IMPACT OF REARING GIRIRAJA CHICKEN UNDER BACKYARD SYSTEM IN HASSAN DISTRICT

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CERTIFICATE

This is to certify that the thesis entitled ***"Impact of rearing Giriraja chicken under backyard system in Hassan District".*** submitted by **Mr. RAKESH, K., I.D. No. MVHK 1215/1615** in partial fulfillment 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 of the award of any degree, diploma, associateship, fellowship or other similar titles.

Date: July, 2018 **Dr. T. MUNEGOWDA**
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Affectionately Dedicated to

My Family, Friends

and

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Bengaluru
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Introduction

I. INTRODUCTION

In the recent years, the livestock sector has become one of the fastest growing segment in Indian agriculture, and within livestock sector, the poultry husbandry has occupied a pivotal position both in providing employment as well as in contributing a substantial proportion to the national GDP. About 20.5 million people depend upon livestock for their livelihood. Livestock contributed 16% to the income of small farm households as against an average of 14% for all rural households. Livestock provides livelihood to two-third of rural community. It also provides employment to about 8.8 % of the population in India. Livestock sector contributes 4.11% GDP and 25.6% of total agriculture GDP. Poultry development in the country has taken a quantum leap in the last three decades. The development owes to various factors which include growth in income and urbanization, progresses in processing technology and improvements along the marketing chain. Though India has shown a tremendous growth in poultry production over decades, rural poultry farming is still lagging behind and always found neglected. In developing countries, backyard poultry represent ~80% of poultry stock, often consisting of indigenous unselected breeds of various ages, with various species mixed in the same flock still today, Present poultry industry gives more emphasis on supplying meat and egg products majorly to urban, peri urban areas. So, the poultry products are still costly in rural areas (10-40%), hence people in villages gives more scope on backyard poultry rearing, to meet their necessities.

Mandal *et al* (2006) described nicely while giving a definition to backyard poultry production system. According to him it is a low input or no input business which is

characterized by indigenous night shelter system, scavenging system, with little supplementary feeding, natural hatching of chicks, poor productivity of birds, local marketing and no health care practice. Backyard poultry serves to meet household food demands and is an additional source of income.

In this type of farming, birds are kept in low-input and low- output system and can easily be managed by women and children of the households. Now-a-days as there is growing concern about meeting of per capita requirement of protein for rural citizens of India, poultry meat and especially eggs have been proved to be the best and cheapest solution to this. Protein deficiency is a common phenomenon in the diets of rural people as their diets are predominantly based on cereals rich in energy and low in protein. Through backyard poultry farming, the high incidence of protein hunger in the rural populations especially in pregnant as well as nursing women and growing kids can be minimized.

The eggs and meat of birds reared in the backyard farming with characteristic flavor and taste fetches premium price due to high consumer preference even in the urban sectors where plenty of eggs and poultry meat from commercial units are available. Native chicken eggs have more Vitamin A, Vitamin E, Omega-3, Beta Carotene and less saturated fat the list of goodness goes on. Feeding of the backyard poultry is made easy by using household wastes, farm products and green vegetation; besides scavenging waste grains and insects free ranging also allows birds to forage for foliage and insects and provides enrichment. They also produce a very effective fertilizer. Their droppings can be treated and used in farms to speed plants' growth.

Having realized its potential a long term integrated research programmes were initiated at several ICAR research centers including state Veterinary and Agricultural universities to develop suitable germplasm for backyard/ free range farming. At present, many multicolored germplasm *viz.*, Giriraja and Swarnadhara (Veterinary College, Bengaluru), Vanaraja and Gramapriya (Project Directorate on Poultry, Hyderabad), Gramalakshmi and Gramashree (Agricultural University, Kerala), Nandanam chicken-1 (Tamil Nadu Veterinary and Animal Sciences University, Chennai), etc., suitable for backyard farming have been developed in India. "GIRIRAJA" being the first in the series was developed in the Department of Poultry Science, Veterinary College, Bengaluru under UAS (B) and released during 1989. The studies on the status of farmers and different aspects of Giriraja birds by farmers at field level in Karnataka state, not been carried out systematically.

In view of the above facts, the present study was undertaken with the following objectives:

1. To evaluate the socio-economic contribution of Giriraja chicken in rural areas.
2. To identify the constraints and priorities of Giriraja chicken production for household nutritional security.
3. To study the profile characteristics of farmers and gender issues in rural areas.

Review of Literature

II. REVIEW OF LITERATURE

A comprehensive review of literature is an integral part of any investigation, as it not only gives an idea on the work done in the past but also provides a basis for interpretation and discussion of the findings. So an attempt has been made to review the available literature having direct or indirect relation on the present study. The available related reviews are presented under the following sub heads.

2.1 Profile characteristics of farmers.

2.2 Adoption behavior of farmers.

2.3 Type of farming and housing of backyard poultry.

2.4 Feeding of backyard poultry.

2.5 Management of backyard poultry.

2.6 Disease control and prevention.

2.7 Marketing of backyard poultry.

2.8 Gender involvement in backyard poultry activities.

2.9 Contribution of backyard poultry towards household development.

2.10 Information sources.

2.11 Backyard poultry genetic resources.

2.1 Profile characteristics of farmers

2.1.1 Age

Prakash *et al*. (2000) reported that most of the backyard poultry farmers in Meghalaya were middle aged.

Kannadhasan (2004) reported that majority of the backyard poultry farmers in Tamil Nadu were middle to old aged.

Nanjesh (2010) reported that majority of the backyard poultry farmers in Karnataka were middle aged.

2.1.2 Education

Bhurtel (1996) reported that majority of the rural poultry farmers were illiterates.

Lasoda *et al*. (1997) concluded in their study that the level of education of majority of backyard poultry farmers was predominantly of primary and secondary level and up to 16 per cent were reported to be illiterate.

Prakash *et al.* (2000) reported in their study that most of the backyard poultry farmers (61.66 per cent) were illiterate.

2.1.3 Flock size of backyard poultry

Rangnekar and Rangnekar (1996) carried out a study in three western states of India, *viz.*, Maharashtra, Gujarat and Rajasthan and concluded that the number of birds reared under backyard ranged from 4 to 25 and majority of rural families kept 4 to 10 birds.

Lasoda *et al*. (1997) revealed that the number of birds possessed by backyard farmers ranged from 1 to 110, with the largest frequency found within the value of 1 to 10 birds.

Kalitha *et al.* (2000) observed that on an average, the flock size was four among backyard livestock farmers in Gujjars of Jammu region.

Panda and Nanda (2000) stated that the average backyard poultry maintained was 10.27 birds per family. The percentage of male, female and chicks were 14.74, 41.90 and 43.35, respectively.

Rai *et al.* (2000) found that the average flock holding per family in South Andaman was 16 birds.

Mandal *et al.* (2002) revealed that the flock size ranged between 2 to 10 birds per tribal family in West Bengal state including cocks, hens and chicks.

Rajini and Narahari (2002) conducted a study at five randomly selected villages of Salem and Namakkal districts of Tamil Nadu and found that the average number of chicks per family was 8.1.

Sapcota and Sharma (2002) observed that small flocks of 10 to 15 desi chicken were found in most household villages in Assam

2.1.4 Occupational status

Bhurtel (1996) found that the occupation of the rural poultry farmers was agriculture. The farmers have been traditionally raising chicken for various purposes like religious, family consumption and for sale.

Rajini and Vasanthkumar (2004) in their study on practices adopted by family poultry farmers observed that family poultry was a secondary occupation for 75 per cent of the farmers.

2.1.5 Motivation behind backyard poultry farming.

Bhurtel (1996) found that the purposes of raising backyard poultry were for food, sale, food and religion and combination of all. The responses for the stated purpose were zero; five, ninety and five per cent, respectively in mid hill areas and 20, 10, 13 and 53 per cent, respectively in plains.

Kumtakar (1999a) reported that in tribal backyard poultry system in Jabalpur district of Madhya Pradesh over 76 per cent of the respondents perceived backyard poultry as a source of good income, 75 per cent of them expressed that the birds were used for consumption during festivals and on special occasions, while nine per cent opined that bird rearing was a hobby and two per cent reared birds for traditional rituals and sacrifices.

Kumtakar (1999b) reported that in tribal area of Jabalpur district of Madhya Pradesh, the reasons identified for backyard poultry rearing were for supplementary income (45.57 %), consumption during festival times and special occasions (44.90%), hobby (95.40%) and rituals / sacrifices (1.20%).

Mandal *et al*. (2002) conducted study at tribal villages of West Bengal state and found that majority (70%) of poultry farmers used their birds for cock fighting as a cultural hobby. They sacrificed coloured cocks and pullets to please the „Vanadevata

(Forest Goddess) and sometimes they had also offered eggs and live birds to their relatives or guests as gifts.

Conroy *et al.* (2004) conducted study at Peruganur village of Trichy district and Udaipur villages of Rajasthan and concluded that rural poultry keepers expressed their main reason for keeping poultry was to generate income and also for home consumption. The other most frequently cited reason was to provide meat for guests. Birds were also raised for ritual sacrifice.

The overall findings from the above review indicated that, majority of the respondents among backyard poultry farmers were women who come under middle-aged category and were illiterates. They maintain a flock size of around 10 birds, practicing agricultural farming as the main occupation. The backyard poultry was utilized for generating supplementary income as well as home consumption.

2.1.6 Type of family

Semmeran (2007) observed that majority of the families of the backyard poultry farmers were nuclear.

2.1.7 Experience in rearing Giriraja chicken

Semmeran (2007) reported that 95 per cent of the farmers were experienced in rearing Giriraja in Karnataka.

2.2 Adoption behavior of farmers

2.2.1 Knowledge level of the backyard poultry farmers

Knowledge level of backyard poultry farmers on backyard poultry farming practices will be a determinant of its adoption. Hence, it is necessary to review the studies on knowledge level of backyard poultry farmers.

Kumtakar (1999b) revealed that the tribal backyard poultry farmers in Jabalpur district of Madhya Pradesh were aware of and had knowledge of few identified common diseases. The rural households (66%) attribute major causes of mortality due to outbreak of diseases like Kata (Ranikhet/ New Castle disease) Fafundi (fungus leading to toxicity) by four per cent and 30 per cent were unable to identify the diseases.

Kannadhasan (2004) reported that majority of the respondents possessed very high knowledge level on backyard poultry farming practices.

Rajini and Vasanthakumar (2004) reported in their study that 90 per cent of family poultry farmers knew about Newcastle disease vaccination.

2.2.2 Level of adoption of backyard poultry farming practices

Kannadhasan (2004) reported that all the respondents belonged to medium to high level of adoption category. Practice-wise adoption of recommended type of farming,housing, feeding, management, disease control and prevention and marketing practices by respondents were found to be high and ranged between 70 to 100 per cent except the scientific practices namely, providing mineral supplement, adopting scientific

breeding, providing calcium supplement and artificial light to laying hens, testing fertile eggs and adopting deworming as per schedule.

Semmeran (2007) who found majority of farmers in Karnataka were in the category of medium level with respect to scientific practices recommended for rearing Giriraja birds.

2.2.3 Reasons for adoption

Semmeran *et al*. (2008) reported that attractive plumage color as the first reason for adoption of Giriraja birds.

2.3 Type of farming and housing of backyard poultry

2.3.1 Type of farming

Four management sub-systems in poultry production have been described by Bessei (1990) and Sonaiya (1990). They are the free range system or traditional village system or the backyard (family or subsistence) system, the semi-intensive system and the intensive husbandry system. According to Gueye (1998), the two first types are the most commonly practiced systems in rural Africa. There is no doubt that adoption of one or more management sub-system(s) is largely determined by the availability of resources and inputs i.e. housing, cages, feed, drugs and time. Also these management sub-system(s) supplementation, backyard with night confinement but without feeding; standard poultry cages in confined space, etc. In many developing countries, poultry production is based mainly on traditional extensive poultry production systems (Aini,

1990; Spradbrow, 1994; Branckaert, 1996; Kitalyi, 1996; Gueye, 1998; Sonaiya *et al*., 1998).

Sonaiya *et al*. (1998) reported that these low input/low output husbandry systems have been a traditional component of small farms for centuries and are assumed to continue for the foreseeable future in the developing world.

Branckaert and Gueye (1999) estimated that 80 per cent of the poultry population was found in traditional family-based poultry production systems, which contribute up to 90 per cent of poultry products in some countries. Approximately 20 per cent of the protein consumed in developing countries originates from poultry (i.e. meat and eggs). Backyard poultry is an integrated component of nearly all rural, many peri-urban and some urban households. It provides valuable protein and generates extra cash. All ethnic groups tend to be involved in backyard poultry production.

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.

2.3.2 Housing

2.3.2.1 No housing

Housing in backyard poultry is at a rudimentary stage and field surveys have shown cases where no housing or shelter was provided (Huchzermeyer, 1973; Kuit *et al.*, 1986; Atunbi and Sonaiya, 1994; Yongolo, 1996).

2.3.2.2 Housing practices for backyard poultry in Asia and Africa

Housing practices for backyard poultry in Asia and Africa were reported to be influenced by the prevailing farming system, with major differences between the pastoral farming systems and the agro-pastoral or sedentary systems (Kuit *et al.*,1985). Research on the economic efficiency of housing in rural poultry is scanty. However, published reports suggest that where housing was provided to backyard chickens, the houses were made with locally available materials such as wood, mud bricks, sugarcane stems bamboo and cereal stovers (Atunbi and Sonaiya, 1994; Yongolo, 1996).

Dessei and Ogle (2001) conducted study in three 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.

2.3.2.3 Housing practices for backyard poultry in India

Lasoda *et al.* (1997) reported that the location for the breeding and maintenance of backyard poultry included the yard with 34%, the poultry house with 26% and both with 36%.

Kumtakar (1999b) observed in his study conducted in tribal areas of Jabalpur district of Madhya Pradesh that 62 per cent respondents reared chicks under cane baskets,

14 per cent inside wall openings and 17 per cent reared under mud houses. Remaining 7 per cent had not taken special measures for housing.

Prakash *et al.* (2000) reported in their study conducted at three hills of Meghalaya that about 85 per cent of respondents did not provide proper housing for their birds.

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.

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

2.4 Feeding of backyard poultry

Musharaf (1990) reviewed literature on feed resources for small-scale poultry production, included data on tropical crops such as cassava (Manihot utilissima), plantain (Musa sapientum) and yam (Dioscorea rotundata) meals as unconventional energy feed resources. The review also included information on protein sources that were not used conventionally in commercial poultry feeding: palm kernel meal, cashew nut meal and African locust bean seed and pulp.

Roberts and Gunaratne (1992) observed that productivity of village chickens is determined by the relationship between the biomass of the chicken population and the scavenging feed resource base.

Ravindran and Blair (1993) provided description of novel energy and protein resources for scavenging chickens.

Reddy and Quadratullah (1996) in their discussion on strategic feed supplementation through locally available resources provided production and qualitative characteristics of unconventional feeds.

Lasoda *et al*. (1997) observed that the system of feeding adult birds maintained a regional domestic link by making use of restaurant wastes (26%), maize (24%), wheat grains (20%) and alfalfa (11%). The feed for the young birds included commercial concentrates, waste breads, vegetables, wheat and rice.

Kumtakar (1999b) observed in his study conducted at tribal area of Jabalpur district of Madhya Pradesh that 82 per cent of the respondents feed their birds with broken grains but the feeding pattern was very ad-hoc. There was no separate feeding for chicks and adults and the remaining 18 per cent of them fed their birds with leftover food made at the house.

Huque (1999) inferred in his study about scavenging poultry in Bangladesh that the feeds scavenged were deficient in nutrients and birds need to be provided with adequate nutrition for expected production.

Prakash *et al*. (2000) reported in their study conducted at three hills of Meghalaya that 60 per cent of the respondents did not provide any additional feed to their birds.

Rai *et al*. (2000) found in their study that among 80 backyard poultry farmers of South Andaman, 43 farmers provided (20 to 25g/bird/day) rice or wheat, while 15 provided only kitchen waste and fed tender coconut (available in the surroundings). However, 22 farmers did not offer any feed regularly and birds managed their requirements by scavenging. There was no significant difference among these three groups in terms of egg production.

Dessie and Ogle (2001) reported that there was no regular provision of clean water for native birds, although in some households the mother hen and her chicks were provided with water in broken clay pots until they started to forage by themselves. The resource base for the village flock was scavenged material from their surrounding, leftover food and small amounts of grain provided by the housewife.

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.

Sharma *et al.* (2002) stated that strategic supplementation of cereals both in the morning and evening would be desirable to sustain optimum production in free-range poultry farming.

Huque and Paul (2003) developed a strategy based on their study on family poultry production that availability of clean water needs to be ensured since intake of feed and consumption of water are highly related.

2.5 Management of backyard poultry

Cumming (1992) stated that the solution to predation in scavenging environment would be to provide a secure creep fence and area of confinement for chicks during day and night housing.

Bhurtel (1996) found in her study that majority (52 %) of the respondents had set 8 to 10 eggs for incubation under one broody hen.

