ECONOMICS OF MEAT PRODUCTION OF DESI DUCKS

By

O. J. GEORGE

THESIS

Submitted in partial fulfilment

of the requirement for the degree

MASTER OF VETERINARY SCIENCE

Faculty of Veterinary and Animal Sciences

Kerala Agricultural University

Department of Poultry Science

COLLEGE OF VETERINARY & ANIMAL SCIENCES

MANNUTHY - TRICHUR

1978

ABSTRACT

An experiment was designed to evaluate the meat production potentialities of straight run Desi ducklings. 110 desi one-day-old ducklings divided into two qual groups which formed the replicates. Identical feed and managemental practices were employed in the trial. After an initial brooding of 3 weeks in a battery brooder, they were reared on floor upto ten weeks of age.

Initial body weight, weekly body weight and weekly feed consumption were recorded. Five birds from each group were randomly sacrificed at 7, 8, 9 and 10 weeks of age. The results indicated that there is a steady decrease in body weight gains from 6th week onwards. Similarly the feed efficiency also decreased with advancement of age. Slaughter studies indicated significant increase in the proportion of the breast muscles with the advancement of age and a corresponding decrease in the proportion of legs.

It is reasonable to surmise from the data on weight gains and feed consumption that the genetic potential of the Desi ducks has to be improved in order to raise them for meat production economically.

DECLARATION

I hereby declare that this thesis entitled "ECONOMICS OF MEAT PRODUCTION OF DESI DUCKS" is a bonafide record of research work done by me during the course of research and that the thesis has not previously formed the basis for the award to me of any degree, diploma, associateship, fellowship, or other similar title, of any other University or Society.

Signature:

Name: O.J.GEORGE

Place: Mannuthy

Date: 20-12-1978.

CERTIFICATE

Certified that this thesis, entitled "ECONOMICS OF MEAT PRODUCTION OF DESI DUCKS" is a record of research work done independently by Sri.O.J.George 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.

Name of the Guide: Dr.A.K.K.Unni

(Chairman, Advisory Board)

Designation : PROFESSOR

Place: Mannuthy

Date: 20-12-1978.

ACKNOWLEDGEMENTS

I wish to extend my heart-felt thanks to:

Dr. A.K.K. Unni, Professor, Department of Poultry Science, College of Veterinary and Animal Sciences, Mannuthy for his incessant help, valuable guidance and encouragement as major advisor.

Dr. C.K.Venugopalan, Senior Scientist, Dr.A.Ramakrishnan, Professor (on deputation) in the Department of Poultry Science for their valuable assistance and suggestions,

Dr. B.R.Krishnan Nair, Associate Professor, Department of Animal Breeding and Genetics, Dr. P.S.Pushkaran, Assistant Professor, Department of Extension for their generous advice,

Dr. P.U.Surendran and Sri.K.L.Sunny of the Department of Statistics for their suggestions and help in the statistical analysis.

I express my deep sense of gratitude to Dr.P.G. Nair, Dean, Faculty of Veterinary and Animal Sciences, for granting permission to undertake this study.

My sincere thanks are due to Dr.Renchi P.George, Assistant Professor and Dr.T.Prabhakaran, Associate

Professor for their timely help.

I wish to express my gratitude to my colleagues and friends in the Department of Poultry Science and A.I.C.R.P. on Poultry for Eggs for their valuable suggestions and assistance.

I wish to thank Sri.V.T.Kurian for putting the manuscript into neat type.

O.J. GEORGE

TABLE OF CONTENTS

INTRODUCTION

INTRODUCTION

Poultry enterprise in India has made rapid strides during the last couple of decades. The main interest in the industry had been centered around chicken. Though ducks constitute 7 per cent of the total poultry population and contribute 5 per cent of the egg output in the country (Anon, 1977) this species of poultry had not received its due attention in the developmental programmes. Taking cognisance of this, the Government of India had initiated programmes in the Fifth 5-year Plan for the development of duck farming at central and state levels. Ducks occupy an important place in the production of eggs in the coastal states. They are accredited with better total egg production, better egg production in the second year and a larger egg size compared to chicken. Over and above these advantages they exhibit no agonistic behaviour and consequently the managemental problems are very few in comparison to chickens.

The State of Kerala having 3.62 lakhs of ducks is ranked 5th in the country (Anon, 1975) as far as duck population is concerned. Consumption of duck eggs and meat varies from region to region in the country depending on religious taboos and socio-economic conditions. However, in Kerala, duck eggs and meat are relished by a sizeable chunk of the population. Ducks are mainly raised in the State for eggs, and meat comes from surplus drakes and spent ducks.

The concept of raising Desi ducks under confinement system on quality feed for meat purposes is rather new and opens possibilities for exploiting the availability of surplus drakes for this purpose. For achieving this objective the meat production potentialities of Desi ducks have to be assessed. A perusal of the available literature furnishes very little information in this regard. The mean body weight of Desi ducks raised in confinement system of management on standard farm feed at 12 weeks of age has been reported to be 1567.65 g (George, 1977). Based on this information a study was designed and conducted to evaluate the meat production potentialities of Desi ducks under scientific conditions of management and to ascertain whether such a programme would be economical and practicable under the conditions existing in Kerala. It was also considered desirable to assess the optimum age for slaughter in order to make this venture economically viable. The feasibility of such a study would open a new avenue for this segment of poultry industry.

REVIEW OF LITERATURE

REVIEW OF LITERATURE

Very little research work has been carried out on the requirements of the ducks with respect to various nutrients. The N.R.C.(Anon, 1966) recommendation on nutrient requirements for ducks include standards for total protein and a few of the vitamins. Previous studies on duck nutrition indicate that ducks grow satisfactorily during early growth period on a somewhat lower level of protein than do chicks and that the nutritional requirements of the ducks are qualitatively similar to that of chicks (Ewing, 1963). It is suggested that the ducks may not be as critical in their dietary requirements as chicken. Information available on the energy and protein requirements of ducks for various productive purposes is insufficient to draw a conclusion. However, recently a few reports have appeared on the feeding of ducks.

Singh and Moudgal (1976) found that White Pekin ducklings on high levels of protein under intensive system of management had faster growth rate with higher feed efficiency than those on low level of protein and in the semi-intensive system. Body weight and growth rate were significantly lower in 17 per cent protein fed group than in the 21 per cent and 25 per cent protein fed groups.

The performance of local ducks in Malaysia was studied by Yeong and Devendra (1977) in two trials with different levels of dietary energy (3000, 2800, 2600 and 2400 Kcal/kg)

and two systems of management (Semi intensive and Intensive systems). The starter diet contained 22 per cent protein and was fed for the first three weeks of age. The birds received the finisher ration from fourth to tenth week of age and contained 18 per cent protein. No significant difference was noticed for total body weight gain in both the trials but feed efficiency was significantly different between treatments with varying energy levels.

Experiments carried out by Leclercq and Carville (1977) with varying levels of dietary protein ranging from 17.7 to 24.5 per cent and with varying energy levels of 10.4 to 13.2 MJ/kg in Muscovy ducklings revealed that 17.7 per cent protein was insufficient for optimum growth. With 19.3 per cent protein and higher energy level there was no difference in weight gains but feed consumption decreased as energy content increased in the ration.

Gutierrez (1977) reported that Pekin ducklings from hatching to three weeks showed maximum body weight gain with 20 per cent protein. Higher levels of protein did not influence the body weight gains. In a study with ducks in battery cages fed with rations containing different levels of protein and energy, Konovalov (1978) opined that upto twenty days of age 18 per cent protein in the ration produced optimum growth and best feed efficiency and during the period from 21 to 50 days the best feed efficiency and optimal growth were obtained with a ration containing 16 per cent protein. The ME content of the ration ranged from 2750 to 2950 Kcal/kg.

Ash and Nothers (1964) observed that the optimum marketing age for Long Island White Pekin ducks and drakes was 7th and 8th week respectively.

Marais and Van Vuuren (1968) observed that White Pekin ducks had higher body weight at 8, 10 and 12 weeks of age when compared to White Plymouth Rock chickens. However, they also reported that the feed conversion ratio was 5.3 in ducks compared to 2.97 in chicken at 12 weeks of age. Pekin males were mated with Ukkranian White females by Padoba (1970), who observed that body weight was intermediate and the feed conversion efficiency was better, in the cross breds.

