

# **A SURVEY ON THE STATUS OF DUCK FARMING IN KERALA STATE**

By

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## **THESIS**

Submitted in partial fulfilment of the  
requirement for the degree

## **Master of Veterinary Science**

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COLLEGE OF VETERINARY AND ANIMAL SCIENCES  
Mannuthy - Trichur

**1983**

DECLARATION

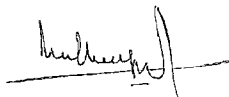
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Certified that this thesis entitled " A SURVEY ON THE STATUS OF DUCK FARMING IN KERALA STATE" is a record of research work done independently by Shri. T.K. Ravindran under my guidance and supervision and that it has not previously formed the basis for the award of any degree, fellowship, or associateship to him.



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28-2-1983.

## ACKNOWLEDGEMENTS

I wish to express my deep sense of gratitude to my Major Adviser, Dr. C.K.Venugopalan, Associate Professor, Department of Poultry Science for his valuable guidance, encouragement and co-operation. But for his immense and unhesitating help I would not have completed this work in the stipulated time.

I am especially thankful to Dr. A.Ramakrishnan, Professor and Head of Department of Poultry Science for his expert planning, valuable guidance and constant encouragement throughout this study.

I am gratefully thankful to Dr. A.K.K. Unni, Senior Scientist, AICRP on Poultry for Eggs, Mannuthy, for his valuable suggestions during the preparation of this thesis.

I wish to express my sincere thanks to Dr. G.Nirmalan, Professor of Physiology and Dr. Maggie D. Menachery, Associate Professor (Nutritionist), AICRP on Poultry for Eggs, for their valuable suggestions and guidance.

I am indebted to Dr. P.K.Nanciar, Director of Animal Husbandry, Trivandrum and to the Government of Kerala for deputing me for this course of study.

I am thankful to Mr. K.V. Pappu, Kallur house, Trichur,

the largest duck egg dealer in Kerala, who gave out information regarding the various pockets of duck farming in the State and also for giving information regarding marketing of duck eggs.

I am grateful to Sri. V.S.Skandakumar for getting this thesis neatly typed within the stipulated time.

I also acknowledge the encouragement received from my wife and children and appreciate their patience and kind understanding during the period of my study.

T.K. Ravindran.

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# INTRODUCTION

## INTRODUCTION

Asia is considered the homeland of wild (Mallard) ducks from which all modern breeds have originated. Present day breeds of domestic ducks (Anas platyrhynchos) have been developed for their excellent egg/meat production by Europeans and Americans through scientific breeding practices. Duck farming has become popular in almost all countries of the world and it has developed into a commercial enterprise in several developed countries like United States of America, United Kingdom, Holland (Netherlands), Hungary and Denmark.

According to 1972 census, the duck population in India was 9.01 millions, which constituted 6.5 per cent of the total poultry population (Anon, 1981a). Ducks are mainly concentrated in the Eastern and Southern states. West Bengal leads in duck population, followed by Assam, Tamilnad, Andhra Pradesh, Bihar, Kerala and Orissa (Table 1). The availability of vast river beds largely contributed to the development of duck industry in these states. Thus definite positive correlation is seen to exist between the availability of wallowing facilities and the development of duck farming. Therefore, the National Commission on Agriculture (Anon, 1976) recommended development of duck farming in Kerala State, because the extensive coastal belt provides ideal environmental conditions



for duck farming here. Duck egg production was estimated to be 400 millions per year (Anon, 1981b) constituting five per cent of the total egg production. Ducks contribute significantly to the Gross National Product (GNP) to the extent of four crores per year (Bulbule, 1981), although duck population is mainly in the hands of the 2-3 lakhs of poor rural farmers who maintain indigenous stocks of ducks for egg production.

In Kerala the duck population is estimated to be 4.3 lakhs which constitute 3.3 per cent of the total poultry population (Table 2). Duck eggs, generally fetch premium price over chicken eggs. Keralites are not averse in using duck eggs and meat. Therefore, the chances of duck farming becoming a commercially viable enterprise are great in this State. In order to achieve this objective, necessary technology suitable to conditions prevailing in the State have to be developed by appropriate research.

Ducks in our country are maintained essentially for egg production and spent ducks and surplus drakes are the only source for duck meat. This indicates that the amount of duck meat consumed in our country is quite negligible. Broiler duck raising is non-existent at present.

The geographic location, social structure and tradition of keeping ducks offer promise to develop duck farming in

Table 1. Poultry population in India 1972 (in 1000's)

Name of States	Ducks	Fowls	Name of States	Ducks	Fowls
Andhra Pradesh	387	19047	Rajasthan	4	1235
Assam	2401	8879	Tamilnadu	547	12978
Bihar	364	12560	Tripura	76	513
Gujarat	6	2736	Uttar Pradesh	68	3920
Haryana	2	966	West Bengal	4245	15494
Himachal Pradesh	Below 500	189	<u>Union Territories.</u>		
Jammu and Kashmir	-	1654	Andamans	9	157
Karnataka	41	10163	Arunachal Pradesh	-	1193
Kerala	362	12207	Delhi	-	304
Madhya Pradesh	28	6701	Dadar Haveli	-	38
Maharashtra	37	12217	Laccadives	-	25
Manipur	34	938	Missoram	-	603
Meghalaya	42	975	Pondicherry	6	183
Nagaland	-	703	Chandigar	5	83
Orissa	326	8454	Total	9007	138476
Punjab	24	3017			

Source: Eleventh All India Livestock Census, 1972 (Final), Directorate of Economics and Statistics, Ministry of Agriculture and Irrigation, Government of India.

Table 2. Duck and poultry population in Kerala State (1977)  
(District wise).

Sl No	Name of Districts	No. of ducks	No. of fowls	Percentage of ducks population
1	Trivandrum	7384	1114273	1.84
2	Quilon	19762	1379485	4.60
3	Alleppey	159617	1545893	37.16
4	Kottayam	53660	1132951	12.49
5	Idukki	9691	613230	2.26
6	Ernakulam	105935	1444649	24.66
7	Trichur	30690	1247528	7.14
8	Palghat	18289	985379	4.26
9	Malappuram	8784	1353587	2.04
10	Calicut	11184	1006589	2.60
11	Cannanore	7073	1132622	1.65
Total		429569	12956186	100.00

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Farm Guide, 1982 - Farm Information Bureau, Trivandrum.

Kerala State on the lines of developmental achievements made in the sphere of chicken farming. Mr. Kortlang of England, an expert appointed by Government of India to prepare a project report for the development of duck industry in India has observed that the nature of duck farming enterprise in Kerala is quite unique and such practices are not seen elsewhere in the world. Therefore, any step to tackle the problems of duck farmers in Kerala should be such that it will not upset the traditional systems of duck rearing, greatly. Mr. Kortlang also reported that there is ample scope for duck farming in Kerala State (Nair, 1977).

Efforts to improve duck farming and production of duck eggs call for an understanding of the different managerial operations currently carried out by the farmers so that suitable modifications could be suggested and those that require further investigations can be taken up. The absence of any authentic information on these aspects has prompted this survey study to obtain information on the present status of duck rearing in this State.

# REVIEW OF LITERATURE

## REVIEW OF LITERATURE

In spite of the acceptability of duck eggs by a sizable portion of our non vegetarian population, adequate stress has not been given so far in our National planning to study at length the various problems and prospects of duck raising in India, thus leaving this part of the industry mostly at the stage of "pheasant husbandry". Duck farming is still considered as a backyard operation and practically very little effort has been made to assess the viability of this industry as a profitable commercial operation (Chowdhary et al. 1979). Therefore published research on either husbandry practices or other technology in respect of ducks is very scanty in Indian research journals. However few research observations have been published from developed countries, but this mainly centers around duck broiler technology. Under these circumstances, the following review is an attempt to present the information available on duck farming.

A survey in Trichur Taluk revealed that 63.18 per cent households reared chicken. A large percentage of rural population had taken up poultry keeping. Their objectives are to derive supplementary income and also to get quality products (Sureshchandra and Pushkaran, 1977).

A comparative study of production of broiler duck and broiler chick has been made by Agarwal et al. (1981). White Pekin ducklings at six weeks of age weighed 1350g and Indian River Broilers 671g with a feed conversion efficiency of 3.3 and 2.5 respectively.

So far, no study has been undertaken to assess the status of duck farming in Kerala State. Ramachandran and Ramakrishnan (1982) had conducted a mini survey on the status of duck farming in the suburbs of Trichur town. This consisted of information collected only from 18 duck farmers in and around Trichur town area on duck husbandry practices and marketing of duck eggs.

In order to probe into the problems confronting duck farming, Kerala Agricultural University had initiated preliminary studies by establishing a duck farm during 1976. In a report on the resume of research work carried out in the area of duck farming, Ramakrishnan (1982) had narrated that the following works were carried out, viz., incubation of duck eggs, embryopathy, growth studies, feed and water consumption, housing systems, egg production studies, egg quality, duck meat characteristics, economics and crossbred performance with a view to obtain first hand information.

#### Management of adult ducks

Hays (1952) observed that ducks under intensive system

showed significantly higher body weight at the age of sexual maturity than their counterparts under semi intensive system and correspondingly the ducks of former group matured sexually earlier than the ducks of the latter group.