Barua and Yoshimura (1997) in a study on rural poultry keeping reported that eggs were naturally incubated by broody hens, which were provided with wooden boxes of bamboo baskets and straw bedding mater

Lasoda *et al*. (1997) opined that majority of the backyard poultry farmers took advantage of natural incubation and claimed an average of two incubations per year or more. The number of eggs hatched ranged between 7 and 11.

Kumtakar (1999b) observed in a study conducted at tribal area of Jabalpur district of Madhya Pradesh that most of the respondents preferred to hatch eggs under a brooding hen and to raise the chicks to adults rather than selling them as chicks.

Dessie and Ogle (2001) found that village poultry keepers used clay pots called dibignet, cortoons, bamboo baskets or even simply a depression in the ground for setting

eggs. The bedding materials used in all such systems of setting was a crop residue, usually wheat straw. The families incubated most of their eggs in order to replace the birds from their flock that had been sold or consumed or those that had died.

Mandal *et al*. (2002) found in their study conducted at tribal villages of West Bengal that the main source of chicks for backyard poultry farming was from natural incubation by broody hens.

Sharma *et al*. (2002) stated that strategic supplementation of limestone (3 to 4g/adult bird/day) was desirable to sustain optimum.

2.6 Disease control and prevention

2.6.1 Studies in India

Pandey (1993) reported that the development of backyard poultry health programmes requires reliable information on the epidemiology of diseases, which was lacking in backyard chicken production systems. Disease surveillance was further limited by poor infrastructure and communication, as well as inadequate diagnostic facilities.

Prakash *et al.* (2000) reported in their study conducted at hills of Meghalaya that none of the respondents practiced any disease management practices

Rai *et al.* (2000) found that all the 80 selected backyard poultry farmers except eight of South Andaman did not give any medication or vaccination. Deworming once or twice and injecting antibiotics during sickness were practiced by those eight farmers.

Jalaludeen (2002) reported that the rural poultry birds were dewormed at six weeks of age and gave protective vaccinations against Ranikhet disease at seven weeks of age and thereafter, deworming was done at bi-monthly intervals.

Mandal *et al*. (2002) in a study conducted at tribal village of West Bengal state reported that none of the respondents practiced any disease management practices.

Rajini and Vasanthakumar (2004) observed from their study on family poultry conducted at Salem and Namakkal districts of Tamil Nadu that 75 per cent of family poultry farmers vaccinated their birds.

Pathak and Nath. (2013) in their study suggested that the birds should be vaccinated against ND and Fowl pox.

2.6.2 Studies in other countries

Olabode *et al*. (1992) reported that the major factors associated with the transmission of ND in backyard chickens were exposure to natural environment, including wild fauna; flocks of various ages and susceptible new hatches and contact through either exchange of live chickens and products or movement between households and villages.

A study on ectoparasites of domestic fowls in Nigeria by Zaria *et al.* (1993) revealed that the lice, Menacanthus straminen, were the major problem in rural backyard poultry. In this Nigerian study, the external parasite problem was associated with season-higher rates of infestation occurred during the rainy season.

Research work in other African countries such as Benin (Chrysostome *et al.*, 1995), Burkina Faso (Bourzat and Saunders, 1990), Mauritania (Bell *et al*., 1990) and the United Republic of Tanzania (Yongolo, 1996) supports the argument that ND was the most devastating disease of backyard chickens.

Mengesha *et al.* (2011) observed from their study conducted at Jamma district of Ethiopia that most frequently occurring was ND.

2.7 Marketing of backyard poultry

Kumtakar (1999a) in study on tribal backyard poultry system in Jabalpur district of Madhya Pradesh found that 91 per cent of the respondents had no problem in procuring or selling birds in their village itself. As far as the sales go, 83 per cent indicated that the avenues were within the village and 17 per cent sold to others.

Kumtakar (1999b) reported that 83 per cent of tribal poultry keepers sold poultry produce in the same village while 17 per cent sold their produces to nearby villages.

Prakash *et al*. (2000) concluded in their study conducted at three districts from Khasi, Jaintia and Garo hills of Meghalaya that local marketing system was available for all the respondents of backyard poultry.

2.8 Gender involvement in backyard poultry farming activities.

Women were mainly responsible for backyard poultry along with the existing homestead activities. Keeping this fact in view, review on past studies had been made to understand their contribution and importance in backyard poultry farming.

Paul *et al*. (1990) reported that participation of women in physical work related to village poultry production was about 66 per cent while in decision making and execution it was about 51 per cent in rural Bangladesh.

Bhurtel (1996) found that majority of the housewives were managing the backyard poultry. About 66 per cent of the caretakers of the chickens were women, 10 per cent were women and children, 15 per cent were husbands and wives and 9 per centwere combination of all in midhill areas, while in plains it was 82, 3, 3 and 12 per cent respectively.

Desai (1996) reported that successful rural poultry projects involving women led to increased production and empowering of women though provision of training and credit

Lasoda *et al.* (1997) concluded that the management of backyard poultry was largely the responsibility of women and children. It represented only a secondary activity for men.

Rai *et al.* (2000) opined that out of 80 backyard poultry farmers in South Andaman, 67 were found to be women. They further concluded that there was no difference in egg production whether managed by men or women.

Dessie and Ogle (2001) observed that in all the three villages of Ethiopia, it was mostly the women that owned and managed the birds and controlled the cash from sales, followed by school boys and girls.

Mandal *et al*. (2002) found in their study conducted at tribal areas of West Bengal state that the housewives or children released the birds early in the morning for scavenging. The housewives cleaned the poultry house daily as routine work. Housewives took care of the broody hens by providing resting place, food and water till they hatched.

Sharma *et al*. (2002) reported in a survey conducted by UNICEF sponsored programme that rural women were better adapted to delicate handling of chicks, their management and they were also better conversant with income generation than their male counterpart.

Kannadasan (2004) reported that majority of the backyard poultry farming activities were found to be carried out by women. An overwhelming majority of women contributed in feeding, watering, housing, laying and brooding management, egg collection, environmental hygiene, decision making and execution.

Mengesha *et al.* (2008) observed in their study conducted at Jamma district of Ehiopia that overall caretaking of chicken, feeding, treating sick birds, decision for off take of poultry products were the responsibility of women.

2.9 Contribution of backyard poultry towards household development

Backyard poultry provides nutritional and economic contribution towards household development. Hence it was mandatory to review the past studies to know its importance among resource poor rural folk.

2.9.1 Nutritional contribution

Rangnekar and Rangnekar (1996) concluded in their study carried out in two districts in each of the three western states of India *viz*., Maharastra, Gujarat and Rajasthan that more than 60 per cent of the families reported that egg selling was not the main objective and that a good number of eggs were consumed in the family specially for the children and sick persons. In majority of the families, the interest was in sale of birds for meat. Hatching the eggs and selling of chicks were reported as a major source of income for about 35 per cent families.

Rai *et al*. (2000) found in their study conducted at South Andaman that the cost of production of egg in backyard varied from 10 to 25 paise against rupees 1.70 to 1.90 in intensive systems. The sale of surplus eggs from backyard poultry farming was made on a monthly basis to the nearest shop at rupees 2.00 to 2.25 against the market price of rupees 2.50 to 3.00 and about 30 to 50 per cent of production obtained from backyard poultry was consumed by the South Andaman rural families.

Rajini and Vasanth Kumar (2004) observed in their study on family poultry farming conducted near a commercial poultry pocket that 60 per cent of the eggs produced by family poultry were consumed by the family

Pathak and Nath. (2013) in their study concluded that the backyard poultry farming with improved birds provide a solution to food security to the needy villagers paving a way for sustainable agriculture in rural areas of India.

2.9.2 Economic contribution

2.9.2.1 Studies in India

Bhurtel (1996) found that women earned rupees 91.30 to 116.00 per bird through backyard poultry production. The cost of production per bird ranged from 7.43 to 12.92.

Kumtakar (1999b) reported in his study conducted at Jabalpur district of Madhya Pradesh that 67 per cent of backyard poultry farmers earned up to rupees 700 annually from backyard poultry. In comparison to the total earning, 50 per cent of the respondents indicated their earning as 0.1 to 4.9 per cent through backyard poultry to their total earnings. Only eight per cent respondents earned between 9 and 14.9 per cent to the total earnings.

Panda and Nanda (2000) stated from a survey conducted by the regional centre of Central Avian Research Institute, Bhubaneswar that many households habituated with backyard poultry confirmed that backyard poultry farmers usually earn much from a single desi hen as compared to one high yielding variety of birds.

Dessie and Ogle (2001) reported that farmers sold birds when they needed to meet a cash requirement for minor household expenditure.

Mandal *et al*. (2002) observed that the surplus birds and eggs as reported by all the backyard poultry farmers families in tribal area of West Bengal were sold in nearby villages and shops directly and sometimes to middlemen who came to the village for purchasing birds. The average selling price was rupees 2.00 to 2.25 per egg. The price of birds and eggs varied according to season and festivals. They reported that during

festivals (Holi, Makar Sankranti, Moharum etc.) both birds and eggs were sold at higher rates. All the families remarked that eggs and birds were easily sold and the demand was more than the production.

Rajini and Narahari (2002) found that net profit earned per annum from 100 indigenous or non-descript birds reared under free range system and 100 commercial layer under intensive system was rupees 14,329 and 10,419, respectively and stated keeping indigenous or non-descript birds in backyard area was more economical.

Sharma *et al.* (2002) in a study undertaken by the Uttar Pradesh Council of Agricultural Research for improving productivity of the small holder poultry production system in the unorganized sector opined that it was possible to increase profitability by two to three folds per bird.

Kannadhasan (2004) reported that the annual income generated per bird from backyard poultry including on-farm consumption it was rupees 91.81. Their percentage contribution to gross annual family income was found to be 0.32 and 0.26 per cent respectively. The review indicates that backyard poultry farming provides supplementary income with employment generation and providing egg and meat for household consumption.

2.9.2.2 Studies in countries other than India

Chale and Carloni (1982) reviewed the attributes of chicken meat and eggs in rural areas. Egg dishes and chicken meat cook faster than pulses and red meat, and therefore consumes less fuel wood. In the same survey they briefed about poultry projects

in Asia and Africa, the authors reveled that the significance of chickens as a assortment component in rural farming systems, particularly for women. Earnings obtained from the marketing of eggs in a women's project in Sudan was used to buy household consumable goods, thus increasing household welfare.

In United republic of Tanzania, a survey was conducted on 600 families in 20 villages, and survey reaveled that chickens were the only form of livestock found in most families (Collier *et al*., 1986).

Gittinger *et al*. (1987), conducted a study on food production by women and its impact on food security, found that agricultural families which solely depended on cultivation as their only source of food production had more food insecure than households that had livestock, including poultry. The benefit of backyard poultry in bettering household food security and increasing household welfare has been reported in other regions.

As per Bangladesh Bureau of Statistics (1980,1990,1995) poultry generated income for about 45 per cent and 40 per cent people in the rural and urban areas, respectively in Bangladesh.

The backyard poultry population in most Asian and African countries accounts for more than 30-60 per cent of the total national poultry population, which has been accorded an asset value of US$5750 million (Sonaiya,1990).

Village backyard chickens were more widely distributed in rural Asia and Africa than the other livestock species.

Surveys in some African countries had reported that the main function of village chickens from the farmer's perspective was the provision of meat and eggs for home consumption [South Africa (Cairns and Lea, 1990); Gambia (Andrews, 1990) .

The importance of organizational and capacity building in enhancing increased rural women's poultry production featured highly in the projects in Asia and Latin America. The recent developments in the importance of poultry in household food security, especially for the poorer members of the community, including increased distribution of resources through involvement of women, have been appreciated globally (FAO, 1995).

MacGregor and Abrams (1996) reported that Small poultry production units of 12 laying hens per unit have reported an increase in the consumption of animal protein and reduced incidence of malnutrition in resource-poor households of South Africa.

Reports on successful rural poultry projects involving women led to increased production and empowering of women through provision of training and credit were available from Thailand and Honduras (Bradley, 1996), as well as Bangladesh (Saleque and Mustafa, 1996).

Dessie and Ogle (2001) observed in their study that the main objectives of keeping poultry, as stated by the villagers of three villages at three different altitudes in the central highlands of Ethiopia, were for production of eggs for hatching, sale and home consumption and production of birds for sale, sacrifice (healing ceremonies), replacement and home consumption. Some farmers gave live birds and eggs as gifts and invited

special guests to take part in the popular dish doro wat, which contained both chicken meat and eggs and was considered to be one of the most exclusive national dishes.

The above review revels the international scenario and indicates that readily available information on backyard poultry is scanty. The backyard chickens are reared under wide range of management systems in Asia, Africa and other parts of the world.

2.10 Information sources

Bessei (1990) reported inaccessibility of information on backyard poultry production as a major constraint to development. FAO and other development agencies have increasingly promoted the development of rural poultry through expert consultation meetings, workshops and seminars. In 1989, the formation of the African Network for Rural Poultry Development (ANRPD) was proposed in an international workshop on rural poultry production in Africa at Ile-Ife, Nigeria and this proposal was endorsed in 1990 in a seminar on smallholder poultry production in Thessaloniki, Greece. The formation of the network, which has technical and financial backing from FAO, was a major milestone in rural poultry development in Asia and Africa. One of the main activities of ANRPD has been the production of a newsletter has a medium for dissemination of information and developments in rural poultry in Africa (ANRPD, 1995).

2.11 Backyard poultry genetic resources

According to Horst (1988), the genetic resource base of the indigenous chickens in the tropics was rich and should form the basis for genetic improvement and

diversification to produce a breed adapted to the tropics. There was little information on the genetic make-up of the indigenous chickens of Asia and Africa. However, information collated in the FAO Domestic Animal Diversity Information System (DADIS) shows that these genes were prevalent in the local populations across the Asian and African countries.

Bessei (1989) opined that continued crossbreeding programmes in rural poultry, which do not consider gene preservation aspects, would lead to erosion of the indigenous germplasm. There was a major global thrust on genetic preservation and biodiversity of rural poultry varieties which was reflected in efforts on development of genome and data banks (National Research Council, 1993; Crawford and Gavora, 1993).

Barua and Yoshimura (1997) observed that the rural poultry farmers in Bangladesh did not often follow any systematic breeding programme and as a result close inbreeding occurred frequently among indigenous fowls.

Lasoda *et al.* (1997) revealed in their study that the criteria which determined the selection of birds for breeding (male and female) were the body structure, size of the bird and/or the live weight. These factors combindly represented 90 per cent of the determinant; the remaining factors were breed and colour.

Dessie and Ogle (2001) observed in their study conducted at different altitudes in central highlands of Ethiopia that the male-to–female ratio in the village poultry flocks was between 1.3 and 1.4 in most cases. Also some of the families kept additional double-combed male birds for breeding with special colours for cultural purposes.

Materials and Methods

III. MATERIALS AND METHODS

This chapter consists of five major parts, the first part deals the research design, the second part gives the sampling procedure, the third part describes with the variables and their empirical measurement, the fourth part explains the instruments and methods used for data collection and the fifth which is the final part covers the statistical procedures used for the analysis of data.

3.1 Research design

3.2 Sampling procedure

3.3 Variables and their empirical measurement

3.4 Instruments and methods used for data collection

3.5 Statistical tools used for analysis of the data

3.1 Research design

Ex-post-facto research design reinforced with case studies was used in the present investigation. Keeping in view the objectives of the study, type of variables, size of respondents and phenomenon to be studied, ex-post-facto research design was considered as an appropriate design to investigate the profile study, adoption behavior, household food security, economics and gender issues and constraints involved in rearing Giriraja chicken.

3.2 Sampling procedure

A simple random sampling procedure was used to select the farmers from the study area.

3.2.1 Location of the study

The study was conducted in the Karnataka state as it is one of the important agricultural state in the country with considerably high density of livestock population. It lies between 11 degree and 18 degree N latitude and 74 degree and 78 degree E longitude. According to the 2011 census of India, the total population of Karnataka was 6.11 crores and the density of population is 319/sq km. For every 1000 males, 964 females exist in the state. The literacy rate of the state was 75.60 per cent. The Karnataka state is bordered by Andhra Pradesh to its east, Tamil Nadu to its south-east, Kerala to its south-west, Lakshadweep sea and Goa to its west and Maharashtra to its north-west.

As per the 2007 livestock census, the state was having total livestock population of 3.29 crores and poultry population of 4.24 crores.

3.2.2 Selection of the district

The Hassan District of Karnataka was selected for the present study as this District is in close proximity to the Instructional livestock farm complex, Department Veterinary College, Hassan and the District Poultry rearing and training center is located at Hassan proper which is supplying five weeks old Giriraja birds regularly to the farmers. The location of the District in the state is illustrated in the Fig 3.2.

The location of the taluks in the district is shown in the Fig. 3.3. In each taluk, two villages were selected randomly.

Fig 3.1. Map showing location of Karnataka in India

Fig 3.2. Karnataka map with selected districts.

Fig 3.3. Hassan district map.