Majna et al.(1973) observed an average body weight of 2512 g and feed conversion ratio of 2.96 at 53rd day of life, in White Pekin ducks.

In a comparative study on the production performance of ducks (White Pekin and Minikos) and broiler chicken (New Hampshire and White Cornish) for 16 weeks on deep litter, Moudgal and Singh (1975 a) opined that ducks grew faster and had better feed conversion ratio than broiler chicken. The marketing age was determined as 7th week in ducks and 11th and 12th weeks for New Hampshire and Cornish chicken respectively. At seven weeks, the Pekin and Minikos ducks attained 1.93 kg and 1.19 kg body weight respectively with a feed conversion ratio of 2.64 and 3.3 respectively.

Experimental studies by Gibes (1975) in Pekin and domestic ducks revealed that weight gains were highest at 4 weeks

of age and after 5 weeks of age growth rate declined in both the genetic groups. Veitsman et al.(1975) reported that Cherry Valley ducks in Western Siberia with a hatch weight of 61.2 g attained an average body weight of 3154 g at 49 days with a feed efficiency of 3.65, the corresponding figures for Pekin ducks were 50 g, 1528 g and 4.0 respectively.

In a feeding trial to compare the performance of Muscovy and Pekin ducks for 3 to 10 or 12 weeks of age on ad libitum diets containing high, medium or low protein levels with high or low energy levels Pilla and Quilci (1975) observed that Pekin ducks grew quickly during first three weeks than Muscovys but thereafter Pekins grew more slowly on all diets. On all diets conversion was better in Muscovys than Pekins.

Oplt et al (1975) hatched 3 groups of Pekin eggs, first group weighing less than 82 g, second group between 89 to 92 and the third weighing more than 95 g. Body weights of the groups were 2465, 2583 and 2598 g at 7 weeks of age and feed efficiencies were 2.85, 2.82 and 2.86, respectively.

Khitrov (1976) reported a daily body weight gain of 39.9 g in Pekin ducklings reared on floor from 0 to 55 days of age. The corresponding weight gain for those raised in cages was 41 g.

Experiments by Abdel Malek and Yamani (1976) showed that the body weight of White Pekins at 12 weeks of age averaged 1511 g.

George (1977) raised desi ducklings on floor and reported that the mean body weight at 7, 8, 9 and 10 weeks of age averaged 835.77, 1031.95, 1188.9 and 1343.57 in the case of females. The corresponding figures in males were 891.38, 1103.72, 1291.8 and 1481.8 g respectively.

Experimental studies of Wilson (1973) indicated that the edible weight represented approximately 70 per cent of dead weight in both sexes of Pekin ducks at 56 days of age.

Pingel and Loebel (1973) reported that the breast weight percentage was phenotypically correlated with juiciness, meat colour and muscle thickness in ducks (0.315, -0.482 and 0.272 respectively).

Studies conducted by Moudgal and Singh (1975 b) in two varieties of ducks (White Pekin and Minikos) and two varieties of broiler chicken (White Cornish and New Hampshire) reared for 16 weeks in deep litter system and slaughtered at 8, 10, 12, 14 and 16 weeks of age revealed that ducks had higher percentage of eviscerated and dressed weights than chicken. But percentage of ready-to-cook weight was less compared to broiler chicken. The percentages of eviscerated, dressed and ready-to-cook weights were higher in males than in females and continued to increase with advancing age in both sexes. Ducks had lesser bone percentage in raw meat than chicken. Duck meat scored lower flavour value than chicken. It was also less juicy than chicken meat and the juiciness declined with age. Acceptability of duck meat was higher at ten weeks of age.

Carcass composition in ducks was evaluated by Delpech and Milovanovic (1975) in Muscovy, Pekin, Mallard crosses and domestic ducks. Weight of head and neck was lower in Muscovys than in other groups but the Muscovy had more breast (9.3 and 11.6 per cent in males and females respectively) than others.

Rudolph and Hoppe (1975) in their studies with American Pekin and crossbred ducks at 51 days of age reported that the final live weight averaged 2365 and 1948 g in males as against 2262 and 1945 g in females. The breast meat in the two groups weighed 109 and 106 g respectively in males and 118 and 116 g in females. The thigh meat averaged 202 and 166 g in males and 189 and 163 g in females. In both groups and sexes, yield of breast and thigh meat was correlated with final body weight.

In experimental studies by Gnetov and Kolchev, et al.(1976) in Cherry Valley lines 151 and 102 and local Pekin ducklings, the dressed carcass weight at 49 days of age was 2189, 1920 and 1392 g and edible part as a percentage of carcass weight was 76, 74 and 68 respectively.

Luhmann (1976) conducted slaughter studies in 70 Pekin ducks at 7, 8 or 9 weeks of age. The dressing percentage averaged 71.0, carcass quality was best in 9 week old ducks which had heavier breast muscles than the other two age groups.

Investigation by Luhmann and Vogt (1976) in male and female Pekin ducks fattened in floor pens at 7, 8 and 9 weeks

of age indicated that cold carcass weight (no blood and feat ers) as a percentage of live weight averaged 68.0, the corresponding percentage for ready-to-cook weight (no edible offal) being 61.1. Breast muscle weight of males averaged 161.4, 232.0 and 263.4 g at 7, 8 and 9 weeks of age respectively and that of females 178.6, 235.6 and 257.2 g. It was recommended that ducks should not be slaughtered before 9 weeks of age as breast muscle develops relatively late and this is the most important carcass character.

Studies in native ducks of Krishna District conducted by Varadarajulu and Rao (1976) revealed that per cent yields of carcass was 60.4 and 58.8 in males and females respectively. The total ready-to-cook yield (after chilling in slush ice for 3 hrs) was 74 per cent in males and 72.8 per cent in females.

Studies in White Pekin ducks at hatch and at 1, 2, 3, 4, 5, 6, 9 and 12 months of age by Kamar and Yamani (1977) on carcass yields and character showed that the eviscerated per cent carcass yield increased with body weight until attainment of sexual maturity. The legs matured as early as one month of age. The wings and breast showed their highest growth at three to five months. They also reported that the back and Pelvis were the earliest maturing parts as no change was observed in their proportional weight during the study.

Stadelman and Weinert (1977) conducted meat yield studies in White Pekin ducks grown by standard methods at 6 ages from 28 to 68 days. They reported that the proportion of breast meat increased with age from 4.79 to 15.93 per cent and leg meat decreased from 17.97 to 12.28 per cent. The proportion of skin and fat was least at 53 days of age.

George (1977) reported that the ready-to-cook yield of desi drakes at 12 weeks of age averaged 74.3 per cent.

MATERIALS AND METHODS

MATERIALS AND METHODS

In a study to evaluate the meat production potential of Desi ducks, one hundred and ten, one-day-old straight-run Desi ducklings were reared in confinement for a period of ten weeks. The ducklings were wing banded, weighed and randomly allotted to two equal groups of 55 ducklings each being the replicates. The ducklings were brooded in an electrically heated thermostatically controlled battery brooder for three weeks and subsequently transferred to identical floor pens for the rest of the experimental period. Each duckling was provided with an average floor space of 1786 cm^2. The birds received a starter ration upto 3 weeks of age and from the 4th week onwards they were on the finisher ration (Table 1). Feed and water were provided ad libitum. Standard managemental practices were followed. The study was carried out for a period of ten weeks.

Individual body weights were recorded at weekly intervals and average weight of birds in each group was calculated. Feed wastage was kept minimum by filling the feed troughs only half each time. Feed intake by each group of birds was noted at the end of each week. Mean feed consumption of birds in each group per week was calculated. Feed efficiency was arrived at from the data on weight gains and feed intake.

The chemical composition of ration was worked out as per the methods described (A.O.A.C. 1970) and is set out in Table 2.

Slaughter studies were carried out at the end of 7th, 8th, 9th and 10th weeks of age. Five birds from each replicate group were randomly selected and sacrificed at the end of the above periods to study the carcass yields and losses. Birds were fasted for 12 hours prior to slaughter. Water was provided ad libitum during the fasting period. Weight loss due to fasting was recorded and percentage of fasting shrinkage was calculated. Birds were killed in a bleeding funnel by outer cut method described by Kotula and Helbacka (1965). A bleeding time of one minute was given after killing.

