



Duck Farming: A Potential Source of Livelihood in Tribal Village

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Abstract | The Khaki Campbell an improved breed of duck was intervened in tribal village of Saraitoli, Ranchi, Jharkhand. The investment cost and return on duck farming were collected by administration of a well-structured data sheet for growth, feed, egg production, egg weight, egg consumed, egg sold, live bird sold on the body weight basis by the stakeholders. The data were analyzed and accordingly production efficiency was calculated. The average age of bird laid first egg at 151 ± 2.11 days and body weight was recorded 1553 ± 17.26 g. The first laid egg weight was found 61 ± 0.26 g, whereas after 36 and 52 weeks, it was found 62 ± 2.23 g and 64 ± 3.57 g, respectively. The average total egg production per bird was recorded 126.58 ± 1.87 numbers. The total cost of production was found INR (Indian rupees) 430.23 per bird and production cost per kg of live weight was INR 182.98. The cost of feed, 30 days old ducklings and medicine, transportation cost, etc was calculated about 56.35 %, 41.84 % and 1.81% of the total production cost, respectively. The gross return per bird was found INR 726.15. The net returns per live bird including sell of egg and fresh live weight was INR 295.92. The proportion of egg and meat gross income accounts for 35.21 % and 64.76 %, respectively. The gross expenditure incurred of INR 42,592.70 and gross income of INR 71,889.00 was found in duck farming. The net income obtained from the duck farming was INR 2663.30 /household/year with benefit –cost ratio of 1:1.69. The meat –feed ratio was found 3.44. The result revealed that duck breed Khaki Campbell intervention improved tribal people's source of income and significantly contributes to rural livelihoods.

Keywords | Duck farming, Tribal household, Livelihood, Benefit cost ratio, Feed- meat ratio.

Editor | Asghar Ali Kamboh, Sindh Agriculture University, Tandojam, Pakistan.

Received | March 24, 2017; **Accepted** | April 18, 2017; **Published** | April 21, 2017

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Citation | Jha BK, Chakrabarti A (2017). Duck farming: a potential source of livelihood in tribal village. *J. Anim. Health. Prod.* 5(2): 39-43.

DOI | <http://dx.doi.org/10.17582/journal.jahp/2017/5.2.39.43>

ISSN (Online) | 2308-2801; **ISSN (Print)** | 2309-3331

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INTRODUCTION

Duck farming plays an important part in the agricultural economy in Asian continent which alone accounts for 82.6% of the total duck meat production of world. The duck meat and eggs are relished and consumed by people worldwide. Intensive awareness to empower rural households for duck farming to increase duck egg and meat on commercial aspects by rural household production is prerequisite (Adzitey and Adzitey, 2011). The duck farming has the potential and can take the advantage to engage rural people in duck production and they must be given adequate training for duck farming. It is an important tool for alleviating poverty among the rural communities and

has great potentials in tribal area. These potentials can be tapped to reduce poverty among rural households or communities.

In many countries, ducks rank next to chicken for meat and egg production. Ducks can be raised for both commercial and small scale meat or egg production purpose even as backyard with other birds or animals. Ducks are very hardy bird and they need less care or management. They can adopt themselves with almost all types of environmental conditions. They also have the natural tendency of foraging on aquatic weeds, algae, green legumes, fungi, earthworms, maggots, snails, various types of insects etc. which directly reduce feeding cost. Ducks have less mor-

tality rate and usually they live longer than chickens. In case of egg production, ducks lay eggs for a long time period. Duck products such as eggs and meat have a great demand as they are good source of protein and iron (Tai and Tai, 2001). The current report on main duck meat producer countries indicates that, eight countries from Asia are among the top fifteen countries worldwide (FAO, 2010). The duck farming also provide manure which can be used to improve soil fertility of agricultural lands.

There are readily available exotic and local breeds of ducks for production. Khaki Campbell is one of the best egg and meat producing breed in ducks having fast growth rate and efficient feed converters (Adzitey and Adzitey, 2011). Duck farming on small scale has been practiced for many years among rural communities for livelihoods and prevalent among weaker sections of rural population which provides them supplementary and steady income and employment and also provides nutritive duck eggs and meat for family consumption.

Jharkhand is having dominated population of tribal people and majority of them rely on rain-fed agriculture. This has led to the food insecurity in the tribal areas due to the lowering of agricultural output. The investments in duck farming can generate handsome returns and contribute to increased food and nutrition security among rural population. In Saraitoli village, few households have embarked on indigenous duck farming. It was found that the duck production systems in Saraitoli are traditional and poorly remunerative. The households were involved in mixed farming which encompasses crop cultivation, livestock rearing, poultry and duck farming. The majority of farmers in Saraitoli practices poultry farming keeping indigenous domestic chickens (*Gallus domesticus*) in order to strengthen their livelihood and food security (Jha and Chakrabarti, 2017).