It is generally believed that plenty of water is essential for the efficient functioning of the various biological needs of water fowls. Abakumov (1971) reported that the birds with access to ponds had a feed conversion efficiency of 5.18 and production of 137 eggs per duck per year during 1960. Corresponding values for birds without access to water were 5.46 and 90 eggs.

Rikhter et al. (1975) observed that for economic duck production controlled access to ponds was essential. Two systems of housing of ducks - one with unlimited access to ponds and the other with confinement in a fenced area with access to 3m x 100m water source (i.e. 0.6 sq.m. of water area per bird) revealed that feed consumption per kg gain in body weight was 6.1 to 3.5 and 5.7 to 6.6 respectively.

System of management was found to affect growth rate and feed efficiency. Under intensive system, White Pekin ducklings were found to have faster growth rate with higher feed efficiency than those reared under semi intensive system (Singh and Moudgal, 1976).

Robinson et al. (1977) gave an account of the unique



and elegant exploitation of the vast area of fresh water swamps which was partially or totally submerged, for the production of duck eggs in Kalimantan (formerly Borneo). Alabio ducks were maintained there for egg production. The duck houses and duck hatcheries were constructed with bamboo slats on poles fixed above the level of water in the swamps. Ducks had ready access to water usually on the side of the building through a ramp which led down to the fenced off swimming areas in the swamp. The fence was usually constructed of bamboo poles plunged vertically into the swamp beds approximately five cm apart. This structure permitted water, fish, snails and algae to enter and leave the compound, but acted as a barrier to the ducks. In this fenced off areas there were floating logs or platform which was used by the ducks as resting areas and preening places during their daily rounds of foraging in the swamps. The dwelling place of the farmer used to be above the duck house or on its side and his communication to the land was by means of a canoe. With such facilities a farmer wholly occupied himself with the care of an average sized flock of 200-300 ducks.

Biological features of Alabio ducks were very peculiar. Egg production was reported to continue for eight months when forced moulting was practiced by withdrawing feed. Ducks were brought back into production by inclusion of high protein

fish meal and snails in the diet. Three such egg laying cycles were used before the birds were disposed off. Production was said to vary between 60 and 90 per cent over the period of lay, probably averaging 70 per cent. Considering the simplicity of the diet and the vagaries of season this was a remarkably high productivity. The growing, laying, resting, laying, resting and laying cycles were 7, 3, 3, 3, 3 and 3 months respectively giving a life time production over three years of about 500 eggs (Robinson et al. 1977).

Many farmers in South Kalimantan kept one or two males per fifty females. This was said to reduce social problems among ducks. Farmers believed that the productive periods for intensively maintained ducks did not correspond with those observed in range reared ducks. They believed that ducks under intensive housing system laid for longer periods (Kingston et al. 1978). Farmers attributed the early moulting of range fed ducks largely to the weather, but this also was associated with feed quality and quantity.

In Indonesia, the laying flock kept intensively usually consisted of 400-1000 ducks. It was usual practice for farmers to operate their flocks for six months of lay to produce market eggs and then to introduce male birds for collection of hatching eggs (7-10 per cent males was the

usual ratio for hatching eggs). It was stated that best hatchability came from eggs derived from layers older than 18 months and males which were two years of age. Eggs from matings with younger males were said to have lower fertility and hatchability (Kingston et al. 1978).

It is possible that native Indonesian egg laying ducks could be kept in individual laying cages for long periods of time and high production obtained for them. Under the cage system, the Tegal duck was superior to either of the other two Indonesian ducks namely Alabio and Bali. But these findings could not be extrapolated to other husbandry systems, particularly with those wherein ducks were allowed to forage in paddy fields and swamps (Chavez and Masmini, 1978).

The production performance of native ducks of Kerala reared in confinement had been studied by Andrews (1978). The study revealed that the ducks reared under intensive system returned better hen-day egg production, but consumed more feed than those under semi intensive system. Fertility and hatchability were better under the semi intensive system. There was no difference in the efficiency of feed conversion, pattern of body weight maintenance, livability, egg size and egg quality in terms of albumen, yolk and shell percentages between the two systems.

Sharma and Singh (1978) observed that the type of management had no significant effect on egg production, egg weight, clutch size, length of laying pause or egg quality characters. In an experiment in which 60 ducks were reared in indoor pens (intensive management) and another 60 ducks reared on range with wallowing facilities at all times (semi intensive system) it was observed that egg production to 200 days was significantly correlated with that of 100 and 400 days. For birds under intensive system, age at sexual maturity was 162 days, body weight at seven weeks, 1794g, at sexual maturity 2441g and at 50 per cent egg production 2203g. The corresponding figures for birds under semi intensive system were 172 days, 1683g, 2352g and 2303g respectively.

The ducks performed best in terms of number of eggs per duck and feed efficiency when maintained from sexual maturity to first 100 days lay. The results indicated that breeders should not be maintained after obtaining 200 days egg production (Chopra et al. 1981).

#### Management of ducklings

Staples (1970) reported that chilling was by far the most common complaint among artificially reared ducklings. The most crucial period is the first 14 days when even

moderate fluctuations in brooder temperature can result in chilling.

Kingston et al. (1973) gave an account of rearing ducklings in the swamps of South Kalimantan. They observed that the farmers started with five-day old sexed female ducklings. The ducklings were fed with Sagopalm, shrimps, snails and rice bran, were not provided with artificial heat during the brooding period and were not allowed to water for the first fourteen days.

Chavez and Lasuini (1978) in a comparative study observed that for three varieties of native Indonesian ducks, Tegal, Alabio and Bali, the age at first egg averaged 173, 179 and 189 days and number of days from first egg to 50 per cent production, 33, 32 and 24 days, per cent peak production, 83.2, 92.7 and 58.6, egg weight, 63.0g, 60.0g and 59.4g, feed consumption 162g, 169g and 138g daily and food conversion 4.1, 4.4 and 4.7 kg feed per kg egg. In Tegal ducks four per cent laid more than 300 eggs, 65 per cent laid more than 200 eggs and eight per cent laid less than 100 eggs in one year of production.

Desi ducklings were reported unsuitable for economic meat production, even though they attained marketable weight at 49 days of age, possibly because of their poor genetic potentiality for weight gain and feed efficiency (George et al. 1980).

In a study with desi ducks, George et al. (1981) showed that the body weight of ducklings raised in battery was significantly higher than those raised on litter floor till eight weeks of age. Thereafter the results obtained were just the reverse. The feed and water consumption were 200g and 924 ml respectively at 12 weeks of age. The feed: water ratio of 1:5 remained constant irrespective of the age and system of management.

The cost of producing six weeks old ducklings was reported by Chopra et al. (1981). The per kg cost of raising ducks upto six weeks was almost similar to the cost of raising one kg broiler chicken to eight weeks of age. This indicated that if both (six week old duckling and eight week old broilers) are sold at the same time and rate, more crops of ducks could be raised per year compared to those of broilers which will result in higher profit and early returns.

Semi intensive system of management of ducks was found to be very much ideal for subsistence farmers in Papua New Guinea villages (Abdelsamie , 1979). Under this system each farmer received a total of 117 day old ducklings (9 Pekin and 108 Muscovy) and six weeks supply of feed. From six weeks of age the ducks had access to free range all days and were given one feed daily. Seventy per cent of the ducks survived to 36 weeks of age when body weight was 1.7 kg and 2.9 kg for ducks and drakes respectively.

## Feeding practices

Robinson et al. (1977) described the feeding practices of Alabio ducks in South Kalimantan. The food primarily consumed was that compounded by the farmer himself and consisted of "Rumbia" (finely chopped sagopalm) fresh shrimp, fish, rice bran etc. Sagopalm (*Metroxylon* species) locally known as "Rumbia" in Indonesia, has high percentage of starch in its pith and hence was the staple food for ducks in Indonesia. Sagopalms were made into logs of 2m length. One metre of Rumbia finely chopped would feed 50 ducks for one week. The snails and shrimps probably contributed the major portion of dietary protein. The species of snail used is *Pila ampulaceae*. These water snails were being harvested and sold for duck feed. Snails were not cooked, but were crushed and fed. Some used whole snails while others used only meat.

Nair (1977) reported the formula of duck feed used at the Government Duck Farm, Niraman. He pointed out that groundnut cake as source of protein was purposely avoided in the ration to ward off the possibility of aflatoxicosis occurring through contaminated groundnut cake.

Kingston et al. (1978) described a feeding practice for rearing of Alabio ducklings. From fifth day onwards ducklings were fed a starter feed. Upto five days only cooked rice was given to the ducklings. Starter feed was a wet mixture of

sagopalm plus fresh water snails and steamed fish with cooked rice - fed 3-4 times a day. The mixture was squeezed in a cloth and given spread on a plastic sheet. It was moist, but not sloppy. Every day the quantity of feed was increased.

Weights of feed ingredients for 175 ducklings (10 days old).

