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Studies on the 'Aroor System of Sustainable Duck Rearing' in Kerala, India

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Abstract: A study on the duck rearing system for egg production existing in the coastal belt of Aroor region in Kerala state, India was carried out by means of structured questionnaire designed to collect data on socio-economic and husbandry factors affecting production. This system was unique in that the birds were fed on Fresh Prawn Waste (FPW), a waste product of prawn processing industry. The internal and external qualities of eggs laid by ducks fed on fresh prawn waste were compared with ordinary market eggs. The study revealed that this system was the most economical enterprise compared to any other animal husbandry enterprises in this region. The fresh prawn waste not only incorporates a salmon red colour to the yolk (due to the pigment xanthene) but also improves considerably the egg weight, albumen index, yolk index and shell quality. This system demonstrate how a waste product, which was causing lot of environment pollution can be effectively utilized to produce high quality balanced food, the eggs for human consumption economically.

Key words: Duck rearing, prawn waste, egg production

INTRODUCTION

The Indian sub-continent with its varied agro-climatic zones has favored the development of wide varieties of plants and animal resources not seen else where on the globe. The total duck population in India was 22 million (A.H. statistics G.O.I, 1999) out of which 6.6 million ducks belong to the state of Kerala. Alapuzha district known as "Venice of east" is a costal district famous for its backwaters and canals. There, ducks were reared mainly for eggs. According to 17th quinquinneal census (2003) the total duck population of this district was 2, 50,164. Kuttanad area was the main pocket of duck rearing in this area, but now the farmers of the coastal belt of Aroor are venturing into this enterprise in a big way.

The common practice of duck rearing in Kerala is 'duck-rice' free-range system in which the birds in large numbers are allowed scavenging on harvested paddy fields of Kuttanad, the "rice bowl of Kerala". The present study was undertaken at Aroor region of the district where a unique semi-intensive system of duck rearing is followed. The farmers of Aroor region rear local variety of ducks, the 'Chara' and 'Chemballi' in semi-intensive system as an economic enterprise. The peculiarity of this system was that the birds were fed on inexpensive fresh prawn waste, which was freely available waste product of prawn pealing industry spread throughout this area. The F.P.W, which is the main unconventional protein source, meets the complete protein requirement enhancing egg production and quality. This in turn, has also solved the crisis of water and air pollution prevalent in these areas since a long time due to disposal of prawn waste into the water bodies.

MATERIALS AND METHODS

The husbandry practices of the farmers were studied using structured questionnaire method. A 68 item questionnaire was drawn to cover the respondent's biodata on important aspects of duck rearing such as socio-economic status of the farmer, procurement of birds, housing, feeding, health care, egg production, management practices, marketing, incidence of disease, cost, returns, the problems faced by the farmers and constraints. A multi stage stratified random sampling was used to select the sample households. The questionnaire was administered through personnel interview with the farmers at their convenience. The biodata was collected from 102 farmers in Arror, Kodanthuruthu and Kuthiathode panchayath Numerical aspect of the data was analyzed using simple descriptive statistics.

Egg quality studies were conducted at the Center of Advanced Studies in Poultry Science, College of Veterinary and Animal Sciences, Mannuthy, Thrissur, Kerala. Egg weight, shape index, albumen index, yolk index, shell thickness and colour of yolk were compared with ordinary duck eggs available in the market from another place where F.P.W. was not available.

RESULTS

Ninety four percent of the farmers engaged in duck rearing belonged to educationally and socially backward, low-income groups. Sixty three percent of the farmers were marginal farmers possessing less than 10 cents of land.

The average stock of the farmers ranged from 200-1200 ducks, which were procured at the age of 150-200 days

at a cost of Rs 90/-per duck from near by hatcheries. Regular laying starts at the age of 300 days. Egg production declines after 2-3 years of regular laying and the spent ducks were sold at the rate of Rs 50/-per duck. All the farmers practiced semi-intensive duck housing system adjacent to their homestead.

The daily duck ration consisted of only F.P.W and broken rice grain. The prawn waste which formed the major unconventional protein source was available from the nearby pealing sheds and fed at the rate of 230-250g/day/duck. The broken rice grain, which is a by-product of rice mills, is procured at low cost through middlemen and fed at the rate of 94-100g/day/duck.

On an average 50% of birds lay eggs every day and the maximum production recorded was 85%.

