

Original Research Article

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

ABSTRACT

Khaki Campbell duck being an important poultry species can contribute efficiently in increasing egg and meat production in the Kuliarchar Upazilla, Kishoreganj district. The study was carried out in Kuliarchar upazilla, Kishoreganj during the period of August 2014 to May 2015. A total of 120 female day-old ducklings (Khaki Campbell) were procured from the local farmer from Kuliarchor Upazilla. The ducklings were randomly distributed into 4 treatment groups i.e group A, group B, group C and group D (untreated control), were treated by Digester[®], Vitapoultry[®], Alqurzim[®] respectively which is marketed by ACI animal health Limited. All ingredients were supplied 2g/kg feed daily. Body weight was increased day by day with the helping of feed additives. Digester[®], Vitapoultry[®], Alqurzim[®] had direct effects on the growth of ducklings. The weight was higher in group B treated by Vitapoultry[®] in every stage of weighing compare with other. The body weight 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 egg production of Khaki Campbell ducks recorded at 24-28 weeks, 28-32 weeks, 32-36 weeks, 36-40 weeks of age at group A, group B, group C and group D were 19.70 ± 0.64 , 19.78 ± 0.61 , 18.76 ± 0.56 , 18.51 ± 1.25 ; 22.81 ± 0.67 , 22.67 ± 0.70 , 23.56 ± 0.87 , 21.56 ± 0.67 ; 18.44 ± 0.45 , 20.09 ± 0.38 , 17.91 ± 0.56 , 17.62 ± 0.26 ; 14.61 ± 0.69 , 15.83 ± 1.65 , 15.16 ± 0.46 , 14.42 ± 0.79 number respectively. There was a significant difference ($p < 0.01$) between the treated group and control group in 32-36 weeks of age. The weight of the egg of treated group was higher than the control group. The

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Comment [U2]: Correct: August, 2014 and May, 2015

Comment [U3]: Remove the brackets and move it after day-old

Comment [U4]: 'a', instead of the

Comment [U5]: This sentence is cumbersome. Correct it. If you like: 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.

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Comment [U7]: Consider merging it as suggested above rewrite appropriately. It is wrong to say all ingredients were supplied 2g/kg feed daily

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25 onset of puberty of Khaki Campbell recorded at group A, group B, group C and group D were
26 23.9±0.12, 22.54±0.17, 23.14±0.57, 24.14±0.61 weeks respectively. The fertility of egg (%) of
27 Khaki Campbell recorded at group A, B, C and D were 83.78±0.57, 85.44±2.46, 84.28±0.24 and
28 78.49±2.74 respectively. The Hatchability (%) of Khaki Campbell recorded at group A, B, C and
29 D were 67.27±8.09, 68.16±7.68, 64.94±0.97, 58.85±3.83. The hatchability (%) highest in treated
30 groups compared with the control group. Feed additives had tremendous result both productive
31 and reproductive performance of Khaki Campbell duck compared with control group in
32 Kuliarchar Upazilla, Kishoreganj district. Specifically Vitapoultry[®] had very good result when
33 mixed with the basal feed and provided daily to the duck. So, my recommendation is to use
34 vitaamin, mineral and amino acid containing feed additives with basal feed for enhancing the
35 productive and reproductive performance not Khaki Campbell but all other breeds of duck in
36 Bangladesh. Further studies need to develop an appropriate implementation of using feed
37 additives with basal feed in ducks in Bangladesh.

38

39 **Keyword:** Duck, feed additives, performance, Kishoreganj, Bangladesh.

40 1. INTRODUCTION

41 The economy of Bangladesh largely depends on agriculture and it is the principal occupation of
42 the rural people. The Government has identified agriculture and rural development as the
43 topmost priority sector for rapid poverty reduction. The rural economy as a whole contributes
44 more than 56% of total GDP where the contribution of rural non-farm sector is 36.71% [1].
45 Agriculture generates 48.4% of total employment, contributes a quarter of total export earnings
46 and provides food security for the increasing population [2]. The supply and demand gap of
47 animal protein can be met by increasing the production of poultry meat. Among poultry, raising