<u>Ingredients</u>	<u>Quantity</u>	<u>Percentage</u>
Sagopalm (kg)	1.83	37.00
Fish (kg)	0.74	15.00
Snails (kg)	1.66	33.60
Rice (kg)	0.71	14.40
	-----	-----
Total	4.94	100.00
	=====	=====

The nutrient composition of the feed is estimated as follows on fed basis.

Crude protein percentage	- 13.10
M.E. (Kcal/g)	- 2.12
Cal percentage	- 4.50
P percentage	- 0.30
Moisture percentage	- 34.00

They further described the traditional method of preparing food for ducklings in Kalimantan as follows.



Fresh or dried fish is cooked for 30-60 minutes. When dried fish is used, it is customary for cooked coconut cake (one hour cooking) to be added to the ration. Snails were not cooked, but were crushed and drained. When the cooked fish is cooled and crushed snails drained, all ingredients except rice are mixed and chopped together. Feeding is done immediately and no storing of feed is done. After the fish - snail mixture is completely fed, cold cooked white rice is fed. The quantity of rice is then progressively reduced and the quantity of sagopalm increased until at 20 days of age when no further rice is fed.

Avens et al. (1980) in a study on egg production and efficiency of food conversion of Khaki Campbell ducks under different management systems recorded that housing of ducks in cages did not reduce egg production and feed efficiency compared with those on floor pens. Egg production and egg size were adversely affected by restricted feeding programme. Gaging in a controlled environment with unrestricted food appears to be a potentially feasible management regime for laying ducks.

Singh et al. (1980) opined that feed restriction at various levels of 20, 30 and 40 per cent for different periods of 6-20, 6-24 and 10-24 weeks had no significant effect on albumen and yolk quantities of White Pekin. But ducks on

restricted feeding produced larger number of medium sized eggs than the control ducks.

Reddy et al. (1981) estimated that the requirement of proteins for layer ducks was 19 per cent and energy 2400 Kcal ME per kg feed. Feed efficiency and egg quality were satisfactory at these protein and energy levels.

Ducks are voracious eaters and good foragers. Apart from compounded feeds, snails fingerlings, earth worm, insects and vegetation form a part of their diet (Bulbule, 1981).

Aflatoxicosis and other mycotoxicosis were largely ignored in poultry production until the discovery of "Turkey x disease" in England in 1960. Ducklings and turkey poults were very much susceptible. Even 4 ppm of aflatoxin was found to be toxic to ducks (Antonio and Calval, 1981).

Ash and Nothers (1964) observed that the optimum marketing age for long Island White Pekin ducks and drakes was seven and eight weeks respectively.

Duck eggs with their 28 day cycles and high porosity of shells need special air circulation in incubators. Since humidity level requirements are different from those of chicken eggs during first 25 days (57-62 per cent RH) and the last three days (73-79 per cent RH) no good results can be expected from machines where setting and hatching are done in the same compartment (Bulbule, 1981).

Duck eggs should be incubated in forced draught incubators at 37.5°C for getting best results. Mc Ardle (1966) recommended that the relative humidity should be about 70 per cent for the first few days and then reduced to 60 to 65 per cent until chipping, when it should be again enhanced to 70 per cent. He also recommended spraying of warm water over the duck eggs during the last four days of incubation as a means to provide higher humidity.

Ubiquitous Entok ducks, commonly known as Manila or Muscovy ducks (*Carina Muschata*) are exploited as an incubator machine to establish an intensive duck egg industry in Borneo (Robinson et al. 1977; Kingston et al. 1978). The Muscovy (an inter species of duck and geese) ducks are trained to sit on eggs for 4-5 months instead of only for 35 days (the incubation period for Muscovy eggs is 35 days). Twentyfive to thirty Alabio duck eggs are set under each Muscovy. Hatchability is 95 per cent (Average 75 per cent) on all eggs set.

Special incubating houses are built above water in the swamp and on them slatted floor boxes 25 cm square are placed in rows, each with 25-30 eggs and a single Entok duck. Hatcheries in South Kalimantan (Borneo) varied from a single wooden box under the owner's house with one Entok duck to buildings accommodating upto 100 sitting ducks. The largest

hatchery there utilised a total of 600 Entok ducks. The nesting material in the boxes was usually the threshed heads of the rice plants, though occasionally rice straw also was used. The ducks will sit all day until released for about one hour of feeding. Each Entok knows its own nest and usually there will not be any fight between them for nests.

The same broody is utilised to hatch out three and sometimes four clutches of 25-30 duck eggs consecutively. The broodiness is artificially induced by restricted access to a purely carbohydrate diet consisting of Rumbia and rice bran with no source of protein. The broodiness is broken after the last hatch by removing the Entok to well lighted open places and starving for two to three days. After 2-3 months rest the Entoks are brought into production again by inclusion of protein rich feed usually fish meal in the diet. A clutch of Entok ducks is hatched as replacement "incubators" followed by a series of Alabio clutches.

Entok ducks happily remain broody upto five months. Following a prolonged brood they rest for two to three months and then return to brood again. Under such conditions the birds remain productive incubators for at least five years.

Cayuga and the Black Indian Runner are the other two kinds of ducks which incubate their own eggs (Leslie, 1975).

Kortlang, a duck expert from England who visited India

in 1976 commented that the failure with imported ducks in breeding stock and incubation has been mainly due to errors in management, feeding and incubation techniques in India (Sheriff, 1979).

An outbreak of duck plague causing considerable mortality was encountered in Kerala State during 1976. Symptoms and lesions were similar to those reported in duck plague infection. Extensive necrotic lesions were also seen in the musculature of gizzard and heart (Rajan et al. 1980).

New Castle disease virus, even though not pathogenic to ducks, a strain of New Castle disease virus ducks (NDV-D has been isolated from a case of acute respiratory condition in ducks (Salochana et al. 1981).

When ducks are reared in proximity with chicken, possibilities of getting ducks exposed to NDV from chicken cannot be ruled out. It is probable that the ducks may suffer from an inapparent type of infection with a rapid course and high mortality (Boro and Chakrabarthy, 1981).

#### Marketing, costs and returns

Bulbule (1977) gave an account of costs and returns from duck farming under intensive system both for duck layer and duck broiler farms. According to him a 1000 duck layer farm yields a gross profit of Rs. 20,070/- or net profit of Rs. 1/60

per bird per month and a duck broiler unit with 6000 broilers yielding six crops of 1000 birds each of seven weeks duration with 10-12 days interval between crops yields a gross profit of Rs. 12,935/- or net income of Rs. 2/- per bird. Bulbule (1984) also reported a net income of Rs. 0.69 per bird per month from a flock of 250 Khaki Campbell ducks.

Kingston et al. (1978) worked out the economics of hatching duck eggs using Entok ducks in Borneo. A duck hatchery unit having 70 broody and 90 non broody Muscovy ducks after taking into consideration the feeding costs of Muscovy, costs of hatching eggs @ Rs. 0.60 per egg, sale of sexed male and female ducklings at differential rates of Rs. 0.25 and 4.00 respectively yielded an average weekly profit of Rs. 310/-. Hatchery business was reported by him to be more remunerative.

## **MATERIALS AND METHODS**

## MATERIALS AND METHODS

District wise scrutiny of the distribution of ducks in the State of Kerala indicated that the maximum duck population is in Alleppey district (1.6 lakhs) followed by 1.06 lakhs in Ernakulam district, 0.5 lakhs in Kottayam district and 0.31 lakhs in Trichur district (Table 2). Thus, 80 per cent of the total duck population is in these four districts. Alleppey and Ernakulam districts were selected for the study since these two are the main pockets of duck population. Trichur district was also selected for the survey due to its close proximity to the Kerala Agricultural University where the investigator was doing his graduate research programme, even though this district had the fourth rank in the State with respect to duck population.

### Selection of respondents

The Deputy Directors (Animal Husbandry) in these districts maintain lists of duck farmers in their respective jurisdiction. The investigator contacted some of the duck farmers according to that list and it was revealed that the number of persons actually engaged in duck farming were more than what was available in the lists. Therefore, the investigator himself made a list of duck farmers by making enquiries with some of the duck farmers in the three districts.



In this way, it was possible to locate 76 duck farmers in Trichur district, 157 in Alleppey district and 90 in Ernakulam district. A person who had more than 200 ducks and whose main source of livelihood was the income derived from duck farming was considered as a duck farmer for the purpose of this survey. Thus, one hundred farmers were selected for the study. The selection of farmers was done by adopting probability proportionate size sampling technique of Lahiri (Snedecor and Cochran, 1967).

An interview schedule was constructed embodying all the information to be collected and the individual farmer was interviewed personally by the investigator. In order to understand the various aspects of duck farming, the questionnaire consisted of various sections like economic and educational status of the farmer, husbandry practices followed for adult birds and ducklings, incubation practices, handling of duck eggs, nutrition of young and adult stock, marketing methods, various costs and returns etc.

A number of visits were made in order to establish rapport with the duck farmers and the objectives of the study were made clear to them during these visits. This helped the investigator to establish cordial relationship with the duck farmers and gain their confidence. The questionnaire was presented among some of the farmers initially to find out

the relevance of the various points on which information were sought for. On a preliminary enquiry in the area, duck farming was seen carried out as fractional enterprises comprising of various activities either singly or jointly, like hatching of eggs, brooding of ducklings, hatching and brooding, rearing of ducklings to pullet age or pullets on point of lay, production of table eggs and hatching eggs, marketing functions etc. While selecting respondents, due representation was given to persons involved in each of these enterprises. After this test interview suitable modifications were made in the interview schedule (Annexure). This initial contact programme also helped to shed their inhibitions and apprehensions and to freely give out informations.

