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Duck rearing in polythene pond for economic gain and sustainable livelihood : a study

Abstract

Village duck production plays a vital role towards nutritional requirements and sustainable livelihood of small and marginal farmers. A study was carried out with ~ 200 farmers to assess the performance and economic gain of Khaki Campbell ducks maintained in polythene ponds. Besides training and capacity building, the farmers were supplied with critical inputs like polythene sheet (to construct a small water body), day-old ducklings, initial starter feed, and little medication to initiate the duck unit of their own. The activities of farmers in duck rearing were monitored and data regarding body weight, mortality, age at first egg in the flock, total egg production, egg weight, and finally income generated through the practice up to a period of 40 weeks. The observation revealed the average body weight of ducks surpassed 1500g at 20 weeks of age with less than 15 percent mortality under the backyard production system. Data from 30 units were recorded as per the format provided and found that the average age of initiation of egg laying was 143 days, the average number of egg production in the flock was 903 (up to 40 weeks age) with an average egg weight of 60 g at 40th week. The study revealed that the average net profit of the farmer from a duck unit through the sale of eggs and live ducks was INR 11,933/- which supports the livelihood of farmer's amily besides nutritional security to the family members.

Keywords: Polythene pond, Khaki Campbell ducks, economic gain

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Introduction

Ducks are waterfowl. Farmers in villages prefer duck rearing for both meat and egg purposeswhen accessibility to ponds or water bodies is available. They presume Ponds are essential for the production and management of ducks. Duck cum fish farming is a common practice in Bangladesh[1] and rice-fish-duck integrated agriculture is more profitable even in Arunachal Pradesh, India.[2] Production performance and economic return of two varieties of ducks (Khaki Campbell and native duck of Odisha state) under an extensive system of management was studied[3] in tribal districts of Odisha, India. Further, it was observed that farmers having no ponds or accessibility to water bodiessometimes showed much interest in duck production. Therefore, the present study was planned to maintain the flock of ducks in the presence of an artificially constructed polythene pond in villages where there areno natural water bodies available.

Materials and methods

Selection of farmers: The experiment was conducted with more than 200 farmers in three districts (Keonjhar, Sambalpur, Mayurbhanj) of Odisha state, India. The selection of villages (for the adoption of farmers) was made based on absence of ponds or water bodies in the area. The farmers selected were having much interest in duck rearing and most of them were either landless or had marginal land holdings. Most of the beneficiaries were women who were not going to land for crop production or any other agricultural farm activities and per-capita income was below 1.0 lakh INR per annum.

Training and capacity building of the participants: The selected farmers were imparted training on duck production and its benefit on their livelihood as well as the nutritional security of the whole family. They were also educated about the management of day-old ducklings till egg laying including vaccination and basic knowledge of managing different diseases in the flock. A seriesof meetings were conducted and exposure visitsto duck farms were organised to motivate and initiate duck production in polythene ponds.

Methods of polythene pond preparation: A Rectangular pit (6ft x 4ft x 2ft) was made by removing soil in the ground. The pit was completely mulched/lined with good quality thick single polythene sheet (12ft X 8ft) without any joint or overlapping. The outer edge of the polythene sheet was fixed at the outer margin of the pit with keels or nails so that the polythene sheet remained intact with the soil. Pits were filled with water from well/tube well or from any other water source. The water in the polythene pond was always filled to the brim by adding it from time to time. Further, the total water was changed when it was dirty and unhygienic (Figure 1).

Figure 1 Methods of polythene pond preparation

Rearing of ducks: A small low-cost duck house (10ft x 10 ft x 10ft) was constructed by each farmer with locally available material for each flock as brooding space and night shelter. Day-old ducklings (25 nos; Khaki Campbell variety) were supplied to each farmer as a critical input to initiate the duck unit. The day-old ducklings were brooded inside the house under a 100 watt electric bulb that provided

optimum brooding temperature inside the house. Rice husk was used as litter material during brooding period. Duck mash/feed (wheat-based; 22 percent Ccrude Protein and 2700 kcal Metabolisable Energy; *ad.lib*) mixed with water was offered to the ducklings. Sufficient clean drinking water in a small plastic water trough was provided daily. After 10 days of brooding, ducklings were left outside within a confined area where water in trough and feed were offered for a few days in order to keep the ducklings acclimatized to the environment. After completion of three weeks of age, the grown-up ducklings were allowed to enter the polythenepond. Commercial feed was stopped once brooding was completed The leftover food, kitchen waste of the family, fish scales, vegetable peels, etc were offered to the ducks daily. The growing ducks were allowed to graze outside to collect the feeding source from the environment and utilize the polyethylene pond as per their desire to meet the physiological need of dipping their head in water besides swimming. By 20th week of age, egg laying was initiated in almost all the units when the farmers were advised to put wide-mouth earthen pots in a tilting manner (little rice husk inside) for smooth egg laying of ducks. The male ducks (drakes) were sold by the farmers for meat purposesbefore egg laying was initiated in the flock and the first income from the practice was generated.