Table 3.1: Selection of backyard poultry farmers as respondents

Sl. No.	Taluk	Village	No of Respondents
1	**Hassan**	Jakkenahalli	10
		Kandli	10
2	**Holenarasipura**	Keragodu	10
		K Muddanahalli	10
3	**Chanarayapattana**	Nuggehalli	10
		Ramapura	10
4	**Arakalgud**	Ettapatna	10
		Somapura	10
5	**Arasikere**	Gandsi	10
		Haranahalli	10
Total	**5**	**10**	**100**

3.2.3 Selection of respondents

A total of 100 farmers were selected for the study from 10 villages with 10 farmers from each village randomly

3.3 Variables and their empirical measurement

The variables for the study were selected after a thorough review of available literature on the topic and in consultation with the experts (Table 3.2).

3.3.1 Operationalisation and measurement of variables

3.3.1.1 Age

It is one of the basic characteristics of an individual linked with maturity, physical wellbeing, work efficiency and level of productivity. Here, it refers to the actual chronological age of the respondent in completed years at the time of investigation. The respondents were grouped into three categories according to their age.

3.3.1.2 Education

It is operationalized as a person's ability to read, write and the formal education received by him/her. They were categorized as illiterate, primary, middle, high school and above high school education.

3.3.1.3 Gender

The respondents were categorized into men and women.

3.3.1.4 Family type

It refers to the type of family that the respondent was from, whether joint or nuclear type. Nuclear family refers to that family in which husband, wife and their children live together as one unit. Joint family refers to that group of persons in which two or more conjugal pairs with their children live together under one shed cook and eat together and the earnings from all the sources are pooled together and managed by the family head. In the present study, it was measured in terms of frequency and percentage.

Table 3.2: Selected variables and their empirical measurement

VARIABLES	MEASURMENT
Age	In completed years
Education	Schedule
Gender	Male/female
Experience in poultry rearing	In completed years
Family type and size	Schedule
Caste	Schedule
Type of house	Schedule
Land holding	Schedule
Main and Subsidiary occupation	Schedule
Flock size	Open ended
Managemental practices	Schedule
Source of chicks	Schedule
Marketing	Schedule
Adoption behavior	Schedule
Supplementary feeding	Schedule
Vaccination and treatment	Schedule
Low cost housing/night shelter	Schedule
Cleaning/disinfection of Shelter	Schedule
Chick production and recycling	Schedule
Performance indicators	Schedule
Economics of poultry production	Schedule
Income	Schedule
Cost: benefit ratio	Schedule
Nutrition and employment benefits	Schedule
Constraints	Schedule

3.3.1.5 Family size

It was operationalized as the total number of members residing together in one household and sharing a common kitchen.

3.3.1.6 Caste

It denotes the group status conferred upon a member of the society since time immemorial. Moreover, it refers to a well defined category, which was decided by the birth of an individual in a particular group. Caste of the respondent was recorded by questioning and further classified into three groups as: Scheduled Caste (SC), Scheduled Tribes (ST) and Other Backward Classes (OBC).

3.3.1.7 Type of house

It was operationalized as the kind of house the respondents had at the time of investigation i.e. Katcha, Mixed and Pucca.

3.3.1.8 Land holding

It refers to the area of land possessed by the respondents.

3.3.1.9 Main occupation

Occupation refers to ones usual or principal work especially as a means of earning of the respondent. It was operationalized as the main source of income of the family. The occupation of head of the family was only considered for the study. The respondents were categorized into four occupational groups, *viz.,* Agriculture, Animal Husbandry, backyard Poultry and labour

3.3.1.10 Subsidiary occupation

It was operationalized as the subsidiary source of income of the family. The respondents were categorized into three subsidiary occupational groups, *viz.*, animal husbandry, poultry and labour.

3.3.1.11 Experience

Giriraja poultry farming experience was operationalized as the duration (in completed years) of keeping Giriraja birds by the respondents.

3.3.1.12 Flock size

The flock size has been operationalized as the total number of Giriraja birds possessed by an individual respondent at the beginning of adoption and at the time of present study.

3.3.1.13 Employment generation

It was operationalized as the total hours spent by the male, female and children on different Giriraja poultry rearing practices.

3.3.1.14 Work distribution pattern

In order to study the division of labor in Giriraja poultry farming, data was collected regarding the major activities where the male, female and children were involved.

3.3.1.15 Consumption pattern

Consumption of egg in terms of numbers per week and meat in terms of grams per week by the family members of the respondents was recorded.

3.3.1.16 Decision making pattern

Decision making pattern refers to the extent of participation of men, women and all family members in decision making in Giriraja poultry rearing activities.

3.3.1.17 Gross income from poultry

This refers to the income in rupees from rearing of Giriraja poultry alone.

3.3.1.18 Income utilization

Income utilization was operationalized as the income obtained from the poultry utilized for different purpose such as education, recreation, agriculture, household, medicines, to increase flock size etc.

3.3.1.19 Source of chicks/ Birds

It refers to the sources from where respondents have purchased the chicks/birds.

3.3.1.20 Production parameters

Production parameters were operationalized as: Laying of first egg (Age at sexual maturity in days); Average egg weight (gm); Body weight at 8 wks (kg) both male and female; Annual egg production (Number); Livability fertility and hatchability percentages.

3.3.1.21 Adoption of management practices

The extent of adoption behavior of Giriraja poultry farmer was operationalized as non-adoption, discontinuation, partial adoption, and full adoption of five management practices such as supplementary feeding, vaccination and treatment, low cost housing/ night shelter, cleaning/ disinfection of night shelter, chick production and recycling. A score of 0, 1, 2 and 3 were given to non-adoption, discontinuation, partial adoption and full adoption. The total score combined by all the five practices ranging from 0-15 formed the overall adoption score.

3.4 Instruments and methods used for data collection

3.4.1 Interview schedule was pre-tested on non sample area

Primary data was documented through a semi-structured interview schedule from farmers and apart from this group discussions and field visits were organized at the end of personal interviews.

3.4.2 Data was collected from selected respondents in the study area

3.4.2.1 Development of interview schedule

The interview schedule was developed from the data obtained through documentation and suitable modifications were made in consultation with the experts in the field of Poultry science and Veterinary and Animal Husbandry Extension, before administering in main sample area. The final interview schedule for farmers is appended in Appendix-I.

The final interview schedule comprised of five parts. Part A deals with the **profile** characteristics of farmers rearing Giriraja chicken. Part B covered the items related to the **adoption behavior** of farmers rearing Giriraja chicken. Part C consisted of the items related to the role of Giriraja chicken among its adopters as a tool in **household nutritional security**. Part D dealt with the **gender issues** and **economics** involved with the rearing of Giriraja chicken and Part E consisted of the items related to the **constraints** in poultry rearing of Giriraja chicken.

3.4.2.2 Establishing rapport with the respondents

Necessary rapport with the respondents was very essential as it plays an important role in eliciting the responses from respondents throughout the investigation. So, keeping this in view, prior to data collection, few days were devoted to get acquainted with the poultry farmers selected for the study. Later, the investigation was carried out by making informal and friendly visits to their homes. This helped the investigator in obtaining the desired cooperation, valid and reliable information from the farmers

3.4.2.3 Methods of data collection

Each of the selected farmer was interviewed personally in the local language i.e. Kannada. It was made sure that the entire items in the schedule as such were correctly explained to the respondents and the responses were recorded accordingly

3.5 Statistical tools used for data analysis

For statistical analysis of coded data, the following statistical tools were utilized.

1. Frequency
2. Percentage
3. Mean
4. Paired t-test
5. Chi square test
6. Rank

Fig. 3.4: Night shelter provided for Giriraja Chickens

Fig. 3.5: Farmer with backyard rearing of Giriraja Chickens

Results

IV. RESULTS

The results of the present study was conducted on impact of rearing Giriraja chicken under backyard system in Hassan district with the objectives to evaluate the socio-economic contribution of Giriraja chicken in rural areas, to identify the constraints and priorities of Giriraja chicken production for household nutritional security, to study profile characteristics of farmers and gender issues in rural areas. The results obtained are presented in this chapter under the following headings.

4.1 Profile characteristics of farmers rearing Giriraja chicken

4.1.1 Age

4.1.2 Gender

4.1.3 Education

4.1.4 Type of family

4.1.5 Caste

4.1.6 Type of farmers

4.1.7 Occupation of farmers

4.1.8 Type of house

4.1.9 Awareness of Giriraja chicken

4.1.10 Experience of farmers

4.1.11 Type of rearing

4.1.12 Source of chicks

4.1.13 Night shelter

4.1.14 Frequency of cleaning

4.1 Profile characteristics of farmers rearing Giriraja chicken

4.1.1 Age of farmers rearing Giriraja chicken

The results of age of farmers rearing Giriraja chicken showed that majority (74%) of farmers were middle aged followed by old (15%) and young (11%). The average age of the farmers was 40.86 with sd of 6.6. The results obtained are presented in Table 4.1.

4.1.2 Gender of farmers rearing Giriraja chicken

The results indicated that majority (58%) of farmers rearing Giriraja chicken were women and men accounted (42%) to per cent. The results obtained are presented in Table 4.2.

4.1.3 Education of farmers rearing Giriraja chicken

Table 4.3 indicates that majority (47%) of the farmers studied in high school, followed by illiterates (38%), studied upto middle school (9%), above high school (3%) and those farmers who can read only were 3 percent.

4.1.4 Type of family of farmers rearing Giriraja chicken

The results indicated that 65 per cent of the respondents belong to nuclear families while the rest (35%) belong to joint families. The mean family size was with sd of 5.72 possessing an average land of 2.31 acres per family . The results obtained are presented in Table 4.4

4.1.5 Caste

The results showed that majority (82%) of farmers belonged to other backward class followed by scheduled caste (10%) and scheduled tribes (8%). The results obtained are presented in Table 4.5

4.1.6 Type of farmers rearing Giriraja chicken

The results indicated that majority (69%) of the farmers rearing Giriraja chicken were marginal farmers followed by small (31%) farmers. The results obtained are presented in Table 4.6 and graphically depicted in Fig. 4.6.

4.1.7 Occupation of farmers rearing Giriraja chicken

The results showed that the main occupation of all the farmers rearing Giriraja chicken was agriculture. Subsidiary occupation for majority (87%) were animal

husbandry (excluding poultry) followed by backyard poultry (10.00%) and agriculture labor (3%). The results obtained are presented in Table 4.7

4.1.8 Type of house

The results showed that majority of the farmers (40%) live in kutcha type of house followed by pucca (31%) and mixed (29%) houses. The results obtained are presented in the Table 4.8.

4.1.9 Awareness of Giriraja chicken

The extent of awareness in farmers with respect to Giriraja chicken was 98 per cent and 2 percent farmers didn't have any awareness. The results obtained are presented in the Table 4.9.

4.1.10 Type of rearing

All the farmers (cent per cent) interviewed in this study happened to practice backyard farming.

4.1.11 Source of chicks

The results indicated that the majority (73%) of the respondents obtained the chicks from veterinary hospital and 16 per cent of the respondents obtained chicks from the Instructional livestock farming complex and remaining 11 per cent from other sources. The results obtained are presented in Table 4.11.

4.1.12 Night shelter

The results showed that majority (69.00%) of farmers opined that they provided night shelter under bamboo woven basket, followed by inside the bathroom (14.00%), store room (10.00%), hall (5%) and under the staircase (2%). The results obtained are presented in Table 4.12

4.1.13 Frequency of cleaning

Cent per cent respondents were of the opinion that they clean the night shelter daily in the morning after the birds move out for scavenging.

4.1.14 Type of supplementary feed

Most of the farmers in the study area were feeding maize, broken rice, ragi, wheat, maize, groundnut cake, agricultural waste, horticultural waste, kitchen waste, feed mill waste etc., as supplementary feeding

4.1.15 Time spent for rearing Giriraja chicken

The results indicated that 70 percent women spent their time for rearing backyard poultry followed by children (23%), men (7%). Total time spent for rearing Giriraja chicken was 1.34 hours per day per family. The results so obtained are presented in Table 4.13

Table 4.1: Age of farmers rearing Giriraja chicken

Category	Frequency	Percentage
Middle Aged (mean±sd) 32 to 47years	74	74
Age (mean±sd) 32 to 47 years	14	14
Old (mean± sd) more than 48	12	12

Table 4.2: Gender of farmers rearing Giriraja chicken

Sex	Frequency	Percentage
Females	57	57
Males	43	43

Table 4.3: Education of farmers rearing Giriraja chicken

Literacy	Frequency	Percentage
Upto High School	47	47
Upto Middle	9	9
Above high school	3	3
Can read and write	3	3
Illiterate	38	38

Table 4.4: Type of family of farmers rearing Giriraja chicken

Family	Frequency	Percentage
Nuclear	65	65.00
Joint	35	35.00

Table 4.5: Caste of Farmers rearing Giriraja chicken

Caste	Frequency	Percentage
Other backward caste	82	82
Schedule tribe	10	10
Schedule caste	8	8

Table 4.6: Type of farmers rearing Giriraja chicken

Type of farmers	Frequency	Percentage
Marginal	69	69
Small	31	31

Table 4.7: Occupation of farmers rearing Giriraja chicken

Occupation	Frequency	Percentage
Main occupation agriculture	100	100
Subsidiary occupation		
Animal husbandry	87	87
Backyard poultry	10	10
Labour	3	3

Table 4.8: Type of house of farmers rearing Giriraja chicken

Type of house	Frequency	Percentage
Mixed	40	40
Pucca	31	31
Katcha	29	29

Table 4.9: Awareness of Giriraja chicken

Experience in rearing Giriraja	Frequency	Percentage
Yes	98	98
No	2	2

Table 4.10: Experience of farmers in rearing Giriraja chicken

Awareness of Giriraja chicken	Frequency (f0	Percentage (%)
Yes	98	98
No	2	2

Table 4.11: Source of chicks

Source of chicks	Frequency	Percentage
Veterinary hospital	73	73
Department of ILFC, Hassan	16	16
Others	11	11

Table 4.12: Type of night shelter

Night shelter	Frequency (f)	Percentage (%)
Woven basket	69	69
Bathroom	14	14
Store room	10	10
Hall	5	5
Under the staircase	2	2

Table 4.13 Time spent for rearing Giriraja chicken

Time spent on backyard poultry	Frequency	Percentage	Avg. Time spent in hrs
Female	70	70	0.69
Children	23	23	0.73
Male	7	7	0.70
Overall average			1.34