The collected data were tabulated in tally sheets, categorised and fitted into tables to facilitate meaningful interpretation of findings. Relevant inferences and conclusions were drawn and the results were interpreted and discussed objectively.

## RESULTS

## RESULTS

### Socio-economic status

Most of the farmers interviewed had no other source of income other than the one from duck farming. Out of the 100 farmers interviewed one had supplementary income from running a tea shop and another from cutting of coconuts for copra making. During non-harvest seasons the farmers had to resort to hand feeding of ducks which involved heavy expenditure. For this purpose they were forced to avail of loan facilities from private individuals at exorbitant interest rates for short term periods.

Socially, people from all strata of the society irrespective of caste or religion were found to be engaged in duck farming. Out of the 100 farmers interviewed 62 were Christians, 12 Muslims, 23 Hindus and 3 scheduled caste individuals (Table 3). Economic background of the duck farmers, generally, was not found to be sound enough to maintain their families. Most of them who availed loan facilities from financiers were not able to completely repay the loan in time and failed to become independent. All financiers in the duck industry were also egg dealers or commission agents in egg markets. The farmers are obliged to sell their eggs to these functionaries towards the

Table 3. Distribution of respondents based on their social status

Total No. N = 100.

Sl No	Social Status	Number of farmers		Total
		Frequency	Percentage	
1	Christians	62	62	62
2	Muslims	12	12	12
3	Hindus	23	23	23
4	Scheduled Castes	3	3	3
Total		100	100	100

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repayment of loan. Thus, a sort of contract is established. As far as an average duck farmer is concerned, all the activities such as purchase of feeds, collection, transportation of ducks, purchase of ducklings or adult ducks and sale of eggs etc are arranged by the financiers. So exploitation by middle men is prevalent in duck farming also which is managed by duck farmers who are generally poor.

Based on the availability of land holdings all the duck farmers fell under the categories of small and marginal farmers and agricultural labourers except two who were big farmers according to IRDP classification. The distribution of the farmers on the basis of their land holdings is given in table 4. Most of them had only 10 to 15 cents of land. Educationally, majority of them had only primary or secondary education. Only 18 had high school education (Table 5).

All the duck farmers interviewed had enough experience in duck farming acquired from their predecessors in the family. In many cases, it was seen that all the members in the same family were involved in the business. At the time of partition of the family properties, the total stock of ducks also became an item to be divided among the family members. No one had gone into the business on his own and tried to grow into the business. So the question of getting out of the business due to inexperience and inefficient management did not arise.

Table 4. Distribution of the respondents based on their availability of land holdings

Total No. N = 100

Sl No	Classification	No. of respondents			Remarks
		Frequ-ency	Percen-tage	Total	
1	Less than 10 cents	10	10	10	Agriculture Labourer
2	10 cents to 1 acre	80	80	80	Marginal farmer
3	1 acre to 2.5 acres	5	5	5	
4	2.5 acres to 5 acres	3	3	3	Small farmer
5	Above 5 acre	2	2	2	Big farmer
Total		100	100	100	

Table 5. Education status of farmers

Total No. N = 100

Sl No	Qualification	Number of farmers		Total
		Frequency	Percentage	
1	Illiterate	2	2	2
2	Lower primary (upto Vth Std)	20	20	20
3	Upper primary (upto 7th Std)	60	60	60
4	Upto S.S.L.C.	18	18	18
5	Others	-	-	-
Total		100	100	100



### Flock strength

The survey indicated that the flock strength that a team of three members could efficiently manage under the existing system, was 350-400 ducks. The farmers had observed that the social behaviour of the ducks required "masters" in front and behind to be guided and goaded while they move in flocks along the paddy fields, roads or bunds. At least three persons inclusive of the owner were reported to be required for managing a flock. In cases where there were large number of birds owned by a single farmer the flocks were split so that the number of birds in each flock did not exceed 350-400. The distribution of farmers according to the number of birds possessed by them is presented in table 6. It was observed that majority of the farmers had a flock strength of 200-400.

### Breeds

All the farmers maintained only the native non-descript breed of ducks which differed widely in phenotypic traits. Very few farmers had heard of exotic breeds like Khaki Campbell and White Pekins. Even those who were aware of this were reluctant to accept the new breeds, especially Khaki Campbell. The comparatively small size of the eggs of Khaki Campbell, in spite of higher egg number was not to the liking by the farmers.

Table 6. Distribution of farmers according to the number of birds possessed by them and the range of net profit from flocks

Total No. N = 100

Sl No	Number of birds	Frequ- ency	Percen- tage	Total	Range of Net profit *
1	Less than 200	7	7	7	Rs.575/- to Rs.4476/-
2	201 to 400	41	41	41	Rs.2000/-to Rs.14800/-
3	401 to 800	26	26	26	Rs.7150/-to Rs.15240/-
4	801 to 1200	14	14	14	Rs.9800/-to Rs.21675/-
5	Above 1200	12	12	12	Rs.10725/-to Rs.51980/-
Total		100	100	100	

\* Net profit calculated on the basis of costs and returns furnished by the individual respondents.

## Hatching and Brooding

Information gathered on procurement of replacement stock revealed that hatching of day-old ducklings is a specialised feature centering around "Kuttanad". It was further revealed that farmers in other districts do not usually indulge themselves in incubating eggs, but rather go to Kuttanad areas to purchase young ducklings. Large sized desi broody hens are used by the farmers for getting their duck eggs hatched out. The survey revealed that the duck eggs were hatched in three definite seasons, namely October-November, January-February, and April-May periods.

Depending upon the size of the broody hen 15 to 18 eggs are set under each hen. Experienced farmers claimed that they get 80-85 per cent overall hatchability on all eggs set. Many housewives in Kuttanad area were engaged in hatching of duck eggs using broody hens. Hatching of duck eggs was seen carried out in many households as a cottage industry in those areas (Fig. 1). About five to ten hens will be broody at a time and the receipts derived from hatching of eggs is a supplementary income for such families. For every duckling hatched out the housewives are paid Rs.1/25 each as remuneration by the duck farmers. Therefore, all efforts were made by the housewives to achieve maximum hatchability. The cost involved in incubation is only the

cost of feeding the broody hen. Broody hens are fed mainly with cooked rice soaked in water over night. They believe that the hen will remain in active broodiness for a long time if they are fed with cooked rice alone. They reported from experience that broodiness could be prolonged by feeding cooked rice alone daily. The same hen was utilised for hatching a second set of eggs in continuation of the first. The ducklings hatched out are removed on the second day, the shell debris removed and new nesting materials provided for a second batch of eggs. The hens are never used for more than two consecutive batches in the same period of broodiness. After the second brooding, the hens are released free after the removal of ducklings and the nests are removed to prevent them sitting further on it. Then the brooder hens are given protein rich feed comprising of wheat, grains, oil cakes and dried unsalted fish. Broodiness is reported to disappear within a period of 1-2 months and the hens come into lay. After 14-20 days of laying they again become broody and are used again for hatching. Thus it was observed that the Kuttanad duck farmers use a single broody hen for six crops of ducklings in the course of three broody periods in an year.

It was further revealed that candling is done on the seventh day by holding the eggs against light during night hours. All clear eggs which are definitely infertile are

removed for table purpose. Various kinds of containers are used for the sitting hens - like earthen pots, bamboo baskets, dealwood cases, aluminium bowls etc. Paddy straw is used as nesting materials. Eggs for hatching are collected from ducks which had been laying for at least six months. Eggs collected at peak production are said to have maximum hatchability. Selection of hatching eggs is made by visual examination based on size, cleanliness and soundness of shell. Wet and soiled eggs are not used for hatching. Washing of eggs is not practiced. If good quality eggs are set, farmers claimed 80-85 per cent hatchability.

The interview further revealed that during hatching season certain agents were actively engaged in distributing hatching eggs to households where broody hens were available. On the second day of the hatch, the hatching agents collected all the ducklings after paying the remuneration to households for their services. The ducklings were pooled then at one place and reared.

It was observed that artificial incubation was not practiced at all by the farmers. Previously there was a system of custom hatching for duck eggs at the central hatchery, Chengannoor, at a nominal cost of Rs. 0.25 per egg set. But that system was discontinued probably due to low hatchability and other administrative reasons. Now the duck

farmers depend entirely on the broody hens, the natural "living incubators" for getting their eggs hatched out. Even though the incubation of large number of eggs under many broody hens is a cumbersome process, the farmers expressed their satisfaction and desire to incubate only under broody hens as they believe that the latter will yield at a higher percentage of viable ducklings.

#### Rearing of ducklings

The ducklings collected from various broody hens are pooled at the owner's premises and are housed in a temporary thatched shed, the floor of which is spread with dry sand. Each farmer raises about 2000-3000 ducklings. The floor area of the shed is generally 2m x 4m divided into four partitions with 25 cm high woven coconut leaves. The partition is provided to prevent death of ducklings due to hurdling. The height of the shed is normally 2.5m at the roof and 60cms at the sides with bamboo mat or woven coconut leaves. The broody shed is generally a temporary structure and is used only for one month.