Feeding of FPW improves considerably all the external and internal qualities of egg *viz*, live egg weight, yolk index, albumin index and shell thickness as seen in Table 1.

Feeding of FWP incorporates a salmon red colour (Fig. 1) to the yolk due to the pigment Xanthene (Elizabeth *et al.*, 1982). However the shape index was slightly lower indicating that the eggs were longer than the market egg.

The cost-benefit ratio of this system was 1:0.30.

DISCUSSION

The farmers adopted duck rearing as a subsidiary occupation as it supplemented their income and provided financial security during emergencies. No religious bias was noticed for this enterprise, as people from all religious groups were involved in duck farming. The procurement price of ducks were Rs 90/-per duck at the age of age of 150-200 days. There were middle men who supplied ducks at half the price but those farmers have to supply egg to them until the cost of ducks are met. Most of them provided housing with a night shelter with a fenced range with nylon nets abandoned by the fishermen. The 'runs' invariably included a water body like pond or stream. The night shelter was made of arecanut tree planks. The roof was supported by bamboo poles, thatched with coconut leaves and covered by plastic sheets to prevent seepage of water during heavy rain. This shelter protected the birds from adverse climatic conditions and heavy rains during monsoon. The muddy floor was covered with wood shavings as litter material. Top dressing of the litter was practiced once in six months. Later the built-up litter was sold as organic manure.

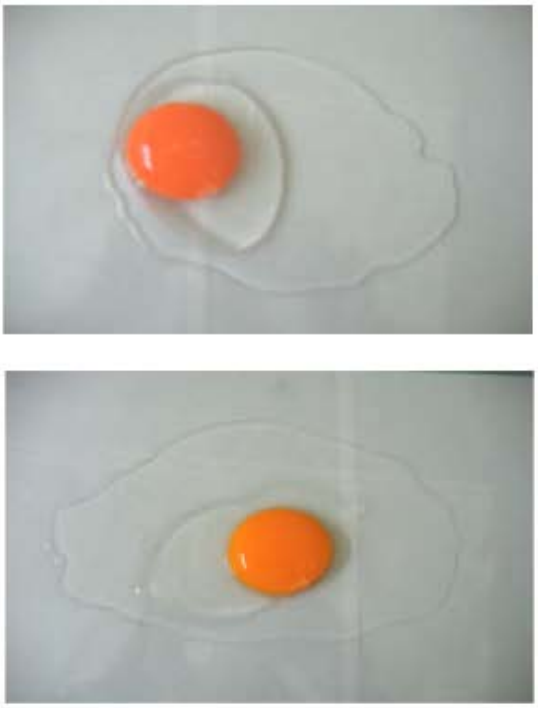

Fig. 1: 'Salmon red colour' and thick albumen of the Aroor eggs

The daily duck ration consisted of only F.P.W and broken rice grain. The prawn waste which formed the major unconventional protein source was available from the nearby pealing sheds and fed at the rate of 230-250g/day/duck. The annual availability of FPW was estimated to be around 40,000 tones in the country (Ramachandran and Madavan, 1975). The broken rice grain, which was a by-product of rice mills, was procured at low cost through middlemen and fed at the rate of 94 to 100 g/day/duck. Apart from this, few farmers incorporated mineral mixture in the daily ration, which improved the egg shell quality. The chemical composition of fresh prawn waste was 42.21% Crude protein, 9.8% Ether extract, 13.73% crude fibre, 6.6% Nitrogen free extract 27.6% Ash, 13.5% Chitin and 1750 K cal/Kg DM Digestible energy. (Mohan and Sivaraman, 1993).

The only health care management practice adopted by the farmers was the yearly immunization against duck plague. Routine management practices like deworming, disinfection, fumigation were not at all practiced by the

Table 1: Internal and external qualities of market eggs v/s aroor eggs

Eggs	Egg Weight (g) (n = 30)	Shape Index (n = 30)	Yolk Index (n = 30)	Albumen Index (n = 30)	Shell Thickness (mm) (n = 30)
Market Eggs	66.1±0.98	76.2±0.97	0.31±.02	0.056±.01	0.37±0.01
Aroor Eggs	70.74±2.0	74.53±.78	0.70±0.01	0.072±0.01	0.38±0.01