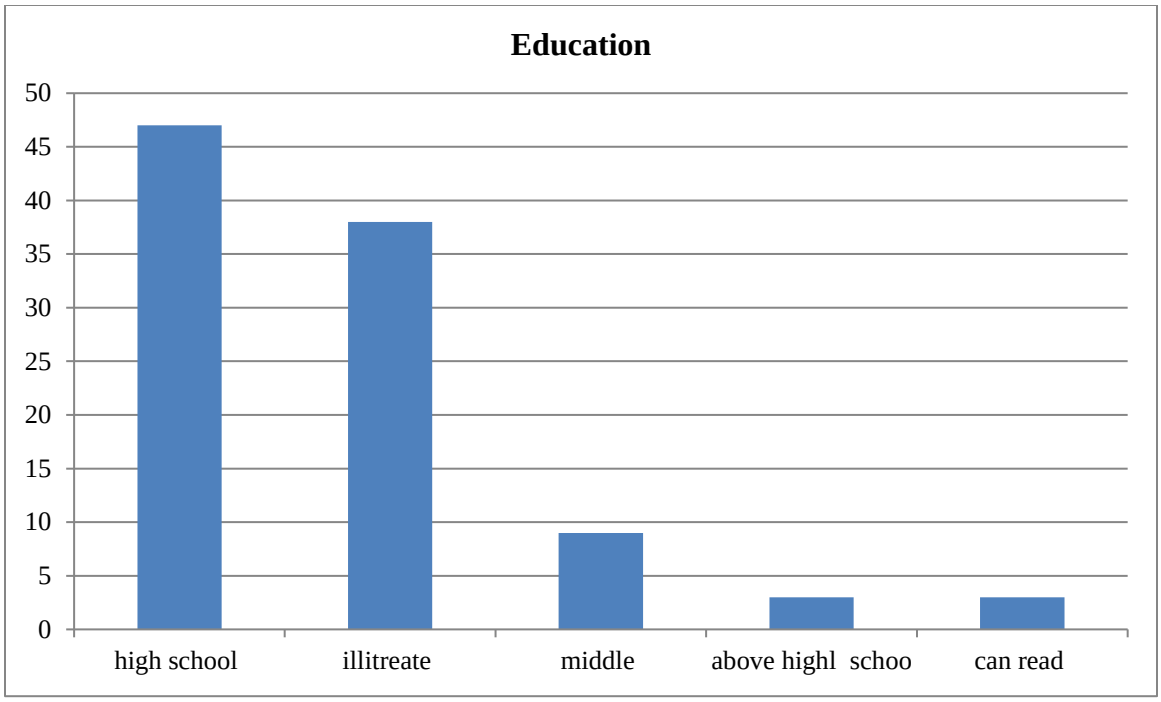

Fig. 4.1 Diagrammatic illustration Education of Farmers

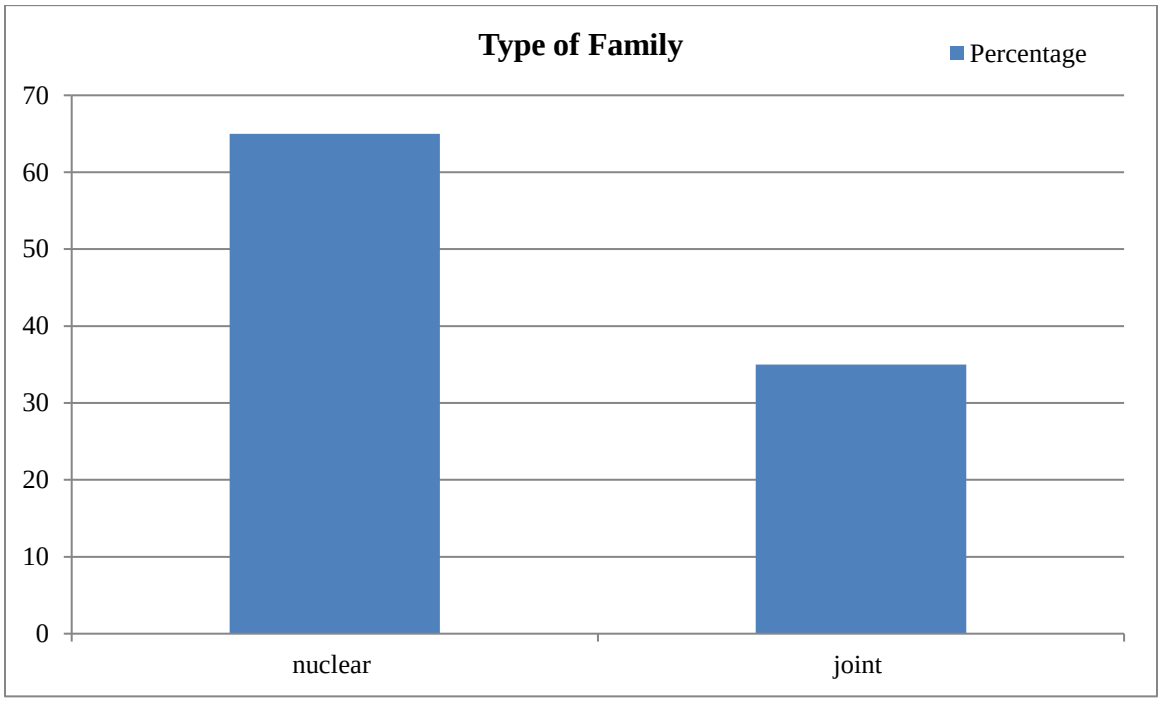

Fig. 4.2 Diagrammatic illustration of Type of family of farmers rearing Giriraja chicken

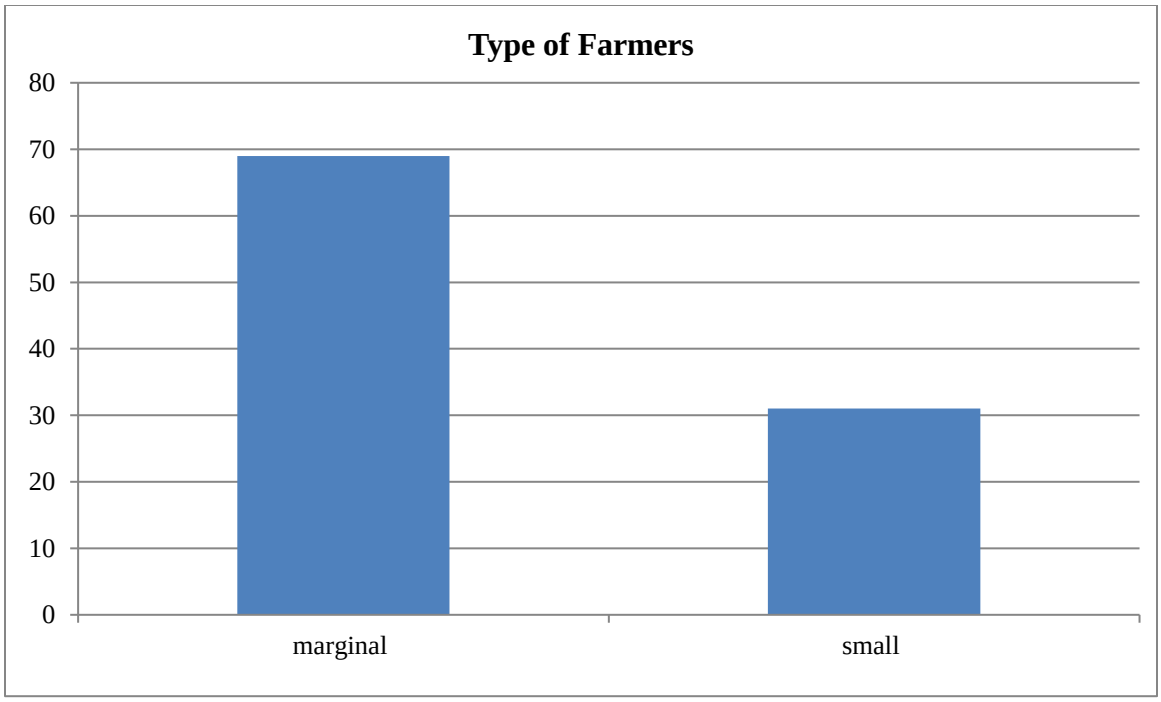

Fig. 4.3 Diagrammatic illustration Type of farmers rearing Giriraja chicken

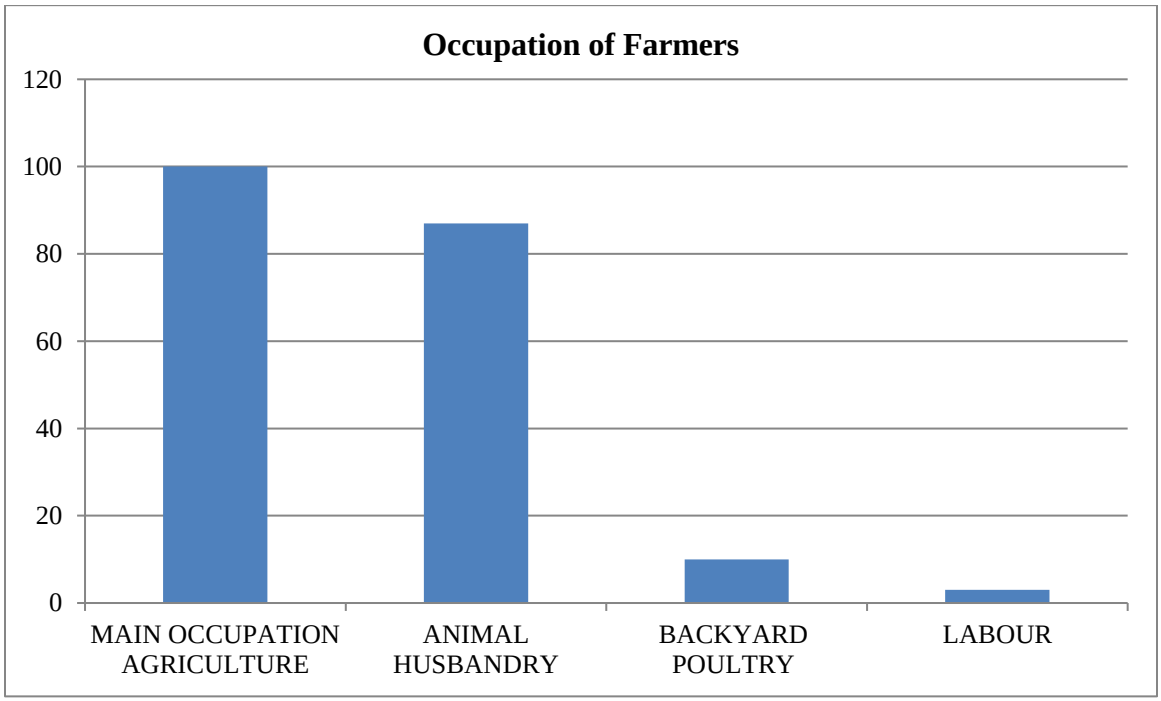

Fig. 4.4: Diagrammatic illustration of Occupation of farmers rearing Giriraja chicken

4.2 Priorities for Giriraja chicken production and its role as a tool in household nutritional security

4.2.1 Priorities for Giriraja chicken production

The results showed that 98.00 per cent of farmers have given priority for adoption as higher body weight, followed by more eggs per year (91%), attractive plumage color (73%), more income (69%), low cost rearing (64%), higher adoptability (59%), resistant to diseases (23%), source of employment (14%). The results obtained are presented in Table 4.14 and graphically depicted in 4.5.

4.2.2 Production, consumption and sale of chicken

The results indicated that on an average 14 birds were produced per family among the respondent groups in the study area. The average consumption percentage was 90.83 and the average selling percentage was 9.19. The results obtained are presented in Table 4.15

4.2.3 Production, consumption and sale of eggs

The results indicated that on average 992 eggs were produced per family among the respondent groups. The average consumption percentage was 89.2, average selling percentage was 9.22 and average eggs used for hatching was 8.53 per cent. The results obtained are presented in Table 4.16.

4.2.4 Consumption details

The results indicated that average consumption of eggs per week were 2, 2, 3, 3 and 3 respectively for adult male, adult female, children less than six years, children

between 6 to 12 years and children between 12 to 18 years. Average egg consumption per member per week was 2.6 eggs.

The results also indicated that average consumption of chicken meat among adult male, adult female, children less than six years, children between 6 to 12 years and children between 12 to 18 years was 200 g, 150 g, 50 g, 100 g and 150 g, respectively. Average meat consumption per member per week was 130g. The results obtained are presented in the Table 4.17.

Table 4.14: Priorities for Giriraja chicken production

Priorities for adoption	**Frequency (f)**	**Percentage (%)**
Higher body weight	98	98
More eggs per year	91	91
Attractive plumage colour	73	73
More income	69	69
Low cost rearing	64	64
Higher adoptability	59	59
Resistance to diseases	23	23
Source of employment	14	14

Table 4.15 Production, consumption and sale of chicken

Average Production of birds in numbers	14
Average consumption percent	90.83
Average selling percentage	9.19

Table 4.16 Production, consumption and sale of eggs

Average egg production in year (numbers)	992.16
Average consumption percent	89.20
Average selling percentage	9.22
Used for hatching	8.53

Table 4.17 Consumption details

	Eggs /week	**Chicken (grams/week)**
Adult male	2	200
Adult female	2	150
Children (< 6years)	3	50
Between 6-12 years	3	100
Between 12-18 years	3	150
Average consumption per member	2.6	130

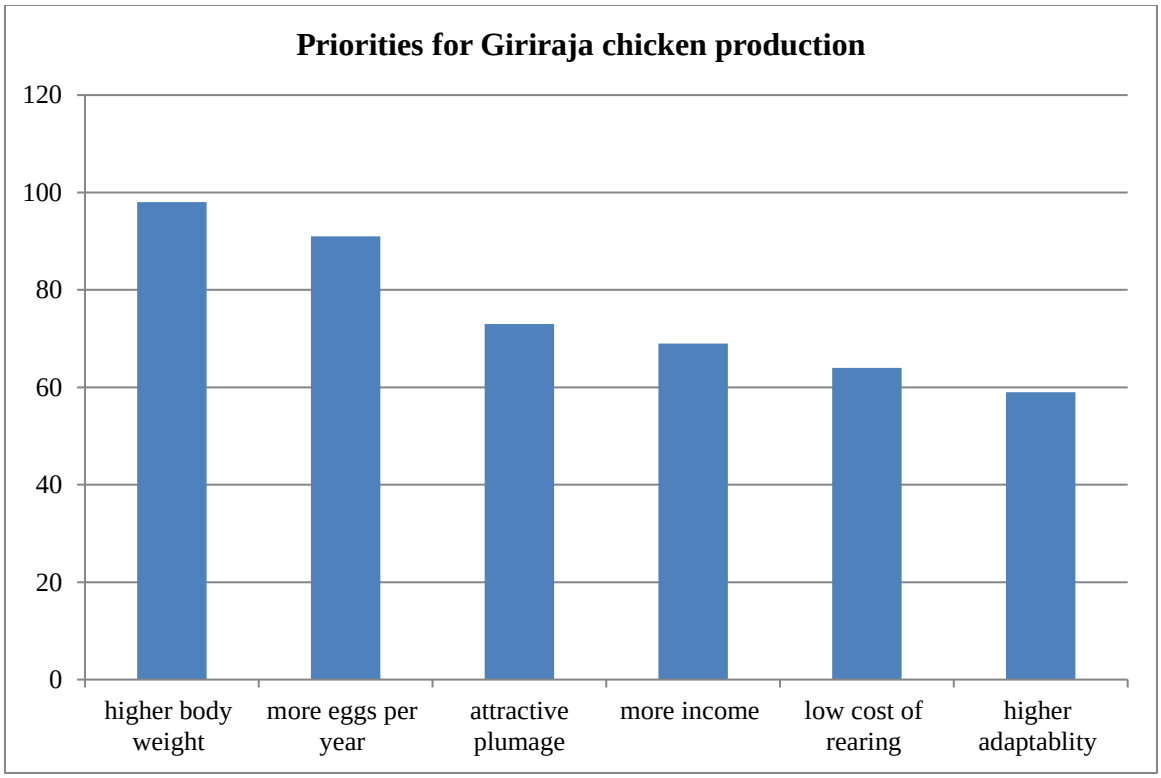

Fig. 4.5 Diagrammatic illustration of Priorities for Giriraja Production

4.3 Gender issues involved with Giriraja chicken farming.

4.3.1 Gender wise dynamics of labour involved in rearing Giriraja chicken

The results showed that cent percent involvement of men was found in shelter construction for backyard poultry, followed by selling of chicken (30.00%), selling of eggs (10.00%), and health care management (4%). In case of women, cent percent of involvement was found in cleaning, supplementary feeding and in providing water, followed by selling of eggs (90.00%), health care management (96%) and selling of chicken (95%). The results of gender wise dynamics of labor involved in rearing Giriraja chicken is presented in table 4.18 and graphically presented in Fig.4.6.

4.3.2 Gender wise dynamics of decision making involved in rearing Giriraja chicken

The results indicated that 90 per cent of women were involved in decision making such as selling of eggs, 70% selling of chicken and 7% recycling of chicks. Similarly, 98 per cent of women involvement was observed in respect of home consumption of chicken, 94.00 per cent home consumption of eggs and 86.00 per cent in income utilization.

It is indicated that men involved in decision making only to the extent of 10.00 per cent in selling eggs, 30% selling chicken and 93% recycling of chicks, while 6.00 per cent towards home consumption of eggs and 14.00 per cent towards income utilization. The results obtained are presented in Table 4.19 and graphically depicted in Fig. 4.7.