For feeding and watering, the ducklings are let out to an enclosed open area which is continuous with the thatched shed. The partition in between the shed and the enclosed area is removed and the ducklings are allowed to enter the

enclosed open air area where they are given feed spread on a plastic sheet or bamboo mat (Fig. 2).

Feeding is done only from the second day onwards. The opening feed is cooked rice well mixed with coconut gratings. After draining the water completely from cooked rice, it is mixed with freshly grated coconut at a ratio of 3:1. This is practiced to increase the palatability of rice. For the first week only medicated water is given. The formula for medicated water used by most of the duck farmers in Chengannoor and Puthuvalla area consists of "Vayambu" 100g; pepper 20g, turmeric 100g, "karapetty" 300g and water five litres. The ingredients are well pulverised and smashed and added in required quantity of water (5 litres) and boiled for 10 minutes. Feed is given on plastic sheet or bamboo mat and water (medicated) kept in a shallow pan on the sheet. Feeding and watering are done three times a day. Five kg of rice is cooked to feed two thousand ducklings on the opening day. Subsequently the quantity is increased day by day according to requirements so that the ducklings get ad lib feed always. This kind of feeding and watering is continued for the first week. Some farmers give whole milk or reconstituted milk to ducklings during the first week when no other kind of water is offered. The medicated water is believed to afford the ducklings more stamina and resistance to various

ailments like cough, sneezing, paralysis etc. The ducklings are disturbed periodically during night in order to prevent mortality due to huddling. No artificial warmth is given to the ducklings during the brooding period.

On the seventh day, the ducklings are allowed to swim in water. For this purpose another temporary thatched shed is prepared near the course of water channel or a lagoon or a pond. From this shed a pathway of about one metre wide is made leading to the water. The pathway is limited on its sides with woven coconut leaves to prevent the ducklings straying away from the premises while being led to the water source (Fig. 3). This will help the ducklings to get experience to move in flocks. They are allowed to swim in water for one hour in the morning.

During second week, finely powdered roasted fish meal and dry roasted shrimp powder are mixed with the cooked rice and fed. At three weeks slightly coarser feed is given consisting of cooked wheat, cooked rice mixed with slightly large grades of fish meal and fish powder. During fourth week cooked paddy mixed with dried small fish and shrimps is given. The time allowed for swimming is increased daily. This kind of temporary housing is provided only till the end of first month. Thereafter, they are taken to the paddy fields for foraging. Supplementary feed consisting of ready made poultry mash is also fed to ducklings as wet mash.



Ducklings are reared straight-run during the first two months. After two months, the males are distinguished by their hoarse and shrill voice and are separated and sold off immediately. Day-old sexing is not at all practiced by the farmers.

Mortality during the period of rearing is reported to be <sup>o</sup>around five per cent upto two months and is mainly attributed to weaklings, accidents, hurdling and occasional chilling. Health cover programmes include only vaccination of ducklings against duck plague at the age of three months repeated after one month. Whenever the farmers notice any symptom of disease like drowsiness, sneezing, coughing, fever and occasional mortality they immediately give mass treatment with medicated water referred to earlier. Use of antibiotics and nitrofurazone is less common. If the condition does not improve they seek help from Veterinarians.

Ducklings hatched out at different seasons are designated according to the month during which they are hatched out. There are three hatching seasons in Kerala. They are :

1. Chingakunhu (ducklings hatched out in August-September)
2. Vrischika kunhu ( - do - November-December)
3. Kumbha kunhu ( - do - February- March)

Ducklings hatched out during these seasons will be ready to lay after five months when the harvest seasons will commence all over the State.

## Management of Adults

Since the ducks are moved from place to place depending upon the harvest season and availability of post-harvested paddy fields no permanent housing is provided for ducks in Kerala. Duck farmers in Kerala not only move within the State but also take their stock to neighbouring States like Tamilnadu (Kaniyoor, Erode, Madurai), Andhra Pradesh (Bhadravathy) and Karnataka (Mysore). Locations available close by are covered by foot, while those which are far away are reached by road transport in special trucks (Fig. 4). After the day's foraging the birds are flocked together in slightly elevated place on the bank of the field and are enclosed in a circular area of three metre diameter with one metre high chicken wire mesh or woven bamboo slats at dusk. The farmer or his assistant keeps sentry for his flock during night to safeguard against theft and attack by wild predators. Birds are reported to start laying about 12 midnight onwards and continue to lay upto 6 a.m. They seldom lay eggs two hours after sun rise. The eggs are collected in baskets at about 4 a.m. while the ducks are still in the enclosure (Fig. 5). This is done to prevent the eggs being soiled with droppings and to prevent breakage by movements of the ducks. By 6 a.m. the remaining eggs, if any, are also collected and the ducks are released from their enclosure (portable) and



Fig. 6. Night shelter

start their journey to the next field which had been previously identified by the owner and the day of the farmer is again started.

The eggs collected are sold in the nearby market, if they are small in number or kept in a dark cool place safely for being collected by the financiers or commission agents, periodically.

The study revealed that most of the flocks had 3-4 drakes for every 100 ducks. The farmers claimed satisfactory degree of fertility even with this wide sex ratio. Drakes in a flock are said to control the social order, customs and behaviour in a flock. Even though the farmers are aware that males are not required for the production of table eggs, they believe that some drakes are required in a flock in order to control the flock especially during foraging and also during transit by walk.

The survey further indicated that the farmers in Trichur and Ernakulam districts and even people from other parts of South India procure adult ducks or ducklings from the Kuttanad area. This is because the conditions available in Kuttanad are conducive to obtain viable ducklings hatched out and reared. People in Kuttanad areas breed their own flocks and sell off partly grown ducklings.

The duck farmers incur some expenditure for foraging

their ducks in post-harvested fields. As far as the land owner is concerned it is an additional income for him without any extra cost. Depending upon the availability of post-harvested paddy fields and the competition for the fields, the rate of remuneration varies from 20-40 eggs or equivalent cash per acre of field. The foraging areas are booked in advance by the duck farmers. Every day he has to go in search of the available foraging areas and it is an important job for a duck farmer. The search is so exhaustive that there may not be a single paddy field in Kerala State which has not been utilised for browsing by ducks at least once in a year. In certain areas where the paddy cultivation is carried out by farming co-operatives, the right for foraging ducks in the whole continuous area of paddy is given in public auction. The kole lands in the State, which are managed by the co-operatives are reported to obtain a substantial return on this account.

#### Feeding practices

The farmers reported that the harvested paddy fields are available for about seven months in a year and economic production is generally limited to this period. The remaining five month period is one of lean production as far as duck farmers are concerned. During this period he has to purchase feed for hand feeding his ducks. This is a major cost item experienced by duck farmers.



σ. 7. 3gcs pacel in empty  
plywood cases for  
marketing

The main item of feed given in Trichur and Ernakulam district is 'Milo' or Jowar (*Sorgam Vulgaris*) which is brought from Tamilnadu and Karnataka. The present rate is Rs. 135/- per quintal and the quantity of feed is 150 kg per day for 1000 ducks. In addition, 25 kg each of dried unsalted fish which costs Rs. 200/- per quintal is also fed. When milo is not available, the same is substituted by paddy or wheat. In Alleppey and Ernakulam districts 'Palm Core' (finely chopped and smashed pith of umbrella palm) is given mixed with groundnut cake in order to economise feeding. The farmers opined that palm core being rich in starch, is an excellent maintenance ration even if the ducks do not produce any egg by such feeding. The total length of a moderately sized palm tree is about 20m and it is cut into pieces of 2m length. Palm trees of this particular type are seen in wild state in central Travancore areas especially in Palai (Kottayam district). Three numbers of such palm trees cut into 30 pieces can be transported in an average truck. The cost involved on this account will be Rs. 2500/- from Palai to Kuttanad including the cost of the trees and the transport charges. The feeding regimen is one piece (2m length) of broken and smashed palm mixed with 5 kg of fresh well soaked groundnut cake per day for 500 ducks. Farmers reported that no amount of artificial feeding will bring back the ducks into their original production status. They further

added that it will take 10-14 days for the ducks to come into original production after being newly introduced into a post-harvested paddy field.

#### Egg production

None of the farmers had kept any account of the number of eggs produced from their flocks for a complete year. They admit that the production potentiality of the indigenous ducks is very high, but they are not able to exploit the same due to various difficulties such as finance, unfavourable season, vagaries of nature etc. Nevertheless, the egg production as reported by most of the farmers is 130 to 140 per duck per year. Some of the farmers stated with great confidence that the desi ducks could be made to lay even 200 eggs per bird per year provided they are fed with sufficient quantity of maize and fish. But the cost of intensive hand feeding impose great financial burden upon the poor duck farmers and hence they depend only on natural browsing and foraging for egg production.