Observations and data collection: The adopted farmers' activities were monitored regularly and necessary advices were given for smooth management of each duck unit. Simultaneously, observations w.r.t. the growth performance (g) for the birds at regular intervals, mortality rate (%), first egg (age in day) in the flock, egg weight (g) at 40 weeks of age, and income generated (INR) by the farmer up to 40 weeks of age were recorded (providing notebook and a pen to each beneficiary) from many farmers and analyzed to summarise the success of the practice of duck rearing in polythene ponds.

Results and discussion

The results obtained in this experiment are based on the data collected from the farmers door step through frequent visits and monitoring their activities. The actual number of farmers is much more who adopted polyethylene pond technology for rearing ducks. However, due to the inconvenience of collecting information from each and every beneficiary, we recorded the data from a few farmers whom we visited many times and those who cooperated in generating the data for the purpose of documentation.

Growth performance: After analysis of the recorded data, the growth performance of Khaki Campbell ducks maintained in polythene pond is presented (Table 1). The day old body weight recorded in the present study corroborates the observation of Padhi et al,[4,5] that supports the genetic potentiality of the bird. However, the present observation of growth up to 20 weeks of age (except 4th week) maintained in polyethylene pond is higher than the corresponding age of Khaki Campbell ducks reared under extensive system of management in tribal districts of Odisha.[3] The higher value at 4weeks age[3] might be due to the provision of commercial feed for a long brooding period. Further, body weight of Khaki Campbell ducks (8th, 12th and 20th week age) maintained at one time in farm (intensive management) and farmers field (extensive management) is much lower when compared to the present findings.[6] The higher growth observed in the current study might be attributed to the impact of polythene pond that catered the physiological need of the birds besides being fed with house hold / kitchen wastes in a more efficient way.

Mortality: The mortality percent recorded in the present study (Table 2) is much lower as reported by Giri et al,[3] where the mortality percent is much higher especially beyond 4th week of age. However, the same is in close proximity with the report of Chakravarthi and Mohan[6] under farmer's field condition for Khaki Campbell ducks.

Table 1 Growth performance of Khaki campbell ducks reared in polythene pond.

Age (week)	Body weight (g) (combined sex)	No. of observations
0 wk (Day old)	40.07±0.02	200
4th	487.66±16.21	178
8th	819.27±27.03	150
12th	1015.36±25.61	120
16th	1260.93±36.66	98
20th	1506.74±22.13	92

Table 2 Mortality percent of Khaki campbell ducks maintained in polythene pond.

Age of ducks	Mortality percent	Observations
Up to 4thweek	8.95	78 flocks
Up to 8thweek	11.36	61 flocks
Up to 20thweek	14.36	55 flocks

Sexual maturity and egg production: The reproduction parameters of the Khaki Campbell ducks reared in polythene ponds were presented (Table 3). The age of the ducks when first egg was laid in a flock maintained under polythene pond were recorded for 46 units and the average age of sexual maturity was calculated to be 143.95 ± 2.17 days which is much less against 152.95±3.96 days reported by Giri et al,[3] for Khaki Campbell ducks maintained (free-range practice) in tribal districts of Odisha state. However, Padhi et al,[7] and Zahan et al,[8] reported a much lower value than the present study for the age at sexual maturityin Khaki Campbell ducks maintained under intensive method and backyard rearing respectively. The early onset of egg laying reported by Padhi et al,[7] might be due to balanced nutrition offered to the birds during intensive rearing. The average weight of female ducks on the day of first egg in the flock observed in the present study is less than reported (in Bangladesh) for Khaki Campbell ducks in backyard[8] but almost at par with findings of Giri et al (2014). Thus, in a comparison with Giri et al,[3] for almost same body weight of female ducks but initiating egg laying earlier in the present study might be attributed to the presence of polythene pond for the adult ducks in the flock that helped in maintaining body physiology as well as reproductive behaviour of the waterfowls.

