COMPARATIVE EVALUATION OF GIRIRAJA AND RAJA II UNDER INTENSIVE AND SEMI-INTENSIVE SYSTEM OF REARING

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CERTIFICATE

This is to certify that the thesis entitled ***"COMPARATIVE EVALUATION OF GIRIRAJA AND RAJA II UNDER INTENSIVE AND SEMI-INTENSIVE SYSTEM OF REARING"*** submitted by **Mr. NAGAVATH NEMYA NAIK, I.D. No. MVHK-1410** in partial fulfilment of the requirements for the award of degree of **MASTER OF VETERINARY SCIENCE** in **POULTRY SCIENCE** of the KARNATAKA VETERINARY, ANIMAL AND FISHERIES SCIENCES UNIVERSITY, BIDAR, is a record of bonafide research work carried out by him during the period of his study in this University under my guidance and supervision and the thesis has not previously formed the basis for the award of any degree, diploma, associate ship, fellowship or other similar titles.

Place: Bengaluru
Date: October, 2016

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Affectionately Dedicated to

My beloved mother for her eternal memory

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CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

%	-	Per cent
ANOVA	-	Analysis of Variance
BIS	-	Bureau of Indian Standards
CRD	-	Chronic Respiratory Disease
DF	-	Degrees of Freedom
dl	-	desilitre
DP	-	Dressing Percentage
FAO	-	Food and Agriculture Organisation
FCR	-	Feed Conversion Ratio
g	-	Grams
HDL	-	High Density Lipoproteins
IBD	-	Infectious Bursal Disease
ICAR	-	Indian council of Agriculture Research
ICMR	-	Indian council of Medical Research
IU	-	International Unit
Kg	-	Kilo Grams
LDL	-	Low Density Lipoproteins
MD	-	Mareks Disease
mg	-	Milli Gram
Min	-	Minute
µl	-	Micro Litre
Ml	-	Milli Litre
MMT	-	Million Metric Ton
MS	-	Mean Sum of squares
ND	-	Newcastle Disease
NRC	-	National Research Council
NEH	-	North Eastern states Hilly regions
PB-2	-	Punjab Broiler-2
PDP	-	Project Directorate on Poultry
SE	-	Standard Error
STAT	-	Statistics
wks	-	Weeks

Introduction

I. INTRODUCTION

Backyard Poultry keeping though is a century old concept, has relevance even today in rural areas of our country. Nearly four to five decades back backyard poultry was the only source of chicken eggs and meat in the country. However, the entirely unorganized farming practices have gradually changed to a commercial production with high intervention of technologies. Earlier, the birds were kept in backyard, but now, they are reared intensively in open sided as well as environmentally controlled houses giving maximum income to the farmers. It provides employment and nutrition for rural people, eventually contributing to the national economy. There is evidence that growth in the livestock sector can significantly contribute to economic growth and poverty alleviation, because the largest segment of the rural poor are partly dependent on livestock for their livelihoods.

The twelfth five year plan (2012-2017) of Government of India – which is subtitled as 'Faster, sustainable and more inclusive Growth' – stresses that economic growth, including agriculture, should be more balanced and inclusive than it has been so far. It sets a target GDP growth rate of 9 % per year, with agriculture anticipated to grow at 4 % per annum. Within agriculture, the livestock sector is expected to grow in between 6 and 7 % per year, with poultry growing at 10 % per year. Promotion of backyard poultry farming can help the country to bridge the gap between demand and supply of eggs and poultry meat as well as generate self-employment to reduce poverty and empowerment of rural women.

Though poultry development in the country has taken a quantum leap in the last three decades, the growth has been mainly restricted to commercial poultry. Rural backyard poultry has so far forced itself in a neglected state. This is in spite of the fact that their eggs and meat fetch a much higher price than that from the commercial poultry. Private poultry producers are also not able to attend to the needs of major rural consumers and to the consumers of the north-eastern states and other difficult regions.

The major limiting factor in the way of increasing consumption of egg and poultry meat in rural areas is their poor availability. Backyard poultry requiring hardly any infrastructure set-up is a potent tool for upliftment of the poorest of the poor. Besides income generation, rural backyard poultry provides nutrition supplementation in the form of valuable animal protein and empowers women. It has also been noticed that the demand for rural backyard poultry is quite high in tribal areas. Though generally considered secondary to other agricultural activities by small scale farmers, poultry production makes an important contribution in supplying local populations with high quality protein and additional income. The Government of India has recognized the potential of small-scale poultry sector development for poverty alleviation. It may also be mentioned that groups of small rural producers cater to the needs of consumers who have a specific preference for rural indigenous colored birds and brown-shelled eggs, both of which are mostly produced in the rural sector through backyard poultry.

The red jungle fowl (*Gallus gallus*) which is of Indian sub-continent origin is believed to be the ancestor of almost all modern breeds of fowl including indigenous chicken. The red jungle fowl is still found in northern India from Kashmir to Assam and

in Madhya Pradesh, West Bengal, Odisha, Visakhapatnam and parts of Godavari district of Andhra Pradesh (Mandal *et al*., 2006).

As per 19th livestock census 2012, the total poultry population in India is around 729.21 million out of which, 597.31 million are in organized poultry farm and 131.9 million in the backyard. Out of 131.9 million birds in backyard, Andhra Pradesh accounts for maximum contribution (22.12%) followed by Tamil Nadu (16.09%) and then Karnataka (7.33%).

As per FAO STAT (2011) India ranks third in egg production with 63.04 billion eggs after China and USA. India ranks fourth in Broiler production in the World with 2.33 million metric tons (MMT) meat production after USA, China, Brazil and Mexico. Even with this statistics of good rank in the World, the per capita availability of egg is only 53eggs against ICMR recommendation of 180 eggs. Also the per capita availability of meat is 2.15 kg against ICMR recommendation of 11 kg. Hence there is a good opportunity for the farmers in the country to grow poultry and fill the gap between availability and requirement. Also, the increasing demand for poultry products from non-industrial or commercial production systems is offering an opportunity for indigenous breeds/strains of livestock and poultry in India, where there is a strong preference for indigenous poultry meat and eggs. Therefore, the assessment of productive potential of indigenous chicken for development of backyard and also commercial poultry strains is taken into consideration

Poultry is socio-culturally important with very few religious taboos attached. Production is feasible at village level, where, only low cost technology is needed to

improve production considerably. Village chicken are active in pest control, provide manure, required for special festivals and also essential for many traditional ceremonies and some birds are well known game birds as they are used for cock fighting during some festivals. Besides this, low input poultry production is characterized by slower growth rates and higher cull rates during the growing stage, which has made such systems less commercially viable. Also, the existing traditional poultry farming is unable to meet the increasing demand of eggs and meat in the region. With the growing demand of indigenous birds, it is being replaced by the colored birds. Improved varieties like Vanaraja which are phenotypic replica of indigenous fowl are being developed by Project Directorate of Poultry (PDP), Hyderabad and introduced in the region of Andhra Pradesh.

It has been scientifically proved that maximum performance of broilers would be achieved only by maximizing the nutrient utilization. However, the reduction in the cost of production and reduction in the environmental pollution are some of the key factors in modern commercial poultry production.

The University of Agricultural Sciences, Bangalore released the first improved coloured bird Giriraja in 1989 suitable for backyard rearing which was developed at Department of Poultry Science, Bengaluru. Giriraja is a pioneer bird and blazed to strengthen the economy of the rural poor by producing good quantity/quality meat (3-6 kg body weight) under rural conditions (Reddy and Rajendiran, 2002).Though it is widely accepted by poultry farmers all over the state for rural poultry farming, scientific studies on different aspects of production in these birds are scanty.

To reach the expected meat production, both commercial broiler industry and small scale farming are to be improved. In this direction, need based attention was focused by ICAR through AICRP on Poultry Breeding for meat at Bengaluru and Department of Poultry Science, KVAFSU, Hebbal, Bengaluru and some other centres to evolve and release different varieties of coloured birds for small scale rearing which will be a boon for rural masses.

Raja-II a synthetic strain was developed by crossing parents of PB-1 and PB-2. Fertilized eggs of these parental stock were brought from AICRP, Ludhiana in 1994, and developed at AICRP Bengaluru. These birds resemble the native fowls in plumage pattern and are suited for small scale farming. They are also resistant to adverse climatic conditions because of acclimatization and perform equally with other local multi-coloured birds.

Poultry nutritionists in India are adopting BIS or NRC recommendations in formulating rations for different age groups of chicken. These recommendations may not be optimum for birds like Giriraja and Raja-II broilers, since these breeds differ in growth rate under intensive and semi-intensive systems of rearing.

The cost effective rearing systems like backyard and semi-intensive system of rearing can be recommended to the small and marginal land holding farmers of rural sector, as they have no adequate facilities to rear the birds under intensive or conventional system of rearing.

Keeping this in view, the present study was attempted to record the comparative performance of Giriraja and Raja-II broilers under intensive and semi-intensive systems of rearing with the following objectives:

1) To study the growth performance and carcass characteristics

2) To assess the biochemical parameters.

Review of Literature

II. REVIEW OF LITERATURE

Village chicken production under the free range and semi-intensive system is one of the viable alternative systems for improving the livelihood of rural households which provide additional income and supplement protein intake in rural and tribal folks.

To meet the growing demands of the population and to improve the per capita consumption among the rural/tribal people, backyard poultry farming in these areas is the best alternative. Traditionally *desi* varieties are used for backyard poultry production whose production potential is very low around 60-80 eggs per year and the average adult body weight of cocks is about 1.5 kg and that of hens is 1.0 kg (Ghosh *et al.*,2005) thus making the backyard poultry less economical.

Keeping this in mind Government supported various poultry development programmes to improve backyard poultry varieties like Giriraja, Gramapriya and Vanaraja. These birds are popular and well accepted by the small landless farmers and tribal folks of the country. These birds are popular among the rural/ tribal women as one of the income generating activity. The information supplied by formal and informal sources of backyard poultry extension as well as availability of services are inadequate in the study area and needs to be sharpened particularly with respect to low cost housing and rearing with increased production (Pathak and Nath,2013).

The economic factors have positive and significant contribution towards overall adoption of Giriraja and Raja-II farming. Poultry meat being a high quality animal protein source, plays a significant role in maintaining the health and nutrition of the

people. Intensive literature review revealed that nutritional requirement of these two breeds are scanty. Hence the available literature and published information has been reviewed pertaining to the present study under the following headings.

2.1 Rearing practices

2.1.1 Housing adjacent to residence (Semi-intensive system)

2.1.2 Separate Housing (Intensive system)

2.2 Feeding habits

2.2.1 Only scavenging

2.3 Body weight (g) profile of native chicken

2.4 Feed consumption

2.5 Feed conversion ratio

2.6 Carcass characteristics

2.6.1 Carcass yield of indigenous chicken

2.6.1.1 Dressing Percentage

2.6.1.2 Abdominal Fat Percentage

2.6.1.3 Giblets weight

2.7 Biochemical parameters

2.7.1 Meat cholesterol.

2.7.2 Serum cholesterol, LDL, HDL.

2.8 Common diseases

2.8.1 Vaccination practiced in native chicken

2.9 Survivability

2.1 Rearing practices

2.1.1 Housing adjacent to residence (Semi-intensive system)

Dessie and Ogle (2001) studied the production system in villages at different altitudes in central highlands of Ethiopia and concluded that there was no special housing provided for the birds and in most cases (88.5%), they roosted inside the family dwelling at night, the roost being made of two or three raised parallel planks of wood. A few households (11%) had constructed a small enclosure outside the house and this night shelter was occasionally cleaned by the housewife depending on her workload.

Mandal *et al.* (2002) found in their study conducted at tribal villages of West Bengal state that all the tribal backyard poultry farmers (100) reared birds under backyard / free-range system and the birds were protected from predators by providing night shelter only. Majority (95%) of the tribal people reported that the birds shared the same house with owners whereas only five per cent of the respondents had constructed a separate small mud, stone or bamboo house for their birds.

Mcainsh *et al*. (2004) documented that the small holder chicken population of Zimbabwe was traditionally on extensive scavenging system with extra shelter at night adjacent to animal shed.

Rajini and Vasanthakumar (2004) in their study on family poultry found that 75 per cent birds were housed in basket for night shelter whereas, 15 per cent were housed in both basket and trees and the rest (10%) allowed their birds to shelter in trees.

Tantia *et al.* (2005) documented that Ghagus birds were housed under a shelter made by a stack of dry fodder kept at a height of about 1-1.5 feet above the ground level on stone pillars to provide shade and to keep away from predators.

Vijh *et al*. (2005) documented that Miri birds reared under backyard farming were let out during the day time and sheltered in the night.

Vij *et al.* (2005) revealed that Danki birds were housed both in confinement as well as free range. Cocks being more ferocious are usually restrained in houses made up of thatched roof on wooden pillars to protect the birds from sun while, Hens and chicks mostly remain in the free range system.

Tantia *et al*. (2006) reported in their study that Ankleshwar birds reared in the free backyard system were provided a small shelter adjoining to the house to protect them from predators.

Vijh *et al*. (2006) documented that in Andaman and Nicobar groups of islands, the Nicobar birds were mostly raised in backyard system. The birds fulfil their nutritional requirement for maintenance and production in and around the households, nearby forest and sheltered in the night adjacent to other animals sheds or human houses.

Vijh *et al*. (2006a) observed that Punjab brown birds reared under backyard system were let free in the morning for scavenging in the vicinity and sheltered during the night and about 10 percent of farmers kept the birds confined both during the day and at night.