The paper presents an overview of duck farming by intervention of an improved Khaki Campbell breed in Saraitoli village for livelihood and food security to poor tribal farmers. The focus on exotic duck breeds which often do not thrive well in rural areas, due to inadequate extension services, duck feed unavailability, lack of technical know-how which either do not reach to the poor or lack of awareness on scientific rearing. These currently limit the contribution of duck production to rural livelihoods. Considering the importance and prospects of duck farming in reducing poverty level among rural communities, trial was conducted in tribal village of Saraitoli, Ranchi, Jharkhand. The objective of the study was to find out the effect of intervention of improved breed of Khaki Campbell duck in small holder farming to improve the livelihood in tribal villages in Jharkhand state.

The Saraitoli village is located between the parallel of latitude 23°15.0' N & longitude 85°28.2' E at an altitude of 598 m above mean sea level (MSL) having annual average rainfall of 1200 mm. The small-scale farmers of village embarked into the raising of indigenous duck breeds and few farmers willing to start the enterprises, but due to financial constraints, could not started the duck rearing. The farmers rearing indigenous duck by traditional skill and having interest in duck rearing was identified among 55 households by the 'Gram sabha' viz., a village committee constituted democratically through the electoral procedure and empowered to take decision in the interest of village. They recommended 11 households in participatory mode for scientific rearing of Khaki Campbell duck. The data for observations on growth, feed given, egg production, egg weight, egg consumed, egg sold, bird live weight basis sold during duck farming was collected by administration of a well-structured data sheet. The farmers were imparted training before start of the intervention and exposure visit were also conducted to gain more practical knowledge by the stake holders. The descriptive statistics were used to analyze the data as per (Snedecor and Cochran, 1995).

The intervention was made with improved breed of Khaki Campbell by providing 9 numbers of ducklings of 30 days old having average body weight of 161.36 ± 2.16 g to each household in the year 2013-14 under Tribal Sub Plan. The duck feed, other feed supplement and medicines were provided with objective to thrive better under scientific management practices to grow faster than indigenous birds and lay more eggs leading to the improvement of livelihood. The care of duck was done by periodical monitoring of diseases and protection from wild animals. Farmers also provided the supplementary feed of domestic waste. These abilities include good foragers and scavengers which thrive well on locally available feeds, hardy and tolerant to harsh environmental and disease conditions compared to chicken. Farmers also house their birds at night to reduce losses from predators such as wild cats, snakes and domestic dogs.

RESULTS AND DISCUSSION

In Saraitoli village, a total of 99 Khaki Campbell duck was provided among 11 beneficiaries. The household wise distribution, mortality, egg, meat production & income from duck farming are depicted in Table 1. Since the 30 days old ducklings were provided without sex differentiation, later on it was observed that optimum female to male ratio were not maintained which in turn affected the total egg production. The utmost care was taken during the duck farming by the farmers, but a total of 19.19% mortality occurred due to attack of mostly by wild animals and diseases like coccidiosis and duck cholera.

Table 1: Household wise distribution, mortality egg, meat production & income from Duck farming

| House hold No. | No. of birds given | Mortality | Male | Female | No. of eggs laid (Sold/ Consumed)/year | Meat produced (kg) | Gross income from egg (INR) | Gross income from meat (INR) | Total Gross income (INR) |
|----------------|--------------------|-----------|------|--------|--|--------------------|-----------------------------|------------------------------|--------------------------|
| 1. | 9 | 1 | 6 | 2 | 312 | 21.00 | 1560 | 4200 | 5760 |
| 2. | 9 | 0 | 4 | 5 | 592 | 28.20 | 2960 | 5640 | 8600 |
| 3. | 9 | 3 | 2 | 4 | 510 | 17.20 | 2550 | 3440 | 5990 |
| 4. | 9 | 0 | 3 | 6 | 612 | 27.10 | 3060 | 5420 | 8480 |
| 5. | 9 | 1 | 1 | 7 | 695 | 19.80 | 3475 | 3960 | 7435 |
| 6. | 9 | 0 | 6 | 3 | 486 | 25.40 | 2430 | 5080 | 7510 |
| 7. | 9 | 3 | 5 | 1 | 158 | 17.60 | 790 | 3520 | 4310 |
| 8. | 9 | 4 | 2 | 3 | 480 | 14.60 | 2400 | 2920 | 5320 |
| 9. | 9 | 3 | 2 | 4 | 428 | 19.40 | 2140 | 3880 | 6020 |
| 10. | 9 | 1 | 5 | 3 | 495 | 24.35 | 2475 | 4870 | 7345 |
| 11. | 9 | 3 | 4 | 2 | 295 | 18.12 | 1475 | 3624 | 5099 |
| Total | 99 | 19 | 40 | 40 | 5063 | 232.77 | 25315 | 46554 | 71869 |

