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Performance of Indian Runner, Zending and Khaki Campbells in Integrated Duck-Cum-Fish Farming System

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Abstract: An experiment was carried out to assess the performance of Indian Ranner (IR), Khaki Campbell (KC), Zending (Z) ducks in an integrated duck-cum-fish farming system for a period of 15 months. Two hundred-seventy number 90-days-old duckling of Indian Runner, Khaki Campbell and Zending ducks fed (115g/duck day^{-1}) on a formulated feed containing 18.41% crude protein and 2720.50 ME (kcal kg^{-1}) of energy for grower ration and 16.68% crude protein and 2637.00 ME (kcal kg^{-1}) of energy for layer ration. The results showed that the three genotypes were almost similar in body weight gain, mortality, egg production, feed conversion and egg weight ($P>0.05$). In respective of breed, egg production (nos./ duck) was inversely correlative ($r = -0.33$; $P<0.001$) with fish production (kg/duck). The total income from egg, fish, Spent duck and net profit per duck were almost similar in three breeds ($P>0.05$).

Key words: Duck-cum-fish farming, duck

Introduction

Duck-cum-fish farming is getting its importance all over the world (Woynarovich, 1980; Engle, 1987) and fits very well with the niche concept of polyculture (Ali *et al.,* 1992; Latif *et al*., 1993). Ducks consume organism and such as aquatic insect and weeds which are not generally eaten by commonly stocked fishes particularly carps. In addition harmful organisms to fishes eliminated (Waynarovich, 1980). Fishes get this major nutrition from feeding on ducks waste, duck feed and from natural fish food organisms produced in the ponds by duck faeces manuring (Wohlfarth and Schroeder, 1979). Raising ducks on fish ponds is a new concept in integrated farming in Bangladesh aimed at optimum utilization of resources, land, through recycling of wastes from one enterprise to another for maximizing benefit. This integration holds promise in developing countries where farmers with limited resources have to make efforts for integrating their various farming activities (Gupta, 1991).

One of the most important factors affecting profit of duck is genotypes. Some investigation have been done with Khaki campbell (Latif *et al*., 1993; Ali *et al*., 1992) and Peking (Martyshev, 1983) and Indian Runner and indigenous ducks (Hamid *et al*., 1988) and cross breed (Edwards, 1983) and encouragable results were obtained. Limited information is available on the comparative performance of different duck genotypes in the same ecological pattern where integrated with fish culture. So, the present study was undertaken to evaluate the growth performance, survival rate, egg production and profitability of three genotypes of ducks raised over ponds in integrated duck-cum- fish farming system in the same climatic condition.

Materials and Methods

The experiment was carried out of fresh water station of fisheries Research Institute, Mymensingh. A total 270 number ninety days old female ducklings of Indian Runner, (IR) Khaki Campbell (KC) and Zending were reared in three replications were reared in nine houses constructed on fish ponds for a period of 60 weeks. Nine houses were constructed over nine ponds, about 90 cm above water level. Houses of 4X2 m^2 in size with terrestrial grass. Floor of house was constructed with bamboo splits with a gap of 1 cm in between splits to allow the faeces to fall directly into the pond. The sheds were constructed at a middle of each pond adjacent to the embankment. Perfect fencing was made between the ponds to prevent movement of ducks between ponds. The loss of duck faeces out side the ponds was prevented by allowing an resting areas on pond dykes.

At first the ponds were drained out and were made free of undesirable species of fishes. The ponds were treated with lime at of 250 kg ha^{-1}. After filling up with water, the ponds were stocked with fingerlings of catla (*Catla catla*), rohu (*Labeo rohita*), mrigal (*Cirrhina migala*),

Table 1: Composition of the ration given duck

Ingredients		ME (Kcal kg^{-1})	CP (%)	EE (%)	Ash (%)	Ca (%)	Av. P (%)	Lysine (%)	Methionine (%)
Grower ration (49-120 days of age)									
Crushed wheat	48.00	1512	6.24	0.78	0.86	0.02	0.09	0.24	0.09
Rice polish	23.00	632	2.53	2.96	0.17	0.13	0.04	0.11	0.04
Fish meal	12.00	342	6.00	0.21	1.34	1.02	0.51	0.33	0.27
Sesame oil cake	13.00	234	3.64	0.57	0.85	0.26	0.09	0.01	0.12
Oyester shell	3.50	--	--	--	--	1.05	--	--	--
Common salt	0.50	--	--	--	--	--	--	--	--
Total	100.00	2720	18.41	4.53	3.24	2.26	0.75	0.69	0.54
Layer ration (121-420 days of age)									
Crushed wheat	48.00	1512	6.24	0.78	0.86	0.02	0.09	0.24	0.09
Rice polish	24.00	660	2.64	3.09	0.18	0.14	0.04	0.01	0.09
Fish meal	10.00	285	5.00	0.17	1.12	0.85	0.43	0.27	0.22
Sesame oil cake	10.00	180	2.80	0.44	0.65	0.02	0.07	0.01	0.09
Oyester shell	7.50	--	--	--	--	2.25	--	--	--
Common Salt	0.50	--	--	--	--	--	--	--	--
Total	100.00	2637	16.68	4.49	2.83	3.28	0.64	0.64	0.46