Vij *et al*. (2006) reported in their study that Daothigir birds were raised in the open area where birds move freely in the forest area and eat available feed in the form of grains, seeds, vegetation, insects, etc. and come back in the evening to the owner's house.

Kumar and Kumar (2007) observed that the local poultry keepers of Uttarakhand followed confinement housing with grazing in open area to reduce feed cost. Common shelter was given along with other livestock during night while nomads of Tarai and Bhabar areas followed only scavenging system.

Vij *et al.* (2007) found that Tellichery birds were raised under scavenging system at their home tract of Northern Kerala and shelter was provided during night with wooden coops in their home.

Sanka *et al* (2014) studied to determine the effect of rearing systems, sex and age at slaughter on growth performance and carcass traits of local chicken. From the study, it was concluded that local chicken with modest supplementation and assuming availability of scavenging feed resources, semi-confinement system of chicken rearing could be more appropriate for the small holder poultry keepers.

2.1.2 Separate Housing (Intensive system)

Chatterjee *et al.* (2002) observed that the growth rate of Nicobari fowl was better under intensive management system than backyard farming system because of adoption of better care and management practices. However, rearing of birds under backyard farming system was much cheaper than intensive system.

Mcainsh *et al*. (2004) documented that local chicken of Zimbabwe were confined in coops made of wooden poles ,branches or bricks with one or more sides with the mesh wire doors. The roof is often thatched /iron sheets/asbestos sheets and canvas. The flooring was mainly soil or wood. Only a few pens of local chicken of Zimbabwe were fitted with perches and no litter materials was used inside the pens/houses.

Tantia *et al*. (2005) documented that housing of Ghagus birds was in confinement area and the shelter was provided under the dry fodder stack kept at a height of about 1 to 1.5ft above the ground level on the stone pillars. Birds use this space to keep away from sunlight and predators.

Tantia *et al.* (2005a) reported that separate housing with the thatched roof with mud flooring was provided to Kashmir Faverolla birds during night.

Vij *et al*. (2005) documented that housing of Danki birds was in confinement area. Aggressive cocks were restrained in the houses made up of thatched roof on wooden pillars to protect from sun light.

Vijh *et al*. (2005) documented that Miri birds were provided housing only during nights in bamboo cages.

Vijh *et al*. (2005a) noticed that housing of Kalasthi birds was in confinement area and the birds were allowed to spend their nights on the trees or roof tops but the fighting cocks were kept individually under baskets.

Vijh *et al*. (2006) documented that housing for Nicobari birds was mainly at night and the shelter was made up of low cost materials and sometimes, birds stayed on trees throughout nights.

Vijh *et al.* (2006a) documented that the shelter made for Punjab brown chicken were small, mostly made up of mud of about 68 per cent ,about 30 per cent were of bricks and 2 per cent were of wood.

Vij *et al.* (2007) stated that wooden house raised two to three ft. above the ground level was used for Tellichery chicken.

Chatterjee and Yadav (2008) found that the house was provided to the Nicobari fowl only at nights. Small, low cost houses used were made up of locally available materials. Sometimes birds were cornered in the house along with the owner or other livestock.

Das *et al.* (2008) observed that the chicken sheds in the rural area of Bangladesh were usually made of materials that are locally available viz, wooden barks, bamboo, mud or mud bricks.

Patel *et al.* (2013) concluded that intensive system of management had significantly higher body weight, higher feed intake, than semi intensive system**.**

2.2 Feeding management

2.2.1 Only Scavenging

Mandal *et al.* (2002) concluded in their study that in addition to scavenging, all respondents in tribal areas of West Bengal state offered handful of broken rice/rice bran to their birds. They had supplied water during night but none of the respondents kept water during day time. No separate feed mixtures were supplied for fighting cocks, hens or growing chicks.

Vijh *et al.* (2005) found that no specific feed was fed to the Miri birds but they were allowed to scavenge in their surroundings.

Vij *et al.* (2006) noticed that Daothigir birds scavenge freely in the forest area to find grains, seeds, vegetation to forage, insects and other natural feed source.

Vij *et al.* (2007) reported that in Tellichery chicken no commercial feed was fed to birds. They were allowed scavenge and eat available grain, seeds, vegetation and insects in the field.

2.3 Body weight (g) profile of native chicken

Krishna *et al.* (2007) compared growth performance of desi birds and coloured birds under backyard farming and have found that the average body weight (g) of birds at $6^{th}$and 8^{th} week were significantly ($P \leq 0.01$) higher in coloured layer birds (408.00 ± 4.79 *vs* 339.00 ± 9.66, 575.00 ± 14.43 *vs* 450.00 ± 15.14 respectively) indicating higher/more weight gain in coloured layer birds in comparison to desi birds.

Iqbal and Pampori (2008) studied the qualitative and quantitative characteristics of indigenous chicken of Kashmir reared by rural population in backyard and scavenging system. The live weight in pullets and cockerels were 0.853 ± 0.140 kg and 0.939 ± 0.153 kg and in cock and hen the weight was recorded as 1.820 ± 0.250 kg and1.350 ± 0.220 kg, respectively which differed significantly ($P \leq 0.01$) between the sexes.

Yakubu *et al.* (2008) studied the growth performance of free range naked neck and full feathered chicken from a randomly selected 102 smallholder farmers of Nigeria. It was found that there was a significant difference ($P \leq 0.05$) in the body weight of the two genotypes with higher mean value (1.30 kg) recorded for naked neck hens compared to full feathered chicken.

Doley *et al.* (2009) conducted a study to determine the productive and reproductive traits in Indigenous chickens of North-Eastern region of India under extensive, semi-intensive and intensive systems of rearing. They recorded that there was significantly higher body weight under intensive system than semi-intensive and extensive system at all stages of growth, while there was non-significant difference between the extensive and semi-intensive system.

Kalita *et al.* (2009) estimated the different productive and reproductive performance of Indigenous chicken in three districts of Assam under rural condition comprising non tribal and tribal communities. The body weight at day-old was found to be 25.95 ± 0.20 for non-tribal farmers while for tribal farmers it was 25.36 ± 0.22. It was also recorded that there was no significant difference in body weights between indigenous chicken of different communities and districts at various ages.

Wang *et al.* (2009) studied the effect of a free range raising system on growth performance of Gushi chicken and found that the body weight of chicken in intensive treatment was significantly higher than those of free range treatment ($P \leq 0.05$).The average body weight of chicken in free range was recorded at 1419.40 ± 101.80g and 1610.50±138.60g for the chicken reared under intensive system.

Choudhuri *et al.* (2010) evaluated the growth and production traits of Nicorock, Nishibari, White Nicobari and Black Nicobari under intensive and backyard system of rearing. It was found that the under intensive system of rearing, Nicobari birds had the highest body weight (554.00 ± 19.60g) followed by Black Nicobari (508.00 ± 16.10g), White Nicobari (500.00 ± 17.50g) and Nishibari (452.00 ± 7.24) birds at 8^{th} week of age, Under backyard system of rearing, Nicorock chicken showed the highest body weight (494.00 ± 18.62g) followed by Nishibari (410.00 ± 7.47g), Black Nicobari (409.00 ± 7.72) and white Nicobari (404.00 ± 5.98g) at 8^{th} week of age.

Haunshi and Doley (2011) studied the growth performance of Mizo-local chicken under intensive system of rearing. They reported that the body weight at day old, 4^{th}, 6^{th} and 8^{th} age were 23.21 ± 0.29, 165.36 ± 5.28, 296.47 ± 10.22 and 438.39 ± 16.35g respectively. It was observed that no significant difference lies in between the male and female birds for body weight recorded from day old to 8^{th} weeks of age.

Kalita *et al*. (2011) studied the crossbred chicken (PB-2 x indigenous) under intensive system of rearing and reported the average body weight at day old, 1 month and 2 months as 29.65 g, 210.58 g and 670.83 g respectively.

Kalita *et al*. (2011a) studied the production traits in indigenous chicken of six districts of Assam in rural condition *viz*., Cachar, Morigaon, Dibrugarh, Darrang, Dhubri and Kokrajhar. It was found that the average body weight of the adult male and female chicken was recorded at 1.44 ± 0.01 and 1.14 ± 0.01 kg respectively. Also, the overall mean body weight of male and female indigenous chicken was found to be similar among birds of different Districts.

Gonmei (2012) recorded the mean body weight of indigenous chicken at day old and 8 weeks of age were 27.19 ± 0.23 g and 389.56 ± 5.42 g for males and 22.39 ± 0.18 g and 258.90 ± 3.96 g, respectively for females. The mean body weight of Vanaraja chicken at day old and 8 weeks of age was recorded as 41.96 ± 0.30 g and 1327.69 ± 14.85 g for males and 37.58 ± 0.24 g and 930.22 ± 5.99 g for females respectively. Also, it was reported that there was significant ($P \leq 0.05$) difference in body weight between the groups with Vanaraja chicken recording a higher body weight than the Indigenous chicken.

Jha *et al.* (2012) studied the viability, adaptability and productive performance of Vanaraja birds under intensive system of rearing. They reported that the mean body weights of Vanaraja birds at day old, 4^{th}, 6^{th} and 8^{th}weeks of age were recorded as 39.91 ± 0.26 g, 316.47 ± 2.47 g, 629.23 ± 4.02 g and 832.51 ± 4.53 g respectively. Also, the mean body weights of desi birds observed at corresponding periods were recorded as 28.52 ± 0.20 g, 124.83 ± 1.18 g, 183.61 ± 2.54 g and 258.75 ± 3.57 g, respectively.

Kalio *et al* (2012) conducted a study to investigate the performance of broiler chickens under the intensive and semi- intensive systems of poultry production and found

that the daily weight gains of the birds managed under the two management systems were significantly ($P< 0.05$) different.

Mosbood *et al.* (2012) carried out a study to determine the performance and carcass characteristics of broiler chicken under two management system intensive (total confinement) and semi intensive. It was concluded that birds under intensive management performed better in terms of total weight gain and daily weight gain.

Joanna Kuzniacka *et al* (2014) compared the results of rearing broilers kept under intensive and semi-intensive systems. The system of rearing did not significantly affect the body weight in broiler chickens.

Sanka and Mbaga (2014) studied the Tanzanian local chicken reared under intensive and semi-intensive systems. Overall, the weight gain of chickens in the semi-intensive system was significantly ($P<0.05$) lower than in the intensive system. The higher weight of birds kept in full confinement could be explained by higher feed intake, and probably better feed conversion efficiency due to lower energy expenditure for exercise.

2.4 Feed consumption

Chatterjee *et al*. (2002) recorded average daily feed intake per bird in Nicobari fowl under intensive system of rearing at 4^{th}, 5^{th}, 6^{th}, 7^{th} and 8^{th} weeks of age as 12.80, 13.90, 14.20, 17.51 and 19.87 g respectively.

Sunder *et al*. (2005) recorded feed consumption in white, black and brown varieties of Nicobari fowl of Andaman at the end of eighth week of age, as 2.7, 2.64 and

2.84 Kg, respectively which were maintained under intensive system. No significant difference was found among the various groups.

Halima *et al*. (2006) documented the mean feed intake at the end of their growing phase (eight weeks) under intensive system of rearing for the seven identified native chicken ecotypes of Ethiopia namely Tilili, Gellilia, Debre-Ellias, Mello-Hamusit, Gassay, Guangua and Mecha as 13.80, 15.16, 13.44 , 13.25, 13.81, 13.36, and 12.83 Kg respectively. No significant ($p<0.05$) differences among the tested chicken lines in total feed consumption was noticed.

Mohan *et al*. (2008) recorded daily feed intake per bird at the age of 8 weeks and 12 weeks of age as 93.55±3.10 g and 95.60±4.10g respectively.

Thakur and Parmar (2006) recorded the feed consumption of Kadaknath type indigenous birds at 1^{st}, 2^{nd}, 3^{rd}, 4^{th}, 5^{th}, 6^{th}, 7^{th} and 8^{th} weeks of age were 24.74, 35.61, 40.34, 62.33, 82.44, 116.52, 155.65 and 195.12 g, respectively in semi-intensive system of rearing.

Haunshi *et al*. (2009) recorded the average daily feed intake of Miri type indigenous birds from 1^{st} week to 8^{th} week as 24.74, 34.61, 40.34, 62.33, 82.44, 116.52, 155.65 and 195.12 g, respectively.

Kalio *et al* (2012) conducted a study to investigate the performance of broiler chickens under the intensive and semi- intensive systems of poultry production and found that the feed intake of birds managed under the intensive and semi-intensive systems was not different.

2.5 Feed conversion ratio

Chatterjee *et al*. (2002) reported that the FCR at 1^{st},2^{nd},3^{rd},4^{th},5^{th},6^{th},7^{th} and 8^{th}weeks of age were 2.22,2.56,2.64,2.81,2.99,3.17,3.31 and 3.49 respectively in Nicobari fowl managed under intensive system.

Lima & Naas (2005) proved the significant differences in the feed conversion ratio (2.98 vs 1.97) between chickens housed in free range and without access to the free-range, respectively.

Sunder *et al*. (2005) reported that the FCR at 1^{st}, 2^{nd},3^{rd},4^{th},5^{th},6^{th},7^{th} and 8^{th} weeks of age were 2.11,2.52,2.63,2.67,2.89,3.46,3.68 and 3.77, respectively in indigenous breed of Andaman and Nicobar Islands maintained under semi-intensive system.

Dou *et al*. (2009) carried out a research on slowly-growing Gusbi chickens housed under two systems. Favorable feed conversion ratio of 3.95 (compared to 4.41) was confirmed in chickens housed under an intensive system.