The birds were then scalded at a temperature of 71°C for 50 seconds. Defeathering was done using a mechanical poultry feather picker and the left over feathers were removed by hand. The pin feathers were removed with a pinning knife. After pinning, the body hairs were removed by singeing. The birds were weighed at this stage to determine the dressing losses. The carcasses were washed thoroughly and left for evisceration. The head was removed with a clever and the shanks by cutting through the hock joints. The heads and shanks were weighed. The skin on the back of the neck was cut and the gullet, crop and wind pipe were removed by

pulling them away from the neck skin. The oil glands were then removed.

An incision was made below the end of the breast bone down to and around the vent. The viscera was pulled out through this opening. The lungs were then removed using a scoop.

The liver, heart and gizzard were separated from the viscera. The gall bladder was removed from the liver. The gizzard was split lengthwise and the contents and the lining were removed. The heart was trimmed and washed free of blood. The giblets were weighed separately and also along with the carcass to calculate the ready-to-cook yield and the percentage worked out.

The carcass was then cut to study the percentage yields of the different cuts viz. neck, wings, breast, thigh and the back and back outlet. The five cuts were weighed separately and the percentage yields of breast and thigh were calculated.

Data relating to body weight gains and feed consumption during 7th, 8th, 9th and 10th weeks of age and percentage of fasting shrinkage, dressed yield, ready-to-cook yield and proportions of breast and thigh at the above periods of age were subjected to statistical analysis (Snedecor and Cochran, 1967).

A quadratic equation was fitted using the observed values of feed consumption and body weight as per the procedure of Snedecor and Cochran (1967). From the equation, estimates of total production and marginal production were prepared and the economics analysed as outlined by Heady (1964).

Table 1. Composition of Experimental rations

Ingredients (parts/100 kg)	Starter	Finisher
De-oiled coconut cake	33	30
Horse gram	20	15
Yellow maize	30	23
Rice bran	--	10
Unsalted dried fish	15	10
Dried tapioca	--	10
Mineral mixture[1]	2	2
Total	100	100
Added per 100 kg of diet:		
Common salt	250 g	250 g
Rovimix[2]	25 g	25 g
Calculated C.P.(%)	22	18
Metabolizable energy (Kcal/kg)	2900	2900

1 Poultrymin (Aries, Agro-Vet Industries Pvt.Ltd), the mineral mixture contained 3% moisture, 32% calcium, 6% phosphorus, 0.27% manganese, 0.01% iodine, 0.26% zinc, 0.03% fluorine, 100 ppm iron.

2 Rovimix A+B2+D3 (Roche products India, Ltd.) contained vitamins A, B2 and D3 at levels of 40,000 I.U., 20 mg and 5000 I.U. per g respectively.

Table 2. Chemical composition of experimental rations (D.M. basis)

Nutrients	Starter	Finisher
Dry matter	88.8	93.2
Crude protein	22.0	18.7
Ether extract	3.1	3.1
Crude fibre	3.1	5.6
Nitrogen-free extract	55.2	58.6
Total ash	11.6	14.0
Acid insoluble ash	4.6	6.9
Calcium	1.25	1.04
Phosphorus	1.09	0.91

RESULTS

RESULTS

Growth

The mean weekly body weight, replicate wise are set out in Table 3. The data pertaining to weekly body weight gains are presented in Table 4. The mean body weights at 7th week of age for replicate 1 and 2 were 1040 and 1026 g respectively. The mean final body weights at 10th week of age were 1271 and 1236 g for replicate 1 and 2 respectively. The weekly body weight gains revealed that the maximum gains were during 3rd and 4th weeks in both the replicates. The weekly body weight gains during 7th, 8th, 9th and 10th weeks of age were subjected to statistical analysis, the results of which are presented in Table 5. The analysis indicated that the differences in weight gain were statistically significant ($P < 0.05$). The gain during the 7th week was significantly higher ($P < 0.05$) than that during the rest of the periods. However, there was no significant difference between replicates within weeks. The weight gain recorded during the 8th week was significantly higher ($P < 0.05$) than the gains observed during the 9th and 10th weeks. Nevertheless, the difference in weight gain between the 9th and 10th weeks was comparable as the same was not statistically different.

Feed intake and efficiency

The average weekly feed consumption per bird replicate-wise are presented in Table 6 and the feed efficiency from

7 to 10 weeks in Table 7. The total feed consumption for 10 weeks amounted to 7.42 and 7.36 kg for replicates 1 and 2 respectively. The corresponding figures for 7 weeks were 4.36 and 4.39 kg. The data on feed consumption for the replicate groups during 7th, 8th, 9th and 10th weeks of age were subjected to statistical analysis (Table 5). There was no significant difference in feed consumption during these weeks.

The average body weight of experimental birds at 7, 8, 9 and 10 weeks of age were 1033, 1139, 1201 and 1254 g and the average feed intake of birds at the above periods were 4.38, 5.36, 6.36 and 7.39 kg thereby registering feed conversion efficiency of 4.42, 4.88, 5.48 and 6.1 respectively.

Mean carcass yields and losses

The slaughter data pertaining to the carcass yields and losses at 7 to 10 weeks of age are given in Table 8 and 9 respectively.

Shrinkage.

The percentage of fasting shrinkage for the different ages is given in Table 8. The statistical analysis of the data (Table 10) revealed that the differences in shrinkage between different ages of slaughter were not significant. The maximum fasting shrinkage obtained was 9.38 per cent during the 9th week and the minimum was 7.82 per cent

during the 10th week. The percentage for the 7th and 8th weeks were 8.96 and 8.02. The overall mean shrinkage observed in the study was 8.54 per cent.

Dressed yield.

The mean per cent dressed yield for the different periods of slaughter from 7 to 10 weeks of age are given in Table 8. The per cent dressed yield of the replicates during different periods of slaughter were subjected to statistical analysis (Table 10). The maximum dressing percentage observed in the study was 85.98 during the 7th week which was significantly higher ($P < 0.01$) than that recorded during 8th and 9th weeks. However, during the 10th week the dressing percentage observed was 85.61 which was not different statistically from that observed during 7th week. The mean per cent of dressed yield recorded during 8th and 9th weeks were 83.47 and 82.86 respectively. The dressing percentage at the 10th week was significantly higher than that observed during the 9th week. However, there was no significant difference between values observed during 8th week when compared to the values during the 9th and 10th weeks. The average dressing percentage observed in the study was 84.48.

Giblet yield.

The data pertaining to the weight of giblet and its percentage in relation to the body weight are also presented

in Table 8. The mean percentage of giblet yield recorded during 7, 8, 9 and 10 weeks of age were 7.5, 6.53, 7.17 and 6.71 respectively with an overall mean value of 6.98.

Ready-to-cook-yield.

The mean percentage of ready-to-cook yield of the replicates at different ages of slaughter is given in Table 8. Data were statistically analysed and presented in Table 10. The maximum ready-to-cook yield observed was 69.21 per cent during the 7th week and the minimum observed was 66.61 per cent during 9th week. On analysis it was observed that per cent yield registered during 7th week was significantly higher ($P < 0.05$) than that observed during 8th and 9th weeks. The per cent yield observed during the 10th week was 68.71 which was significantly higher ($P < 0.05$) than that observed during 9th week. The differences in ready-to-cook yield percentage between 7th and 10th weeks and also between 8th and 10th weeks are not statistically significant. The values obtained during 8th and 9th weeks also did not differ statistically.

Losses.

The mean percentage losses due to blood from 7 to 10 weeks of age were 6.44, 7.69, 7.94 and 7.02 respectively (Table 9). The corresponding percentage of losses due to feather were 7.58, 8.85, 9.21 and 7.37. The mean percentage of losses due to viscera were 8.29, 8.44, 8.36 and 8.33 respectively for the periods of 7, 8, 9 and 10 weeks

of age. The proportion of head and shank accounted for 8.49, 8.04, 7.89 and 8.58 per cent for the corresponding periods. The overall mean percentages of the above inedible offals, ie. blood, feather, viscera and head and shanks were 7.27, 8.25, 8.35 and 8.25 respectively.