Vitamin mineral premix was added at 250 g/100 prepared feed

Table 2: Growth, production performance and cost –benefit of Indian Runner (IR) Zending (Z) and Khaki Campbell (KC) ducks in integrated duck cum fish farming system

Parameters	Duck genotypes IR	KC	Z	SEDS and significance level
Initial body Wt. (g/duck)	580.00	584.00	581.00	NS
Body wt. gain (up to start of egg laying kg/duck)	1.55	1.51	1.48	NS
Feed consumption at 420 days (kg/duck)	49.30	49.30	49.30	NS
Feed conversion ratio	5.00	4.92	5.52	NS
Mortality (%)	3.00	4.50	3.50	NS
Egg production (%)	68.00	70.00	61.00	NS
Egg weight (g/egg)	61.00	60.50	58.00	NS
Feed conversion ratio (feed fed /egg mass)	3.10	3.03	3.70	NS
Fish production (kg/duck)	10.15	10.10	10.70	NS
Production cost Tk/duck				
Duckling	28.00	28.00	28.00	
Feed	443.70	443.70	443.70	
Fish fingerling	25.00	25.00	25.00	
Housing	35.00	35.00	35.00	
Labour	53.00	53.00	53.00	
Total	584.70	584.70	584.70	
Sale income (Tk/duck)				
Egg	585.00	625.00	515.00	NS
Spent duck	50.00	45.00	42.00	NS
Fish	507.50	505.50	535.00	NS
Total	1142.50	1175.50	1092.00	NS
Net profit (Tk/duck)	557.80	590.80	507.30	NS

All SEDS against 3 df, NS, P>0.05

silver carp (*Hypophthalmicthys molitrix*), grass carp (*Etenopharyngodon idella*) common carp (*Cyprinus carpio*) and tilapia (*Oreochromis niloticus*) in the ratio of 2.5:3.0:2.0:1.0:0.5:0.5:0.5 with a stocking density of 600 fingerlings/ponds (7500/ha). No supplementary feeds and fertilizers were given to the ponds, only grass carps were supplied twice daily with green grass @ 10-15% of their body weight.

Balance ration of ducks was prepared by mixing locally available ingredients (Table 1). Energy, protein, fibre and ash content feed were estimated as per AOAC (1984) for grower and layer ration (Table 1). The birds in the three treatment groups were feed with wet mash given @ 115 g/day/duck. Feed were given 8.0 AM and 4.0 PM daily. Ducks were allowed to roam throughout ponds to engulf natural feeds.

The initial body weight of the duckling in each replication was recorded when death occurred. To asses the environmental condition of the ponds, physico-chemical parameters such as water temperature, transparency, dissolved oxygen, free carbondioxid, pH total alkalinity and total hardness of the pond water were monitored fortnightly following the procedure described by APHA (1971), egg mass and fish production were recorded in each replication. Profitability was calculated by subtract the total cost of duckling, fish fingerling, feed, labour etc., from the total income of eggs spent duck and fish sale. The data was analyzed by using a completely randomized design.

Results and Discussion

Growth, production performance and cost benefits of rearing three genotypes were studied (Table 2). The initial body weight of all ducks were almost similar. Body weight gain up to start of egg laying was slightly higher on Indian Runner than the other two genotypes ($P>0.05$). Rate of mortality also followed similar trend. Egg production and feed conversion tended to be highest in KC intermediate in IR and lowest in Zending duck ($P>0.05$). Egg weight were similar in three genotypes ($P>0.05$). Fish production was slightly higher in ponds were Zending ducks were raised. The over all performance of ducks was good. The finding of better egg production capability of KC in the present study is in agreement with Edwards (1983) and Sharma (1989), Interestingly a significant negative correlation ($r = 0.33$, $P<0.001$) was found between fish and egg production. The result might and consequently less nutrient was incorporates dropping into the ponds that resulted in lower fish production and incase of lower egg production, the unused nutrient containing dropping were used as a substitute for additional fish feed and pond fertilizer that enhanced comparatively higher fish yield (Ewards, 1983; Ali *et al*., 1995). The environmental condition of the pond water (Table 3) were in suitable ranges in accordance with the findings of Ali *et al*. (1992) and Latif *et al*. (1993).

Table 3: Water quality parameters of experimental ponds

Parameters	Ranges
Water temperature (°C)	25.01±0.48
Transparency (cm)	20.02±0.02
Dissolved oxygen mg l^{-1}	3.40±0.16
pH	7.90±0.25
Total alkalinity mg l^{-1}	71.05±3.70

Duck production costs were similar in all breeds the highest egg sale income was obtained from KC following by IR and Zending breed ducks ($P>0.05$) respectively. However, the profit was highest in case of KC breed ducks intermediate in IR and lowest income was obtained from Z breed. The result of the present study was indicated that Khaki Campbell was apparently better for egg laying and both Indian Runner and Zending duck breeds, statistically similar with respect to performance and income in an integrated farming system.

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