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48 of ducks is more profitable in Bangladesh [1]. Ducks can be easily brooded, considerably cheaper
49 to raise, do not require any elaborate and expensive housing and equipment, needless care and
50 they are more resistant to diseases and have no cannibalism and agnostic behavior [3,4]. Duck
51 population in Bangladesh has been reported to be 45.12 million [2] mostly of indigenous type
52 although genetic dilution in some regions has occurred due to distribution of high yielding breeds
53 or strains. Ducks in Bangladesh are traditionally reared as family poultry following free range
54 scavenging system. Farmers, who cannot afford to keep large animals because of the big
55 investment required, can easily maintain a few chicken or ducks within their homestead premises
56 [5]. Ducks rank second, next to chicken in the country in terms of total egg and meat production
57 [4]. It has been stated that national share of egg production from commercial and family poultry
58 is almost equal and that of meat production is 60:40 [6] in Bangladesh. Ducks being an important
59 poultry species, can contribute efficiently in increasing egg and meat production in the haors or
60 low laying areas of north-eastern districts. Ducks are natural foragers and thus help to control
61 weed and pests that attack field crops, particularly rice which ultimately helps the farmer [7].
62 Ducks ranked 2nd place as the supplier of eggs and meat and about 98% of ducks in Bangladesh
63 are traditionally reared under the existing scavenging system [8]; 90 to 95% of which are of Desi
64 (native) type [4]. In Bangladesh, the available duck genotypes are Khaki Campbell, Indian
65 Runner, Jinding, Pekin, Muscovy and Desi [4]. Among these, Pekin is an excellent meat
66 producing duck. But they have poor scavenging ability and high mortality under extensive
67 condition [4]. On the contrary, Desi birds are well adapted to poor management and rural
68 conditions of Bangladesh [9,10,11]. The haor basin located in the north-eastern region of
69 Bangladesh is a wetlands ecosystem considered to be of international ecological importance due
70 to the extensive waterfowl population that uses the basin as its habitat. There are altogether 423

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71 small and large haors in Bangladesh [1] comprising an area of about 8000 km² dispersed in the
72 districts of Sunamgonj, Sylhet, Moulvibazar, Hobigonj, Netrokona and Kishoreganj [13].
73 Despite the economic importance of the Haors, people in the region are poorer than any other
74 parts of the country. More than 28% of the total population here lives below the lower poverty
75 line [13]. Development potentials are huge, but need an integrated approach for maximizing the
76 utilization of resources, both human and natural resources [13]. Ducks in the haors area of
77 Bangladesh provides self-employment for landless and small farmers. There is a great
78 potentiality of improving the productivity of ducks in coastal and *haor* (large marshy land) areas
79 through supplementary feeding. Recently, Pervin et al. [14] reported that the growth performance
80 of *desi* ducklings could be improved by supplementation of improved diets under scavenging
81 system of rearing. Duck keeping is an integral part of the rural farming system that provides
82 family income for the small, marginal and landless poor. It was found 78 per cent of egg and 86
83 per cent of poultry meats are produced by the smallholders under scavenging condition. Rearing
84 of ducks gives maximum return with minimum cost. Ducks are efficient converter of agricultural
85 by- products; kitchen wastes, seeds, grains, garden left over, insects, green grasses and all other
86 human refusal that would otherwise waste. Ducks occupy second place in comparison with
87 chicken in producing meat and egg in the country. Ducks are traditionally raised under
88 scavenging [8] by the smallholders in haors and low-lying areas with little or no feed
89 supplementation. Duck production in the Kishoreganj districts of Bangladesh provides self-
90 employment for landless and small farmers. There is a great potentiality of improving the
91 productivity of ducks in low-lying and haors areas through supplementary feeding. Khaki
92 Campbell duck being an important poultry species can contribute efficiently in increasing egg
93 and meat production than chicken in the haors or low lying areas in Kishoreganj districts. No

94 systematic study has yet been done to assess the potentiality of existing duck rearing system in
95 the haor area. In consideration of these factors, this study was designed to fulfill with the
96 following objectives:

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97

- 98 • To study the effects of feed additives on productive and reproductive performance of
99 Khaki Campbell in Kuliarchar Upazilla, Kishoreganj district of Bangladesh.

100

101 2. MATERIALS AND METHODS

102

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

105

106 2.1 Study Area

107 The study was carried out in Ramdi, Kuliarchar upazilla, Kishoreganj district. Kuliarchar is
108 located at 24.1542°N 90.9000°E . It has 26143 units of house hold and total area 104.01 km². It is
109 in north east side of Bangladesh [15]. As of the 1991 Bangladesh census, Kuliarchar has a
110 population of 133327. Males constitute 50.61% of the population, and females 49.39%. This
111 Upazila's eighteen up population is 67006. Kuliarchar has an average literacy rate of 21.6% (7+
112 years), and the national average of 32.4% literate. Kuliarchar has 6 Unions and 1 Proshaba, 46
113 Mauzas/Mahallas and 131 villages.