Cut-up parts

The proportion of the different cuts viz. neck, breast, wings, thighs including drumsticks and the back and back outlet in relation to ready-to-cook yield during the different periods of slaughter are presented in Table 11. The giblet yield per cent in relation to ready-to-cook yield during the different weeks did not show any appreciable difference. The same trend was observed in the case of percentage of neck. The mean percentage of wing during 7, 8, 9 and 10 weeks of age were 14.73, 14.37, 15.75 and 16.02 respectively. The per cent yield of back and back outlet in relation to the ready-to-cook yield were 25.17, 25.68, 22.20 and 23.17 during 7, 8, 9 and 10 weeks of age respectively.

Thigh and drumstick.

The percentage yield of thigh including drumstick for the different periods of slaughter from 7 to 10 weeks of age for the replicates are presented in Table 11. The maximum yield was 22.33 per cent during the 7th week and the minimum yield was 19.61 per cent during the 10th week. The yields for 8 and 9 weeks of age were 21.7 and 20.51 respectively.

The statistical analysis of the data (Table 12) indicated that the yield observed during the 7th week was significantly higher ($P < 0.01$) than that observed during the 9th and 10th weeks. The yield obtained during 8th week also differed significantly ($P < 0.01$) from that obtained during the 10th week. There was no significant difference between the yields obtained during 7th and 8th weeks as also between 8 and 9 and 9 and 10 weeks of age.

Breast yield.

The per cent yield of breast portion in relation to the ready-to-cook yield is given in Table 11. Per cent breast yield observed during the 7th week was 16.3 while the same at 8th, 9th and 10th weeks were 17.69, 20.42 and 20.65 respectively. The maximum percentage of breast yield observed was during the 10th week and the minimum yield was during the 7th week. The data when subjected to statistical analysis (Table 12) revealed that the value obtained during the 10th week was significantly higher ($P < 0.01$) than that observed during the 7th and 8th weeks. Similarly the value obtained during the 9th week was significantly higher ($P < 0.01$) than that registered during the 7th and 8th week. The proportion of breast yield exhibited a progressive increase from 7th to the 10th week.

Correlations

Data pertaining to pre-slaughter body weight and breast weight during the four periods of slaughter were subjected to further analysis to assess the correlation between these values. It was observed that the pre-slaughter body weight and weight of the breast were highly correlated ($r = 0.75$). Similarly significant positive correlation was observed between the pre-slaughter body weight and the weight of thighs ($r = 0.67$). However, there was a highly significant negative correlation between the percentage of breast weight and thigh weight in relation to the ready-to-cook yield over the periods ($r = -0.92$). A steady increase was observed in the proportion of breast weight from the 7th to 10th week corresponding to a similar decrease in the proportion of thigh weight over the same period.

Economics

To the experimental data a quadratic equation was fitted relating feed consumed (x) to body weight (y). The equation, $y = 0.2772 + 0.23332\ x - 0.0137\ x^2$; was found to be increasing at a decreasing rate with the derivative assuming a formula of $0.2332 - 0.0274\ x$. The estimated total and incremental body weights of ducks at various levels of feeding were as shown in Table 13. The estimated body weights of ducks at various feeding levels shown in Table 13 compare favourably with observed values as can be seen from Figure 1.

Table 13 also shows in monetary terms the incremental values in feed cost (@ Rs 1.16/kg) and weight gains (@ Rs 7.50/kg) as feeding levels increase. That is, commencing from feeding 4 kg (at the age of below 7 weeks) and increasing to 10 kg at the rate of about 1 kg per week, the gain in body weight for the corresponding period decreased from 125 g at 4 kg feed level to about 14 g per kg of feed at 8 kg feed level (age above 10 weeks) and total body weight actually decreased at 9 kg feed level (beyond 11 weeks). In value terms, for a constant increase of Rs.1.16 in feed cost, returns from body weight gains decreased from Rs.0.93 to Rs.0.10 by feeding 8 kg of feed (age above 10 weeks) and decreased further to a loss of Rs.0.30 at the level of 10 kg feed. The maximum body weight of 1.2695 kg as estimated from the equation was attained on consuming 8.511 kg of feed beyond 11 weeks of age.

Mortality

Only one bird died during the entire experimental period and the death was not due to any specific disease condition.

Table 3. Mean weekly body weights (g) of experimental ducklings

Replications	Initial weight (g)	Weeks									
		1	2	3	4	5	6	7	8	9	10
Rep. 1	42	94	216	406	575	726	898	1040	1139	1200	1271
Rep. 2	41	94	218	415	574	708	894	1026	1139	1202	1236
Mean	42	94	217	411	575	717	896	1033	1139	1201	1254

Table 4. Mean weekly body weight gain (g) of experimental ducklings

Replications	Initial weight	Weeks									
		1	2	3	4	5	6	7	8	9	10
Rep. 1	42	52	122	190	169	151	172	142	99	61	71
Rep. 2	41	53	124	197	159	134	186	132	113	63	34
Mean	42	53	123	194	165	143	179	137^{c}	196^{b}	62^{a}	53^{a}

Values bearing similar superscript did not differ significantly ($P > 0.05$)

Table 5. Analysis of variance for the growth characteristics of Experimental ducklings

Factors	Source	df	SS	MS	f
Weekly Body weight gains	Between weeks	3	314647.4	104882.47	13.63*
	Replicates within weeks	4	30770.38	7692.59	1.64^{ns}
	Error	372	1748983.06	4701.57	
	Total	379	2094400.84		
Weekly feed consumption	Between weeks	3	0.0039	0.0013	2.6^{ns}
	Error	4	0.0020	0.00005	
	Total	7	0.0059		

* Significant ($P < 0.05$)

ns: Non significant

Table 6 Mean weekly feed consumption (g) of experimental ducklings

Replications	Weeks									
	1	2	3	4	5	6	7	8	9	10
Rep. 1	135	326	467	652	872	927	981	984	1026	1050
Rep. 2	136	322	500	672	849	941	969	979	977	1012
Mean	135	324	483	662	861	934	975	982	1002	1031

Table 7. Feed conversion efficiency of experimental ducklings

Replications	Initial body weight	7 weeks			8 weeks			9 weeks			10 weeks		
	(g)	Body wt. (g)	Feed consumed (kg)	Feed efficiency	Body wt. (g)	Feed consumed (kg)	Feed efficiency	Body wt. (g)	Feed consumed (kg)	Feed efficiency	Body wt. (g)	Feed consumed (kg)	Feed efficiency
Rep. 1	42	1040	4.36	4.37	1139	5.34	4.86	1200	6.37	5.5	1271	7.42	6.03
Rep. 2	41	1026	4.39	4.46	1139	5.37	4.89	1202	6.35	5.46	1236	7.36	6.16
Mean	42	1033	4.38	4.42	1139	5.36	4.88	1201	6.36	5.48	1254	7.39	6.10

Table 8. Mean slaughter data of experimental ducklings from 7 to 10 weeks of age

Age at slaughter (weeks)	Replications	Final body wt. (g)	Body wt. after fasting (g)	Fasting shrinkage (%)	Dressed yield g	Dressed yield %	Giblet yield g	Giblet yield %	R to C yield g	R to C yield %
7	Rep. 1	1232	1115	9.5	971	87.09	80	7.17	768	68.87
	Rep. 2	1270	1163	8.42	987	84.87	91	7.82	809	69.55
	Mean	1251	1139	8.96	979	85.98[e]	86	7.50	789	69.21[b]
8	Rep. 1	1265	1161	8.22	968	83.38	74	6.37	778	67.01
	Rep. 2	1266	1167	7.82	975	83.55	78	6.68	781	66.96
	Mean	1266	1164	8.02	972	83.47[df]	76	6.53	780	66.99[ac]
9	Rep. 1	1450	1302	10.21	1066	81.87	95	7.30	863	66.28
	Rep. 2	1475	1349	8.54	1133	83.84	95	7.04	903	66.94
	Mean	1463	1326	9.38	1099	82.86[d]	95	7.17	883	66.61[a]
10	Rep. 1	1282	1176	8.27	1015	86.31	80	6.80	825	70.15
	Rep. 2	1223	1133	7.36	962	84.91	75	6.62	762	67.26
	Mean	1253	1155	7.82	989	85.61[ef]	76	6.71	794	68.71[bc]
Overall Mean		1308	1196	8.54	1010	84.45	84	6.98	811	67.86