Table 4.18: Gender wise dynamics of labor involved in rearing Giriraja chicken

Labour profile	Men		Women	
	Frequency	Percentage	Frequency	Percentage
Shelter construction	100	100	0	0
Cleaning	0	0	100	100
Supplementary feeding	0	0	100	100
Providing water	0	0	100	100
Selling chicken	5	5	95	95
Selling eggs	4	4	96	96
Health care	4	4	96	96

Table 4.19: Gender wise dynamics of decision making involved in rearing Giriraja chicken

Decision making	Men		Women	
	Frequency (f)	Percentage (%)	Frequency (f)	Percentage (%)
Selling of eggs	10	10	90	90
Selling of chicken	30	30	70	70
Home consumption of egg	6	6	94	94
Home consumption of chicken	2	2	98	98
Recycle of chicks	7	7	93	93
Income utilization	14	14	86	86

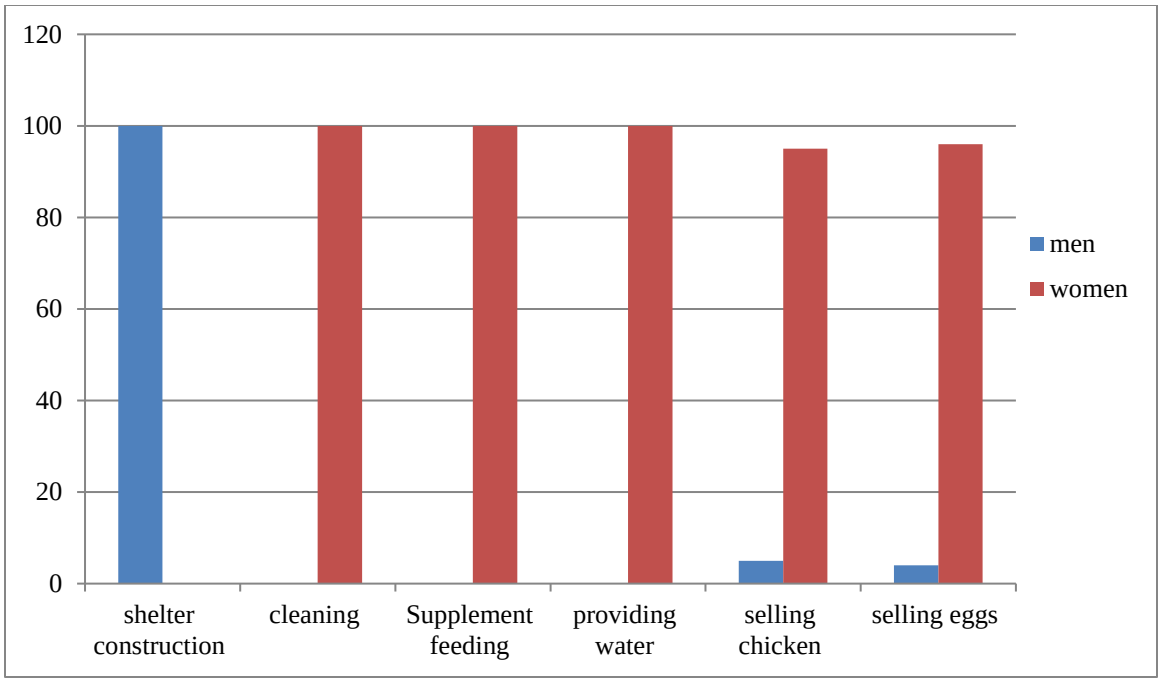

Fig. 4.6: Diagrammatic illustration of Gender wise dynamics of rearing Giriraja chicken-labour profile

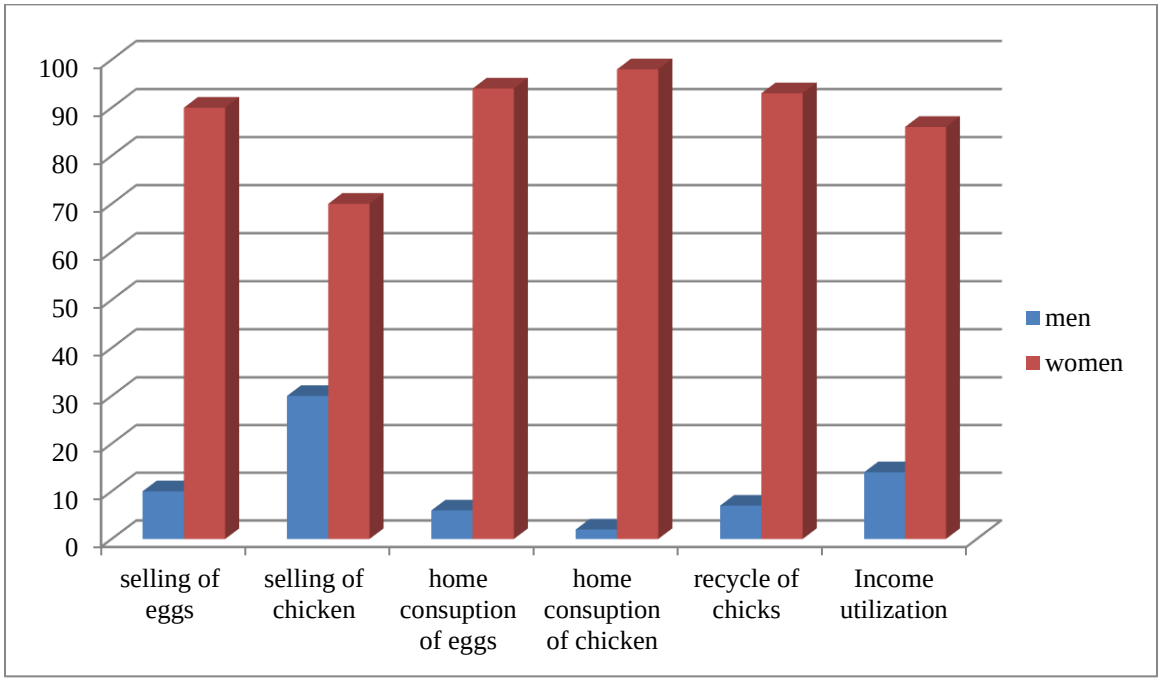

Fig. 4.7 Diagrammatic illustration of Gender wise decision making of rearing Giriraja chicken

4.4 Socio-economic contribution of Giriraja chicken in rural areas

4.4.1 Self help group member

Seventy seven percent of Giriraja rearing farmers are members of self help group and remaining are nonmembers. All the members of self help group of Giriraja rearers have not taken loan from the group.

4.4.2 Adoption behavior of farmers rearing Giriraja chicken

4.4.2.1 Flock size of Giriraja chicken

The results indicated that an average flock size at the beginning of rearing of Giriraja chicken was 3.65 and at the time of data collection was 9.38 (average male chicken flock size was 3.02 and average female chicken flock size was 6.36). The results obtained are presented in Table 4.21 and graphically depicted in Fig. 4.7.

The results showed that majority (74 %) of the respondents were rearing 1 to 10 birds at the time of data collection followed by 20 per cent respondents with flock size between 11 to 20 and 6.00 per cent respondents with flock size of more than 21birds. The results obtained are presented in Table 4.22.

The mean flock size of Giriraja birds increased to 2.56 folds at the time of collection of data when compared to starting of adoption with a significant ($P<0.0001$) t value. The results obtained are presented in Table 4.23.

4.4.2.2 Chi test for Flock size and type of family

Null hypothesis: There will be no significant difference between flock size adopted at present between joint and nuclear family.

Empherical hypothesis: There will be significant difference between flock size adopted at present between joint and nuclear family.

Expected frequency was calculated under the assumption that null hypothesis is true.

The results indicated that there was significant difference ($P<0.0001$) in the flock size adopted at present between joint and nuclear family. The flock size was more in case of nuclear families. The results obtained are presented in Table 4.24.

4.4.2.3 Chi square test for Caste and flock size

Null hypothesis: There will be no significant difference between flock size adopted at present between schedule caste, schedule tribe and others.

Empherical hypothesis: There will be significant difference between flock size adopted at present between schedule caste, schedule tribe and others.

Expected frequency was calculated under the assumption that null hypothesis is true.

The results indicated that there was significant difference (P<0.001) in the flock size adopted at present among schedule caste, schedule tribe and other backward classes. The results obtained are presented in Table 4.25.

4.4.2.4 Chi square test for Literacy and flock size

Null hypothesis: There will be no significant difference between flock size adopted at present between literates and illiterates.

Empherical hypothesis: There will be significant difference between flock size adopted at present between literates and illiterates.

The results indicated that there is significant difference (P< 0.0001) between flock size adopted at present between literates and illiterates. There was impact of education on adoption of flock size. The results obtained are presented in Table 4.26.

4.4.3 Adoption behavior of farmers rearing Giriraja chicken for improved managemental practices

The results showed that about 77 per cent, 75 per cent, 76 per cent, 84 per cent, 7 per cent of farmers respectively adopted fully the practices of supplementary feeding, vaccination and treatment, low cost housing/ night shelter, cleaning and disinfection of night shelter, chick production and recycling. About 23 per cent, 25 per cent, 24 per cent, 16 per cent, 5 per cent of the respondents had partially adopted supplementary feeding, vaccination and treatment, low cost housing/night shelter, cleaning and disinfection of night shelter, chick production and recycling respectively. About 6 per cent have discontinued the adoption of chick production and recycling.

About 82 per cent of respondents had never adopted chick production and recycling. The results are presented in Table 4.27 and graphically depicted in Fig. 4.9.

4.4.3.1 Overall adoption score

To see the overall adoption behavior of farmers rearing Giriraja chicken with respect to different recommended scientific practices for rearing Giriraja chicken like supplementary feeding, vaccination and treatment, low cost housing/ night shelter, cleaning and disinfection of night shelter, chick production and recycling of chicks, a score was allotted for each category of adoption in the order of 0, 1, 2 and 3 for non adoption, discontinuation, partial adoption and full adoption. The results indicated that 79.00 per cent farmers have got the score between the 6 to10 out of total score of 15 for overall adoption followed by 15 per cent who got score of more than 11 and only 6.00 per cent of farmers got score less than 5. The results obtained are presented in Table 4.28.

4.4.4 Performance indicators of Giriraja chicken

The results showed that the average age of laying first egg was 168 days, average egg weight was 56g, average body weight at 8 weeks was 1400 g, annual egg production was 156 average, adult average body weight was 5.10 kg (male), 3.7 kg (female) in case of Giriraja chicken in field condition under backyard system of rearing. The results obtained are presented in Table 4.29.

4.4.5 Utilization of Giriraja chicken

The results showed that cent percent of the respondents awarded first rank for considering as source of food and second rank as source of income. Majority (88.00%) of

farmers awarded third rank and 12.00 per cent awarded second rank for of farmers awarded third rank and 12.00 per cent awarded second rank for using the birds as source of propagation. The results obtained are presented in Table 4.30.

4.4.6 Marketing information

4.4.6.1 Demand

The results showed that most (98.00%) of the respondents had the opinion that demand for meat and egg of Giriraja chicken was more and only two per cent feel that it was low. The results obtained are presented in Table 4.31.

4.4.6.2 Average body weight and age at marketing

Average body weight and age at marketing for Giriraja chicken was 4.15 kg and 6.00 months, respectively.

4.4.6.3 Sale of eggs and birds- Marketing pattern

The results showed that majority (87%) of the respondents sold eggs and birds directly to the consumer, followed by at village market (10%) and to village shopkeepers (3%). It was indicated that none of the respondents sold eggs and birds to the nearest shopping center, to neighboring village, middlemen and to town. The results obtained are presented in Table 4.32 and graphically depicted in Fig. 4.10.

4.4.6.4 Selling price

Average selling price of Giriraja egg as revealed by respondents was on an average of 5.00 rupees per egg and for meat Rs. 120 per kg live weight

4.4.7 Income utilization

The results showed that about 45 percent of respondents were using income earned through Giriraja for education of children, 65 percent for household activities, 8 percent for livestock purchase, 16percent to increase flock size, 4 percent for recreation and 5 percent to purchase medicines. The results obtained are presented in Table 4.33 and graphically depicted in Fig. 4.11.

4.4.8 Cost benefit ratio

The average cost of production per bird per year was Rs 242.68 and the average income per bird per annum was Rs 1026.86. The cost benefit ratio is 4.231 in the present study in the study area.

Table 4.20 Self help group member

	Member of self help group		**Taken any loan for poultry activities**	
	Frequency (f)	**Percentage (%)**	**Frequency (f)**	**Percentage (%)**
YES	77	77	0	0
NO	23	23	100	100

Table 4.21: Flock size of Giriraja chicken.

AVERAGE FLOCK SIZE	**MEAN VALUE**
At the beginning	3.65
At the time of data collection	9.38
Male flock size	3.02
Female flock size	6.36

Table 4.22: Range of flock size of Giriraja chicken

Flock size	Frequency(f)	Percentage (%)	Mean	RANGE
Between 1-10	74	74	9.38	1.28
Between 11-20	20	20		
21 and above	6	6		

Table 4.23: Paired 't' test for flock size at the beginning of adoption and at the time of data collection

Flock size	At the beginning	At the time of data collection
Mean	3.65	9.38
Significance	p<0.0001	

Table 4.24: Chi square test for type of family and flock size

Type of family	Observed flock size	Expected flock size
Joint	76	469
Nuclear	862	469
Calculated value of chi-square	399.4	

Table 4.25: Chi-square test for caste and flock size

Caste	Observed flock size	Expected flock size
Scheduled caste	161	312.66
Scheduled tribe	78	312.66
Others	699	312.66
Calculated value of chi square	363.7	

Table 4.26: Chi square test for literacy and flock size

Literacy	Observed flock size	Expected flock size
Literates	847	469
Illiterates	91	469
Calculated value of chi square	363.7	

Table 4.27: Extent of adoption behavior of improved practices by farmers

Extent of adoption		Non adoption	Discontinuation	Partial adoption	Full adoption
Supplementary feeding	f	0	0	23	77
	%	0	0	23	77
Vaccination and treatment	f	5	0	25	75
	%	5	0	25	75
Low cost Housing	f	0	0	24	76
	%	0	0	24	76
Cleaning and disinfectants	f	0	0	16	84
	%	0	0	16	84
Chick production	f	82	6	5	7
	%	82	6	5	7

Table 4.28: Overall adoption behavior of improved practices by farmers

Category	Score	Frequency (f)	Percentage (%)
LOW	1-5	6	6
MEDIUM	6-10	79	79
HIGH	11-15	15	15

Table 4.29: Performance indicators of Giriraja chicken

Laying of first egg	168 days
Egg weight	56 g
Body weight at 8 weeks	1400g
Average annual egg production	156
Average adult body weight male	5.10 kg
Female adult body weight	3.7 kg

Table 4.30: Utilization of Giriraja chicken

Rankings		Rank	
		Frequency	Percentage
Source of food	1	100	100
Source of income	2	100	100
Source of propagation	3	12	12
Source of propagation	4	88	88

Table 4.31: Demand for eggs and chicken of Giriraja birds

	Demand of Chicken		Demand of Eggs	
	Frequency	**Percentage (%)**	**Frequency**	**Percentage (%)**
High	98	98	98	98
Low	2	2	2	2

Table 4.32: Sale of eggs and chicken of Giriraja birds

Eggs and birds sale	Frequency (f)	Percentage (%)
Direct to consumer	87	87
Village market	10	10
Shopkeepers in the village	3	3
Nearest shopping centre	0	0
Neighboring village	0	0
Middle men	0	0
Town	0	0

Table 4.33: Income utilization

Income utilization	Frequency (f)	Percentage (%)
Education	45	45
For household	65	65
Livestock purchase	8	8
To increase flock size	16	16
Recreation	4	4
Medicines	5	5
Land purchase	0	0
Agriculture	0	0