No separate breeding flock is maintained for the production of hatching eggs. Even the ratio of 3-4 males for every 100 females is said to give high fertility (85 per cent). The eggs intended for hatching are collected clean and without contamination by any faecal material. Eight to ten per cent extra cost is levied for hatching eggs than table eggs. The





g. 8. Foraging in paddy fields

additional amount is levied not on account of keeping males in the flock, but to compensate for the additional labour involved in collecting clean, sound and unsoiled eggs.

A flock is maintained for only one year of production and the farmers might sell the birds to some other needy farmers at reduced rates. The latter keeps the flock for one more year after which he sells them at still lesser rate as spent ducks. Some duck vendors purchase these spent ducks for disposal as meat birds specially during Christmas and Easter seasons.

#### Diseases

Contagious duck diseases and resulting loss due to death of ducks were not known to the duck farmers till 1976. Heavy mortality was experienced in Alleppey district during the middle of March 1976 and by June the tragedy made its havoc in almost all parts of the State. Hundreds of ducks were dying daily. The panic stricken farmers started transporting their surviving birds to the neighbouring districts thereby disseminating infection to those areas as well. In the initial stages the cause of death was not diagnosed properly. Later on when it was confirmed as duck plague proper vaccination was conducted by procuring duck plague vaccine from West Bengal and Ranipet.

Duck plague is the only disease about which the farmers

Eggs are carried in tempo vans and lorries after packing. Previously eggs used to be despatched to Calcutta market in large consignments by rail. But now the eggs are sold out within the State itself, mainly at Ernakulam, Thodupuzha, Moovattupuzha etc. A major egg marketeer at Trichur is dealing 15,000 eggs daily. Maximum sales take place during the period of August-September, December-January and April. When the production of eggs in Kerala become less during non harvest seasons, duck eggs are brought from nearby States to meet the demand here. Usually eggs are brought from South Arcot, North Arcot, Kulthala, Trichy etc. In spite of best care taken in the handling of eggs the survey revealed that the farmers generally encounter five per cent cracked eggs. Out of this only one per cent may have to be condemned as "loss" eggs. The remainder of the checked or cracked eggs are sold at a reduced rate depending upon the degree of cracking. Various facilitating functions such as grading, washing, oil treatment or refrigeration are not practiced with duck eggs. Selling price varies from 55-60 paise per egg according to the elasticity of demand. The commission rate levied by the financiers is reported to be Rs. 10/- for every thousand eggs handled.

Costs and returns from the flocks

Costs and returns were calculated with respect to all

the respondents on the basis of the data given by them. The number of birds in the flock, expenditure, gross returns and net profit from the flock are calculated and range of profits is presented in table 6.

For production of market eggs - the items of expenditure included cost of birds, cost of rearing, labour and other costs such as hard feeding, rent for paddy fields, transportation costs etc. These costs are highly variable and the net returns from flocks of different strength are also not uniform. The items of returns are fairly constant, namely the return from sale of eggs and from spent ducks. The net return or profit from a flock of 200 layers was calculated to be Rs. 3270/- per annum or Rs. 1.36 per duck per month. Incubation enterprise - the return obtained from hatching duck eggs by the housewives is the rent received by them for the broody hens and for their services. It was calculated to be Rs. 185/- within a period of 56 days with five broody hens giving two crops of ducklings in each brooding period - with 82 per cent hatchability out of 18 eggs set under each hen. The remuneration received by the housewives for their services is at present Rs. 1/25 per duckling hatched out.

Estimates of costs and returns from "Ducklings for sale" business.

Cost items

Considering 30 per cent hatchability, total eggs to be set in order to get 1000 ducklings	1250 eggs
Cost of 1250 hatching eggs @ 0.70.	: Rs. 875.00
Rent for broody hen @ Rs.1/25 per duckling	: Rs. 1250.00
Feeding charges @ 1.5 kg feed per duckling per month - 1500 kg feed @ Rs. 2/30 per kg.	: Rs. 3450.00
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Total	: Rs. 6325.00
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Returns

Receipt by sale of 980 ducklings allowing two per cent mortality @ Rs. 8/- per duckling at the end of one month.	: Rs. 7340.00
Net profit (after two months from the date of setting eggs)	: Rs. 1015.00

farming system could possibly attract many progressive farmers as in the case of chicken business.

Most of the people in Kerala, especially in coastal districts have very limited land holdings. A tangible result of successful implementation of the progressive and comprehensive land legislation in the State has resulted in considerable increase in the number of small holdings. Consequently the number of small and marginal farmers has increased considerably. Since Keralites have a high degree of literacy compared to people of other States, a desire to become economically independent seems to be their general feature. The realignment in the pattern of utilisation of labour that followed the implementation of land reforms act could have served as a compulsion to the new land owners to translate their aspirations for achieving economic independence. These had to be brought about by venturing into new enterprises or expanding the old ones in a more remunerative manner. Duck rearing happened to be one of such enterprises within their reach and many of them turned to it. Since it was found to be remunerative duck farming has become a viable occupation and traditional trade in certain areas.

The survey indicated that duck farming in Kerala State is of a unique and peculiar nature. The traditional duck rearing practices die hard among the low income peasants who tend to adhere rigidly to systems of proven value and avoid

experimentation and innovation especially when these involve capital outlay.

### Flock strength

The common flock strength appeared to be 350-400 ducks while units of much smaller size and those with a few thousand ducks are not uncommon (Table 3). The usual duck unit in South Kalimantan is of 200-300 ducks (Robinson et al. 1977) manned by a single person and the entire income is his own. Laying flocks in Indonesia kept intensively consisted of 400-1000 layers (Kingston et al. 1978). While male-female ratio of 1:30 is found highly satisfactory in Kerala for range system, in South Kalimantan the sex ratio works out to 1:10 (Kingston et al. 1978).

In the University Poultry Farm, Mannuthy, where the ducks are presently maintained on semi-intensive system, the sex ratio is 1:6 (George et al. 1981). The success of the wide sex ratio adopted by the traditional farmers may be attributed to frequent successful matings of ducks on water.

### Breed

The result of the study showed that the duck farmers in Kerala have only flocks of desi (local) ducks. Even among these ducks, wide variations in phenotypic characters are seen. This could perhaps be due to the absence of any specific

selection and breeding system applied in their flocks. At present, some exotic breeds like Khaki Campbell and White Pekin are available in considerable numbers only at Government Duck Farm, Niranam. Kerala Agricultural University is maintaining a small unit of Khaki Campbell in its duck unit in order to make a comparative study of productive performance with desi ducks. Small flocks of Khaki Campbell ducks consisting of 10 to 20 numbers are maintained in various house-holds in Thiruvalla Taluk as backyard duck units. Eventhough the Khaki Campbell ducks are capable of laying about 300 eggs per annum, the farmers expressed satisfaction with desi birds which give only about 150 eggs per year, because of their hardiness and ease of management and large sized eggs. This was the unanimous opinion of the duck farmers at a seminar on ducks organised by the Kerala Animal Husbandry Department, at Thiruvalla, recently.

#### Hatching and brooding

While the desi brooding hen sits for two months giving two consignments of ducklings consecutively, the Entok ducks sit for 4-5 months and hatch out 4-5 batches of ducklings, both giving the same percentage of hatchability. Inter species exploitation is practiced for hatching eggs using Muscovy or Manila or Entok ducks (*Muscha Carinae*) in Borneo. Kingston et al. (1981) have described the use of Muscovy for



**DISCUSSION**

## DISCUSSION



The duck population in Kerala is mostly concentrated in the two districts of Alleppey and Ernakulam constituting 62 per cent of the total duck population in the State (Table 2). The reason for such concentration might be due to the age old experience that duck rearing requires facilities for wallowing and those two districts are endowed with backwaters and lagoons. Plenty of flooding river bed areas of West Bengal, Orissa, Assam, Bihar and Tamilnadu may be the factors conducive for duck farming in those States. The geographic land scape of low lying "Kuttanad" area which lies extended to parts of Alleppey and Kottayam districts is comparable to that of swamp lands of South Kalimantan (Formerly Borneo) and submergible below sea level areas of Netherlands (Holland) where duck industry has developed extensively.

### Socio-economic status

Duck rearing enterprise is not confined to any particular sector of people as evidenced from the results of this survey. It is well accepted by many people irrespective of caste and religion and is taken up by those who have a desire for self employment. Majority of the marginal farmers who take up duck farming consider this enterprise as a main source of their livelihood. It is seen mostly as a traditional or a hereditary occupation. Development of duck farming into viable intensive

hatching duck eggs. The survey revealed that the broodiness of the desi hen in Kerala is prolonged by feeding them with cooked rice. The Indonesian duck farmers in Borneo try to bring about the same effect in the Entoks by feeding them with "rumbia" (finely chopped sagopalm) and cracked rice only.

The fertility and hatchability enjoyed by the Kerala duck farmers appear to be highly satisfactory, eventhough, the process of incubation is rather cumbersome. The general belief that the ducks mate more frequently on water than on land appears to be true based on the fact that the male-female ratio maintained by the Kerala duck farmers is only one drake to 30 ducks and that the hatchability obtained by them was reported to be around 85 per cent on all eggs set. This observation is further confirmed by the fact that in intensive system of rearing ducks with a narrow sex ratio of 1:6 provides only fertility and hatchability rates of 63.29 and 71.4 per cent respectively (George, 1977).