INR: Indian Rupees (1 USD= 64.6 INR)

The total numbers of 5063 eggs were produced from 40 female birds among the 11 beneficiaries in the village condition and it was sold in the local market @ INR 5/- per piece. After attaining maturity of birds, they sold extra male birds @ INR 200/-Kg of live body weight after maintaining male- female ratio of 1: 5. Finally, the total meat production of 232.77 Kg was recorded after sale of all the birds. The Khaki Campbell provides a lot of meat due to their large sizes and also lays bigger eggs compared to those of desi ducks. The total duck feed consumed of 800.09 Kg and cost incurred in rearing of Khaki Campbell among households are depicted in Table 2. The studies suggest that locally available feeds can be use freely for duck farming to reduce feed cost and to help improve the livelihood of rural households. Feeding Khaki Campbell duck on locally available feedstuffs had no adverse effect on egg productivity (Nho and Tieu, 1997). Feed is one of the most important factors to consider in any farming venture and alone constituent about 70% of total production cost (Singh et al., 2009). The cost of production of feed, thirty days old ducklings and medicine, etc. was found to be of 56.35%, 41.84% and 1.80%, respectively.

The gross expenditure incurred of INR 42,592.70 in rearing of Khaki Campbell among households. The total cost of production per bird up to marketing was recorded INR 430.23 and production cost per Kg of live weight for duck of INR 182.98.

The observations taken on performances of Khaki Campbell are also depicted in Table 3. The average age of bird laid first egg at 151±2.11 days and body weight 1553±17.26 g was recorded among the Khaki Campbell. The average to

tal egg production/bird/year was recorded 126.58 ± 1.87 numbers. The eggs average weight was recorded 61± 0.26 g at first laying of eggs followed by 62±2.23 g (36 weeks) and 64±3.57 g (52 weeks), respectively. The present findings of age at first sexual maturity is comparable to the reports of (Dolberg, 2009; Alders et al., 2009; Das et al., 2012; Naga Raja et al., 2014) obtained in poultry.

Table 2: Expenditure incurred in rearing of Khaki Campbell birds among households

| House holds No. | Feed consumed (Kg) | Cost of feed (@ INR 30/- per kg) | Cost of 30 days old bird (@ INR 180/- per piece) | Cost of Medicine, etc., (INR) | Total Gross Expenditure (INR) |
|-----------------|--------------------|----------------------------------|--|-------------------------------|-------------------------------|
| 1. | 80.20 | 2406.00 | 1620 | 70 | 4096.00 |
| 2. | 82.68 | 2480.40 | 1620 | 70 | 4170.40 |
| 3. | 62.50 | 1875.00 | 1620 | 70 | 3565.00 |
| 4. | 84.86 | 2545.80 | 1620 | 70 | 4235.80 |
| 5. | 68.56 | 2056.80 | 1620 | 70 | 3746.80 |
| 6. | 83.48 | 2504.40 | 1620 | 70 | 4194.40 |
| 7. | 70.42 | 2112.60 | 1620 | 70 | 3802.60 |
| 8. | 60.82 | 1824.60 | 1620 | 70 | 3514.60 |
| 9. | 64.80 | 1944.00 | 1620 | 70 | 3634.00 |
| 10. | 81.25 | 2437.50 | 1620 | 70 | 4127.50 |
| 11. | 60.52 | 1815.6 | 1620 | 70 | 3505.60 |
| Total | 800.09 | 24002.70 | 14580 | 770 | 42592.70 |

INR: Indian Rupees (1 USD= 64.6 INR)

The economics in rearing of Khaki Campbell among households are presented in Table 4. The total gross income generated in rearing of Khaki Campbell among households was found to be of INR 71889.00. The gross return per bird was recorded INR 726.15 and the net return per bird including sale of egg and meat was found INR 295.92. The proportion of gross income from the sale of egg and meat was recorded 35.21% and 64.76 %, respectively. The net income obtained from the Khaki Campbell was recorded INR 2663.30 /household/year with benefit –cost ratio of 1:1.69. The meat–feed ratio was found 3.34 to be higher