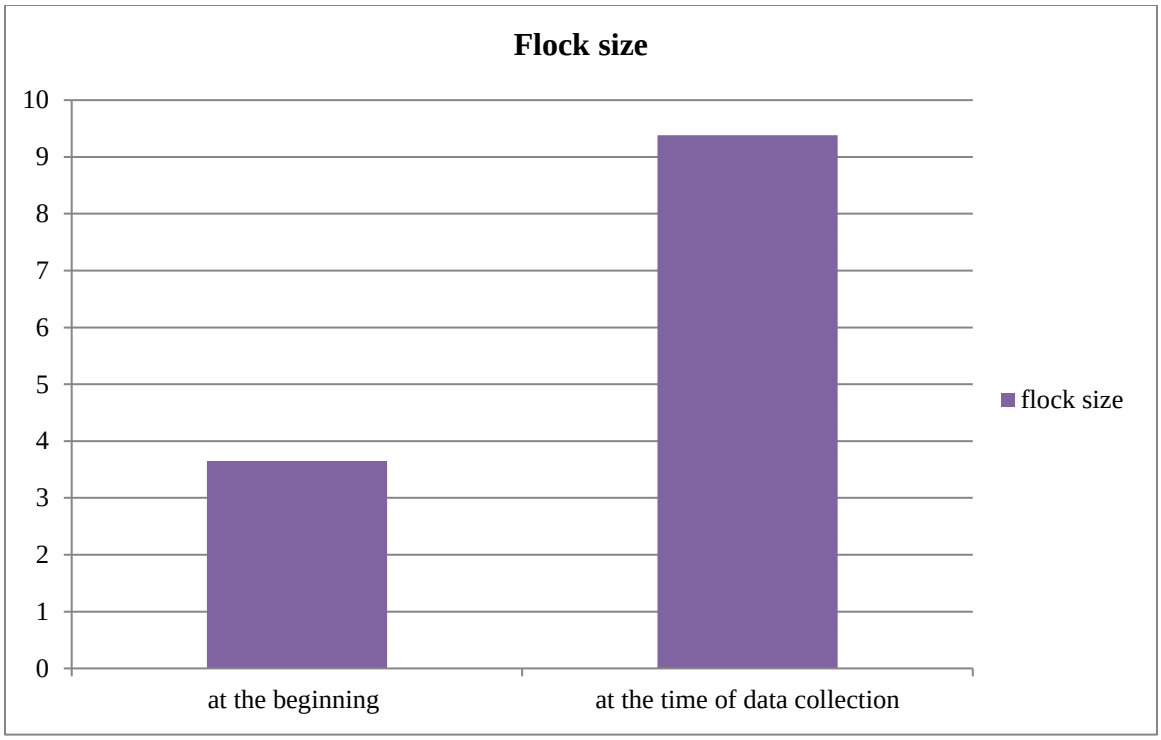

Figure 4.8: Diagrammatic illustration of Flock size

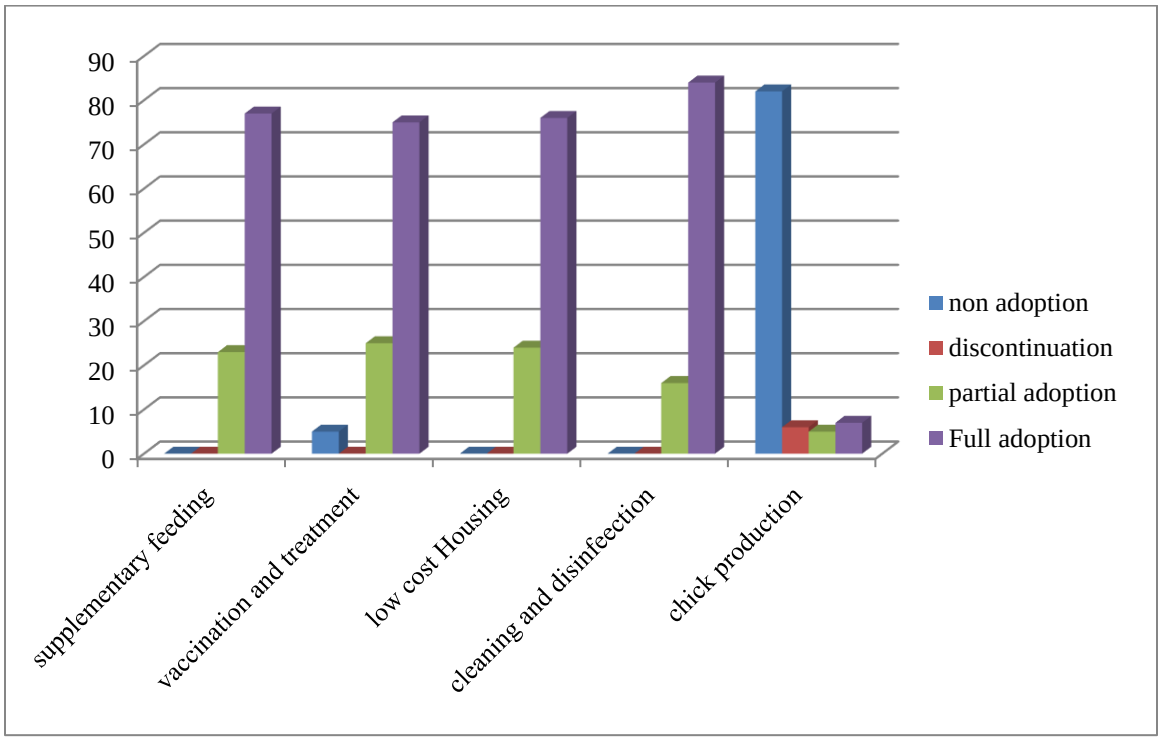

Figure 4.9: Diagrammatic illustration of Adoption behavior

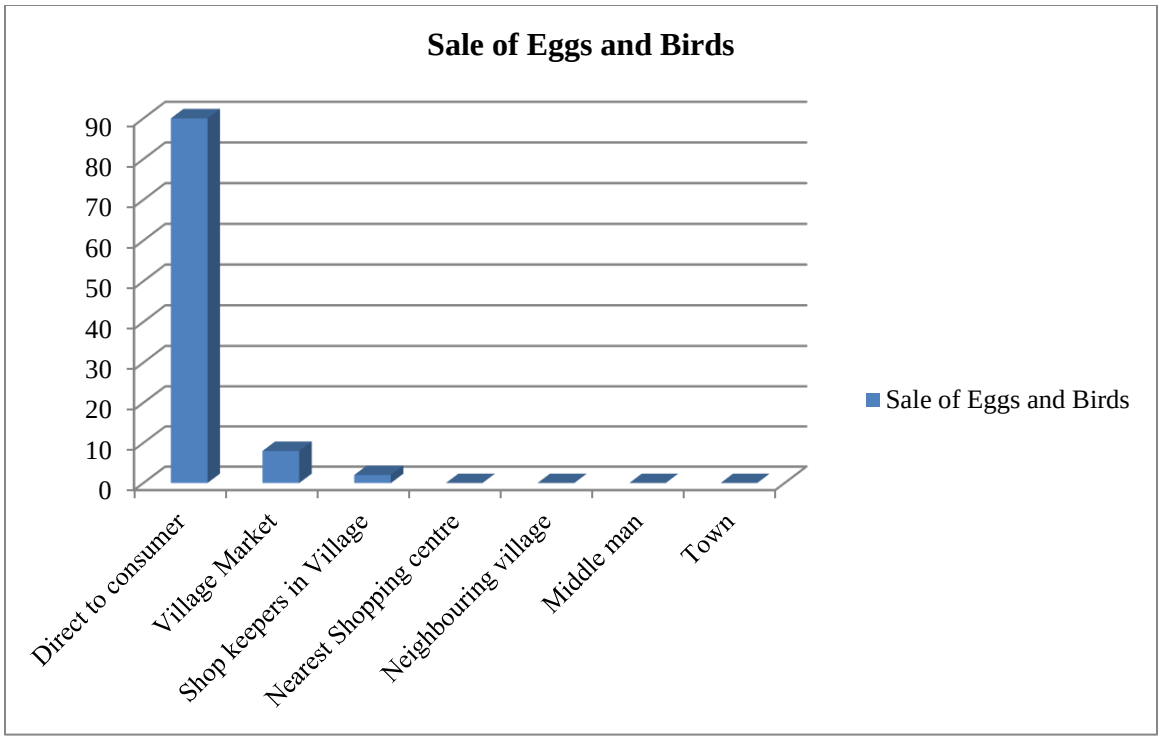

Fig 4.10 : Diagrammatic illustration of Sale of eggs and birds – marketing pattern

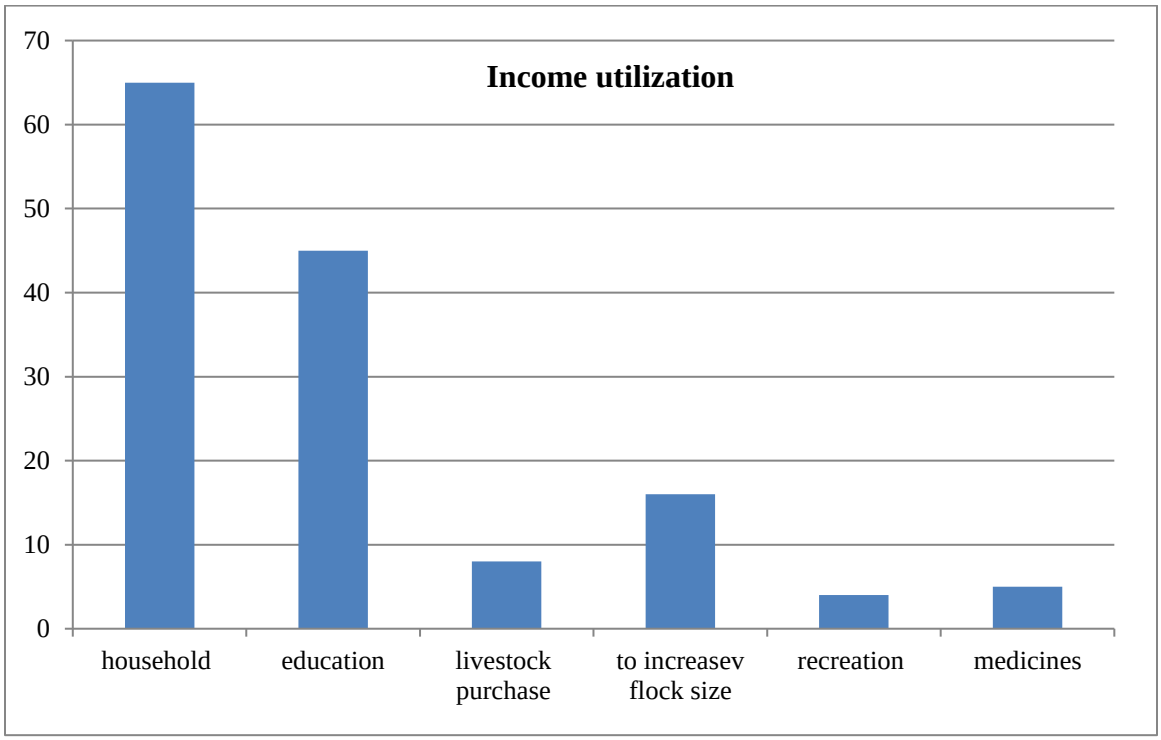

Fig 4.11 Diagrammatic illustration of Income utilization

4.5 Constraints involved in rearing Giriraja chicken

The results indicated that the major constraints reported by farmers rearing Giriraja chicken were in order of non availability of Giriraja chicks at nearest place (82%), problem of predators (78%), mortality of chicks (73%), laying eggs outside shelter (69%), lack of awareness about brooding technique (46%), non availability of timely vaccine (42%), non availability of scavenging area (41%), lack of funds for initial investment (38%), lack of awareness about disease control (37%), lack of knowledge to access bank for loan (25%), destroys agricultural crop in surrounding area (20%), worried about zoonotic diseases like bird flu (15%), marketing problem (2%). The results obtained are presented in Table 4.35 and graphically depicted in Fig. 4.12.

Table 4.34: Constraints involved in rearing Giriraja chicken

Constraints	Frequency(f)	Percentage (%)
Non availability of Giriraja chicks at nearest place	82	82
Problem of predators	78	78
Mortality of chicks	73	73
Laying eggs outside shelter	69	69
Lack of awareness about brooding technique	46	46
Non availability of timely vaccine	42	42
Non availability of scavenging area	41	41
Lack of funds for initial investment	38	38
Lack of awareness about disease control	37	37
Lack of knowledge to acess bank for loan	25	25
Destroys agricultural crops in surrounding area	20	20
Worried about zoonotic diseases	15	15
Marketing problem	2	2

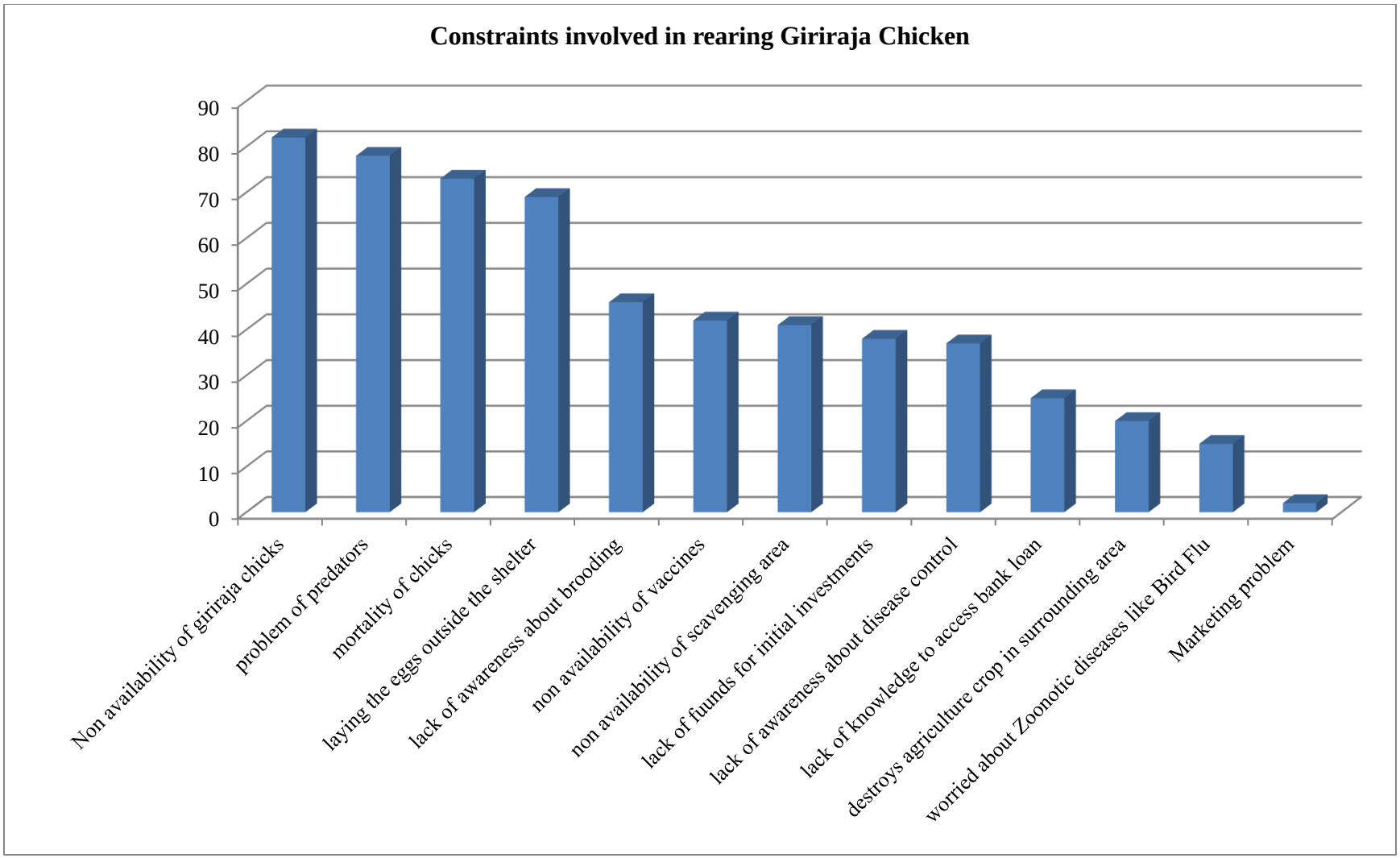

Figure 4.12: Diagrammatic illustration of Constants involved in rearing Giriraja chickens.

Discussion

V. DISCUSSION

The study was conducted to know the impact of rearing Giriraja chicken under backyard system in Hassan district with the objectives to evaluate the socio-economic contribution of Giriraja chicken in rural areas, to identify the constraints and priorities of Giriraja chicken production for household nutritional security, to study profile characteristics of farmers and gender issues in rural areas. The results obtained are discussed in this chapter under the following headings.

5.1 Profile characteristics of farmers rearing Giriraja chicken

5.2 Priorities for Giriraja chicken production and its role as a tool in household nutritional security

5.3 Gender issues involved with Giriraja chicken farming

5.4 Socio-economic contribution of Giriraja chicken in rural areas

5.5 Constraints involved in rearing Giriraja chicken

5.1 Profile characteristics of farmers rearing Giriraja chicken

5.1.1 Age of farmers rearing Giriraja chicken

The results of the study clearly indicated that majority of backyard poultry farmers rearing Giriraja chicken were from middle age group. This might be due to age impact as majority of the middle aged farmers attracted towards backyard poultry farming being low input venture and they shoulder more family responsibility.

The results were in confirmation with the findings of Prakash *et al.* (2000), Kannadhasan (2004) and Nanjesh (2010) who found that majority of farmers were in middle age.

5.1.2 Gender of farmers rearing Giriraja chicken

The results of the study indicated that both males and females were involved in rearing Giriraja chicken. In this study, the percentage of involvement of females was higher to the extent of 16 per cent than males.

The results were in confirmation with the findings of Bhurtel (1996) and Kannadhasan (2004) who found that majority of the housewives were managing the backyard poultry.

5.1.3 Education of farmers rearing Giriraja chicken

The results of the study indicated that most of the farmers were in the category of high school followed by illiterates, the rest being middle school and above high school, which could be due to the fact that farmers who were educated up to high school level were aware of the Giriraja chicken indicating literacy was influencing the technological innovation to reach gross root level. The rest of the farmers who were illiterate were age old backyard poultry farmers who later shifted to rearing Giriraja chicken.

The results were in agreement with the findings of Lasoda *et al.* (1997) who found that majority of backyard poultry farmers were predominantly having secondary level education.

The results were contradictory to the study conducted by Bhurtel (1996) and Prakash *et al*. (2000) who reported that majority of the rural poultry farmers were illiterates.

5.1.4 Family type of farmers rearing Giriraja chicken

The results of the study clearly indicated that majority of the families of the farmers rearing Giriraja chicken were nuclear. This could be because most of the nuclear families own less land and they can earn additional income without much input from backyard poultry.

The results were in confirmation with the findings of Semmeran, (2007) who found that majority of the families of the backyard poultry farmers were nuclear.

5.1.5 Caste of farmers rearing Giriraja chicken

Majority of farmers rearing Giriraja chicken belonged to other backward classes (OBC) followed by scheduled caste and scheduled tribes. This trend may be due to the fact that people of other backward class, scheduled caste and scheduled tribes prefer to eat non vegetarian food and they have no religious taboo for consumption of chicken or egg.

The results were in confirmation with the findings of Nanjesh (2010) who found that majority of backyard poultry farmers belonged to OBC.

5.1.6 Type of farmers rearing Giriraja chicken

The results showed that the majority farmers rearing Giriraja chicken were marginal followed by small land holders. This was because marginal and small land holding farmers possess followed land but can get additional income and nutritional security by rearing these birds.

5.1.7 Occupation of farmers rearing Giriraja chicken

Main occupation of majority of farmers rearing Giriraja chicken was agriculture and subsidiary occupation for the majority was animal husbandry excluding poultry followed by backyard poultry. This was because backyard poultry may not give income sufficient to run family, it can only give additional income and nutritional security by rearing these birds.