#### Rearing of ducklings

The conventional standard on floor space requirement is not adhered to by the farmers in village brooding nor they provide any artificial warmth to baby ducklings. The farmers assume that the maximum stocking density will help the ducklings to brood themselves by utilising their metabolic heat. This appears to be true to a great extent. In Indonesia

ducklings are never permitted access to any water at all, including access to drinking water for the first ten days of life, since they claim that damp feathers are associated with pneumonia and high mortality. The medicinal mixture referred to earlier is believed by the farmers to exert great beneficial effect in the early stages of growing ducklings. "Vayambu" (Acorus calamus) the underground stem of an aromatic marsh herb is a medicine described in Ayurveda having beneficial effects on the body. It is stated to be a stimulant, tonic and antispasmodic (Kirtikar and Basu, 1975). It increases body resistance against diseases and is believed to give more stamina and make the living organism always alert and active. Pepper and Turmeric may have action on gastro-intestinal tract. "Karupetty" is a rich source of energy.

The opening meal of ducklings in Kerala is a mixture of cooked rice and fresh coconut gratings in the ratio of 3:1, while the one given in Indonesia is a mixture of Rumbia (chopped and smashed sagopalm) shrimps and steamed fish with cooked rice (Kingston et al. 1978).

In the village conditions of brooding, chilling was not reported to be a problem in this study as against the observation of Staples (1970). Day-old sexing is yet to be practiced by using the shape of the bill, sound of voice and

by examination of cloaca as described by Kingston et al. (1973). This could eliminate the excess costs in rearing males and hence will prove to be highly economical to the farmer.

#### Management of adults

Ducks are water loving birds and they have the required anatomical and physiological adaptations to support life in water. But swimming is not essential for various productive performances and reproductive traits as reported by Sharma and Singh (1978) and Hays (1952). The farmer's opined that the ducklings and ducks would obtain sufficient snails, fingerlings, weeds, algae and some fallen grains in the swamps and post harvested paddy fields, so that protein supplementation is not essential. But during non-harvested seasons and when there is no rain, they are fed with some quantity of unsalted fish. It is understood that 4-5 acres of post-harvested paddy fields is required per day for every one thousand ducks as against one hectre reported by Ramachandran and Ramakrishnan (1982).

#### Feeding practices

The core of the palmirrah palm (*Borassus flabellifer*) fed to the ducks in Kerala during the lean seasons appears to be similar to the "Rumbia" (finely chopped and smashed

sagopalm) the staple carbohydrate feed used in Indonesia. While it is true that the browsing nature of desi ducks satisfies the entire protein requirements, the indiscriminate use of insecticides, pesticides and weedicides might have reduced the population of aquatic creatures in the fields to a great extent, thereby reducing the availability of animal proteins to the ducks. The reclamation of land for dwelling and other purposes has resulted in a shrinkage of foraging area. Therefore, farmers are compelled to feed a little quantity of dried fish after each day's browsing.

Growth of ducklings is at a faster rate when compared to that of turkeys and chicken. There is no tendency for deposition of fat in duck meat like that seen in swine. Hence it was suggested that only 17 to 18 per cent protein is required for ducklings and growers, (Anon, 1932) at the same time the energy content of the diet appears to be more. It is not clearly understood whether our foraging ducks meet their entire nutrient requirements. Indian Standard Institution has not hitherto recommended any specific nutrient requirements for ducks. Reddy et al. (1980) suggested practical levels of all nutrients for different categories of ducks in India. Scott and Heuser (1952) reported that Niacin deficiency is important in ducks and it may cause leg

weakness and lead to bowed legs. To prevent Niacin deficiency and to improve growth, as a safety measure it was recommended to use about 5-7 per cent Brewer's yeast in duck rations (HMSO, 1980).

The nutritional requirements of ducks of various ages have not yet been clearly understood. Most of the data available are on broiler ducks. The yearly feed consumption of laying ducks reared under confinement is 56-60 kg per bird compared to the 40 kg of chicken (Anon, 1982). Similarly egg-feed ratio in the case of ducks is 3.1 kg while the same in the case of chicken is only 2 kg feed per dozen of eggs. This means that the feed conversion efficiency of ducks is poor than chicken. On the basis of these studies it appears that more research work is warranted on the nutrition, management and breeding of ducks.

There are no easy methods to detect the presence of Aflatoxin in groundnut cake. So the practice of incorporation of groundnut cake in duck feed as a protein source has been generally discontinued as ducks are known to be the most vulnerable subjects for the deleterious effects of Aflatoxin.

#### Flock health

Even now the duck population in the State is not entirely free from the clutches of duck plague. The disease is still prevalent in certain parts of Kottanad with the

only difference that it occurs with less virulence than it was in the initial period. The vaccination is presently being continued with the vaccine manufactured at Veterinary Biological Institute, Palode, Kerala State. The farmers generally expressed reservations about the vaccine received from Palode in protecting the birds against duck plague and reported that they were procuring the vaccine from Ranipet (Tamilnadu), Department of Animal Husbandry is aware of this and hence is investigating the matter. Government had come with some palliative measures such as supply of hatching eggs free of cost, subsidising cost of ducklings etc. But considering the loss sustained, these measures were reported to be very meagre to the farmers.

The reported failure of the present vaccine available in the State to afford protection against duck plague may be due to various factors, like defective vaccination procedures, vaccination at the phase of outbreak, transformation of the vaccine strain of the virus etc. The low virulence of the disease at present may be due to the natural attenuation the virus might have undergone during the last five years or due to the resistance acquired by the ducks all these years.

Eventhough a number of diseases have been described in ducks (Reddy et al. 1979; Rao et al. 1980; Sharma and Sree Raman 1977; Cubillose, 1982). Duck virus enteritis (duck plague)



is the only one which made an impact on the duck wealth of Kerala. New Castle Disease though not a problem in ducks, a strain of New Castle Disease Virus (NDV-D) has been isolated from an acute respiratory condition in ducks (Sulochana et al. 1980) in Kerala. The Institute of Veterinary Preventive Medicine, Ranipet has claimed that immunity by using duck plague vaccine last for 1½ years.

#### Egg production

The egg production reported by George et al. (1980) is 80 eggs for desi ducks. But the results of the present survey showed that the annual average egg production is around 130-140 for desi ducks. The farmers claim that no amount of artificial feeding will improve the egg production of ducks. The data on egg production reported by George (1977) is the one obtained under semi-intensive system for which the desi ducks are not accustomed to.

#### Marketing

All the duck eggs produced in Kerala are marketed here itself. Only some inter district transportation is required. Duck eggs are packed in empty plywood tea dust boxes, since standard size boxes used for transportation of chicken eggs may not be suitable for duck eggs. A co-operative set up through which the marketing of eggs and spent ducks can be

channelled will be the only solution for getting reasonable price for the producer. Preservation is not a problem as the eggs reach the consuming areas regularly thereby not necessitating storage for any length of time.

#### Costs and returns

The costs and returns with respect to duck farming is very variable. It is understood that the expenditure on establishment charges and daily food allowance to the labourers are rather high. Only well established and financially sound duck farmers are able to manage more than one flock at present. Thus it can be seen that at least three poor families live on each flock of ducks maintained. Net returns are seen fluctuating depending upon the season and from place to place. The farmers consider duck farming as a sort of gambling at times, as they have to depend upon nature to a great extent. In the event of an outbreak of duck plague the average farmer is plunged into poverty; if the season is favourable with good harvest and if there is sufficient rain, he will be blessed with a bumper crop of eggs.

The costs and returns from duck farming enterprises do not generally appear to be directly proportionate to the size of the flock as evidenced from the table (Table 5). Since the farmers go on changing or renewing the flock almost every year, *it is very difficult to assess the profit for an entire laying year* in a particular flock. None of the farmers maintained

any record of the production of their flock. They were unable to express the various costs and returns at different stages of operation in the absence of any records. Records are important in duck business as in any other business. Nevertheless, the farmers stated that they are able to just maintain their families out of duck farming for which they claim, they work hard.

Balbule (1977) worked out a net profit of Rs. 20/07 per laying duck per year and Rs. 2/- per broiler duck (1977). He has also worked out a net profit of Rs. 8/28 per Khaki Campbell laying bird per year during 1982. Since these figures pertain to birds kept on deep litter under intensive system, the same are neither applicable nor comparable with the native ducks on range rearing. The study revealed that a village housewife in Kuttanad generally makes a profit of Rs. 185/- in 56 days without any capital expenditure at all from her backyard brooding hens used for hatching duck eggs.

Periodic outbreak of diseases such as duck plague and the exposure of ducks to natural calamities and absence of proper housing facilities make duck farming a risky enterprise. The recent tendency of reclaiming the low lying water logged areas for the purpose of crop cultivation and construction of dwelling houses has increased the problems of rearing ducks on traditional lines. Hence studies may have to be undertaken

to examine the possibilities of rearing ducks in confinement similar to scientific chicken rearing.

The production potential can be increased considerably within a reasonable period by suitable breeding programmes. There has been a spectacular increase in chicken production during the past few decades. But the duck continued to remain neglected. As a result the contribution of ducks to national economy remained static. Given necessary modern inputs and services, duck rearing could contribute to national economy on par with chicken farming.