Kalio *et al* (2012) conducted a study to investigate the performance of broiler chickens under the intensive and semi- intensive systems of poultry production. The feed conversion ratios of the birds managed under the two management systems were significantly ($P< 0.05$) different.

Mosbood *et al.* (2012) carried out the study to determine the performance and carcass characteristics of broiler chicken under two management system (intensive and semi-intensive). It was concluded that birds under intensive management performed better in terms of feed efficiency.

Sanka and Mbaga (2014) observed that FCR of chicken in the semi-intensive system was significantly better than in the intensive system.

Neupane *et al.* (2014) performance of New Hampshire and Giriraja breeds of chicken were compared and found that Giriraja is better than New Hampshire in terms of better feed efficiency.

2.6 Carcass characteristics

2.6.1 Carcass yield of indigenous chicken

2.6.1.1 Dressing Percentage

Roy *et al*. (2003) evaluated indigenous Miri birds from different villages in Assam and reported dressing percent values ranging between 71.50 to 76.05. The dressing percentage of 74.57±0.96 for males and 74.18±2.83 for females were recorded when pooled over the sexes. The eviscerated percent values recorded were 62.91±1.17, 66.50±1.20 and 67.63± 1.31 respectively for the three categories. Similarly, the values were 65.17 ± 1.17 for males and 66.18±0.95 for females when pooled over categories.

Doley (2006) found the Frizzle Feathered fowl of North-East Region of India had overall mean dressing yield under intensive system (68.13 ± 0.31) was significantly higher than those under semi- intensive (66.62 ± 0.19) and extensive (66.17 ± 0.20) rearing systems at the end of eighth week.

Musa *et al*. (2006) studied the carcass characteristics of Anka and Rugao breed reared under intensive system up to 12 weeks of age. The results showed that live weight, carcass weight, dressing percentage and eviscerated weight were significantly **(**$P \leq 0.01$)

better in Ankathan Rugao breed, i.e., 3400.00 ± 63.58 vs 1113.80 ± 22.65g, 3234.02 ± 62.24 vs 1006.33 ± 21.17g, 94.44 ± 0.35 vs 90.29 ± 0.22% and 2493.07 ± 51.26 vs 792.57 ± 17.29g respectively. They also observed that the males grew faster than females within the breed and showed significantly (P≤0.01) higher live weight, eviscerated weight and carcass weight.

Iqbal and Pampori (2008) studied the qualitative and quantitative characteristics of indigenous chicken of Kashmir reared by rural population in backyard and scavenging system. Twenty adult cocks and hens slaughtered by Halal method revealed significant difference (P≤0.01) in the dressing percentage of hen and cock i.e., 63.80 ± 1.59 and 70.1 ± 0.66 respectively. The average live weight, de-feathered weight and dressed weight of hen and cock recorded were 1525.00 ± 0.33g, 1720.00 ± 0.44g, 1253.00 ± 0.02g and 1206.00 ± 0.02g, 799.00 ± 0.02g 1126.00 ± 0.02g, respectively. Significant difference (P≤0.05) was recorded in blood yield between two sexes. But feather yield showed no significant difference between hen and cock.

Skomorucha *et al*. (2008) determined a higher proportional dressing percentage in 42-day-old broilers Cobb housed without access to free-range.

Doley *et al*. (2009) recorded that the percentage eviscerated yield under intensive system was significantly (P ≤ 0.05) higher due to better growth rate, good nutrition and management. The percent dressing yield of male birds of indigenous chicken of NEH region were 68.13±0.31, 66.62±0.19 and66.17±0.20under intensive, semi-intensive and extensive systems of rearing, respectively at 8 weeks of age.

Dou *et al*. (2009) reported dressing percentage in broilers under intensive and semi-intensive systems of rearing as 69.90% to 69.88%.

Ganabadi *et al*. (2009) compared the carcass composition of three breeds of chicken comprising of jungle fowl, broiler and Malaysian indigenous chicken and found that the mean live weight of adult broiler was higher (2184.08g) compared to adult indigenous chicken (1384.59g) whereas, jungle fowl had the lowest mean live weight (729.39g).

Islam and Nishibori (2009) reported that dressed percentage and total meat yield of indigenous naked neck and indigenous full feathered chicken were 57-63% and 30-37% and 53-61% and 20-30%, respectively.

Wang *et al.* (2009) reported that there was no effect of the free-range raising system on eviscerated carcass, breast, thigh, and wing yield ($P>0.05$) of indigenous chicken. They concluded that the free-range raising system could significantly reduce growth performance**,** abdominal fat, and tibia strength but had no effect on carcass traits and meat quality in slow-growing chicken**s.**

Kalita *et al.* (2011) studied the crossbred (PB-2 x indigenous) chicken under intensive system of rearing and reported the dressing yield percentage of 73.87 per cent.

Kalita *et al*. (2011a) evaluated the carcass quality of Vanaraja and indigenous chicken reared under intensive system. The overall mean values of pre-slaughter live weight (g), dressed yield (%), giblet yield (%) and ready to cook yield (%) recorded were 2850.24 ± 17.36, 65.49 ± 0.21, 6.82 ± 0.03 and 71.23 ± 0.55 respectively for Vanaraja.

The values recorded for indigenous birds were 980.84 ± 12.55, 64.35 ± 0.28, 6.45 ± 0.06 and 70.17 ± 0.37 respectively. Between vanaraja and indigenous chicken, no significant difference was found except in pre slaughter live weight.

Poltowicz and Doktor (2011) found that free-range chickens Ross 308, had only 0.64% higher dressing percentage compared with broilers housed under intensive system.

Yhome and Sapcota (2011) conducted an experiment to study the various carcass quality parameters of desi chickens of Kohima and Dimapur Districts of Nagaland comprising of 6 numbers of chickens from each districts. They reported that the mean values for pre-slaughter live weights were 760.00 ± 119.66 g and 820.33 ± 85.26 g, for eviscerated weight 71.03 ± 28.53% and 70.72 ± 31.77% and for ready to cook yield as 64.98 ± 1.41% and 65.16 ± 3.20%, respectively for Kohima and Dinapur district chickens and observed that there was no significant difference between the traits studied.

Adokiye *et al*. (2012) observed that broilers reared under intensive system possessed a higher body weight and this trend reflected in the dressing percentage as well as the primal parts or cut up parts of the birds. Conversely, the internal organ parts of broilers managed under the semi-intensive system were better developed

Gonmei (2012) studied the performance of indigenous and Vanaraja chicken under deep litter system of rearing. It was observed that the mean pre-slaughter weight, dressing yield, eviscerated yield, and giblet yield for indigenous vs Vanaraja male were 1316.60 ± 51.33g vs 4393.40 ± 163.82g, 71.24 ± 1.22% vs 75.79 ± 0.46%, 74.22 ± 1.25% vs 78.15 ± 0.54% and 2.98 ± 0.16% vs 2.35 ± 0.92%, respectively and the same

for indigenous females vs Vanaraja female were 934.60 ± 48.01 vs 2923.80 ± 133.70g, 70.18 ± 1.39 vs 70.56 ± 4.02%, 74.53 ± 1.19 vs 73.67 ± 4.13% and 4.34 ± 0.35 vs 3.10±0.15%, respectively. Significant ($P \leq 0.05$) differences were observed between the groups as well as between the males and females within the groups in pre-slaughter live weight and giblet yield. No significant difference was recorded for dressing yield and eviscerated yield, both and within the groups.

Kalio *et al*. (2012) reported that broilers managed under intensive system possessed a higher body weight and this trend reflected in the dressing percentage as well as in the primal parts or cuts of the birds.

2.6.1.2 Abdominal Fat Percentage

Castelini *et al*. (2002) proved the difference of 0.9% vs 1.9% after 56 days and one per cent compared with 2.9% at 81 days of ecological rearing of broilers Ross, confirming significantly lower fattiness compared with the conventional rearing.

Bogosavljevic-Boskovic *et al*. (2006) reported that in broilers Hybro G, the proportion of abdominal fat deposition was 1.88% reared in free-range chickens and 1.98% in those reared under an intensive indoor system.

Dou *et al*. (2009) noted significantly higher abdominal fat deposition (6.5%) in those housed under intensive system of rearing when compared with abdominal fat deposition in free-range broilers (3.0%).

Yadav *et al.* (2009) studied and documented that supplementation of house hold kitchen waste in the backyard system (semi-intensive system) had significant effect on abdominal fat deposition.

Adokiye *et al*. (2012) observed that the broilers reared under intensive system had no significant effect on abdominal fat weight and abdominal fat percentage when compared to semi-intensive system.

Joanna Kuzniacka *et al.*(2014) compared the results of rearing broilers kept under intensive and semi-intensive systems and found that chicken fed with complete feed and kept under intensive system were distinguished by higher fattiness expressed as an abdominal fat weight, as well as by lower average intake of feed mixtures per individual broiler.

2.6.1.3 Giblets weights

Roy *et al*. (2003) reported that the overall mean weights of heart, gizzard and liver of Miri indigenous chicken were 0.70±0.27 g, 4.93±0.21 g and 2.94±0.1g, respectively.

Sunder *et al*. (2004) recorded per cent yield of giblets as 4.46±0.27 for black Nicobari, 4.87± 0.24 for brown Nicobari and 5.05±0.18 for barred deshi.

Doley (2006) observed significantly higher overall giblet yield under extensive (7.05 ± 0.07) than that under intensive (6.74 ± 0.08) rearing system.

Doley *et al.* (2009) recorded that giblet weight percent was significantly ($P \leq 0.05$) higher in extensive system. The values recorded were 6.74±0.08, 2.04±0.06 and

7.05±0.07 respectively the three system of rearing. Viz, intensive, semi-intensive and extensive system of rearing.

Iqbal *et al*. (2009) recorded per cent yield of gizzard, liver and heart as 2.16±0.09%, 2.04±0.06% and 1.11±0.06%, respectively in indigenous chicken of Kasmir and significant (P <0.01) was recorded which was higher side as compared to broilers.

Yhome and Sapcota (2011) conducted an experiment to study the various carcass quality parameters of desi chickens of Kohima and Dimapur Districts of Nagaland comprising of 6 numbers of chickens from each districts. They reported giblets yield 6.04 ± 0.55% and 6.07 ± 0.44%, respectively and also observed that there was no significant difference between the breeds.

Hossain *et al.* (2012) reported that per cent yield of heart and gizzard as 0.50 and 2.89 respectively in males and 0.40 and 2.28 respectively in females of naked neck genotype. The percent yields of heart and gizzard in normal genotypes were 0.45 and 2.63 respectively in males as compared to 0.44 and 2.50 per cent for heart and gizzard respectively in females of indigenous chicken.

Kalio *et al*. (2012) observed that broilers managed under the semi-intensive system possessed superior internal organs on account of the exposure of the birds to varying environmental condition and feeds they utilized as they scavenge.

2.7 Biochemical parameters

2.7.1 Meat cholesterol

Bogosavljevic-Boskovic *et al.* (2006) concluded that the free range rearing or semi-intensive system of rearing produced better results in comparison with the intensive system in lower lipid content and a somewhat higher protein content was characteristic of the muscular system of these broilers, indicating that the meat concerned was of a special nutritive and dietary value.

Doley (2006) found that rearing system had significant effect on overall fat content. It was significantly higher under intensive (2.66 ± 0.06 per cent) system than those under semi-intensive (2.35 ± 0.06) and extensive (2.38 ± 0.06 percent) systems of rearing.

Givens *et al.* (2011) observed that there was no evidence that meat from free range chickens had a fatty acid profile that would be classified as healthier than that from intensively reared birds.

Pavlovski *et al*. (2013) found that free ranged naked neck chickens had significant different fatty acid composition compared with broiler chickens reared under conventionally controlled system.

2.7.2 Serum cholesterol, LDL and HDL

Meluzzi *et al*. (1992) reported that serum cholesterol of Thai indigenous chickens was lower than the reference range (Clinical Diagnostic Division, 1990) and broilers (140 mg/dl).

2.8 Common diseases

Rai and Ahlawat (1995) reported that Nicobari birds were resistant to most of the common poultry diseases (ND, Marek's disease, IBD, Salmonella, *Escherichia coli* and Coccidiosis) compared to white Leghorn.

Zaman *et al.* (2004) stated that New castle disease and Infectious Bursal Disease were two major viral diseases occurred in Bangladesh under semi scavenging system of management.

Gupta *et al.* (2006) documented that major diseases of local chicken in Meghalaya were Ranikhet disease, Coccidiosis, Salmonellosis, Chronic respiratory disease, Marek's diseases and fowl cholera diseases.

Tantia *et al.* (2006) reported that common diseases in Ankleshwar birds were Ranikhet and Fowl pox.

Vij *et al.* (2006) observed that Coccidiosis and Ranikhet diseases were common in Daothigir birds.

Iqbal and Pampori (2008) reported that mortality recorded in indigenous chicken of Kashmir was 41 per cent from day one to one year, attributed to predation and New castle disease.

Kugonza *et al.* (2008) reported that in indigenous chicken of Kumi district in Eastern Uganda, the death percent in chick stage (73%) was mainly attributed to Newcastle disease.

2.8.1 Vaccination practiced in native chicken

Tantia *et al.* (2005a) observed that Kashmir Faverolla birds were vaccinated against Ranikhet and fowl cholera.

Tantia *et al*. (2005) reported that Ghagus birds were vaccinated against Fowl pox and Ranikhet disease. Similar observations were reported by Vijh *et al*. (2005a) in Kalasthi birds and Vij *et al*. (2006) in Daothigir birds

2.9 Survivability

Although indigenous chicken are more resistant to diseases, but disease is still an important problem for bird's mortality. The common diseases and disorders of free-range poultry may be either infectious or non-infectious, and are caused by a wide range of organisms or deficiencies.