Table 3 Laying performance of Khaki campbell ducks under polythene pond management.

Parameters	Khaki Campbell	No. of observations
Avg number of female ducks per flock	11.02	50 flocks
Avg age at first egg in flock (days)	143.95±2.17	46 flocks
Avg weight of female ducks in flock at first egg (g)	1392.47±33.70	152 ducks
Avg age at 50%egg in the flock (Days)	178.68±5.32	35 flocks
Avg number eggs produced in the flock (up to 40 wk age)	903.68±7.42	30 flocks
Egg weight at 40th week of age (g)	60.03±0.11	300 eggs

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The information w.r.t. age of ducks upon fifty percent egg production in the flock collected from many farmers revealed an average age of 178.68±5.32 days which is much higher than 151 days reported by Padhi et al (2009) for Khaki Campbell ducks under intensive management practice that supports the fact that nutrition plays vital role for onset of sexual maturity and increased production level in birds. The average number of eggs produced (903.68±7.42) in a unit up to the age of 40 weeks recorded in the present study is appreciable against the report of Giri et al,[3] and Zahan et al,[8] where khaki Campbell ducks were reared under backyard management practice in India and Bangladesh respectively. Further, it is observed that egg weight (60.03±0.11g) recorded in 40th week of age is higher to the report of Giri et al,[3] and Zahan et al,[8] where observation w.r.t. egg weight recorded is much earlier age (28 week) in first case and nothing mentioned about the age of ducks in second. However, egg weight in Khaki Campbell ducks at 40 weeks age under intensive system of management is much higher[4] as compared to present observation which might be due to the balanced and appropriate nutrition offered to the ducks during egg laying period.

Economics of duck rearing in polythene pond: Duck rearing in backyard is beneficial in many ways especially for landless and marginal farmers. In the present study, many farmers were provided with small note books and pen to record the day to day expenditure, mortality, male-female number in the flock,daily egg production and income generated through sale of live birds and eggs from time to time. By 40th week of age many note books were collected. It was found that thirty (30) farmer families have recorded data in a systematic way as advised. Thus, based on the above data, economics was calculated for duck production in polythene pond and is presented (Table 4). During the exercise, the cost incurred towards construction of duck house and services extended by the members of farmer's family is not taken into account.

Table 4 Economics of duck rearing in polythene ponds (INR) for 30 units.

Items of expenditure and income	Average amount	Observations (n=no. of units)
Cost of day old ducklings (25 nos/unit)	375	30
Initial feed (10 kg) / unit	250	30
Feeder & waterer (one each)/unit	200	30
Medications	100	30
Cost of polythene sheet (80 sqft @ Rs10/- per sqft)	800	30
Average expenditure /unit	Rs 1725/-	30
Average no of ducks present up to 20 wk age/unit	21.57±0.33	30
Avg no male/unit	10.03±0.31	30
Avg no female/unit	11.53±0.21	30
Average Income / unit		
Through sale of male bird (live) for meat	3375.67±83.51	30
Sale of eggs for table purpose	6822.87±93.12	30
cost of female birds (approx)	3460.00±62.26	30
Average Total Income	13658.53±163.11	30
Net profit / unit (Income- Investment)	11933.53±163.11	30

It was observed that the expenditure incurred for rearing a flock of Khaki Campbell ducks through polythene pond was not much high even if the cost of polythene added to it. Since no commercial feed was offered during growth and production, therefore the net profit was appreciated. The income would be more if the egg production would have been taken into account up to the 72 weeks of age. The profit recorded in the present study is much less as compared to Chinh et al,[9] who did economic analysis of duck production under house hold system in Vietnam with average flock size of 794 ducks for one productive year. Further, in a study of economic contribution of duck production systems in Banten province, Indonesia, Hadiatry et al,[10] reported that it only gave a small contribution or even negative contribution to house hold income but has value for religious festivities, urgent cash besides daily consumption in family. However, the economic return recorded in the present study is appreciably higher to the report of Giri et al,[3] who evaluated the income generated through Khaki Campbell duck production in tribal districts of Odisha state, India (irrespective of water bodies availability); thus supports the provision of polythene pond in enhancing economic gain.

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None.

Conflicts of interest

The authors declared that there are no conflicts of interest.

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