The survey clearly demonstrated that duck rearing in Kerala is a remunerative enterprise. However, the problems faced by the farmers are becoming more intensive year after year. Dearth of foraging area, transportation costs, hand feeding costs and occasional outbreaks of duck plague cut down the returns greatly. Lack of organised marketing system is another major lacuna.

In the face of the above, it is suggested that duck farming in the State has to be geared up and organised more effectively both in developmental aspects and research activities. The developmental aspects to be considered are:

- the farmers should be able to obtain pullet ducklings in adequate numbers without depending upon the primitive hatching methods. In order to achieve this suitable

duck egg incubators have to be procured and utilised in strategic points in the duck farming belts.

— Government level marketing system has to be set up as in the case of chicken eggs.

Research work is needed to evaluate, improve and even to protect this industry. Scope includes field research, socio-economic research and biological research. Some factors are:

- over a year or a life span, what is the true productivity of the native ducks.
- what precisely is the contribution of natural foraging to the diet.
- what aspects of ecology of shrimps and water snails and fingerlings in fresh water are of importance to the duck industry.
- what will be the future substitute for the particular palmirrah trees which are being cut faster than being replaced.
- to what degree would the native ducks respond to intensive selection for egg production.
- how would hybridisation and inter-strain exploitation with other egg producing ducks affect egg production.
- could the native ducks respond to intensive production system.
- what is the possibility of producing a meat type duck.

## **SUMMARY**

## SUMMARY

Results of a survey to understand the duck husbandry practices in Kerala followed by the traditional duck farmers are summarised below:

Duck rearing is not confined to any particular community or religion of people. All categories of farmers, namely big farmer, small farmer, marginal farmer, agricultural labourer as classified under the IRDP are involved in duck rearing.

All the farmers maintain only the indigenous native ducks (desi ducks). The flocks are maintained under the free range extensive system throughout the year on feed obtained from post-harvested paddy fields by foraging and browsing without any elaborate housing. Maximum number of ducks and duck farmers are available in Kuttanad area of Alleppey district. Specialisation in the production of day-old ducklings is the unique feature of duck farmers in Kuttanad area. Artificial incubation is not at all practiced. No artificial warmth is provided for rearing the ducklings. Broody hens are exploited for getting thousands of duck eggs hatched out. Ducklings are allowed to swim in water on the seventh day and are allowed to forage on paddy fields after 30 days. The opening meal for the baby ducklings is cooked rice mixed with one fourth quantity of freshly grated coconut kernel. Farmers

maintain only 3-4 per cent drakes in a flock and claim high percentage of fertility. The difference between table eggs and hatching eggs is not much, the hatching eggs costing only 5 to 10 per cent extra. Farmers claim a hatchability of 80-85 per cent with natural brooding using country hens. Farmers move inside as well as outside the State with their flock in search of harvested paddy fields. According to the duck farmers, the total foraging area available in Kerala and the suburbs of Tamilnadu, Andhra Pradesh and Karnataka, is sufficient only for seven months in a year. During the remaining five months the flocks have to be fed with artificial feeds like Milo maize, Cholan, ragi and palm core etc. The average annual egg production per duck is 130-140. Ninetyfive per cent of the farmers get financial assistance from private financiers.

Survivability is generally found to be excellent but for the occasional outbreaks of duck plague which cause heavy losses. Eggs are being locally marketed and transportation to distant markets is not practiced for the present. Spent ducks and surplus drakes are sold to individuals, restaurants and hotels.



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**A SURVEY ON THE STATUS OF DUCK FARMING IN  
KERALA STATE**

By

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**ABSTRACT OF A THESIS**

Submitted in partial fulfilment of the  
requirement for the degree

**Master of Veterinary Science**

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Mannuthy - Trichur

**1983**

## ABSTRACT

The results of a survey to assess the status of duck farming in Kerala is reported in this thesis. The economic background of duck farmers in the State was not generally found enough to support their families. Educationally, majority of them had only primary education. Unlike chicken, flocks of ducks consisting of 350-400 are taken from place to place in search of post-harvested paddy fields for browsing. Three members are necessary to manage one flock. Duck rearing is mainly concentrated in Kuttanad area of Alleppey and Kottayam districts where the conditions are congenial for brooding and rearing of ducklings. Specialisation in the production of day-old ducklings is a feature of Kuttanad duck industry. Large number of broody hens are the only natural incubators for the duck eggs and the percentage of hatchability obtained by farmers is 80-85. Artificial incubation and day-old sexing are not at all practiced. Cooked rice mixed with fresh coconut gratings formed the opening meal for the ducklings. Mortality during the rearing period is only five per cent. Ducklings are allowed to swim from seventh day onwards and they are taken to the open paddy fields for foraging after one month.



The average egg production reported by the farmers for the desi ducks is 130-140 eggs per duck per year and flock of ducks is used for laying upto the age of three years. Mortality among adult ducks is very rare.

The marketing of duck eggs is now fully under the control of private commission agents, who act as financiers to the duck farmers as well.

APPENDIX

A SURVEY ON THE STATUS OF DUCK FARMING IN KERALA STATE

INTERVIEW SCHEDULE

1. Name of farmer :
2. Address :
3. Monthly income :
4. No. of children :
5. Educational status of farmer :
6. Land in possession :
7. Other employment if any :
8. Living close by the stock ; Yes/No
9. How long engaged in duck farming :
10. a) Whether rearing Poultry in considerable Nos. : Yes/No
- b) Family labour available :
11. No. of birds in possession.

Adult layers	Drakes	Ducklings		Total
		Male	Female	

12. No. of eggs normally obtained from flock daily :
13. In the opinion of the farmer what is the annual egg production for ducks :
14. No. of male allowed in the breeding flock (male to female ratio) :

15. Do you purchase adult ducks or ducklings :
16. Age of ducks at time of purchase :
17. Source of purchase (Give address if available) :
18. Do you show preference in purchase from a particular person/area :
19. If so why :
20. Type of house provided for adults and ducklings - measurements and brief details of construction :
21. Type of feed given :
22. Do you feed one type of feed at all times of year :
23. If not, when and what quantity - specify composition if available : Adult Young
24. Special method of feeding if any :

#### BREEDING

25. Do you raise your own flock :
26. If you breed yourselves :
- a) Do you select from flock for breeding :
- b) If yes, on what criteria :
- c) Male - female ratio used :
- d) Do you provide any special feed to breeders :
- e) If yes, specify :
- f) Do you hatch yourself or sell hatching eggs :
- g) If selling at what rate :

#### HATCHING OF EGGS:

27. Mode of hatching : Incubator/Brooding hen/Other means

28. If incubator is used : Temperature/Humidity/Turning
29. If using brooding hens
- a) How do you procure them :
  - b) How many ducks per broody hen :
  - c) When do you release the ducklings from the broody hen :
  - d) Do you candle eggs : Yes/No
  - e) If yes, at what stage :
    - at setting :
    - at 18th day :
    - at 8th day :
  - f) What is the percentage of fertility you obtain :
30. Do you clean hatching eggs before setting:
31. If so, how is it done :
32. In your opinion what is the reason for poor fertility :
33. Do you use the ducklings for yourself or for sale :
- a) If you sell, at what age :
  - b) At what cost :
34. What would be the cost of hatching eggs :
35. What is the other expenditure incurred for hatching :
36. Total cost incurred for hatching :
37. Do you feed your ducklings as soon as hatch :
- If yes, with what feed :
  - If no, when do you start feeding :
38. What are the diseases you come across in your ducklings :

BROODING

39. Are you involved only in brooding or do you hatch and brood :
40. If involved only in brooding, source of ducklings :
41. How do you brood ducklings:-
- a) Only with broody hen :
  - b) Provide artificial warmth :
  - c) Special brooding method :
42. How do you hold ducklings before selling. When are they allowed to swim :
43. What feed do you give - uniform feed given till sold off/different feeds specify :
44. What is the % of mortality during brooding:
45. (a) What are the common causes of death :  
(b) Health cover programmes :

MARKETING

46. How do you sell your ducklings/ adult ducks:
47. (a) Eggs used for your family-How used :  
(b) How do you sell eggs :
48. Selling price of eggs :
49. Do you sell eggs on same day of collection or later :
50. If later, when?
- a) Do you employ any methods for preservation:
  - b) Duration of preservation :
51. How long do you keep a laying flock : 1) Year of age  
2) Year of Production
52. a) How do you transport birds from place to place for feeding : Walk/Vehicle  
b) Expenditure on feeding at paddy fields :

53. How do you dispose of spent ducks :

FINANCING THE FARMING

54. Do you get financial support : Individual/Commercial Bank/  
from outside Co-operative Bank/Govt.

55. Are you a member of any Co-operative  
Society or Duck farmers association :

56. How do you repay loan : cash/duck eggs/spent ducks

57. Cost and Return

Flock size.

<u>Cost</u>	<u>Return</u>
(a) Cost of ducks	Cost of eggs
(b) Cost of rearing	Cost of spent ducks
(c) Cost on labour	Others
(d) Other costs (specify)	(Specify)

58. Net return from the flock per annum.