productivity than other breed when supplied feed additives with basal breed. Awad et al. [14] reported that egg number per duck were insignificantly higher for ducks fed diet supplemented with different betaine levels as compared to those fed the control diet. The egg weight of Khaki Campbell ducks recorded (Table 1). Significance difference ($p < 0.01$) found in 32-36 weeks and 36-40 weeks of age. Feed additives directly effects on egg weight of ducks. The treated group Vitapoultry® gave highest weight of eggs compared with other. The results was in agreement with those reported by Hetzel [15] who reported that Khaki Campbell ducks laid high weight egg required compared with other breeds. Awad et al. [14] reported that the egg weight of duck increased when supplemented of feed additives with basal feeds. They found egg weight at 24 weeks and 40 weeks of age 59.89 ± 0.06 , 58.52 ± 0.77 , 59.65 ± 0.20 , 60.06 ± 0.71 g and 70.46 ± 0.63 , 70.36 ± 0.91 , 71.70 ± 0.24 , 71.16 ± 0.62 g respectively. The onset of puberty of Khaki Campbell recorded at group A, group B, group C and group D were 23.9 ± 0.12 ,

Table 1. Effects of feed additives on productive performance of khaki campbell duck

Age (weeks)	Body weight (g)				Significance
	Group A	Group B	Group C	Group D	
	Digester® (2 g/kg feed)	Vitapoultry® (2 g/kg feed)	Alqurzim® (2 g/kg feed)	Control	
Day old	39.79±0.20	41.39±0.69	40.59±1.57	39.10±0.87	NS
4	230.23±0.21	256.45±0.98	213.43±0.11	196.51±0.26	NS
8	447.40±0.81	481.36±0.51	438.25±0.61	385.30±0.76	S
12	882.86±0.45	921.87±0.60	857.54±0.87	828.66±0.83	S
16	1033.00±0.34	1061.88±0.57	993.98±0.47	917.87±0.67	S
20	1291.23±5.13	1359.11±7.03	1237.80±0.87	1156.27±1.38	S
24	1735.23±5.77	1784.23±2.56	1716.32±2.15	1545.78±1.12	S
40	1584.94±7.47	1616.7±8.72	1547.9±7.96	1406.9±8.82	S
Productive performance: (Egg production)					
24-28	19.70±0.64	19.78±0.61	18.76±0.56	18.51±1.25	NS
28-32	22.81±0.67	22.67±0.70	23.56±0.87	21.56±0.67	NS
32-36	18.44±0.45	20.09±0.38	17.91±0.56	17.62±0.26	S
36-40	14.61±0.69	15.83±1.65	15.16±0.46	14.42±0.79	NS
Productive performance: (Egg weight)					
24-28	59.65±0.20	60.06±0.71	58.52±0.77	57.89±0.06	NS
28-32	58.07±0.33	58.34±0.55	58.13±0.86	57.96±0.27	NS
32-36	60.76±0.86	62.67±0.09	60.02±1.00	59.86±0.48	S
36-40	66.70±0.24	68.16±0.62	65.46±0.63	64.36±0.91	S

*S means Significant, NS means Non Significant
(p-value <0.01)*

Table 2. Effects of feed additives on reproductive performance of Khaki Campbell duck

Traits	Group A	Group B	Group C	Group D	Significance
	Digester®	Vitapoultry®	Alqurzim®	Control	
	(2 g/kg feed)	(2 g/kg feed)	(2 g/kg feed)		
On set Puberty (Week)	23.9±0.12	22.54±0.17	23.14±0.57	24.14±0.61	NS
Fertility (%)	83.78±0.57	85.44±2.46	84.28±0.24	78.49±2.74	S
Hatchability (%)	67.27±8.09	68.16±7.68	64.94±0.97	58.85±3.83	S

*S means significant, NS means non significant,
(p-value<0.01)*

22.54±0.17, 23.14±0.57, 24.14±0.61 weeks respectively. The fertility of egg (%) of Khaki Campbell recorded at group A, group B, group C and group D were 83.78±0.57, 85.44±2.46, 84.28±0.24 and 78.49±2.74 respectively (Table 2). The fertility (%) of egg were significantly different (p<0.01) between the groups. The findings were almost similar with Awad et al. [14]. He found fertility rate (%) 87.78±0. Fertility percentage was insignificantly improved by supplementing 0.5 and 1.0 g B/kg diet. The hatchability (%) highest in treated groups compared with the control group. The present

study was similar with the findings of Awad et al. [14]. He recorded the hatchability (%) was 63.61±7.68. He reported that hatchability percentage fertile eggs were significantly improved by supplementing 0.5 g B/kg diet as compared to the control.