Oruseibio (2002) the slightly higher mortality rates recorded for the semi-intensively managed birds may be attributed to bad management or hygienic conditions, bad housing conditions and/or poor feeding

Doley (2006) reported that the overall mortality percentage was higher in Naked Neck (17.13 ± 0.95) followed by Frizzle Feathered (15.74 ± 1.04) and Normal Feathered (13.89 ± 1.17) birds. He also mentioned mortality percentage in different rearing systems as 17.13 ± 1.21, 15.28 ± 0.95 and 14.35 ± 1.02 under extensive, semi-intensive and intensive rearing systems, respectively.

Gawande (2006) reported that the overall mean mortality was higher in Nagaon district (35.81 ± 4.30 %) which was followed by Sibsagar (31.22 ± 4.05 %) and Kamrup (29.90 ± 4.54 %). He also reported that the overall mean mortality percent was found to be higher in the birds of tribal community (34.30 ± 3.45%) than the birds of non-tribal community (30.33 ± 3.16).

Mandal *et al.* (2006) stated that mortality rate in Desi birds due to Ranikhet disease was highest, followed by Fowl pox, Coccidiosis, respiratory problems and other miscellaneous diseases. The study also showed that the death rate was high in chicks followed by growers and adult birds and high flock mortalities recorded during rainy season.

Halima *et al.* (2007) studied the village-based indigenous chicken production system in North-West Ethiopia and reported that the major causes of death of chickens were seasonal outbreaks of Newcastle disease and predation.

Yousef and Yousef (2007) reported that Newcastle disease was the most frequently occurring disease of Saudi Baladi chickens. It was mentioned that diseases such as coccidian (58%), fowl pox (42%), eye diseases, respiratory diseases and coryza (16%) could also attack the birds. It was also reported that all chicken owners vaccinated their birds against ND and 33% of them vaccinated against fowl pox.

Divers *et al.* (2008) reported that Newcastle disease, Infectious Laryngo-trachitis, Infectious Bronchitis, Chicken anemia, and Infectious Bursal disease, as well as both *Mycoplasma gallisepticum* and *Mycoplasma synoviae* appeared to be significant diseases

of the backyard chicken flocks in San Luis, Costa Rica. Pox was also a significant cause of morbidity and mortality in these chickens.

Kugonza *et al.* (2008) reported that death of chicks of indigenous chickens of Kumi district in Eastern Uganda was mainly due to Newcastle disease (70%) with most of the mortality being observed during the dry season (62%). It was also mentioned that survival of chickens was significantly affected ($P<0.001$) by feeding level and strongly correlated ($r = 0.83$) with the housing system.

Khan *et al*. (2009) studied the disease profile of 400 chicks of a native flock of Kashmir poultry reared under intensive system of management following standard vaccination and deworming schedule over a study period of one year. It was found that during the first months about 5 % mortality was recorded, comprising mostly of crippled chicks and weaklings. In the third month, 15% mortality was recorded on account of hepatitis, enteritis and some cases of septicemia. During 4^{th} to 10th month, the mortality was from 1.4 to 10.15 % comprising mostly of articular and visceral gout which could be due to managemental and nutritional cause.

Chutia (2010) studied the mortality pattern of indigenous chicken prevailing in Dhemaji district of Assam. He reported that the overall mean mortality per cent in both growing and adult stage of indigenous chicken was found highest in Murkongselek block (32.35±1.16 and 19.83±0.90 percent) followed by Bordoloni (30.33±1.21 and 18.33±0.79 percent), Machkhowa (28.16±1.19 and 16.19±0.89 percent), Sissiborgaon (27.50±0.92 and 15.33±1.06 percent) and Dhemaji (26.16±1.30 and 13.66±0.64 percent) blocks of

Dhemaji district of Assam. He also found that the overall mean mortality percent to be higher in indigenous birds reared by tribal than the non-tribal people.

Kalita *et al.* (2011) studied the crossbred (PB-2 x indigenous) chicken under intensive system of rearing and reported the mortality (%) as 5.56 per cent up to 6 months.

Kalita *et al.* (2011a) observed mortality rates for birds in the intensive and semi-intensive groups were 3.3% and 5.0% respectively. These rates were within the ideal mortality rates (5%) recommended for a well-managed flock (Oluyemi and Roberts 2000).

Gonmei (2012) studied the performance of indigenous and Vanaraja chicken in deep litter system of rearing and observed that the mortality per cent recorded for indigenous and Vanaraja were 5.1 and 5.6%, respectively up to 5weeks.

Dutta *et al*. (2013)studied the production performance of indigenous chicken in some selected areas of Rajshahi District of Bangladesh and found that the mortality rate(%) in Boalia, Godagari, Motihar, Mohonpur, Poba and Rajpara regions are 0.29, 0.18, 0.25,0.19 0.25 and 0.20 respectively.

Pathak and Nath (2013) studied the rural poultry farming with improved breed of backyard chicken in Sikkim and found that the mortality up to 10 weeks for Vanaraja and Gramapriya birds was less than 5% and less than 4% for indigenous chicken. Mortality up to 20 weeks of age was less than 10%, 12%, and 8% respectively and less than 12%, 15% and 10% respectively during laying period.

Materials and Methods

III. MATERIALS AND METHODS

The present experiment was conducted to evaluate the comparative performance of Giriraja and Raja II birds under intensive and semi-intensive systems of rearing. The experimental procedures and experimental design followed are presented in this chapter.

3.1 Biological Trial

A biological trial was conducted at the Department of Poultry Science, Veterinary College, Hebbal, Bengaluru, using 200 Giriraja chicks procured from the same department and 200 Raja II chicks from AICRP, Veterinary College, Bengaluru. The experiment was conducted for 56 days duration.

3.2 Experimental chicks

Two hundred day old chicks each of Giriraja and Raja II varieties were randomly selected and wing banded for the experiment. All the birds were reared under the deep litter system under standard managemental practices. Standard vaccination and medication were followed during the entire period of experiment. The birds were vaccinated against the diseases like Marek's disease (MD), Newcastle disease (ND) and Infectious Bursal disease (IBD).

3.3 Formulation of experimental diets

Diet was formulated using maize, soya bean meal and feed additives. The broiler rations were formulated as per BIS (2007) specifications by using commonly available feed ingredients which are shown in the table 3.1. The birds were fed with conventional

broiler diets of pre-starter for 0-3weeks, starter for 4-6weeks, and 7-8weeks broiler finisher as recommended by BIS (2007) specifications.

3.4 Experimental Design

The experiment was conducted with 100 birds in each treatment group, as shown in table 3.2. The birds were fed with different diets formulated as per BIS 2007 specifications. Under semi-intensive system (T_3 and T_4) the birds were allowed outside for two hours a day in the protected range i.e. one hour in the morning and one hour in the evening.

Experimental diet

Table 3.1: Per cent ingredient composition of experimental diet

Ingredients	Pre-starter (0-3 weeks)	Starter (4-6 weeks)	Finisher (7-8 weeks)
Yellow maize	51	55	58.5
Soyabean meal (46%)	41.92	37.5	32.5
Vegetable oil	3.1	4	5.5
Dicalcium phosphate	1.0	1.0	1.0
Common salt	0.3	0.3	0.3
Mineral mixture*	2.0	2.0	2.0
Vitamin premix **	0.1	0.1	0.1
DL-Methionine	0.1	0.1	0.1
Liver tonic	0.13	0.13	0.13
Mycotoxin Binder	0.1	0.1	0.1
Coccidiostat	0.09	0.09	0.09
Total	100.0	100.0	100.0
Nutrient composition			
ME (Kcal/kg) [b]	2948.52	3078.47	3141.61
Crude protein (%) [b]	22.69	19.78	18.21
Calcium (%) [a]	1.01	0.91	0.855
Phosphorous (%) [a]	0.46	0.37	0.355
Lysine (%) [a]	1.4	1.18	1.03
Methionine (%) [a]	0.49	0.39	0.342

* Mineral mixture: Each 100 g contains Magnesium oxide- 1.48g, Ferrous sulphate- 6.0 g, copper sulphate- 0.05g, Manganese Sulphate-0.04 g, Potassium Iodide- 0.001g, Potassium Chloride-17.09g and Sodium selenite- 0.001g.

** Vitamin-mineral Premix: Each 100g contains Vitamin AD3 (Vitamin A-10,00,000 IU/g, Vitamin D-200000 IU/g)- 0.165g, Vitamin K3-0.103g, Vitamin E- 2.4g, Thiamine Mononitrate- 0.206 g, Riboflavin- 0.513g, Pyridoxine hydrochloride- 0.309g, Cyanocobalamine- 0.00031g, Folic acid- 0.103g, Niacin-4.124 g, Ca-D-Pantothenate- 1.031g, Biotin- 1.5g, Maltodextrine- 89.545g.

[a] calculated values; [b] analyzed values

Table 3.2: Experimental Design

Treatment	Systems of rearing	Number of birds in each treatment	Type of diet
T_1 (Giriraja)	Intensive	100	Birds of all four treatments were fed with Pre-starter (0-3weeks), Starter (4-6weeks) and Finisher (7-8weeks) broiler ration as per the BIS 2007 Specification.
T_2 (Raja II)	Intensive	100	
T_3 (Giriraja)	Semi-intensive	100	
T_4 (Raja II)	Semi-intensive	100	

3.5 The following parameters were studied

3.5.1 Growth performance

3.5.1.1 Body weight (weekly cumulative)

3.5.1.2 Feed consumption (weekly cumulative)

3.5.1.3 Feed conversion ratio (weekly cumulative)

3.5.1.4 Survivability

3.5.2 Carcass characteristics

3.5.2.1 Dressing percentage

3.5.2.2 Abdominal fat percentage

3.5.3 Giblets weight (Heart, Liver and Gizzard)

3.5.4 Biochemical parameters

3.5.4.1 Meat cholesterol

3.5.4.2 Serum cholesterol, LDL, HDL**.**

3.6 Statistical analysis

3.5.1 Growth performance

The data on growth performance parameters viz., weekly cumulative body weight, weekly cumulative feed consumption and weekly cumulative feed conversion ratio, during the course of experiment was collected as follows.

3.5.1.1 Weekly cumulative body weight

The body weights of individual chicks were recorded at the beginning of the experiment and at the end of each week till eight weeks of age to monitor the pattern of

body weight gain. Based on the body weight recorded, the average body weight gains under different treatments were calculated on weekly basis and also for the entire period. The weighing of the birds was done in the early hours of the day before feeding.

3.5.1.2 Weekly cumulative feed consumption

Daily calculated amount of feed given and feed consumption in each treatment was recorded weekly by subtracting the weight of residual feed from the total quantity of feed supplied during the respective week. Based on the feed intake per week, the average cumulative feed intake per bird was calculated.

3.5.1.3 Weekly cumulative feed conversion ratio (FCR)

The feed conversion ratio (FCR) expressed as the ratio of amounts of feed consumed (kg) to the body weight gain (kg) under each experimental group per week and also on cumulative basis was determined. The FCR was calculated by using the following formula

$$\text{Feed conversion ratio} = \frac{\text{Average feed consumption per bird during the week (kg)}}{\text{Average weight gain per bird during the week (Kg)}}$$

3.5.1.4 Survivability

Daily liveability was recorded in all four treatment groups up to eight weeks and was expressed in terms of percentage (%) on weekly basis.

$$\text{Per cent survivability} = \frac{\text{Number of birds survived}}{\text{Total number of birds housed at the beginning}} \times 100$$

3.5.2 Carcass characteristics

3.5.2.1 Dressing percentage

In order to determine the carcass characteristics of Giriraja and Raja II birds reared in intensive and semi-intensive system, under deep litter system of management. Ten birds from each treatment were randomly selected and sacrificed at the age of eighth week. To find out the dressing percentage, birds were fasted for 12 hours, killed, bled, de-feathered, eviscerated and legs were cut at the hock joint and dressing percentage (D.P.) based on live weight was calculated by the following formula:

$$\text{Dressing Percentage} = \frac{\text{Eviscerated carcass weight (Kg)}}{\text{Pre slaughter live weight (Kg)}} \times 100$$

3.5.2.2 Abdominal fat percentage

The weight of fat lining the abdominal cavity, covering the gizzard and bursa of fabricious was scooped out, weighed and recorded during slaughter of the birds and expressed as per cent of live body weight.

Abdominal fat percentage is calculated by the following formula:

$$\text{Abdominal fat Percentage} = \frac{\text{Abdominal fat weight (g)}}{\text{live weight (g)}} \times 100$$

3.5.3.1 Giblets weight

From the birds slaughtered on 56^{th} day, the giblets namely heart without pericardium, liver without gallbladder and gizzard without inner mucous membrane were

carefully collected and expressed as percent of live body weight and it is calculated by the following formula;

$$\text{Giblet weight percentage} = \frac{\text{Total giblet weight}}{\text{Total live weight of the bird}} \times 100$$

1) **Heart**: the average weight of the heart without pericardium from dressed birds of each treatment was recorded and expressed as percent of live body weight.

$$\text{Heart weight percentage} = \frac{\text{Weight of the heart (g)}}{\text{Pre slaughter live weight (g)}} \times 100$$

2) **Liver**: the average weight of the liver without gallbladder from dressed birds of each treatment was recorded and expressed as percent of live body weight.

$$\text{Liver weight percentage} = \frac{\text{Weight of the liver (g)}}{\text{Pre slaughter live weight (g)}} \times 100$$

3) **Gizzard**: the average weight of the gizzard without feed contents and internal lining membrane from dressed birds of each treatment was recorded and expressed as percent of live body weight.

$$\text{Gizzard weight percentage} = \frac{\text{Weight of the gizzard (g)}}{\text{Pre slaughter live weight (g)}} \times 100$$

3.5.4 Biochemical parameters

3.5.4.1 Serum cholesterol, LDL and HDL.

For the determination of serum cholesterol, LDL and HDL blood samples were collected from ten birds selected randomly from each treatment group at the end of 8th

week, serum was separated individually and pooled treatment wise each treatment and subjected to estimation of serum cholesterol, LDL and HDL by enzymatic method, using auto analyzer kits.