Fig. 2 (a): Night shelter for ducks

Fig. 2 (b): Ducks on the free range

farmers. Ectoparasiticidal spraying was also not adopted. Pasteurellosis was the major disease causing huge mortality and economic loss to farmers. Farmers are looking for an effective vaccine against Pasteurellosis. Bumble foot was a common problem encountered in this system. The incidence of this condition was high due to the prick wound produced on the legs by the hard chitinous exoskeleton of the prawns. Egg production starts from 6½- months of age. Most of the birds lay eggs early in the morning by 5 A.M. Therefore, collection and marketing of egg was very easy. Eggs were collected daily at 6.30 A.M and stored up to 2-3 days at room temperature. These eggs were sold to the middlemen who supply the duck to the farmers. There are few farmers who practice direct marketing and they make more profit than others. Local people relish duck egg and there is a huge demand for eggs in the domestic market. So the eggs are not exported outside the state.

From the cost-benefit analysis of this system presented in Table 2, it is evident that feed cost was the major recurring expenditure. The average daily expenditure of a farmer rearing 100 ducks comes to Rs 97.72 and the average daily returns per day amounted to Rs 137.70. The market price of duck egg is Rs 3.50 per egg, but the procurement price at farmer's door was only Rs. 2.70 per egg and at middlemen level was Rs. 3.00 per egg.

Fig. 3 (a): Fresh Prawn Waste (F.P.W)

Fig. 3 (b): Ducks feeding on fresh prawn waste

Table 2: Cost-benefit analysis of 100 Duck unit for a laying period (2.5 years)

Economic analysis
A. Fixed Cost
1. Cost of 100 Ducklings @ Rs 90/ bird = Rs.9000.
2. Cost of night shelter @ Rs 705/sqm = Rs.5005.5
(Floor space provided for 100 birds = 7.1sqm)
Total fixed cost = Rs 14005.5
B. Variable Cost
1. Feed Cost of F.P.W for 100 birds
for 2.5 years @ Rs 1.06/Kg = Rs. 22246.75
(20987.5 Kg)
2. Feed cost of broken rice for 100 birds
for 2.5 years @ Rs 6.9/Kg = Rs.59184.75
(8577.5 Kg)
Total Feed cost for 2.5 years = Rs. 813431.5
3. Miscellaneous Expenditure
(Deworming, Vaccination, Veterinary Aid, Mineral Mixture) = Rs.5000.
Total variable cost = Rs. 8643.
Total Expenditure = Rs. 100437.
C. Output
Total number of eggs produced per day by 100 ducks = 51.
Total number of eggs produced by 100 birds for 2.5 years = 46,538.
1. Cost of 46,538 eggs @ 2.70/ egg = Rs 1,25,652.6
2. Cost of spent ducks @ 50/bird = Rs. 5000
Total Income = Rs.1, 30,652.60
Net profit for 2.5 years = Rs 30,215.6
Profit for one year = Rs 12,086.24,
Profit per day for 100 birds = Rs 33.11
Input-Output Ratio = 1:1.30.
Cost-Benefit Ratio = 1:0.30

If the farmer ventured for direct marketing they could generate an additional income of 40 ps per egg. The

selling price of the spent duck was Rs. 50 per duck. Even with this low price the cost-benefit ratio of 1:0.30 was indicating that this system is very economical.

The changing climatic conditions impose lot of stress on birds affecting egg production. Heavy rain reduces the feeding time and lowers the egg production. Extreme summer was also found to be disadvantageous for egg production.

Another major problem encountered was the foul smell emanating on account of improper disposal of waste. The problem can be solved by collecting the leftover prawn waste and sun drying. The dried waste has no odour and can fetch revenue if sold to chitin production unit.

Some farmers were of the opinion that feeding of prawn waste added bad smell to the eggs also. So they boiled the FPW in order to reduce the smell.

There is a growing demand for FPW from the newly established chitin production units, which may create scarcity of this locally available cheap feed in the future and increasing its price.

The farmers were ignorant about the scientific duck rearing practices. Extension works, educating the farmers about scientific management practices like disinfection, fumigation, de-worming and record keeping was essential to improve the productivity and economics of this system. Cheap compounded feed incorporating prawn waste should be formulated to feed the duck during lean periods when FPW was not available. Financial help in the form of capital loans, subsidies and insurance coverage for ducks would promote this highly profitable enterprise.

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