Table 3: Performances of Khaki Campbell at Saraitoli village

| Particulars of birds | Description |
|---|--------------------------|
| Initial average body weight of 30 days Khaki Campbell | 161.36 ± 2.16 g |
| Total Egg Production/bird/ year | 126.58 ± 1.87 |
| Age of bird at first egg (in days) | 151 ± 2.11 |
| Egg weight(g) at first laying 25 Weeks | 61 ± 0.26 g |
| Body weight at first laying (g) | 1553± 17.26 g |
| Egg weight at 36 Weeks (g) | 62± 2.23 g |
| Egg weight at 52 Weeks(g) | 64± 3.57 g |
| Colour of egg | Light brown, light cream |

which indicates that meat production was economically remunerative in duck breed Khaki Campbell. The findings are in conformity with (Rahman et al., 2016) who reported higher meat-feed ratio in backyard poultry birds and opined that the ratio was economically viable.

The present findings are also in similarity with (Miao et al., 2005) who opined that development of village chicken enterprises can be a sustainable way of improving food security and livelihoods of the resource poor farmers. The results revealed that Khaki Campbell duck farming is highly remunerative in tribal household. The improved birds fetched better price in terms of meat and egg in the local market. It was also recorded in the present study that almost cent per cent rearing of Khaki Campbell were done by women in tribal households. The similar findings were also obtained by (Ndiweni, 2013; Kusina et al., 2012) in poultry.

The findings reveal Khaki Campbell duck has improved income, food security and nutrition status among the tribal people and was found more tolerant and less susceptible to diseases. The households who engaged in duck farming with improved breed paid their children school fees, medical expenses, buy clothes and some basic food stuffs also. Similar findings in poultry was reported by (Fajemilehin, 2010) and opined that village poultry production, if

developed, can be employed as a tool to alleviate poverty, promote gender equality and ensure food security for economically disadvantaged farmers. Duck production empowers women who are normally a disadvantaged in rural and especially in tribal areas. The duck rearing provides proteins (egg & meat) to them in addition to manure which can be used to improve soil fertility of agricultural lands (Adzitey and Adzitey, 2011). The present intervention of dual purpose improved breed of Khaki Campbell, thrived well under balanced feeding management regime and lay more eggs and meat production in turn which improves the livelihood security among the tribal people.

Table 4: Economic details of raising improved breed of Khaki Campbell

| Particulars of Expenditure | Description |
|---|---------------------|
| Total feed consumed | 800.09 Kg |
| Cost of feed @ INR 30/Kg | INR 24002.70 |
| Cost of 99 Khaki Campbell (30 days old ducklings @ INR 180/- per piece) | INR 17820.00 |
| Cost of Medicine, transportation, etc. | INR 770 |
| Total Gross Expenditure | INR 42592.70 |
| Total cost of production per bird up to marketing | INR 430.23 |
| Production cost per Kg of live weight | INR 182.98 |
| Particulars of Income | INR (Indian rupees) |
| Sale of egg @ INR 5/- per egg | 25315.00 |
| Sale of bird @ INR 200/- per Kg on live weight basis | 46554.00 |
| Gross income | 71889.00 |
| Gross income per house hold | 6533.55 |
| Gross return per bird | 726.15 |
| Net income from improved Khaki Campbell | 29296.30 |
| Net income per house hold | 2663.30 |
| Net income per bird | 295.92 |
| Meat–feed ratio | 3.44 |
| Benefit cost ratio | 1:1.69 |

INR: Indian Rupees (1 USD= 64.6 INR)

CONCLUSIONS

The current study reveals that duck farming significantly contribute to farmer livelihoods in terms of nutrition and income. The farmers made a profitable use of improved breed of Khaki Campbell. Therefore, focus should be on intervention of exotic Khaki Campbell, which thrived well in rural areas and will enhance the income to farmer livelihoods and in turn reducing poverty and increasing food security. The rapid growing demand for duck meat and eggs

can be thrived by adoption of duck farming in rural areas. The farmer also must be given training on duck farming to equip them with relevant skills to merge scientific methods for improving their productivity.

CONFLICT OF INTEREST

No conflict of interest.

AUTHOR'S CONTRIBUTION

Bal Krishna Jha collected the experimental data and prepared the draft and final manuscript. Asit Chakrabarti assisted in analyzing and interpreting the collected data.

ACKNOWLEDGEMENTS

The authors are highly thankful to the farmers of Saraitoli village who involved in participatory mode of research in duck farming and provided the requisite and comprehensive information.

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