3.5.4.2 Meat cholesterol

The cholesterol content in the meat was estimated as follows:

The total lipid from the meat sample was isolated as per the procedure outlined by Folch *et al.*(1957). Approximately two g of meat sample was homogenized with 10 volume of folch solution (chloroform: methanol, 2:1) for three min and allowed to stand at room temperature for one hour. The mixture was filtered through Whatman filter paper No.1. The filterate was evaporated to dryness and 10 ml of 0.9 percent sodium chloride solution was added, allowed to stand at the room temperature for one hour which led to the separation of two layers. The top layer was discarded and the bottom layer containing lipid and chloroform was evaporated to dryness. The dried residue was reconstituted with five ml chloroform.

The cholesterol content in the lipid extract was estimated by the one step method of Wybenga *et al*. (1970). To five ml of cholesterol reagent (ferric perchlorate, ethyl acetate and concentrated sulphuric acid), 50µl cholesterol standard (200 mg cholesterol per 100 ml glacial acetic acid) or lipid extract was added, mixed well, kept in boiling water bath for 15 min. Tubes were immediately cooled and the absorbance was read at 560 nm against blank using UV- visible spectrophotometer.

$$\text{Cholesterol mg /100 g meat} = \frac{\text{Optical density of sample} \times 200 \times 5}{\text{Optical density of standard} \times 100 \times \text{Sample weight}} \times 100$$

3.6 Statistical analysis

The collected data was analysed by using graph pad prism statistical software. The following statistical methods were used to test the hypothesis,

a) Descriptive statistics

b) ANOVA-Duncan multiple range test

c) Graphical representation

The data obtained from the study was analysed in order to demonstrate the effect of different systems of rearing on growth performance, carcass characteristics and biochemical parameters and results are presented in the corresponding tables and depicted graphically.

Results

IV. RESULTS

A biological study was conducted at the Department of Poultry Science, Veterinary College, Bengaluru for a period of 56 days to study the comparative evaluation of Giriraja and Raja II broilers under intensive and semi-intensive system of rearing. The results obtained in this study are presented in this chapter under the following headings.

4.1 Growth performance

4.1.1 Body weight

4.1.2 Feed consumption

4.1.3 Feed conversion ratio (FCR)

4.2 Survivability percentage

4.3 Carcass characteristics

4.3.1 Dressing percentage

4.3.2 Abdominal fat percentage

4.3.3 Giblets weights (Liver, Heart and Gizzard)

4.3 Biochemical parameters

4.3.1 Meat cholesterol

4.3.2 Serum cholesterol, LDL and HDL

4.1 Growth parameters

The average weekly body weight, feed consumption, feed conversion ratio and survivability percentage of Giriraja and Raja II broilers which were reared under intensive and semi-intensive system of rearing are presented in this chapter.

4.1.1 Weekly body weight

The results on mean body weight of Giriraja and Raja II broilers which were reared under intensive and semi-intensive system of rearing from day old to eighth weeks of age are presented in Tables 4.1 and analysis of variance is statistically presented in table 4.2 and graphically summarized in Figure 1.

At the end of first week of experimental period, the mean body weight of chicks in different treatment groups ranged from 106.11 g in T_3 (Giriraja semi-intensive system) to 125.50 g in T_2 (Raja II intensive system).The statistical analysis revealed that the body weight observed in T_2 Raja II birds reared under intensive system (125.50 g) was significantly ($P \leq 0.05$) higher when compared to treatment groups T_1, T_3 and T_4. Significant difference in body weight was also observed among treatment groups T_1, T_3 and T_4. During 1st week significant difference in body weight was observed between systems of rearing and also between Giriraja and Raja II birds.

At the end of second week of experimental period, the mean body weight of chicks in different treatment groups ranged from 231.46 g in T_3 (Giriraja semi-intensive system) to 269.93g T_2 (Raja II intensive system). The body weight observed in T_2 Raja II birds reared under intensive system (269.93 g) was significantly ($P \leq 0.05$) higher when

compared to treatment groups T_1 and T_3 and non-significant difference was observed when compared with T_4 (Raja II semi-intensive system). However, non-significant difference in cumulative mean body weight was noticed in between treatment groups T_1 and T_3. During 2nd week significant difference in body weight was observed between systems of rearing and also between Giriraja and Raja II birds.

At the end of third week of experimental period, mean body weight of chicks in different treatment groups ranged from 394.71 g in T_3 (Giriraja semi-intensive) to 492.65 g T_2 (Raja II intensive). The statistical analysis revealed that the body weight observed in T_2 Raja II birds reared under intensive system (492.65 g) was significantly ($P \leq 0.05$) higher when compared to treatment groups T_1 and T_3 and non-significant difference in body weight was observed when compared to treatment group T_4 (Raja II semi-intensive system). However, the Giriraja birds reared under intensive system (T_1) was recorded significantly higher body weight when compared to birds in the treatment group T_3 (Giriraja semi-intensive system). However, during 3rd week, significant difference in body weight was observed between systems of rearing and also between Giriraja and Raja II birds. However non-significant difference observed among Raja II birds irrespective of systems of rearing.

At the end of fourth week of experimental period, the mean body weight of birds in different treatment groups ranged from 616.40 g in T_3 (Giriraja semi-intensive system) to 844.99 g in T_2 (Raja II intensive system). The statistical analysis revealed that the body weight observed in T_2 Raja II birds reared under intensive system (844.99 g) was significantly ($P \leq 0.05$) higher when compared to treatment groups T_1, T_3 and T_4.

Significant difference in body weight was also observed among treatment groups T_1, T_3 and T_4. However, during 4th week significant difference in body weight was observed between systems of rearing and also between Giriraja and Raja II birds.

At the end of fifth week of experimental period, the mean body weight of birds in different treatment groups ranged from 892.88 g in T_3 (Giriraja semi-intensive system) to 1210.99 g in T_2 (Raja II intensive system). The statistical analysis revealed that the body weight observed in T_2 Raja II birds reared under intensive system (1210.99 g) was significantly ($P \leq 0.05$) higher when compared to treatment groups T_1, T_3 and T_4. Significant difference in body weight was also observed among treatment groups T_1, T_3 and T_4. However, during 5th week significant difference in body weight was observed between systems of rearing and also between Giriraja and Raja II birds.

At the end of sixth week, mean body weight of birds in different treatment groups ranged from 1183.61 g in T_3 (Giriraja semi-intensive system) to 1600.91 g in T_2 (Raja II intensive system). The highest body weight observed in (T_2) Raja II birds reared under intensive system (1600.91g) was significantly ($P \leq 0.05$) higher when compared to treatment groups T_1, T_2 and T_4 and the body weight observed in T_4 (Raja II semi-intensive system) was significantly higher when compared to T_1 (Giriraja intensive system) and T_3 (Giriraja semi-intensive system). However, non-significant difference in mean body weight was observed in between treatment groups T_1 and T_3. During 6th week, significant difference in body weight was observed between systems of rearing. Whereas, Giriraja birds exhibited non-significant difference in body weight irrespective of systems of rearing and Raja II birds showed significant difference in body weight.

At the end of seventh week, mean body weight of birds in different treatment groups ranged from 1480.42 g in T_3 (Giriraja semi-intensive system) to 1982.49 g in T_2 (Raja II intensive system). The highest body weight observed in (T_2) Raja II birds reared under intensive system (1982.49 g) was significantly ($P \leq 0.05$) higher when compared to treatment groups T_1, T_2 and T_4 and the body weight observed in T_4 (Raja II semi-intensive system) was significantly higher when compared to T_1 (Giriraja intensive system) and T_3 (Giriraja semi-intensive system). Whereas, non-significant difference in body weight was observed in between treatment groups T_1 and T_3. During 7^{th} week, significant difference in body weight was observed between systems of rearing. However, Giriraja birds exhibited non-significant difference in body weight irrespective of systems of rearing and Raja II birds showed significant difference in body weight.

At the end of eight week, mean body weight of birds in different treatment groups ranged from 1766.53 g in T_3 (Giriraja semi-intensive system) to 2306.30 g in T_2 (Raja II intensive system). The highest body weight observed in (T_2) Raja II birds reared under intensive system (2306.30 g) was significantly ($P \leq 0.05$) higher when compared to treatment groups T_1, T_3 and T_4. The body weight observed in T_4 (Raja II semi-intensive system) was significantly higher when compared to T_1 (Giriraja intensive system) and T_3 (Giriraja semi-intensive system). Whereas, non-significant difference in body weight was observed in between treatment groups T_1 and T_3. During 8^{th} week, significant difference in body weight was observed between systems of rearing. However, Giriraja birds exhibited non-significant difference in body weight irrespective of systems of rearing and Raja II birds showed significant difference in body weight.

Table 4.1: Weekly Body weight (g/b/) (Mean ± SE) of Giriraja and Raja II birds under intensive and semi-intensive systems of rearing

Treatment	Mean ± SE I wk (g)	Mean ± SE II wk (g)	Mean ± SE III wk (g)	Mean ± SE IV wk (g)	Mean ± SE V wk (g)	Mean ± SE VI wk (g)	Mean ± SE VII wk (g)	Mean ± SE VIII wk (g)
T1-Intensive (Giriraja)	112.70±1.12^{b}	238.50±2.38^{a}	429.39±4.45^{b}	652.16±6.78^{b}	931.34±9.40^{b}	1231.16±15.30^{a}	1530.05±19.34^{a}	1530.05±19.34^{a}
T2-Intensive (Raja II)	125.50±1.45^{d}	269.93±2.68^{b}	492.65±6.04^{c}	844.99±10.22^{d}	1210.99±14.86^{d}	1600.91±20.05^{c}	1982.49±26.02^{c}	2306.30±31.15^{c}
T3-Semi-intensive (Giriraja)	106.11±0.98^{a}	231.46±2.17^{a}	394.71±4.21^{a}	616.40±8.64^{a}	892.88±9.75^{a}	1183.61±13.34^{a}	1480.42±17.67^{a}	1766.53±19.51^{a}
T4-Semi-intensive (Raja II)	120.73±1.17^{c}	262.91±3.93^{b}	492.33±8.71^{c}	776.04±8.96^{c}	1121.34±14.65^{c}	1466.80±19.33^{b}	1834.48±21.57^{b}	2143.58±16.73^{b}

Means bearing at least one common superscript column wise differ significantly (P≤0.05)

Table 4.2: ANOVA of Weekly body weight of Giriraja and Raja II birds under intensive and semi-intensive systems of rearing

Weeks	Source of variation	DF	MS	F Value
week 1	Treatments	3	2997.43	16.985
	Error	589	176.47	
week 2	Treatments	3	3740.82	4.440
	Error	584	842.54	
week 3	Treatments	3	43698.31	19.486
	Error	582	2242.51	
week 4	Treatments	3	27643.22	4.978
	Error	582	5553.56	
week 5	Treatments	3	173334.90	16.101
	Error	581	10765.67	
week 6	Treatments	3	303590.10	16.084
	Error	579	18874.96	
week 7	Treatments	3	5568.31	0.177
	Error	579	31523.75	
week 8	Treatments	3	23716.06	0.577
	Error	579	41071.64	