Means carrying similar superscript did not differ significantly.
C.D. (dressed yield) = 2.138 (P $<$ 0.01)
C.D. (R to C yield) = 1.870 (P $<$ 0.05)

Table 9. Per cent yield of inedible offals

Age at slaughter (weeks)	Replications	Body wt.at slaughter (g)	Losses							
			Blood		Feather		Viscera		Head & shank	
			(g)	(%)	(g)	(%)	(g)	(%)	(g)	(%)
7	Rep. 1	1115	66	5.92	78	7.00	109	9.78	94	8.43
	Rep. 2	1163	81	6.96	95	8.16	79	6.79	99	8.54
	Mean	1139	74	6.44	87	7.58	94	8.29	97	8.49
8	Rep. 1	1161	90	7.75	103	8.88	95	8.18	95	8.18
	Rep. 2	1167	89	7.63	103	8.82	101	8.69	92	7.90
	Mean	1164	90	7.69	103	8.85	98	8.44	94	8.04
9	Rep. 1	1302	113	8.68	123	9.45	94	7.22	109	8.37
	Rep. 2	1349	97	7.19	121	8.97	128	9.49	100	7.41
	Mean	1326	105	7.94	122	9.21	111	8.36	105	7.89
10	Rep. 1	1176	80	6.80	81	6.89	90	7.66	100	8.50
	Rep. 2	1133	82	7.24	89	7.85	102	9.00	98	8.65
	Mean	1155	81	7.02	85	7.37	96	8.33	99	8.58
Overall Mean		1196	88	7.27	99	8.25	100	8.35	99	8.25

Table 10. Analysis of variance table of slaughter data of experimental ducklings

Sl. No.	Factors	Source of variation	df	SS	MS	F
1.	Shrinkage	Between weeks	3	15.001	5.000	1.62^{ns}
		Error	36	111.335	3.093	
		Total	39	126.336		
2.	Dressing percentage	Between weeks	3	71.30	23.77	7.69**
		Error	36	111.25	3.09	
		Total	39	182.55		
3.	Per cent Ready-to-cook yield	Between weeks	3	51.679	17.23	4.05*
		Error	36	143.019	4.25	
		Total	39	204.698		

ns : non significant
** : significant (P $<$ 0.01)
* : significant (P $<$ 0.05)

Table 11. Percentage of various cut-up parts in relation to Ready-to-cook yield

Periods of slaughter		Cut-up parts					
		Giblet	Neck	Wing	Thigh & drum-stick	Breast	Back end back cutlet
7th week	Rep. 1	10.42	10.29	15.23	22.53	16.53	25.00
	Rep. 2	11.25	11.00	14.22	22.12	16.07	25.34
	Mean	10.84	10.65	14.73	22.33[a]	16.30[d]	25.17
8th week	Rep. 1	9.51	11.06	14.14	21.98	17.22	26.09
	Rep. 2	9.96	10.62	14.59	21.42	18.15	25.26
	Mean	9.74	10.84	14.37	21.70[ab]	17.69[d]	25.68
9th week	Rep. 1	11.00	10.66	16.22	20.63	19.24	22.25
	Rep. 2	10.52	10.08	15.28	20.38	21.60	22.14
	Mean	10.76	10.37	15.75	20.51[bc]	20.42[e]	22.20
10th week	Rep. 1	9.70	10.42	15.64	19.52	21.09	23.64
	Rep. 2	9.84	11.16	16.40	19.69	20.21	22.70
	Mean	9.77	10.79	16.02	19.61[c]	20.65[e]	23.17
Overall Mean		10.28	10.66	15.22	21.04	18.76	24.05

Means carrying similar superscript did not differ significantly (P $\geq$ 0.01)

C.D. (Thigh & drumstick) : 1.38

C.D. (Breast) : 2.49

Table 12. Analysis of variance for cut-up parts of experimental ducklings

Factors	Source	df	SS	MSS	F
Percent Breast yield	Between weeks	3	135.15	45.04	10.78**
	Error	36	150.58	4.18	
	Total	39	285.73		
Per cent Thigh yield	Between weeks	3	44.46	14.82	11.49**
	Error	36	46.34	1.29	
	Total	39	90.80		

** Significant ($P < 0.01$)

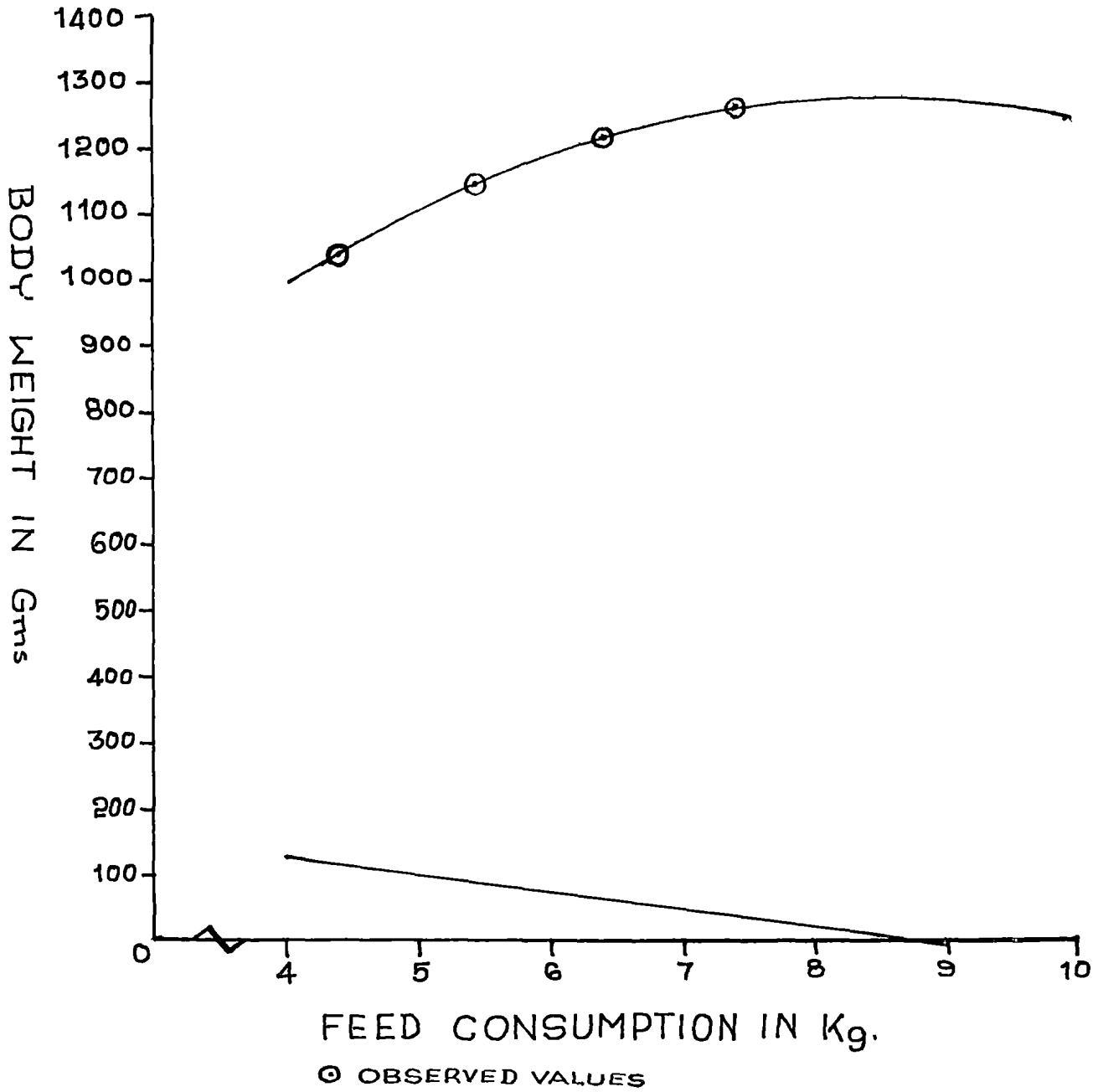
Table 13. Economics of meat production of experimental ducklings