4. CONCLUSION AND RECOMMENDATION

Feed additives had tremendous result both productive and reproductive performance of Khaki Campbell ducks compared with control

group in Kuliarchar Upazilla, Kishoreganj district. Specifically Vitapoultry[®] had very good result when mixed with the basal feed and provided daily to the duck. So, it was recommended that use of vitamin, mineral and amino acid containing feed additives with basal feed might be helpful for enhancing the productive and reproductive performance of Khaki Campbell ducks in Bangladesh. Further studies need to develop an appropriate implementation of using feed additives with basal feed in ducks in Bangladesh.

ACKNOWLEDGEMENT

This study was the MS thesis of 1st author. The author was very much grateful to the farmers of the haor area of Kuliarchar for providing all necessary information to complete this study. All authors were share their scientific knowledge in optimum level and approved the final manuscript.

COMPETING INTERESTS

Authors have declared that no competing interests exist. There is absolutely no conflict of interest between the authors and producers of the products, because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

REFERENCES

1. BER. Bangladesh economic review. Ministry of Finance, Government of the Peoples' Republic of Bangladesh, Dhaka; 2012.
2. Islam S. An Economic study on different farming systems in Dingaputa Haor area of Netrokona District. M.S. Thesis, Department of Agricultural Economics, Bangladesh Agricultural University, Mymensingh; 2012.
3. Batty J. Domesticated ducks and geese. Spur Publications, Saiga Publishing Co. Ltd. England. 1979;116 and 143.
4. Ahmed S. Duck production in Bangladesh. In "Duck Production Science and World Practice". Farrell, D. J. and P. Stapleton, (Ed.). University of New England, Armidale, Australia. 1986;342-350.
5. Das SC, Chowdhury SD, Khatun MA, Nishibori M, Isobe N, Yoshimura Y. Poultry production profile and expected future projection in Bangladesh. World's Poultry Science Journal. 2008;64:99-116.
6. Bhuiyan AKFH. Implementation of National Livestock Development Policy (2007) and National Poultry Development Policy (2008): Impact on smallholder livestock rearers. Keynote paper presented at the South Asia Pro Poor Livestock Policy Programme (SAPPLP)-BRAC workshop held at BRAC Centre, Dhaka; 2011.
7. Manda M, Uchida H, Nakagama A, Matsumoto S, Shimoshikiryo K, Watanabe S. Effects of Aigamo ducks (crossbred of wild and domestic ducks) herding on weeding and pest control in the paddy fields. Japanese Poultry Science. 1993;30: 365-370.
8. Salahuddin M, Barua A, Rashid N and Howlider MAR. A study on the relationship of egg weight with fertility and hatchability of Desi ducks. Poultry Guide. 1991;28(3): 34-37.
9. Alam MS, Quayu MA, Isla MA. Crop Production in the Haor Areas of Bangladesh: Insights from Farm Level Survey. A Scientific Journal of Krishi Foundation, 8(2), Agricultural Economics Division, Bangladesh Rice Research Institute, Gazipur- 1701, Bangladesh. 2011;88-97.
10. BHWDB. Bangladesh Haor and Wetland Development Board, Ministry of Water Resources, Government of the People's Republic of Bangladesh, Dhaka; 2011.
11. Pervin W, Chowdhury SD, Ali MA, Khan JU, Raha SK. Growth performance of indigenous (*desi*) ducklings receiving diets of varying nutrient concentrations. In: Proceedings of 8th Poultry Show and Seminar, World's Poultry Science Association, Bangladesh Branch. 2013;45-50.
12. Coakes SJ, Steed L, Dzidic P. SPSS Version 13.0 for Windows. John Willey and Sons Australia Ltd, Australia; 2016.
13. Chakravathi PV, Mohan B. Comparison of performance of Khaki Campbell Ducks under organized farm and field conditions, Shanlan International Journal of Veterinary Science. 2014;2(2):1-3.
14. Awad AL, Fahim HN, Ibrahim AF, Beshara MM. Effect of dietary betaine supplementation on productive and reproductive performance of domyati

- ducks under summer conditions. Animal Production Research Institute, Agricultural Research Center, Ministry of Agricultural, Dokki, Giza. Egypt. Poultry Science. 2014;34(2):453-474.
15. Hetzel DJS. The growth and carcass characteristics of crosses between Alabio and Tegal ducks and Muscovy and Pekin drakes. British Poultry Science. 1983;24: 555-563.

© 2017 Hasan et al.; This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Peer-review history:
The peer review history for this paper can be accessed here:
<http://prh.sdiarticle3.com/review-history/22164>