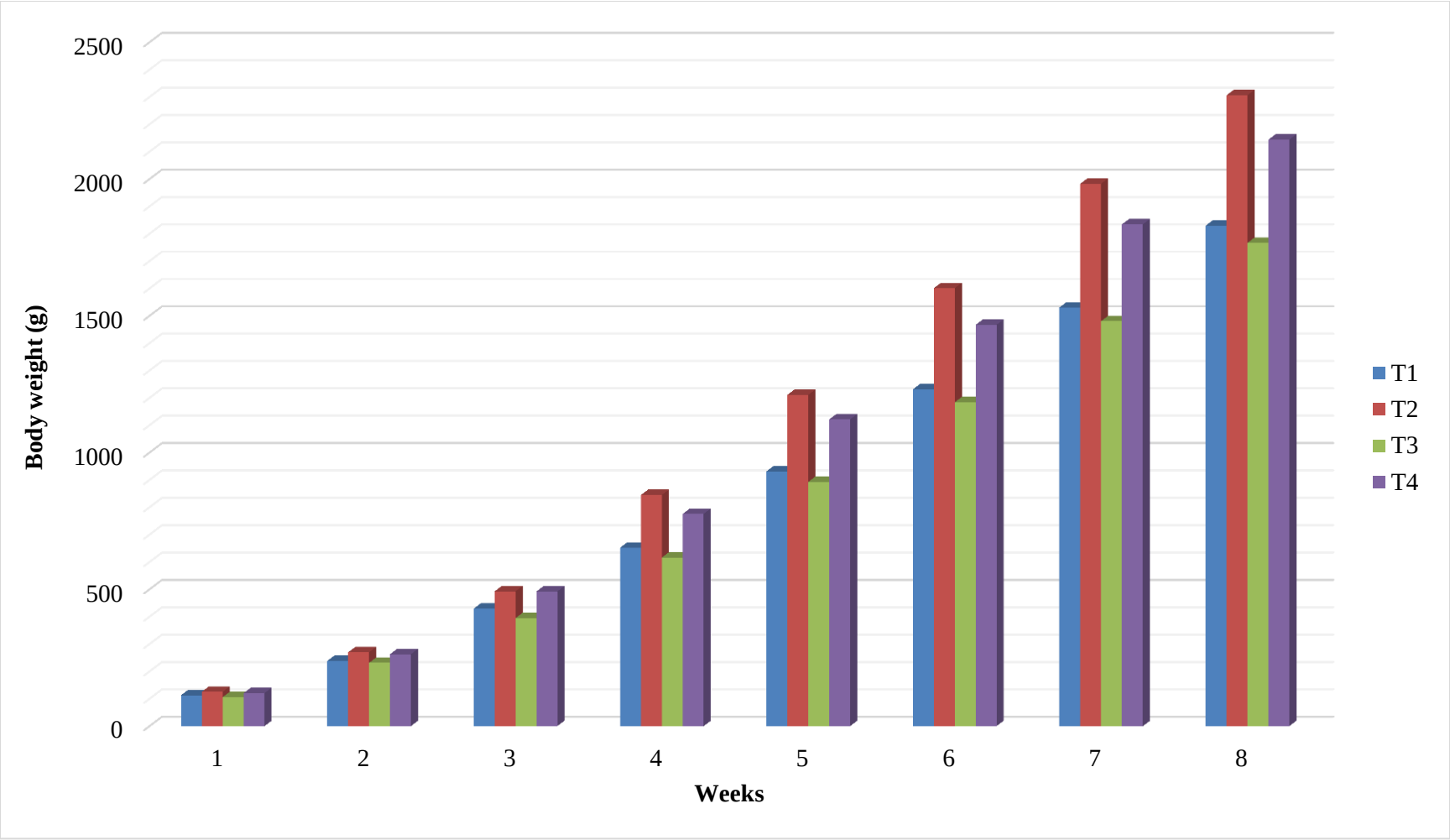

Figure 4.1: Weekly cumulative body weight (g/b/wk) of Giriraja and Raja II birds under intensive and semi-intensive system of rearing

The statistical analysis of data revealed that the intensive and semi-intensive system of rearing exhibited significant ($P \leq 0.05$) difference in body weight of Giriraja and Raja II birds during the experimental period.

4.1.2 Weekly cumulative feed consumption

The results on weekly and cumulative mean feed consumption as influenced by two different rearing systems (intensive and semi-intensive system) on Giriraja and Raja II birds from day old to eight week of age are presented in tables 4.3 and 4.4. Analysis of variance is presented in table 4.5.

At the end of first week, the cumulative mean feed consumption per bird among various treatment groups ranged from 80 g in T_3 (Giriraja semi-intensive system) to 91 g in treatment group T_2 (Raja II intensive system). The feed consumption observed under intensive system and semi-intensive system for Raja II and Giriraja birds was non-significant.

At the end of second week, the cumulative mean feed consumption per bird among various treatment groups ranged from 258.51g in T_1 (Giriraja intensive system) to 304.40 g in treatment group T_2 (Raja II intensive system). The feed consumption observed under intensive system and semi-intensive system for Raja II and Giriraja birds was non-significant.

At the end of third week of age the cumulative mean feed consumption per bird ranged from 545.02 g in T_1 (Giriraja intensive system) to 671.72 g treatment group T_2

(Raja II intensive system). The feed consumption observed under intensive system and semi-intensive system for Raja II and Giriraja birds was non-significant.

At the end of fourth week, the cumulative mean feed consumption per bird among various treatment groups ranged from 933.92 g in T_1 (Giriraja intensive system) group to 1218.12 gin treatment groupT_2 (Raja II intensive system). The feed consumption observed under intensive system and semi-intensive system for Raja II and Giriraja birds was non-significant.

At the end of fifth week, the cumulative mean feed consumption per bird among various treatment groups ranged from 1601 g in T_1 (Giriraja intensive system) group to 1970.62 g in treatment group T_2 (Raja II intensive system). The feed consumption observed under intensive system and semi-intensive system for Raja II and Giriraja birds was non-significant.

At the end of sixth week, the cumulative mean feed consumption per bird among various treatment groups ranged from 2366.25 g in T_1 (Giriraja intensive system) group to 2865.13 g in treatment group T_2 (Raja II intensive system). The feed consumption observed under intensive system and semi-intensive system for Raja II and Giriraja birds was non-significant.

At the end of seventh week of age, the cumulative feed consumption per bird ranged from 3150.46 g T_1 (Giriraja intensive system) to 3778.58 g T_2 (Raja II intensive system). The feed consumption observed under intensive system and semi-intensive system for Raja II and Giriraja birds was non-significant.

Table 4.3: Weekly cumulative feed consumption (g/bird/ wk) of Giriraja and Raja II birds under intensive and semi-intensive systems of rearing

Week	Treatments			
	T1- Intensive (Giriraja)	**T2-Intensive (Raja II)**	**T3- Semi-intensive (Giriraja)**	**T4- Semi-intensive (Raja II)**
I	86.20	91.00	80.00	89.00
II	258.51	304.40	268.50	302.70
III	545.02	671.72	554.12	664.87
IV	933.92	1218.22	940.82	1132.09
V	1601.72	1970.62	1609.72	1884.22
VI	2366.25	2865.13	2375.14	2751.74
VII	3150.46	3778.58	3158.38	3639.06
VIII	3951.91	4701.70	3956.68	4551.49

Table 4.4: Weekly mean feed consumption (Kg/treatment/wk) of Giriraja and Raja II birds under intensive and semi-intensive systems of rearing

Week	Treatments			
	T1- Intensive (Giriraja)	T2-Intensive (Raja II)	T3- Semi-intensive (Giriraja)	T4- Semi-intensive (Raja II)
I	08.62	09.10	08.00	08.90
II	17.231	21.34	18.85	21.37
III	28.651	36.732	28.562	36.217
IV	38.89	54.65	38.67	46.722
V	66.78	54.65	66.89	75.213
VI	76.453	89.451	76.542	75.213
VII	78.421	91.345	78.324	88.732
VIII	80.145	92.312	79.83	91.243
Overall Mean ± SE	49.39±14.71[a]	56.19±16.32[a]	49.45±14.64[a]	55.45±15.74[a]

Note : Values with same superscript in the row does not vary statistically

Table 4.5: ANOVA of weekly mean feed consumption of Giriraja Raja II birds under intensive and semi-intensive systems of rearing

Source of Variation	DF	Sum-of-squares	Mean square	F
Treatments	3	735400	245100	12.07
Weeks	7	66740000	9535000	469.5
Error	21	426500	20310	

At the end of eighth week of age the cumulative feed consumption per bird ranged from 3951.91 g T_1 (Giriraja intensive system) to 4701.70 g T_2 (Raja II intensive system). The feed consumption observed under intensive system and semi-intensive system for Raja II and Giriraja birds was non-significant.

The statistical analysis revealed non-significant ($P>0.05$) differences in overall weekly feed consumption among various treatment groups reared under intensive and semi-intensive system during the experimental period.

4.1.3 Feed conversion ratio

The results on weekly cumulative mean value of feed conversion ratio (FCR) as influenced by two different rearing systems (intensive and semi-intensive system) on Giriraja and Raja II broilers from day old to eight week of age are presented in table 4.5 and analysis of variance is presented in table 4.6.

At the end of first week of age, the cumulative mean values of FCR ranged from 0.73 in treatment group T_2 (Raja II intensive system) to 0.76 in treatment group T_1 (Giriraja intensive system). However, there was no significant difference in FCR among systems of rearing and also between Giriraja and Raja II birds.

The feed conversion ratio values at the end of second week of age, ranged from 1.08 in treatment group T_1 (Giriraja intensive system) to 1.16 in T_3 (Giriraja semi-intensive system). However, there was no significant difference in FCR among systems of rearing and also between Giriraja and Raja II birds.

At the end of third week of age, the cumulative FCR ranged from 1.27 in treatment group T_1 (Giriraja intensive system) to 1.40 in T_3 (Giriraja semi-intensive system). However, there was no significant difference in FCR among systems of rearing and also between Giriraja and Raja II birds.

The cumulative FCR values at end of fourth week of age, ranged from 1.43 treatment group T_1 (Giriraja intensive system) to 1.53 in treatment group T_3 (Giriraja semi-intensive system). However, there was no significant difference in FCR among systems of rearing and also between Giriraja and Raja II birds.

At the end of fifth week of age, the cumulative FCR ranged from 1.63 in T_2 (Raja II intensive system) to 1.80 in T_3 (Giriraja semi-intensive system). However, there was no significant difference in FCR among systems of rearing and also between Giriraja and Raja II birds.

At the end of sixth week of age, the mean values of FCR was ranged from 1.79 in treatment group T_2 (Raja II intensive system) to 2.01 in treatment group T_3 (Giriraja semi-intensive). However, there was no significant difference in FCR among systems of rearing and also between Giriraja and Raja II birds.

At the end of seventh week of age, the mean value of FCR ranged from 1.91 in treatment group T_2 (Raja II intensive system) to 2.13 in treatment group T_3 (Giriraja semi-intensive system). However, there was no significant difference in FCR among systems of rearing and also between Giriraja and Raja II birds.

Table 4.6: Weekly cumulative feed conversion ratio of Giriraja and Raja II birds under intensive and semi-intensive systems of rearing

Week	Treatments			
	T1- Intensive (Giriraja)	T2-Intensive (Raja II)	T3- Semi-intensive (Giriraja)	T4- Semi-intensive (Raja II)
I	0.76	0.73	0.75	0.74
II	1.08	1.13	1.16	1.15
III	1.27	1.36	1.40	1.35
IV	1.43	1.44	1.53	1.46
V	1.72	1.63	1.80	1.68
VI	1.92	1.79	2.01	1.88
VII	2.06	1.91	2.13	1.98
VIII	2.16	2.04	2.24	2.12
Overall Mean ± SE	1.55±0.176[a]	1.50±0.153[a]	1.63±0.182[a]	1.55±0.164[a]

Note : Values with same superscript in the row does not vary statistically

Table 4.7: ANOVA of weekly cumulative feed conversion ratio of Giriraja and Raja II birds under intensive and semi-intensive systems of rearing

Source of Variation	DF	Sum-of-squares	MS	F
Treatments	3	0.06	0.02	10.18
Weeks	7	6.35	0.90	433.6
Error	21	0.04	0.00	

At the end of eighth week of age, the mean value of FCR ranged from 2.04 in treatment group T_2 (Raja II intensive system) to 2.24 in treatment group T_3 (Giriraja semi-intensive). However, there was no significant difference in FCR among systems of rearing and also between Giriraja and Raja II birds.

The statistical analysis revealed non-significant ($P>0.05$) differences in overall cumulative FCR values among various treatment groups during the experimental period.

4.1.4 Survivability

Pattern of percentage survivability of birds under different treatments during 56 days of experimental period is presented in Tables 4.8.

During the experimental period, the survivability percentage ranged from 96% in the Raja II birds reared under semi-intensive system (T_4) to 98% in Giriraja birds reared under intensive system (T_1) and semi-intensive system (T_3).

4.2 Carcass characteristics

4.2.1 Dressing percentage

The results of carcass characteristics of Giriraja and Raja II broiler birds under intensive and semi-intensive system of rearing on dressing percentage are presented in Table 4.9 and analysis of variance is presented in table 4.10 and graphically represented in Figure 4.2

At the end of eighth week, dressing percentage of various treatment groups ranged from 70.18% in T_3 (Giriraja semi-intensive system) to 73.29% in T_2 (Raja II

Table 4.8: Survivability percentage of Giriraja and Raja II birds under intensive and semi-intensive system of rearing

Treatments	System of rearing	Survivability Percentage
T1	Intensive system (Giriraja)	98
T2	Intensive system (Raja II)	97
T3	Semi-intensive system (Giriraja)	98
T4	Semi-intensive system (Raja II)	96

Table 4.9: Dressing percentage of Giriraja (Mean ± SE) and Raja II birds based on live body weight under intensive and semi-intensive systems of rearing

Treatments	System of rearing	Dressing percentage
T1	Intensive system (Giriraja)	71.40 ± 0.69^{ab}
T2	Intensive system (Raja II)	73.29 ± 1.09^{b}
T3	Semi-intensive system (Giriraja)	70.18 ± 0.46^{a}
T4	Semi-intensive system (Raja II)	71.51 ± 1.10^{ab}

Mean bearing at least one common superscript column wise differ significantly (P≥0.05)

Table 4.10: ANOVA of Dressing percentage of Giriraja and Raja II birds based on live body weight under intensive and semi-intensive systems of rearing

Carcass characteristics	Source of variation	DF	MS	F Value
Dressing percentage	Treatments	3	16.48	2.11
	Error	36	7.78	