Quantity of feed consumed	Total body weight (kg)	Increment in feed consumed (kg)	Increment in body weight (kg)	Cost of incremental feed (Rs)	Value of incremental body weight (Rs)	Total feed cost (Rs)	Total returns @ Rs 7.50 per kg body weight (Rs)
1	2	3	4	5	6	7	8
3	0.8535						
4	0.9908	1	0.1236	1.16	0.927	4.75	7.43
5	1.007	1	0.0962	1.16	0.7215	5.91	6.26
6	1.1832	1	0.0688	1.16	0.516	7.07	8.87
7	1.2383	1	0.0416	1.16	0.312	8.23	9.29
8	1.2660	1	0.0140	1.16	0.105	9.39	9.50
9	1.2663	1	-0.0134	1.16	-0.0005	10.55	9.50
10	1.2392	1	-0.0408	1.16	-0.306	11.71	9.29

Cost of starter feed Rs 1.28/kg
Cost of finisher feed Rs 1.16/kg
Price of duck for meat : Rs 7.50/kg live weight
Feed-body weight price ratio: 0.15

FIG. I

ECONOMICS OF MEAT PRODUCTION OF EXPERIMENTAL DUCKLINGS



DISCUSSION

DISCUSSION

Growth

It may be seen from the results that the ducklings fed broiler diet gained weight fairly steadily upto and including six weeks of age thereafter showing a substantial reduction in weight gain. The initial average weight of duckling was 42 g. At the end of third week they weighed on an average 411 g, the maximum gain in weight being in the third week (194 g). Quicker growth rate upto 3 weeks and thereafter a slowing in rate of growth in Pekin ducks was reported by Pilla and Quilci (1975). It was observed that from the fourth week onwards there was a slight decline in the weekly gains. However Gibbs (1975) revealed that weight gains were highest at 4 weeks of age in mallard and Pekin ducks and after 5 weeks the growth rate declined. The lowered rate of gains from fourth week onwards observed in the present study might also be due to the transfer of ducklings to the litter floor from brooding battery. Reduced gains consequent to shifting from the brooder into the litter floor has been reported in Desi ducks earlier (George, 1977). Weight gains from 4th to 7th week of age were fairly uniform though the gain during the sixth week of age appeared to be the best. At the end of 7 weeks of age the ducklings attained an average body weight of 1033 g which is just the minimum

required for a broiler duck. Rearing them to heavier weights in subsequent weeks did not bring about any favourable results since the gains during 8th, 9th and 10th weeks were rather poor. Marketing age was determined to be 7th week in case of ducks (Moudgal and Singh, 1975 a). Similarly optimum marketing age for long Island White Pekin ducks and drakes has been reported as 7 and 8 weeks of age respectively by Ash and Mothers (1964). At the end of 10 weeks, the ducks weighed on an average 1254 g only. However, George (1977) obtained better average body weight for Desi ducklings at 10th week of age (1412 g), but the body weight observed in his studies at 7th, 8th and 9th weeks of age were comparable with the results of the present study. Higher growth rate and body weight at finish have been reported by several workers with broiler ducks. Majna et al.(1973) observed an average body weight of 2512 g in White Pekin ducks at 53rd day of age. Moudgal and Singh (1975 a) reported a body weight of 1930 g in White Pekin and 1190 g in Minikoe ducks at 7 weeks of age. Veitsman et al.(1975) reported that Cherry Valley ducks attained a body weight of 3145 g at 49 days of age and Pekins reached a body weight of 1523 g during the same age. Experiments by Abdel Malek and Yamani (1976) revealed that Pekins attained a final body weight of 1511 g at 12 weeks of age. It may be seen from the above reports that a broiler duck should weigh on an average 1500 g at 7 weeks of age. But in the light of the present results it appears that desi

ducklings have no genetic potential to attain that weight at 7 weeks of age. Hence they can be subjected to crossbreeding with a superior breed to evolve ducklings with better genetic makeup for rapid growth under the present system of rearing.

Feed intake and efficiency

Even though N.R.C. (Anon, 1966) has recommended 17 per cent protein for starting and growing ducks, higher requirements have been recommended by several workers especially for meat type ducks (Singh and Moudgal, 1976; Yeong and Devendra, 1977 and Gutierrez, 1977). The rations used in this study contained 22 and 18 per cent protein in starter and finisher diets respectively.

The experimental birds on an average consumed 4.38, 5.36, 6.36 and 7.39 kg of feed during 7, 8, 9 and 10 weeks of age respectively. The average feed consumption increased steadily from 135 g during the first week to 975 g in the seventh week. Thereafter the rate of increase was negligible. It may be mentioned here that the feed consumption was directly linked to the rate of growth upto 7 weeks of age, and this trend was not maintained during the subsequent weeks. However, George (1977) working with desi ducklings observed higher rates of feed consumption during 8th, 9th and 10th weeks of age though the rate of consumption during the earlier weeks were comparable with the present findings. The higher feed consumption at later weeks in his study might have been due to the higher body weights observed by him.

The feed efficiency in terms of kg feed per kg gain at 7, 8, 9 and 10 weeks of age were 4.42, 4.88, 5.48 and 6.1 respectively. As the age advanced beyond seven weeks, the efficiency of feed conversion decreased, being the poorest at 10 weeks of age. The low efficiency during the last 3 weeks (8-10 weeks) resulted from poor feed utilisation as seen from the low weight gains during these periods. As suggested earlier, based on the results of this parameter it appears uneconomic to rear desi ducklings for meat purposes beyond 7 weeks. Even at 7th week when the experimental birds attained around one kg of body weight the feed efficiency obtained (4.42) does not appear satisfactory. Better efficiencies ranging from 2.9 to 3.9 with Pekin ducks have been reported by Singh and Moudgal (1976) at 3 levels of protein in 2 systems of management for a period of 7 weeks. Generally it appears that the feed conversion efficiency of ducks is lesser when compared to broiler chicken (Marais et al. 1968). As suggested above crossbreeding with improved breeds may be a solution to evolve ducks with better feed efficiency.

Carcass yields and losses

Shrinkage.

The per cent shrinkage due to fasting during different periods of slaughter were more or less similar, the differences being statistically non-significant. The average fasting shrinkage of 8.54 per cent observed in this study was much higher than 2.6 per cent for 6 hours of fasting reported by

George (1977). This difference may be attributed to the difference in fasting time employed in both the studies. The fasting time in this study was 12 hours compared to that of 6 hours employed by George in his study. Ranganathan et al. (1967) reported a fasting shrinkage of 6.63 per cent in Desi fowls fasted for 18 hours. The conflicting reports available regarding fasting shrinkage warrants further controlled studies in this regard to ascertain optimum fasting period for ducks.

Dressed yield.

The differences observed in the per cent dressed yield during the different slaughter periods were highly significant ($P < 0.01$). The 7th week dressing per cent was the highest (85.98) which appears lower than that of 88 per cent reported by Lahmann and Vogt (1976) in White Pekins and 88.3 per cent by George (1977) in Desi drakes. This can be explained due to the higher final body weight obtained in the above two studies. The percentage dressed yield recorded in this study is also lower than those reported in commercial broiler chicken (Nair, 1976; Elizabeth, 1978 and Radhamma Pillai, 1978). However the finding in this study is in contrast to the observation of Moudgal and Singh (1975 b) who reported a higher percentage of dressed yield in ducks in comparison to chicken. The higher dressed yield reported by Moudgal and Singh (1975 b) for Pekin ducks does not hold true with desi ducklings as is evidenced from the results.

The overall per cent of giblet in relation to body weight observed in this study was 6.98 which is comparable to 6.70 per cent reported by Abdel Malek and Yamani (1976) in Pekin ducks and 6.9 per cent reported by George (1977) in Desi drakes.

Ready-to-cook yield.