The results were in confirmation with the findings of Nanjesh (2010) who found that main occupation of majority of farmers was agriculture and subsidiary occupation was animal husbandry.

5.1.8 Type of house of farmers rearing Giriraja chicken

The results clearly indicated that majority of the farmers rearing Giriraja chicken live in mixed type of house followed by katcha house and this could be due to the fact that majority of these farmers were marginal and small farmers with low income.

The results were in partial agreement with the findings of Nanjesh (2010) who found that majority of farmers live in katcha type of house.

5.1.9 Awareness about Giriraja chicken rearing by farmers

Results clearly showed that cent per cent of farmers were aware of Giriraja chicken and this might be because of extension activities of the department of Animal Husbandry, Government of Karnataka and Department of Poultry Science, Veterinary college, Bengaluru.

5.1.10 Experience of farmers rearing Giriraja chicken

Results showed that majority of the farmers had an experience of rearing Giriraja chicken and this could be attributed to the availability of Giriraja chicken in Karnataka from more than two decades back and also District poultry rearing and training center located at Hassan which is supplying Giriraja chicks to the farmers at subsidized rates.

Similar findings were reported by Semmeran (2007), who reported that 95 per cent of farmers were experienced in rearing Giriraja in Karnataka

5.1.11 Type of farming adopted by farmers rearing Giriraja chicken

All farmers followed backyard type of farming and this might be because of the fact that it was cost effective method of rearing Giriraja chicken and these birds were very much suitable for rearing under backyard system.

The results were in confirmation with the findings of Nanjesh (2010) who found that all the farmers were following backyard type of farming. Giving supplementary feed in the morning discourages the birds from scavenging. Similarly, clean drinking water has to be provided round the clock.

The results were in accordance with the findings of Kumtakar (1999b) who observed in his study conducted in tribal areas of Jabalpur district of Madhya Pradesh that 62 per cent respondents reared chicks under cane baskets. The results were also supported by the findings of Reddy and Quadratullah (1996) in their discussion on strategic feed supplementation through locally available resources.

The results are contradictory to the findings of Prakash *et al.* (2000) who conducted study at three hills of Meghalaya and found that about 85 per cent of respondents did not provide proper housing for their birds.

5.1.12 Time spent by farmers rearing Giriraja chicken

Results clearly indicated that women and children were involved in rearing Giriraja chicken and this can be attributed to the type of work involved in rearing Giriraja chicken which can be performed easily by women and children.

This was in confirmation with the findings of Lasoda *et al*. (1997) who concluded that management of backyard poultry was largely the responsibility of women and children.

5.1.13 Source of chicks

The results clearly indicated majority got chicks from the veterinary hospitals from respective Taluks and this was attributed to the scheme which is running in the Department of Animal Husbandry, Government of Karnataka which supply Giriraja chicks to interested farmers, followed by Department of Poultry Science and Instructional

livestock farm complex Hassan. Some of the farmers also got chicks through middle men.

5.1.14 Night shelter, Frequency of cleaning, type of supplementary feed

It was clear from the results that majority (69%) of the farmers provided night shelter under woven basket. Cent per cent respondents were of the opinion that they clean the night shelter daily. Majority of the farmers in the study area were feeding Ragi, maize, broken rice, wheat, groundnut cake, agricultural waste, horticultural waste, kitchen waste, feed mill waste etc., as supplementary feeding.

Results of the cross sectional data indicated that all the family members in one or other way were contributing to various activities of Giriraja chicken farming. Poultry extension workers need to educate the farmers on the time of supplementary feeding.

The results were in consonance with the findings of Kumtakar (1999b) who observed in his study conducted in tribal areas of Jabalpur district of Madhya Pradesh that 62 per cent respondents reared chicks under cane baskets. It was also supported by the findings of Reddy and Quadratullah (1996) in their discussion on strategic feed supplementation through locally available resources.

The results are contradictory to the findings of Prakash *et al.* (2000) who conducted study at three hills of Meghalaya and found that about 85 per cent of respondents did not provide proper housing for their birds.

5.1.15 Number of eggs incubated for natural incubation and hatchability percentage

Results indicated that, with the absence of broodiness in Giriraja birds, majority of the farmers were not practicing the natural incubation of the chicks. Few farmers were aware of natural incubation and practicing it with good hatchability percentage. Door delivery of quality chicks will help the farmers to continue the farming.

5.1.16 Disease prevalence

Results showed that New Castle Disease was the major disease affecting backyard poultry. This may be due to inadequate vaccination to the full extent.

The results were in confirmation with the findings of Mengesha *et al*. (2011) who observed that most frequently occurring disease was ND.

Pathak *et al*. (2013) in their study also suggested that the birds should be vaccinated specifically against ND and Fowl pox.

5.2 Priorities for Giriraja chicken production and its role as a tool in household nutritional security

5.2.1 Priorities for adoption of Giriraja chicken rearing

The respondents in the study area ranked in the reasons for adoption as higher body weight, more eggs per year, attractive plumage color, more income than desi bird, low cost of rearing, higher adoptability, resistance to diseases and source of employment. This may be due to higher gain in terms of income and meat and eggs provided by these

birds. The results were partially supported by the findings of Semmeran (2007) and Semmeran *et al*. (2008) who found attractive plumage color as the first reason.

5.2.2 Consumption details

Results clearly indicated that 89.65 per cent of birds, 68.91 per cent of eggs produced were consumed among members of family. From the results it was also seen that on an average a member in the family was consuming 6.76 kgs of chicken meat per year which was almost 61.45 per cent of recommendations for total meat consumption per year (ICMR recommends 11 kg of meat per year per person). With respect to egg, on an average a member in the family was consuming 135.2 eggs per year which was 75.11 per cent of the ICMR recommendation for egg consumption i.e.180 eggs per year per person. The annual per capita availability of egg and chicken meat in India at present is 55 and 2.8 kg respectively. Eggs and meat became an integral part of their family"s diet.

These two findings of present study clearly shows rearing Giriraja chicken provides nutritional security to rural poor who are otherwise not offered to consume the egg and meat as these farmers were in low income group.

The nutritional security is of the fact that eggs have biological value of 98 % and also it provides essential aminoacids which are deficient in vegetable source. Egg contains all nutrients like proteins, fat, vitamins and minerals required for growth and production of humanbeings. The diet of the rural poor were primarily based on cereals which are deficient in protein which can be supplemented by this chicken meat and egg at free of cost to these farmers, who generally have low purchasing power.

The results were in partial confirmation with the findings of Rajini and Vasanthkumar (2004) who observed that 60 per cent of eggs produced were consumed by the family.

5.3 Gender issues involved with Giriraja chicken farming

5.3.1 Gender wise dynamics of rearing Giriraja chicken

Results clearly indicated that most of labor work like cleaning, supplementary feeding, providing water, selling chicken, health care with respect to rearing of Giriraja chicken was done by women except construction of shelter.

Results also indicated that most of decisions involved with farming Giriraja chicken like selling eggs, selling chicken, home consumption of eggs and chicken, recycling of chicken and income utilization were taken by women.

The findings may be attributed to the kind of work required for rearing Giriraja chicken which can be done easily by women in their free time thereby generating self employment. Socially we have male dominating society. Here, men have left the decision to utilize income from backyard poultry to women. So these findings clearly indicates that there is empowerment of women by rearing Giriraja chicken who were majorly involved in decision making and income utilization provided by these birds. Women sold their birds during festivals which gave them higher prices and they also developed good marketing skills. Giriraja chicken rearing was recognized as an important contributing factor to overall livelihood security of women. The results were in confirmation with findings of Bhurtel (1996) who found that majority of the housewives were managing the

backyard poultry. The findings of Desai (1996) also supported that successful rural poultry projects were those where women were involved and this involvement had led to increased production and empowerment of women through provision of training and credit.

The results were also in accordance with the findings of Kannadasan (2004) who found that majority of the backyard poultry farming activities were carried out by women. An overwhelming majority of women contributed in feeding, watering, housing, brooding management, egg collection, environmental hygiene, decision making and execution.

The results were also in accordance with the findings of Mengesha *et al*. (2008) who found that more than 70 per cent of overall caretaking of chicken like feeding, treating sick birds, decision for off take of poultry products were the responsibility of women.

5.4 Socio-economic contribution of Giriraja chicken in rural areas

5.4.1 Member of Self help group

Majority of the farmers rearing Giriraja chicken were members of Self help group indicating micro savings attitude of backyard poultry farmers and also because of the fact that rearing Giriraja chicken provide additional income to marginal and small farmers which can be saved. Results also clearly indicated that cent per cent farmers have not taken any loan for poultry activities from self help.

5.4.2 Adoption behavior of farmers rearing Giriraja chicken

5.4.2.1 Flock size

The results clearly indicated that there was significant difference in the flock size adopted at present between joint and nuclear family. This is may be due to the fact in joint families members depend on other for additional income but in the nuclear family they need additional income which in the present case is earned through backyard poultry with rearing Giriraja

It is a well known fact that as the flock size increases the number of eggs and live birds for consumption as well as for sale, increases. Further higher flock size will result in better gains due to economy scale of operation. However, flock size should always match with scavenging feed resource base for optimum production. In the present study, all the farmers have adopted supplementary feeding practice to support scavenging feed base. Hence, flock size might have favourably contributed for overall adoption.

This adoption behavior for Giriraja chicken may be due to their easy management practices and the birds continue to provide additional income and nutritional security through eggs especially for children. The results were in accordance with the findings of Panda and Nanda (2000) who stated that the average backyard poultry maintained was 10.27 birds per family. Rai *et al*. (2000) also found that the average flock holding per family in South Andaman was 16 birds. Reports of Mandal *et al*. (2002) revealed that the flock size ranged between 2 to 10 birds per tribal family in West Bengal state including cocks, hens and chicks. Sapcota and Sharma (2002) who observed that small flocks of 10 to 15 desi chicken were found in most household villages in Assam.

Rajini and Narahari (2002) also reported in their study conducted at five randomly selected villages of Salem and Namakkal districts of Tamil Nadu that the average number of birds per family was 8.1.

5.4.2.2 Flock size and type of family

The results indicated that there was significant difference ($P<0.0001$) in the flock size adopted at present between joint and nuclear family. This was due to the fact that in the joint families, members depend on others for additional income but in the nuclear family they need additional source of income which in the present case was earned through backyard poultry with Giriraja chicken.

5.4.2.3 Caste with flock size

The results indicated that there was significant difference ($P<0.001$) in the flock size adopted at present between scheduled caste, scheduled tribe and other backward classes.

This may be due to the fact that other than scheduled caste and scheduled tribes, people are comparatively more literate and have more access to the technological innovation and adopted more birds of Giriraja chicken.

5.4.2.4 Literacy with flock size

The results indicated that there was significant difference ($P<0.0001$) between the flock size of Giriraja Chicken adopted between literates and illiterates. Here, literate people have adopted more number of birds indicating that literacy has a clear role in percolation of technological innovation. The reason for this result was literate people

were more aware of technological innovations which was later adopted by illiterates who were influenced by the literates.

5.4.2.5 Adoption behavior of farmers rearing Giriraja chicken for managemental practices

The results indicated that majority of farmers fully adopted recommended scientific practices for Giriraja chicken like supplementary feeding, vaccination and treatment, low cost housing, cleaning and disinfection. The practices like supplementary feeding, vaccination and treatment, low cost housing, cleaning and disinfection, chick production and recycling are also adopted by part of the respondents.

Results also indicated that majority have not adopted management practice of chick production and recycling. Part of the farmers has also not adopted vaccination and treatment.

The main reason for full adoption of supplementary feeding was availability of household harvest of feed materials, good growth, high returns, advice of veterinary officers and extension personnel. The reasons for partial adoption of supplementary feeding were lack of knowledge and seasonal availability of feed. The reasons for full adoption of vaccination and for treatment by all respondents were prevention from New Castle Disease followed by vaccine by Government Veterinary dispensaries, better health of flocks, better growth, high returns and control of parasites resulting in better feeding.

The reasons for full adoption of low cost housing in poultry rearing practices for long period need permanent house, medium flock size and protection from predators.

The reasons for partial adoption of low cost housing and night shelter were rearing for short period only and seasonal rearing of poultry.

The reasons for full adoption of cleaning and disinfection were to maintain cleanliness in the area surrounding the poultry houses and for prevention of diseases. The reasons for partial adoption were due to influence of other farmers adoption.

The availability of chicks, inability of Giriraja hens to brood, lack of knowledge were the reasons for the non adoption of chick production and recycling.

The reasons for partial adoption were availability of desi brooder hen followed by good knowledge of care of fertile eggs and self dependency in chick production. The discontinuation was due to difficulties in finding a desi hen and brooding technique. The results were almost in accordance with the findings of Semmeran (2007) and Nanjesh (2010) who found that majority of farmers fully adopted recommended scientific practices except chick production and recycling.

5.4.2.6 Overall adoption score to different recommended scientific practices

To see the overall adoption behavior of the farmers rearing Giriraja chicken with respect to different recommended scientific practices like supplementary feeding, vaccination and treatment, low cost housing/ night shelter, cleaning and disinfection of night shelter, chick production and recycling and a score was allotted for each category of adoption in the order of 0, 1, 2, 3 for non adoption, discontinuation, partial adoption and full adoption. The results showed that 79% per cent farmers have got the score between

6-10 out of total score 15 for overall adoption followed by 17 per cent who got more than 11-15 and only 4.00 per cent of farmers got score less than 13.

The managemental practices recommended were easy to adopt except chick production and recycling which was not adopted by farmers as they were getting four to five weeks old birds through veterinary hospitals. These results were in confirmation with the findings of Semmeran (2007) and Nanjesh (2010).

5.4.3 Performance indicators

It was perused from results that the average time of laying first egg was 168 days, average egg weight was 56.00 grams, average body weight at 8 weeks was 1400 grams, annual egg production was 156, adult body weight was 5.10 kg (male) and 3.70 kg (female) in case of Giriraja chicken in field conditions under backyard system of rearing. The yield gap analysis provides the differences between performance of birds under experimental condition and the mean of realized yield at farmers level. While yield gaps are attributed to differences in input and management practices. Magnitudes of such gaps are important determinants of strategic or applied poultry research on Giriraja birds. Thus greater the gap between potential and realized yield, higher will be the scope for production growth through applied poultry research. However, in the present study the Giriraja bird yields were nearer to or more than potential yields. As per Ramappa (2002), under this circumstance, there was a little scope for applied as well as socio-economic research, since yield gaps were not observed. In the light of these findings, the future emphasis has to be on basic and strategic research on Giriraja bird to further increase the performance, so that farmers would be benefited.

5.4.4 Income Utilization of Giriraja chicken

The results revealed that cent percent of the respondents have given first rank to source of food followed by source of income and source of propagation. Results indicating Giriraja birds as source of food with first rank clearly revealed the nutritional and commercial value of backyard poultry production in the study area. The importance of Giriraja eggs and meat as source of food has also been reflected in the consumption trends reported in the study. Use of Giriraja birds for social functions also signifies the cultural factor behind their farming. Reason for keeping backyard poultry should be obtained at an early stage, where, poultry development programmes or interventions were being planned, as they have major implications for the nature and sequencing of interventions. In a situation like that of Hassan where farmers ranked source of income as second rank with respect to rearing Giriraja birds, farmers may be ready and willing to rear backyard poultry in commercial lines. Accordingly research, development and institutional supports are to be extended to the farmers on priority.

5.4.5 Marketing information

The results showed that there was good demand for Giriraja eggs and meat round the year in village itself. This could be attributed to good flavor possessed by these birds by feeding in scavenging area compared to commercial broilers and commercial layers. Giriraja chicken egg and meat can be classified under organic egg and meat.

Results also indicated that average body weight and age of marketing for Giriraja chicken was 4.57 kg and 6.00 months, respectively and this was due to good genetic makeup of Giriraja birds and also due to practice of supplementary feeding.

Results also clearly indicated that majority of respondents sold eggs and birds of Giriraja directly to consumer without involving middleman. The eggs were marketed at an average price of Rs 5.00 and chicken meat for Rs 120.00 per kg of live bird. They fetch high prices during festive seasons. Body weight at marketing, live weight price and egg price were the pure economic indicators, and there was no surprise that these factors are positively and significantly influencing the overall adoption.

These findings clearly indicates that already there is good demand and market exists for eggs and meat of Giriraja chicken but still proper marketing facilities on cooperative lines or networked type of marketing may be provided to the poultry producer to market their produce to urban market where demand for organic egg and meat is still high.

The results of the present study were in confirmation with the findings of Kumtakar (1999a), Kumtakar (1999b) and Prakash *et al.* (2000) who reported majority family poultry produce were sold in the same village.

5.4.6 Income utilization

Results revealed that about 65 per cent of respondents were using income earned through rearing Giriraja chicken for education of children. This was followed by usage for household activities (38%), livestock purchase (16%) (small ruminants), to increase flock size (15%), recreation (11%) and purchase of medicine (6%).