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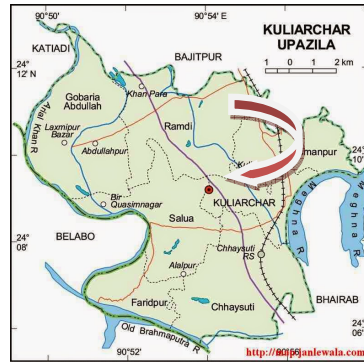


Figure A. Map of my study area

2.2 Study time

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

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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 following parameters were well thought-out:

1. Body weight
2. Egg weight
3. Egg production
4. Onset of puberty
5. Fertility (%)
6. 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. Digester[®] is a probiotics which enhance the growth of the animal. Vitapoultry[®] is one of the best vitamin and mineral premix which enhance the growth rate, egg production as well as meat production of the poultry. Alqurzim[®] helps in improving the digestibility of the poultry. All ingredients were supplied 2g/kg feed daily. The individual body weight of ducklings was recorded.

Table 1. List of the feed additives used in experiment

Name of the feed additives	Composition	Dose
Digester [®]	Probiotics	2g/kg feed
Vitapoultry [®]	Vitamin, minerals and amino acids	2g/kg feed
Alqurzim [®]	Enzyme	2g/kg feed

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

152 four treatment groups. There were 30 ducklings in each treatment group. During experimental
153 period all Khaki Campbell ducks were provided with a balanced diet and feed additives with
154 abundant fresh water.

155

156 **2.6 General management**

157

158 Before the onset of experiment the house was cleaned, disinfected and dried thoroughly.
159 Virocid[®] was used as a disinfectant to kill the organisms at the of the brooder house. Feed and
160 water was provided adlibitum during the brooding period. To facilitate *ad lib* intake, fresh feed
161 and water was provided daily in the morning and afternoon. The left over feed was collected,
162 weighed and dried to know the daily feed intake. Routine management practices were adopted
163 for all treatment groups.

164

165 **2.7 Statistical Analysis**

166

167 Mean value (MV) and standard errors (SE) for different traits were estimated with the help of
168 statistical analysis system computer software.



Figure 1. Day old Khaki Campbell ducklings after hatching



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



Figure 3. Feed Additives used in my study



Figure 4. Adult laying duck during feeding in dry season

3. RESULTS

The study was carried out in Kuliarchar upazilla, Kishoreganj during the period of August 2014 to May 2015. A total of 120 female day-old ducklings (Khaki Campbell) were procured from the local farmers of Ramdi, Kuliarchor Upazilla. The ducklings were randomly distributed into 4

186 treatment groups that is group A, group B, group C and group D (untreated control). Group A,
 187 group B, and group C were treated by Digester[®], Vitapoultry[®], Alqurzim[®] respectively which is
 188 marketed by ACI animal health Limited. All feed additives mixed with basal feed @ 2g/kg
 189 daily.

190

191 **Table 2. Effects of feed additives on Productive performance of Khaki Campbell Duck**

Age (Weeks)	Body weight (g)				Significance
	Group A Digester [®] (2g/kg feed)	Group B Vitapoultry [®] (2g/kg feed)	Group C Alqurzim [®] (2g/kg feed)	Group D 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

192 S means Significant, NS means Non Significant

193

194 **Table 4. Effects of feed additives on Reproductive performance of Khaki Campbell duck**

Traits	Group A Digester [®] (2g/kg feed)	Group B Vitapoultry [®] (2g/kg feed)	Group C Alqurzim [®] (2g/kg feed)	Group D Control	Significance
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
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S means Significant, NS means Non Significant

4. 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 2). 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 [16]. 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 2). 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 [16]. The reported that Khaki Campbell had high egg productivity than other breed when supplied feed additives with basal breed. Awad et al. [18] 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 2). 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 [19] who reported that Khaki Campbell ducks laid high weight egg required compared with other breeds. Awad et al. [18] 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, 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 4). The fertility (%) of egg were significantly different ($p<0.01$) between the groups. The findings were almost similar with Awad et al. [18]. 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 similar with the findings of Awad et al. [18]. 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.

5. CONCLUSION AND RECOMMENDATION

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

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

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Comment [U18]: There is a gross mix up in these two sections:

- i. The materials and methods is not clearly written; it is difficult to know what was actually done; were the productive performance from the farmers or the birds you fed? What is the composition of the diet used in feeding the ducks?
- ii. Results and discussions, still appearing as if it were materials and methods
- iii. Mean separations were not done on parameters with significant differences
- iv. Productive parameters were too few (weight and egg only).
- v. Instruments for egg measurement were too few and unconventional.

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