The ready-to-cook yield during the different weeks of slaughter varied between 66.61 in the 9th week to 69.21 in the 7th week. The percentage yield decreased gradually from 7th week to 9th week. But there is again an increase in the 10th week. This may be due to the higher proportion of breast meat observed in the 10th week. The average ready-to-cook yield obtained was 67.86 per cent in this study. The ready-to-cook yield reported in broiler chicken at 10 weeks of age by Radhamma Pillai (1978) was 72.23 per cent and that reported by Elizabeth (1978) in 8 weeks old broiler chicken was 71.36 per cent. Moudgal and Singh (1975 b) also reported that ducks had lower ready-to-cook yield when compared to chicken. The ready-to-cook yield per cent obtained by George (1977) in desi drakes is not in agreement with this study. The difference is probably due to the reason that the work by George (1977) was in drakes at 12 weeks of age and this study was conducted in straight-run ducks at 7 to 10 weeks of age. The ready-to-cook yield reported by Benjamin et al.(1960) for ducks is 73 per cent. Wilson (1973) reported 70 per cent ready-to-cook yield in Pekin ducks at 56 days of age. But the percentage reported by Luhmann et al.(1976) is much lower. This is due to the non

inclusion of the edible offal while calculating the ready-to-cook yield by the above workers.

Yield of inedible offals.

The percentage losses due to blood, feather, viscera and head and shanks observed in this study were 7.27, 8.25, 8.35 and 8.25 respectively. This is slightly higher than the corresponding values reported by George (1977) in the same species. However, the values reported by him pertained to 17 weeks old drakes. All the values except that for head and shanks are higher than those reported in broiler chicken by Elizabeth (1978). Benjamin et al.(1960) reported shrinkage from live to ready-to-cook weight being 27 per cent for ducks. However, the shrinkage observed is higher (32.12 per cent) in this study. Studies by Prabhakaran and Ranganathan (1977) in White-Rock chicken showed the losses due to blood, head and shank, feather and viscera as 2.85, 9.16, 5.29 and 15.61 per cent in males and the corresponding figures in females were 2.82, 8.94, 5.76 and 15.96 per cent.

Cut-up parts.

Cut-up duck parts are not popular as cut-up chicken parts. However, an attempt was made in the present experiment in this regard with a view to compare the yield of different cuts with that of chicks . Generally variations in the per cent yields of different cuts have been reported by several workers experimenting with different breeds and crosses of ducks. Nevertheless, similar work has not been reported among

desi ducks so far. In the present study also variations in the yields from 7 through 10 weeks of slaughter age could be observed. The average values for breast, thigh and drumstick, wings, back and back cutlet, neck and giblet reported for chicken were 24 per cent, 31 per cent, 13 per cent, 17 per cent and 7½ per cent respectively (Card and Neshiem, 1972). On a comparison, with the results of this study, it may be seen that per cent yield of breast (18.76) in ducks is fairly low and the yield of thigh and drumstick (21.04) is very low when compared to chicken. The difference could be attributed to the facts that breast development in ducks is rather slow and that the ducks have shorter legs. With regard to all other cuts per cent yield are found to be more in ducks compared to chicken.

It can be seen from the results that there was a gradual increase in the per cent breast yield from the 7th week through the 10th week and the per cent yield during the 10th week was significantly higher ($P < 0.01$) than the yields during rest of the periods. This is in agreement with the observations of Luhmann (1976) and Luhmann and Vogt (1976) who opined that ducks should not be slaughtered before 9 weeks of age as the breast muscle develops relatively late and as the breast being the most important carcass character. Studies by Stadelman et al. (1977) in Pekin ducks showed an increase in the proportion of breast meat with age over a period of 28-63 days.

The observations on the percentages of thigh and drumstick in relation to ready-to-cook yield revealed a gradual decrease from 22.33 to 19.61 over the periods from 7-10 weeks

of age. These findings are in agreement with the observations of Stadelman et al.(1977) who reported a decrease in leg meat from 17.97 to 12.28 per cent from 28 days of age to 63 days in dressed duck without neck or giblet. A higher proportion of thigh meat to breast meat at 51 days of age was reported by Rudolph and Hoppe (1975). At 49 and 56 days of age the proportion of thigh to breast was higher in this study as well. Abdel Malek and Yamani (1976) reported that proportion of leg meat was less when compared to the proportion of breast meat at 12 weeks of age. Increase in the proportion of breast yield and decrease in the yield of legs with advancement of age at slaughter reported by the above workers are fully supported as evidenced by the results of this study.

It was revealed in the study that highly positive correlation exists between live-weight and breast weight and also between live weight and weight of thigh. Similar results were obtained by Rudolph and Hoppe (1975) in Pekin and cross bred ducks at 51 days of age. A highly significant negative correlation exists between the percentages of breast and thigh over the periods.

Economics

An insight into the economics of duck meat production can be obtained by comparing columns 5 and 6 of Table 13. Inputs other than feed have not been accounted for. Economic optimum production level is obtained where added cost is equal to added returns. The values did not show equality over the range of estimates made. For example, at the level of feeding

5 kg, additional feed cost incurred was Rs 1.16, while additional returns was only Rs.0.72 indicating actually a loss of Rs. 0.44. At 6 kg level of feeding, the loss increased to Rs. 0.64 and so on. The declining trend in profits (value of duck over feed cost only) is evident from columns 7 and 8. That is, while total feed expenses increased the total return based on body weight also increased but at decreasing rates. Thus with increasing levels of feeding the margin of profit estimated on feed alone declined and, within the estimated range, economic optimum point, which should indicate maximum profit point, could not be discerned.

Thus economic analysis conducted on feed-body weight relationship indicated poor returns over feed input. Though the feed-body weight price ratio of 0.15 (Table 13) can be considered as reasonable the rapidly decreasing body weight gains have resulted in rapidly declining margins between total returns and total feed cost. It can be summarised that this phenomenon observed was due largely to low efficiency exhibited by ducks under the experimental conditions in converting feed to body weight. The poor economy of rearing ducks can be attributed to the poor feed efficiency observed since even at 4 kg feeding level the increment in body weight was only 124 g yielding only about Rs 0.93 to investment in feed of Rs 1.16. Further, the returns declined rapidly. Assuming that feed cost accounted for 2/3 of total rearing cost it is evident that under the experimental conditions rearing of desi ducks for meat was found unremunerative.

Adopting intensive selection, utilising broiler breeds of ducks (White Pekin, Cherry Valley) for upgrading local stock and rearing them on different nutritional planes can possibly yield better results. Therefore future programmes should be directed towards developing a meat type of duck utilising the desi type, and a broiler variety capable of attaining at least 1.5 kg body weight at 6 to 7 weeks of age which will yield optimum profitable level under prevailing price condition.

SUMMARY

SUMMARY

A feeding trial to evaluate the meat production potential of desi ducks was conducted and the results are presented.

One hundred and ten desi ducklings(one-day-old)were reared upto 10 weeks with replicates. The ducklings were reared in battery brooder upto 3 weeks and then transferred to floor.

Data on initial body weight, weekly body weight, feed consumption and feed efficiency were recorded. Slaughter studies at weekly intervals from 7 to 10 weeks were conducted and the data on carcass yields, losses and proportion of different cuts in relation to the ready-to-cook yield were also calculated.

The maximum body weight gains were achieved during the 3rd and 6th week of age and there was a decrease in body weight gains from the seventh week onwards.

The feed efficiency was better at 7 weeks of age when compared to the subsequent periods.

The slaughter data in general were within the normal range but a significant negative correlation was estimated between the proportions of thigh and breast in relation to the ready-to-cook yield over the periods.

The economic analysis indicated poor returns to feed at all ages of slaughter. The return decreased as the age advanced.

Mortality rate was negligible in the trial.

Based on the results it is concluded that Desi ducklings are unsuitable for economic meat production under the existing conditions possibly because of their poor genetic potentiality for growth and feed efficiency. Cross breeding of Desi ducks with superior breeds may prove more beneficial both quantitatively and qualitatively in respect of meat production characteristics.

REFERENCES

REFERENCES

Abdel Malek, A.A.M., and Yamani, K.A.O. (1976). Performance of broiler Pekin ducklings in Egypt. Anim. Breed. Abstr. 44: 3945.

Anon, (1966). Nutrient requirements of Poultry. National Academy of Science. National Research Council. 5th Ed.

Anon (1975). Report on eleventh quinquennial livestock census. 1972. Department of Animal Husbandry, Kerala. Trivandrum Vol. I.