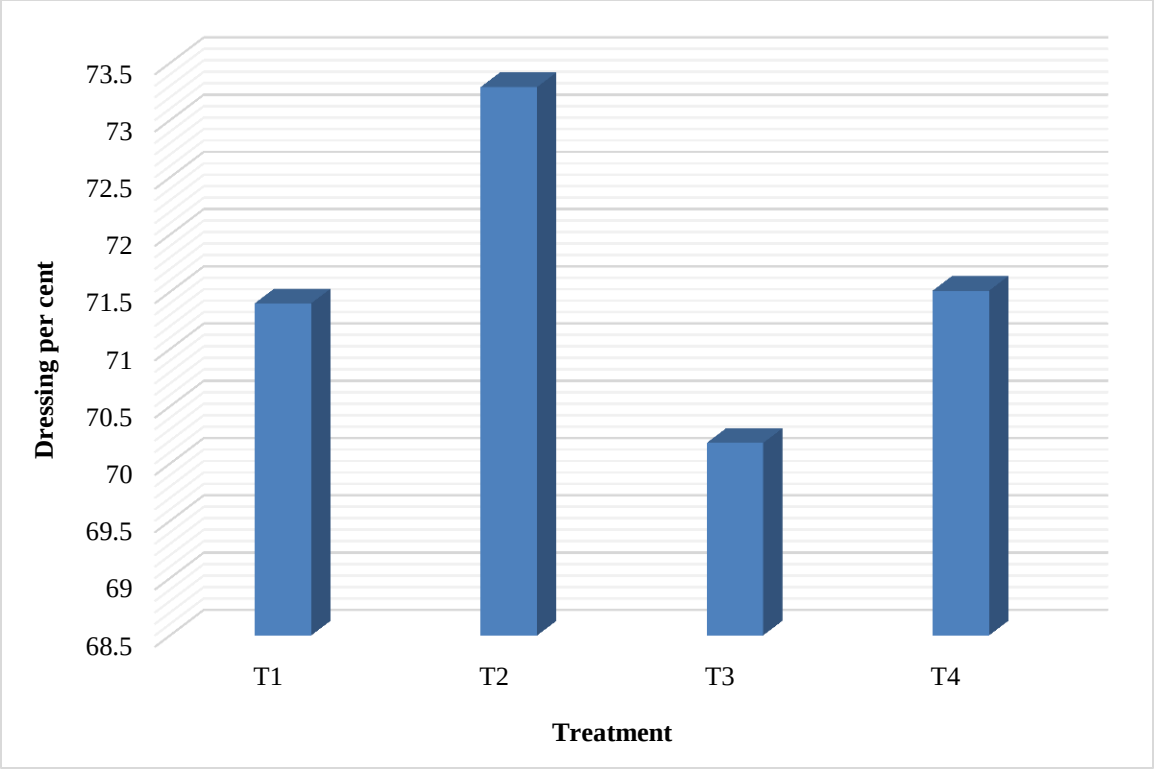

Figure 4.2: Dressing percentage of Giriraja and Raja II birds expressed based on live body weight under intensive and semi-intensive system of rearing

intensive system). The dressing percentage observed in Raja II birds reared under intensive system (T_2) was significantly ($P \leq 0.05$) higher when compared to dressing percentage observed in treatment groups T_1, T_3 and T_4 and non-significant difference in dressing percentage was observed among various treatment groups T_1, T_3 and T_4. However, dressing percentage recorded in Giriraja and Raja II birds was non-significant between two systems of rearing.

4.2.2 Abdominal fat percentage

The results on abdominal fat percentage of Giriraja and Raja II broiler birds reared under intensive and semi-intensive system are presented in Tables 4.11 and Analysis of variance is presented in table 4.12.

Among various treatment groups, the abdominal fat percentage ranged from 1.52% in T_1 (Giriraja intensive system) to 1.84% in T_3 (Giriraja semi-intensive system). However, between systems of rearing and Giriraja and Raja II birds did not show significant difference in abdominal fat percentage.

4.3.1 Giblets weight

The results on mean percentage of organ weights of liver without gall bladder, heart without pericardium and gizzard without inner membrane of the Giriraja and Raja II birds under intensive and semi-intensive system of rearing are presented in tables 4.13 and analysis of variance is presented in table 4.14.

Table 4.11: Abdominal fat percentage (Mean ± SE) of Giriraja and Raja II birds under intensive and semi-intensive system of rearing

Treatment	System of rearing	Abdominal fat percentage
T1	Intensive system (Giriraja)	1.52±0.12
T2	Intensive system (Raja II)	1.62±0.13
T3	Semi-intensive system (Giriraja)	1.84±0.19
T4	Semi-intensive system (Raja II)	1.66±0.20

Table 4.12: ANOVA of abdominal fat percentage of Giriraja Raja II birds under intensive and semi-intensive systems of rearing

Carcass characteristics	Source of variation	DF	MS	F Value
Abdominal Fat Percentage	Treatments	3	0.78	0.63
	Error	36	0.28	

Table 4.13: Giblets weight percentage (Mean ± SE) of Giriraja and Raja II birds expressed based on live body weight under intensive and semi-intensive systems of rearing

Treatment	System of rearing	Giblets Weight (%)		
		Heart	Liver	Gizzard
T1	Intensive system (Giriraja)	2.04±0.20	0.53±0.02	2.64±0.09
T2	Intensive system (Raja II)	2.03±0.20	0.52±0.02	2.66±0.10
T3	Semi-intensive system (Giriraja)	2.11±0.21	0.54±0.10	2.58±0.08
T4	Semi-intensive system (Raja II)	1.99±0.39	0.47±0.02	2.55±0.10

Table 4.14: ANOVA of giblet weight percent of Giriraja and Raja II birds under intensive and semi-intensive systems of rearing

Giblets	Source of variation	DF	MS	F Value
Heart	Treatments	3	0.02	0.36
	Error	36	0.07	
Liver	Treatments	3	0.01	1.30
	Error	36	0.00	
Gizzard	Treatments	3	0.30	3.21
	Error	36	0.09	

4.2.3.1 Liver

Among various treatment groups, the mean percentage weight of liver based on live weight ranged from 1.99% in treatment group T_4 (Raja II semi-intensive) to 2.11% in T_3 (Giriraja semi-intensive). The statistical analysis revealed non-significant difference in mean percentage weight of liver in between various treatment groups.

4.2.3.2 Heart

Among various treatment groups, the mean percentage weight of heart based on live weight ranged from 0.54% in treatment group T_3 (Giriraja semi-intensive) to 0.47% in T_4 (Raja II semi-intensive). The statistical analysis revealed that the non-significance ($P>0.05$) difference in mean percentage weight of heart in between various treatment groups.

4.2.3.3 Gizzard

The relative percentage weight of gizzard based on live weight ranged from 2.55% in Raja II birds reared under semi-intensive system (T_4) to 2.66% in Raja II birds reared under intensive system (T_2). However the statistical analysis revealed that the non-significant difference in mean percentage of Gizzard weight in between various treatment groups.

4.3 Biochemical parameters

4.3.1 Meat cholesterol

The mean values of Meat cholesterol of Giriraja and Raja II broilers reared under intensive and semi-intensive system are presented in table 4.15 and analysis of variance is presented in table 4.16.

Table 4.15: Meat cholesterol (mg/100g) (Mean ± SE) of Giriraja and Raja II birds under intensive and semi-intensive systems of rearing

Treatment	System of rearing	Meat cholesterol mg/100g
T1	Intensive system (Giriraja)	52.78±0.93
T2	Intensive system (Raja II)	52.98±0.85
T3	Semi-intensive system (Giriraja)	51.08±0.51
T4	Semi-intensive system (Raja II)	51.88±0.42

Table 4.16: ANOVA of meat cholesterol of Giriraja and Raja II birds under intensive and semi-intensive systems of rearing

Parameter	Source of variation	DF	MS	F Value
Meat cholesterol	Treatments	3	7.66	1.5
	Error	36	5.11	

Among various treatment groups, the mean value of meat cholesterol ranged from 51.08 mg/100g in T_3 (Giriraja semi-intensive system) to 52.98 mg/100g in T_2 (Raja II intensive system). Statistical analysis revealed non-significant difference in meat cholesterol between systems of rearing and also between Giriraja and Raja II birds.

4.3.2 Serum cholesterol

The mean values on total cholesterol, LDL and HDL cholesterol of Giriraja and Raja II broilers reared under intensive and semi-intensive system are presented in table 4.17 and analysis of variance is statistically presented in table 4.18.

4.3.2.1 Total cholesterol

The mean value of total cholesterol ranged from 130.10 mg/dl in T_1 (Giriraja intensive system) to 132.10 mg/dl in T_2 (Raja II birds intensive system). Non-significant difference in mean value of total cholesterol was noticed between systems of rearing and also between Giriraja and Raja II birds.

4.3.2.2 Low density lipoproteins (LDL) cholesterol

The mean value of total LDL ranged from 70.03 mg/dl in T_3 (Giriraja semi-intensive system) to 71.30 mg/dl in T_2 (Raja II birds intensive system). Non-significant difference in mean value of LDL cholesterol was noticed between systems of rearing and also between Giriraja and Raja II birds.

Table 4.17: Serum cholesterol (mg/dl) (Mean ± SE) of Giriraja and Raja II in different treatment groups under intensive and semi-intensive systems of rearing

Treatment	System of rearing	Serum cholesterol mg/dl		
		Total cholesterol	LDL	HDL
T1	Intensive system (Giriraja)	130.10±1.71	70.50±0.42	35.27±0.91
T2	Intensive system (Raja II)	132.10±1.83	71.30±0.30	34.39±0.37
T3	Semi-intensive system (Giriraja)	130.50±0.54	70.03±0.40	34.87±0.25
T4	Semi-intensive system (Raja II)	130.80±0.32	70.10±0.52	35.43±0.20

Table 4.18: ANOVA of serum cholesterol of Giriraja and Raja II birds under intensive and semi-intensive systems of rearing

Serum cholesterol	Source of variation	DF	MS	F Value
Total cholesterol	Treatments	3	7.492	0.447
	Error	36	16.775	
LDL	Treatments	3	3.399	1.912
	Error	36	1.777	
HDL	Treatments	3	2.155	0.795
	Error	36	2.711	

4.3.2.3 High density lipoproteins (HDL) cholesterol

The mean value of total HDL ranged from 34.39 mg/dl in T_2 (Raja II birds intensive system) to 35.43 mg/dl in T_4 (Raja II birds semi-intensive system). Non-significant difference in mean value of HDL was noticed between systems of rearing and also between Giriraja and Raja II birds.

Discussion

V. DISCUSSION

The results of the experiment conducted to evaluate the comparative performance of Giriraja and Raja II birds under intensive and semi-intensive systems of rearing on growth performance, carcass characteristics and biochemical parameters are presented and discussed in this chapter under the following headings.

5.1 Growth performance

5.1.1 Body weight

5.1.2 Feed consumption

5.1.3 Feed conversion ratio

5.2 Carcass characteristics

5.2.1 Dressing percentage

5.2.2 Abdominal fat percentage

5.2.3 Giblets weight

5.3 Survivability

5.4 Biochemical parameters

5.4.1 Broiler meat cholesterol

5.4.2 Serum cholesterol, LDL and HDL

5.1 Growth parameters

5.1.1 Weekly cumulative body weight

In the present study, the Giriraja and Raja II birds which were reared under intensive and semi-intensive system of rearing exhibited significantly different cumulative mean body weight among system of rearing and between Giriraja and Raja II during the experimental period.

During all the weeks of experimental period except 3rd week, treatment group T_2 (Raja II intensive system) showed significantly higher body weight when compared to other treatment groups. However, Giriraja birds also showed significant higher body weight in intensive system of rearing compared to semi-intensive system of rearing. This trend of higher body weight among Giriraja birds under intensive system of rearing observed up to 5th week of experiment except 2nd week and 5th week onwards Giriraja birds did not show significant difference. This clearly indicates that Giriraja birds were generally suitable to rear as semi-intensive system of rearing in matching the body weight of body weight of intensive system of rearing.

However, Raja II birds in intensive system exhibited highest body weight among Raja II birds in intensive system of rearing during all the weeks of experimental period except 2nd and 3rd weeks. This trend clearly indicate that Raja II birds were perform better under intensive system of rearing compared to semi-intensive system of rearing

The results of the present study are in agreement with the findings of the following researchers who reported higher body weight in intensive system of rearing.

Doley *et al.* (2009) conducted a study to determine the productive and reproductive traits in Indigenous chickens of North-Eastern region of India under extensive, semi-intensive and intensive systems of rearing and recorded that there was significantly higher body weight under intensive system than semi-intensive and extensive system at all stages of growth.

Wang *et al.* (2009) studied the effect of a free range raising system on growth performance of Gushi chicken and found that the body weight of chicken in intensive system was significantly greater than those of free range system ($P \leq 0.05$).

Kalio *et al*. (2012) investigated the performance of broiler chickens under the intensive and semi- intensive systems of poultry production and they concluded that intensive systems showed superior growth performances as compared to those managed in the semi-intensive system.

Mosbood *et al.* (2012) carried out a study to determine the performance and carcass characteristics of broiler chickens under two managemental system viz, intensive (total confinement) and semi intensive and concluded that birds under intensive management performed better in terms of total weight gain.

Sanka and Mbaga (2014) studied on rearing of Tanzanian local chicken under intensive and semi-intensive systems and observed that the weight gain of chickens in the semi-intensive system was significantly ($P<0.05$) lower than in the intensive system.

The higher body weight of birds kept in full confinement could be attributed towards higher feed intake, lack of exercise, genetic variation of strain and also managemental practices.

The results of the present study are not in accordance with the findings of the following researchers who reported lesser body weight which may be attributed towards genetic variation of strain and also managemental practices.

Kalita *et al.* (2009) estimated the different productive and reproductive performance of Indigenous chicken in three Districts of Assam under rural conditions comprising non tribal and tribal communities and recorded non-significant difference in body weights of indigenous chicken of different communities and districts at various ages.

Haunshi and Doley (2011) studied the growth performance of Mizo-local chicken under intensive system of rearing and observed that non-significant difference observed in between the male and female birds for body weight recorded from day old to 8^{th} weeks of age.

Joanna Kuzniacka *et al* (2014) conducted experiment to compare the results of broilers kept under intensive and semi-intensive systems and concluded that system of rearing exhibited non-significant difference in bodyweight in broiler chickens at the end of rearing.