This could be attributed to money needed for education of children in rural areas like school fees, books, note books etc., which can be easily met when required as the

produce of rural poultry was highly liquidative hence anytime money can be obtained by selling the produce. Also small household expenses can be easily met by the income earned through backyard poultry. Some farmers invested the earnings made from these birds to purchase small ruminants which was further invested to purchase large ruminants. The findings clearly indicated that backyard poultry with Giriraja chicken can be taken first by marginal and small farmers and landless laborers who were not able to start livestock venture with small and large ruminants. Later, they can utilize earnings made from backyard poultry to invest in small and large ruminant farming.

5.5 Constraints involved in rearing Giriraja chicken

Results revealed that the major constraints reported by farmers rearing Giriraja chicken were in order of non availability of Giriraja chicks at nearest place, problem of predators, mortality of chicks, laying of eggs outside shelter, lack of awareness about brooding technique, non availability of timely vaccine, non availability of scavenging area, lack of funds for initial investment, lack of awareness about disease control, lack of knowledge to access bank for loan, destroys agricultural crop in surrounding area, worried about zoonotic diseases like bird flu and marketing problem.

This was due to the fact that there was no regular supply of Giriraja chicks at nearest places. Predator problems could be attributed to the low flying capacity of Giriraja chicken due to heavy body weight. Mortality of chicks was due to lack of brooding and vaccination knowledge among farmers and lack of supplementary feeding of chicks.

5.6 Strategies to improve Giriraja chicken rearing

1. Training on Giriraja chicken farming
2. Regular chick supply by establishing hatcheries at all districts
3. Provision of low cost feed supplements on subsidy
4. Regular programmes on radio, television on Giriraja chicken farming
5. Provision of good marketing facilities through co-operatives especially to channelize the produce to urban area where demand is more for organic chicken produce
6. Proper veterinary services like regular and efficient coverage of vaccination
7. Extension activities to propagate the importance of brooding and chick feeding
8. Bank loan to increase flock size
9. Standardization of feeding of large flock size is required
10. Mini-incubator facilities to be extended to the poultry farmers at subsidized cost
11. Supply of hatching eggs of Giriraja to farmers.
12. Supply of 5-6 week old birds with duly vaccinated for Raniketh disease.

Summary

VI. SUMMARY

Backyard poultry is a potent tool for upliftment of poor because it requires hardly any infrastructure set-up. Besides income generation and poverty reduction, Rural backyard poultry can provide nutrition supplementation in the form of valuable animal protein.

The backyard farming will certainly improve the economic status of a majority of rural/tribal areas. In Karnataka, GIRIRAJA and SWARNADHARA were developed in the department of Poultry Science, Veterinary college, KVAFSU, Regional campus, Hebbal, Bengaluru for backyard poultry farming in rural areas.

In view of this, a study on impact of rearing Giriraja chicken under backyard system in Hassan district was taken with the objectives to evaluate the socio-economic contribution of color plumaged chicken production in the villages, to study profile characteristics of farmers and gender issues in rural areas and to identify the constraints and priorities of Giriraja chicken production for household nutritional security

6.1 Research methodology

Ex-post-facto research design reinforced with case studies was used in the present investigation. Data collected from the sample respondents were coded, tabulated, and presented in the form of tables and was analyzed using suitable statistical tools

Majority (74%) of the respondents under investigation were middle aged (32 to 47 years) and with sd of 6.6 (mean±sd). About 58% and 42% of respondents were female and male farmers practicing backyard poultry respectively. Majority of the respondents

were educated up to high school (47%) level, followed by illiterate (38%), upto middle school (9%) above high school level education (3%) and only three per cent of respondents can read and write. About 65 per cent of respondents were having nuclear families followed by 35.00 per cent with joint families. The mean family size was 5.16 with sd of 1.60. Majority (82%) of them belonged to other backward classes followed by scheduled tribe (10%) and scheduled caste (8%). Majority (40%) of respondents possessed katcha type of house followed by pucca (31%) and mixed (29%) houses, respectively. Majority (59%) of them were marginal farmers and rest 41 per cent were small farmers. The main occupation of all (100%) the respondents was agriculture and subsidiary occupation was animal husbandry (87%), backyard poultry (10%) and labour (3%). Majority (98%) of the respondents had an experience in rearing Giriraja birds with a mean experience of 6.75 years and with sd of 2.49.

The respondents in the study area ranked in the reasons for adoption as higher body weight, more eggs per year, attractive plumage colour, more income than desi bird, low cost of rearing, higher adoptability, resistance to diseases and source of employment.

Results clearly indicated that 90.83 per cent of birds and 89.20 per cent of eggs produced were consumed among members of family.

Results clearly indicated that most of labor work with respect to rearing Giriraja chicken was done by women except construction of shelter.

Results also indicated that most of the decisions involved with rearing Giriraja chicken were taken by women.

The results indicated that majority of farmers rearing Giriraja chicken were members of self help group.

The results indicated that majority of farmers fully adopted recommended scientific management practices for rearing Giriraja and majority have not adopted management practices of chick production and recycling.

More number of farmers were in the category of medium adoption (score between 6-10) for overall adoption with respect to different recommended scientific practices for rearing Giriraja chicken.

The results showed that there was good demand for Giriraja chicken egg and meat round the year in village itself.

Cost benefit ratio in rearing Giriraja chicken was 4.231 in the present study.

Results revealed that about 65.00 per cent of respondents were using income earned through rearing Giriraja chicken for household. This was followed by usage for education of children (45%), increase flock size (16%), livestock purchase (8%) (small ruminants), medicines (5%), Recreation (4%) .

Results revealed that the major constraints reported by farmers rearing Giriraja chicken were in order of non availability of Giriraja chicks at nearest place, problem of predators, mortality of chicks, laying of eggs outside shelter, lack of awareness about brooding technique, non availability of timely vaccine, non availability of scavenging area, lack of funds for initial investment, lack of awareness about disease control, lack of

knowledge to access bank for loan, destroys agricultural crop in surrounding area, worried about zoonotic diseases like bird flu, marketing problem.

6.5 Implications of the study

In the light of the findings of the study and informal discussions held with the cross section of the respondents representing farmers rearing Giriraja chicken, the following recommendations are made to enhance backyard poultry production with Giriraja chicken.

1. The present study indicated involvement of more marginal and small farmers and also more women in rearing Giriraja chicken. Hence, suitable policy initiative on large-scale to diffuse further these birds into social system can be one of the tool to ensure that future growth in agriculture is more efficient, sustainable and inclusive.

2. The nutritional benefits of Giriraja chicken rearing to the respondents include average consumption of chicken meat per person in the family per week was 130g and for egg was average of 2.6 eggs per person per week. The nutritional benefits of rearing Giriraja to the rural livelihood are manifold. Hence, suitable policy initiative on large scale to diffuse further these birds into social system that is required for the benefit of other rural masses in enhancing nutritional status.

3. Keeping in view, the crucial role being played by women in rearing Giriraja chicken as reflected in the findings of the present study, the preference to women in the future backyard poultry improvement programmes will increase the resource efficiency and equal distribution of benefits.

4. The average cost benefit ratio of Giriraja chicken farming was 4.231 which is relatively high compared to many agricultural and livestock farming practices.

5. The distributional benefits of Giriraja chicken rearing ranges from children education, household expenses and livestock purchasing which are clearly indicating the economic contribution to the respondents.

6. The influence of agro-climatic conditions on the production performance of Giriraja chicken shows that considerable economic and production gains can be obtained through backyard poultry in other regions by understanding the agro-ecological conditions and their influence on the scavenging feed resource base.

7. Absence of yield gaps between recommended and realized yields suggests considerable scope for basic research to further improve the performance of Giriraja chicken by researchers.

6.4 Limitations of the study

1. The study was conducted in the selected areas ; hence, the findings are applicable to similar situations only.

2. Most of the data were collected based on the expressed opinions of the respondents. Therefore, the study may not be free from usual biases involved with the respondents in social research.

6.5 Conclusions

In view of the importance attained towards backyard poultry as a means of nutritional security, economic viability, employment generation and women empowerment in rural areas, the present study provided an insightful of adoption behavior, nutritional, economic and employment benefits as well as constraints and strategy for promoting the backyard poultry with Giriraja chicken.

The study was based on the hypothesis that backyard poultry with Giriraja chicken form the basis for improving the livelihood security in terms of nutritional, social and economic benefits. The findings of the study conclusively proved this hypothesis. The distributional benefits of income earned through backyard poultry with Giriraja chicken are wide and well recognized. Overall backyard poultry with Giriraja birds helped the respondents as a tool in poverty alleviation, income generation and gave nutritional security besides empowering them economically. So the research and development agencies can further diffuse Giriraja chicken into social system for the benefit of the wide section of rural population.

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Abstract

VIII. ABSTRACT

Data on profile characteristics of farmers, priorities for adoption, household nutritional security, gender issues, socio-economical contribution and constraints involved in rearing Giriraja chicken, collected from 100 respondents in Hassan district of Karnataka was analyzed. Majority of the respondents were middle aged, women, literates, nuclear families with average family size of 5.72 and belong to other backward classes. Majority of them were marginal farmers followed by small farmers with agriculture and animal husbandry as primary and subsidiary occupations, respectively. Majority of them were having experience in rearing Giriraja chicken. The practices of supplementary feeding; vaccination and treatment; low cost housing/ night shelter; and cleaning / disinfection of night shelter were well received and adopted by respondents, while chick production and recycling and brooding of day old chicks were not adopted. The overall adoption behavior of Giriraja chicken was medium with significant ($p<0.0001$) difference in change in flock size. Considerable nutritional and socio-economic contribution of Giriraja chicken has been reported by majority of respondents. On an average each respondent was consuming 12g of chicken and 5.6 eggs per week. The distributional benefits of income through rearing Giriraja chicken were wide and well recognized. Non availability of Giriraja chicks at nearest place, unawareness about proper brooding technique were the major constraints and training on Giriraja chicken rearing, regular chick supply, provision of low cost feed supplements on subsidy and extending mini-incubator facilities to the farmers at subsidy cost were the major suggestions perceived by the respondents. The related implications for further diffusion of Giriraja chicken into the social system were discussed.

Appendices

APPENDIX-I

"Impact of rearing Giriraja chicken under backyard system in Hassan District."

Interview Schedule

Respondent No: Name of village:

Date of interview Name of taluk:

Name of Dist:

Part –A: Profile study of farmers rearing Girirajachicken.

1. Name of the respondent:

2. Age:

3. Sex: male/female

4. Education of the respondent: Illiterate/Primary/Middle/High school/Above high school.

5. **Family:** i.Type: Joint/Nuclear ii. Size of the family: ……

Adults……M…...F……

Children…..M…...F……

6. Categery: General/SC/ST/OBC

7. Status of the family and Total land owned by the family:

Agriculture labours……., small farmers……, marginal farmers……, large farmers……

8.Occupation:

Main…….Subsidiary……..

9. Source of income of the Family;

Source	**Rank**
Backyard Poultry	
Agriculture	
Animal husbandry (Excluding poultry)	
Services	
Buisiness	
Labour	
Others	

10. Type of Residence: Hut/Katcha/Mixed/Pacca.

11. a) Whether farmer aware ofGiriraja birds? Yes/No

b) Whether farmer hasGiriraja chicken farming experience: Yes/No

If yes, no. of years of experience.

12. Type of rearing: a) Backyard b) Semi intensive

Flock size: a) At the beginning……. b) present……., No. of males….., No. of females…….

13 . a) Mention the time spent on Giriraja chicken farming.

Sl. No.	Category	No.	Time spent / day (hrs)
1.	Male		
2.	Female		
3.	Children		
4.	Total		

b) Whether any member of your family has membership of self help group. Yes/No

If yes, any loan taken from SHG for poultry activities Yes/No

Part-B: Adoption behavior of Farmers rearing Girirajachicken.

14. a) Flock size: a) at the beginning……. b) present……

b) Extent of Adoption of Selected Practices:

Technologies	Extent of adoption-frequency(percentage)			
	Non-adoption	discontinuation	Partial adoption	Full adoption
Supplementary feeding				
Vaccination and treatment				
Low cost housing/ night shelter				
Cleaning/ disinfection of night shelter				
Chick production and Propagation				

c) Reasons for overall adoption behavior of Girirajabirds.

1. Attractive plumage color.
2. Low rearing cost.
3. Higher body weight gain.
4. More eggs per year than desi bird.
5. More income than desi birds.
6. Higher adoptability.
7. Resistant to diseases.
8. Source of employment.

15. Cross-sectional data on Giriraja birds production system: please answer the following

a) Housing

1. Where do the chicken rest at night?

   Backyard/perch trees/woven basket/hall/bathroom/store/others (specify)

2. Do you clean the chicken house? Yes/no.

3. If yes how frequently do you clean the chicken house?

   Daily/weekly/monthly

b) Supplementary feeding (other than scavenged feed)

Type of supplement	**Source (household harvest, purchase, any other)**	**If purchased, unit price**	**Quantity and time of feeding per day**	**Person who feeds the chicken.**

1. What type of feed material is available in your scavenging system?

2. When do you feed your birds?

   i. In morning ii. Afternoon iii. Evening iv. Night.

3. Do you provide water to the chicken? Yes/ No. If yes, provide the following information.

   a) Source of clean water. (well, bore well, tap water)

   b) How frequently do you provide water?

c) Source of eggs/ chicks

1. From where do you get chicks?

i. purchase from hatchery ii. Purchase from local market

iii. purchase from dept. of PSc. iv. Purchase from dept. of AH and VS.

v. Any other (specify)

2. How many eggs are used during natural incubation?

3. Usually how many chicks you get out of naturally incubated eggs?

d) Health care

What are the important diseases you noticed in your flock?

1. ND 2. Enteritis

3. External parasites 4. Others

Part-C: House-hold nutritional security of farmers rearing Giriraja chicken.

16. Please provide information on quantity of chicken/ eggs generated from poultry per year. (from whole flock)

Chicken	Total	Quantity consumed by whole family	Quantity sold	Used for hatching(egg)
Live birds				
Eggs				

No. of persons in the family:

Average consumption of poultry products per person:

Consumption details:

	Chicken(grams/week)	Eggs (No./week)
Adult male 18 years		
Adult female 18 years		
Children 6 years		
6-12 years		
12-18 years		

Part-D: Gender issues and economics involved with rearing improved varieties of color plumaged chicken.

17. Gender wise dynamics of Girirajabirds poultry activities: who performs/responsible for the following activities (put a tick mark in the relevant column)

	Female	Male
Ownership		
Labour profile		
Shelter construction		
Cleaning chicken house		
Feeding		
Providing water		
Selling chicken		
Selling eggs		
Health care		
Decision making		
Selling eggs		
Selling chicken		
Home consumption of eggs		
Home consumption of chicken		
Propagation		
Income utilization		
Taking loan for initial investment		

18. Performance indicators: Please give the following data (mention whichever is applicable)

Body weight at 8 weeks ……..g

Age at sexual maturity/age at first egg production …… days

Annual egg production …… eggs

Average egg weight …… .g

Adult body weight-Male …… .kg

Female …… .kg

19. Utilization of Giriraja chicken and ranking

	Rank I	**Rank II**	**Rank III**
Source of food			
Source of income			
Propagation			

20. Marketing information

	Demand				**Supply**			
	Chickens		**Eggs**		**Chicks**		**Eggs**	
	Low	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**
Time of year								
i.Summer								
ii. Rainy								
iii.Winter								

21. During marketing /selling time, what was the approximate body weight and age of your birds?

22.i. Where do you sell eggs and birds ?

Sl. No	Place	Eggs	Birds
a.	Own village market		
b.	Direct to consumer		
c.	Shopkeepers		
d.	Middleman		
e.	Neighboring village		
f.	Nearest shopping centre		
g.	Town		
h.	Any other specify		

ii. What is the selling price?

a. Selling price of eggs Rs……/egg

b. Selling price of live bird Rs……/kg

23.Income utilization:

Total income Giriraja chicken Rs……/month/bird.

Income utilization pattern(Tick one or more)

Purpose	**Yes / No**
Education	
For house hold	
Recreation	

Medicine

Agriculture

To increase flock size

Livestock purchase

(small ruminant/large ruminants)

Other (please specify)

24. Cost and benefit component in backyard poultry production

Cost	Amount	Returns	Amount
Chick cost		Sale of birds	
Feed		Sale of eggs	
Medication/vaccine		Mannure	
Any other(pl.specify)		Any other(pl.specify)	

Part-E: Constraints in rearing Giriraja chicken.

25. what are the constraints in rearing Giriraja chicken? Tick whichever is applicable.

1. Non availability of improved varieties chicks at nearest place.

2. Non availability of scavenging area.

3. Problem of predators

4. Lack of awareness about brooding technique.

5. Lack of awareness about disease control.

6. Marketing problem.

7. Non availability of timely vaccination.

8. Laying eggs outside shelter.

9. Worried about zoonotic disease like bird flu.

10. Mortality of chicks.

11. Lack of funds for initial investment.

12. Lack of knowledge to access bank for loan.

13. Destroys agricultural crop in surrounding area.