Anon (1977). Indian Poultry Industry Year Book 1976-77. The Indian Poultry Industry Year Book, 2 C/34, New Rohtak Road, New Delhi-5.

A.O.A.C. (1970). Official Methods of Analysis. Association of Agricultural Chemists, Washington, D.C.

Ash, W.J., and Nothers, P. (1964). Sex differences in economic traits of Long Island White Pekin market ducklings. Anim. Breed. Abstr. 32: 2385.

Benjamin, E.W., Gwin, J.W., Faber, F.L., and Termohlen, M.D. (1960). Marketing Poultry Products. John Wiley and Sons, U.S.A. 5th Ed.

Card, L.E., and Nesheim, M.C. (1972). Poultry Production. Lea and Febiger, Philadelphia. 11th Ed.

Delpech, P., and Milovanovic, M.(1975). Evaluation of carcass composition in ducks. Anim. Breed. Abstr. 43:3691.

Elizabeth, V.T. (1978). Utilisation of dried poultry manure in broiler rations. M.V.Sc. Thesis. Kerala Agricultural University, Mannuthy.

Ewing, W.R. (1963). Poultry Nutrition. The Ray Ewing Company, Pasadena, California. 5th Ed.

George, R.P. (1977). Studies on certain economic traits in Desi ducks. M.V.Sc. Thesis. Kerala Agricultural University, Mannuthy.

Gibbs, C. (1975). Comparative studies on the growth of Pekin domestic ducks and wild mallards. Anim.Breed. Abstr. 43: 3694.

Gnetov, A., and Kolchev, N. (1976). Cherry Valley Cross K-11 ducks in the Orenbury region. Anim. Breed. Abstr. 44:3436.

Gutierrez, R.(1977). Study on protein requirements and sugar utilisation in starter diets for ducks (0-3 weeks). Nutr. Abstr. Rev. 47: 4343 .

Heady, E.O. (1964). Economics of Agricultural Production and Resource use. Prentice Hall of India Pvt. Ltd. New Delhi.

Kamar, A.R., and Yamani, K.A.(1977). Meat Production from ducks at different ages. Nutr. Abstr. Rev. 47: 1012.

Khitrov, N.I. (1976). Rearing of ducks in cages. Anim. Breed. Abstr. 44: 887.

Konovalov, V. (1978). Feeding of ducks in battery cages. Nutr. Abstr. Rev. 48: 193.

Kotula, A.W., and Helbacka, N.V. (1965). Blood retained by chicken carcass and cut up parts as influenced by slaughter method. Poult. Sci. 45: 404.

Leclercq, B., and Carvillo, M.DE (1977). Influence of the protein and energy contents of the diet on the growth of young Muscovy ducklings. Nutr. Abstr. Rev. 47: 1551.

Luhmann, M. (1976). Investigations on carcass yield in young broiler ducks. Anim. Breed. Abstr. 44: 892.

Luhmann, M., and Vogt, H. (1976). Slaughter loss and breast muscle weight in 7-9 weeks old Pekin ducks. Anim. Breed. Abstr. 44: 1898.

Majna, R., Marniak, F., Staako, J., and Kocivoa, J. (1973). Comparison on growth intensity in three types of meat-type ducks. Anim. Breed. Abstr. 41: 1314.

Marais, C.L., and Van Vuuren, E.P.D.(1968). Meat production potentialities of different types of poultry: Growth, reproduction, meat production and feed conversion ability of fowls, ducks, turkeys and guinea fowl. Anim. Breed. Abstr. 37: 4089.

Moudgal, R.P., and Singh, R.A. (1975 a). Studies on growth rate, feed conversion and marketing age of duck and broiler chicken. Abstract of paper presented at the 4th All India Poultry Science Symposium held at Bhubaneswar.

Moudgal, R.P., and Singh, R.A.(1975 b). Effect of age, breed and sex on quantitative and organoleptic characteristics of ducks and broiler chicken meat. Abstract of paper presented at the 4th All India Poultry Science Symposium held at Bhubaneswar.

Nair, R.S. (1976). Effect of certain feed additives on broiler performance. M.V.Sc.Thesis. Kerala Agricultural University, Mannuthy.

Oplt, J., Petkovova, R., Jindrich, V., and Fielder, J.(1975). The effect of egg weight on fattening characters in ducks. Anim. Breed. Abstr. 43: 2576.

Padoba, B.E. (1970). Characteristics of growth and food utilisation in the development of cross bred ducks. Anim. Breed. Abstr. 39: 2540.

Pilla, A.M., and Quilci, R. (1975). Effect of different diets on growth and some carcass characters in ducks. III. Comparison between the White Pekin domestic ducks and Muscovy ducks. Anim. Breed. Abstr. 43: 533.

Pingel, H., and Loebel, I. (1973). Influence of breeding on carcass performance and meat quality of Poultry. Anim. Breed. Abstr. 41: 3682.

Prabhakaran, P., and Ranganathan, M. (1977). Some edible and inedible offals in twelve to thirteen week old White Rock birds. Kerala J. Vet. Sci. 8: 199-204.

Radhamma Pillai, A. (1978). Evaluation of Rubber seed meal in broiler diets. M.V.Sc. Thesis. Kerala Agricultural University, Mannuthy.

Ranganathan, M., Arumugan, M.P., and Natarajan, R. (1967). A study on the dressing of Rhode Island Red, White Leghorn and Desi cockrels. Indian Vet. J. 44 (2): 956-961.

Rudolph, W., and Hoppe, C. (1975). Carcass value in poultry. 9. Estimation of yields of breast and thigh in duck carcasses. Anim. Breed. Abstr. 43: 5502.

Singh, R.A., and Moudgal, R.P. (1976). A note on the effect of levels of protein and systems of management on growth, feed efficiency, mortality, and eviscerated weight of White Pekin ducks. Indian J. Anim. Sci. 46: 512-514.

Snedecor, G.W., and Cochran, W.G. (1967). Statistical Methods. Oxford and I.B.H. Publishing Co., New Delhi. 6th Ed.

Stadelman, W.J., and Meinert, C.F. (1977). Some factors affecting meat yield from young ducks. Poult. Sci. 56(4): 1145-1147.

Varadarajulu, P., and Rao, A.M. (1976). A study on certain qualitative and quantitative characteristics of duck meat. Abstract of paper presented at the Fifth All India Poultry Science Symposium held at Mysore.

Veiteman, L., Starygin, M., Reiner, V., Vitovtova, N., and Tel'Manova, G (1975). Cherry valley ducks in Western Siberia. Anim. Breed. Abstr. 43: 3710.

Wilson, B.J. (1975). Yield of raw and cooked components from table ducklings carcasses. Anim. Breed. Abstr. 41: 859.

Yeong S.W., and Devendra, C. (1977). The performance and management of local ducks in Malaysia. Nutr. Abstr. Rev. 47: 2157.

ECONOMICS OF MEAT PRODUCTION OF DESI DUCKS

BY

O. J. GEORGE, B.V.Sc.

ABSTRACT OF A THESIS

Submitted in partial fulfilment of the

requirements for the degree

MASTER OF VETERINARY SCIENCE

Faculty of Veterinary and Animal Sciences

Kerala Agricultural University

Department of Poultry Science

COLLEGE OF VETERINARY AND ANIMAL SCIENCES

MANNUTHY - TRICHUR

1978

ABSTRACT

An experiment was designed to evaluate the meat production potentialities of straight run Desi ducklings. 110 desi one-day-old ducklings divided into two equal groups which formed the replicates. Identical feed and managemental practices were employed in the trial. After an initial brooding of 3 weeks in a battery brooder, they were reared on floor upto ten weeks of age.

Initial body weight, weekly body weight and weekly feed consumption were recorded. Five birds from each group were randomly sacrificed at 7, 8, 9 and 10 weeks of age. The results indicated that there is a steady decrease in body weight gains from 6th week onwards. Similarly the feed efficiency also decreased with advancement of age. Slaughter studies indicated significant increase in the proportion of the breast muscles with the advancement of age and a corresponding decrease in the proportion of legs.

It is reasonable to surmise from the data on weight gains and feed consumption that the genetic potential of the Desi ducks has to be improved in order to raise them for meat production economically.