5.1.2 Feed consumption

The effect of intensive and semi-intensive system of rearing on mean feed consumption in Giriraja and Raja II birds from day one to eighth weeks of age was non-significant among various treatment groups.

The results of the present study are in agreement with the findings of following researchers. Sunder *et al*. (2005) recorded feed consumption of 2.7, 2.64 and 2.84 Kg, respectively in white, black and brown varieties of Nicobari fowl of Andaman maintained under intensive system and found non- significant difference among the various groups.

Halima *et al*. (2006) documented the mean feed intake at the end of their growing phase (eight weeks) under intensive system of rearing for the seven identified native chicken ecotypes of Ethiopia namely Tilili, Gellilia, Debre-Ellias, Mello-Hamusit, Gassay, Guangua and Mecha as 13.80, 15.16, 13.44, 13.25, 13.81, 13.36, and 12.83 Kg, respectively and non-significant ($p<0.05$) differences was observed among the tested chicken lines for total feed consumption.

The results of the present study are in contrary with the findings of following researchers. Kalio *et al* (2012) conducted a study to investigate the performance of broiler chickens under intensive and semi- intensive systems of poultry production and found that feed intake of birds managed under the intensive and semi-intensive systems was significantly ($P< 0.05$) different.

Higher feed consumption may be attributed towards genetic variation of strain and environmental temperature. Since the experiment was conducted during winter

season where birds eat more feed the calories obtained from this feed might be used to maintaine normal body temperature.

5.1.3 Feed conversion ratio

The effect of intensive and semi-intensive system of rearing on FCR of Giriraja and Raja II birds from day one to eight weeks of age revealed non-significant difference in mean FCR values among various treatment groups when compared between various treatments groups during the experimental period.

The current results are in contrary with the findings of following researchers. Lima & Naas (2005) proved that significant differences in the feed conversion ratio 2.98 vs 1.97 between chickens housed with free range and without access to the free-range respectively.

Dou *et al*. (2009) carried out a research on slowly-growing Gusbi chickens housing them under two systems. Favourable feed conversion ratio of 3.95 compared to 4.41 was confirmed in chickens housed under intensive system.

Mosbood *et al.* (2012) concluded the birds under intensive management performed better in terms of feed efficiency.

The experiment was conducted during winter season birds will eat more feed but many of the calories they obtain from this feed might be used to sustain normal body temperature and are not converted to build up body tissues. Thus, it might have affected the feed conversion ratio.

5.3 Survivability

The results of the present study showed non-significant difference in survivability percentage in Giriraja and Raja II birds reared under intensive and semi-intensive system of rearing.

The results of the present study are in agreement with the findings of the following researchers. Kalita *et al.* (2011a) noted that mortality rates for birds in the intensive and semi-intensive groups were 3.3% and 5.0% respectively and non-significant difference was noticed between the groups and it was within the ideal mortality rates (5%) recommended for a well-managed flock by (Oluyemi and Roberts 2000).

Gonmei (2012) who observed that the mortality per cent recorded for indigenous and Vanaraja were 5.1 and 5.6%, respectively during 0-5 weeks and no significant difference was observed among the groups.

In the present study results are in contrary with the findings of the following researchers. Kugonza *et al.* (2008) reported that survival of chickens was significantly affected ($P<0.001$) by feeding level and strongly correlated ($r = 0.83$) with the housing system.

Oruseibio (2002) recorded slightly higher mortality rates for the semi-intensively managed birds which may be attributed towards bad management or hygienic conditions, bad housing conditions and poor feeding.

5.2 Carcass characteristics

5.2.1 Dressing percentage

The effect of rearing under intensive and semi-intensive system on dressing percentage of Giriraja and Raja II broilers slaughtered at eight weeks of age, revealed significant difference ($P \leq 0.05$) in mean values among various treatment groups.

The results of the present study showed that the dressing percentage recorded (73.29%) in treatment T_2 (Raja II Intensive system) was significantly higher when compared to all other treatment groups. This may be attributed towards better growth rate, good feed intake, lack of exercise and type of management.

The results of the present study are in agreement with the findings of following researchers. Doley (2006) found the overall mean dressing yield under intensive (68.13 ± 0.31) was significantly higher than those under semi-intensive (66.62 ± 0.19) in Frizzle Feathered fowl of North-East Region of India.

Skomorucha *et al*. (2008) determined a higher proportional dressing percentage in 42-day-old cobb broilers housed without access to free-range.

Adokiye *et al*. (2012) observed that broilers reared under intensive system possessed a higher body weight and this trend reflected in the dressing percentage as well as the primal parts or cut up parts of the birds.

Kalio *et al*. (2012) reported that broilers managed under the intensive system possessed a higher body weight and this trend reflected in the dressing percentage as well as the primal parts or cuts of the birds.

The results of the present study are in contrary with the findings of following researchers. Wang *et al.* (2009) reported that there was no effect of the free-range raising system on eviscerated carcass, breast, thigh, and wing yield (P>0.05) of indigenous chicken and concluded that the free-range raising system could significantly reduce growth performance**,** abdominal fat, and tibia strength but had no effect on carcass traits and meat quality in slow-growing chicken**s.**

Gonmei (2012) studied the performance of indigenous chicken and Vanaraja in deep litter system of rearing and non-significant difference was recorded for dressing yield and eviscerated yield.

5.2.2 Abdominal Fat Percentage

The results on abdominal fat percentage revealed non-significant difference in abdominal fat percentage among various treatment groups of Giriraja and Raja II birds reared under intensive and semi-intensive systems of rearing.

The findings of the present study are in agreement with the findings of following researchers. Adokiye *et al*. (2012) observed that broilers reared under intensive system had no significant effect on abdominal fat weight and abdominal fat percentage when compared to semi-intensive system.

The results of the present study are not in accordance with the findings of following researchers. Dou *et al.* (2009) noted significantly higher abdominal fat deposition (6.5%) in those housed under intensive system of rearing when compared with abdominal fat deposition in free-range broilers (3.0%).

Joanna Kuzniacka *et al.*(2014) compared the results of broilers kept under intensive and semi-intensive systems and found that chicken fed with complete feed which were kept under intensive system were distinguished by higher fattiness expressed as an abdominal fat weight.

The higher abdominal fat percentage could be attributed towards lack of exercise and heavy body weight.

5.2.3 Giblets weight

Liver, Heart and Gizzard

The results of the present study indicated that among various treatment groups of Giriraja and Raja II birds reared under intensive and semi-intensive systems of rearing exhibited non-significant effect on giblets weight (liver, heart and gizzard).

The findings of the present study are in agreement with the findings of following researchers. Yhome and Sapcota (2011) observed non-significant difference in giblets weight between the traits of desi chickens of Kohima and Dimapur Districts of Nagaland.

The results of the present study are in disagreement with the findings of following researchers. Doley (2006) observed significantly higher overall giblet yield under extensive (7.05 ± 0.07) than under intensive (6.74 ± 0.08) rearing system.

Iqbal *et al*. (2009) studied carcass traits of indigenous chicken of Kashmir and recorded per cent yield of gizzard, liver, heart which was significantly higher ($P < 0.05$) in broilers reared under intensive system when compared to indigenous chickens of Kashmir.

Kalio *et al*. (2011a) observed the broilers managed under the semi-intensive system possessed superior internal organs on account of the exposure of the birds to varying environmental condition and feeds they utilized as they scavenge.

Higher percentage of giblets weight may be attributed towards genetic variation of strain and environmental temperature. Birds managed under semi-intensive system possessed superior internal organs on account of the exposure of the birds to varying environmental condition and feeds they utilized as they scavenge.

5.4 Biochemical parameters

5.4.1 Meat cholesterol

The results of the present study showed non-significant difference in meat cholesterol of Giriraja and Raja II birds reared under intensive and semi-intensive system of rearing.

The results of the present study are in agreement with the findings of following researchers. Givens *et al.* (2011) reported that there was no evidence that meat from free range chickens had a fatty acid profile that would be classified as healthier than that from intensively reared birds.

The results of present study are in contrary with the findings of following researchers. Doley (2006) found the rearing system had significantly higher meat fat under intensive than those under semi-intensive and extensive systems of rearing.

Pavlovski *et al*. (2013) found that free ranged naked neck chickens have been shown to have significant different fatty acid composition compared with broiler chickens reared in conventional system.

The higher meat cholesterol could be attributed towards lack of exercise and heavy body weight.

5.4.2 Serum total cholesterol, LDL and HDL cholesterol

The results of the present study showed non-significant difference in serum total cholesterol, LDL and HDL cholesterol in Giriraja and Raja II birds reared under intensive and semi-intensive systems of rearing.

There are no available reports on effect of intensive and semi-intensive system of rearing on serum cholesterol.

Summary

VI. SUMMARY

The Experiment on "Comparative evaluation of Giriraja and Raja II birds under intensive and semi-intensive systems of rearing" was conducted at the Department of Poultry Science, Veterinary College, Hebbal, Bengaluru 24. A total of four hundred Giriraja and Raja II chicks were randomly selected and the experiment was conducted for 56 days duration with four treatments of 100 birds in each. The birds were reared under intensive system in T_1 (Giriraja) and T_2 (Raja II) and semi-intensive system T_3 (Giriraja)and T_4 (Raja II). The birds in semi-intensive system were allowed outside for 2 hours in the protected range i.e. 1 hour in the morning and 1 hour in the evening. The diet prepared as per BIS (2007) specifications was fed to all the four treatment groups.

The salient findings of the study are as follows:

The results of the present study showed that there was significant difference in body weight of the birds reared under intensive and semi-intensive system of rearing. However, during later period of experimental period Giriraja birds showed non-significant difference in body weight irrespective of system of rearing compared to Raja II birds.

The body weight in treatment group T_2 (Raja II intensive system) was significantly higher when compared to T_2, T_3 and T_4 groups. Whereas significantly lower body weight was observed in T_3 (Giriraja semi-intensive) group during the experimental period when compared to other treatments.

The results of the present study showed no significant difference on weekly mean feed consumption of the birds reared under intensive and semi-intensive system of rearing.

The results of the present study recorded non-significant difference on mean survivability percentage of the birds reared under intensive and semi-intensive systems of rearing. The recorded survivability percentage in treatment groups T_1, T_2, T_3 and T_4 from week one to eight weeks of age was 98, 97, 98 and 96, respectively.

The results of the present study observed non-significant difference on mean dressing percentage of the birds reared under intensive and semi-intensive system of rearing. The recorded dressing percentage in T_1, T_2, T_3 and T_4 was 71.40, 73.29, 70.18 and 71.51, respectively.

The results of the present study showed non-significant difference on mean abdominal fat percentage of the birds reared under intensive and semi-intensive system of rearing. Abdominal fat percentage recorded in treatment groups T_1, T_2, T_3 and T_4 was 1.52, 1.62, 1.84 and 1.66, respectively.

The results of the present study showed non-significant difference on mean percentage of giblets weight of the birds reared under intensive and semi-intensive systems of rearing.

The results of the present study showed non-significant difference on mean value of meat cholesterol of the birds reared under intensive and semi-intensive systems of

rearing. Meat cholesterol observed in treatment groups T_1, T_2, T_3 and T_4 was 52.78 mg/100 g, 52.98 mg/100 g, 51.08 mg/100 g and 51.88 mg/100 g, respectively.

The results of the present study showed non-significant difference on mean values of serum cholesterol, LDL and HDL cholesterol of the birds reared under intensive and semi-intensive systems of rearing during the experimental period.

CONCLUSION

From results of the present study, the following conclusions can be drawn.

The intensive and semi-intensive rearing system had significant difference on body weight and dressing percentage of the Giriraja and Raja II birds during the experimental period.

Raja II birds reared under intensive system of rearing recorded highest body weight and dressing percentage when compared to Giriraja birds reared under intensive and semi-intensive system and also Raja II birds reared under semi-intensive system.

Raja II birds perform better under intensive system of rearing compared to semi-intensive system of rearing with respect to body weight, whereas Giriraja birds perform better under both the system of rearing which indicate that Giriraja birds are more suitable for semi-intensive system compared to Raja II birds.

The intensive and semi-intensive system of rearing had non-significant effect on feed intake, FCR, survivability percentage, abdominal fat percentage, giblets weight, meat and serum cholesterol of the Giriraja and Raja II birds during the experimental period.

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Abstract

VIII. ABSTRACT

The study was conducted to determine the effect of two management systems (Intensive and Semi-intensive systems) on the growth performance, carcass characteristics and biochemical parameters of Giriraja and Raja II birds. A total of 400 Giriraja and Raja II chicks were randomly selected and the experiment was conducted for 56 days duration with four treatment groups of 100 birds each. The birds were reared under intensive system for T_1 (Giriraja) and T_2 (Raja II) and in semi-intensive system for T_3 (Giriraja) and T_4 (Raja II). Experimental diets as per BIS (2007) specifications were fed to all the four treatment groups. Data was collected on mean body weight, feed consumption, feed conversion ratio and survivability percentage. At the end of 8 weeks, the birds were slaughtered and dressing percentage, abdominal fat percentage and giblet weight percentage were recorded. Results showed that different rearing systems (intensive and semi-intensive system) had no significant effect on feed intake, feed conversion ratio, survivability percentage, abdominal fat percentage, giblets weight and meat and serum cholesterol during the experimental period. There was significant difference in body weight and dressing percentage among birds of various treatment groups. Body weight of T_2 higher than T_1, T_3 and T_4.

Key words: Giriraja, Raja II, Intensive, Semi-intensive.