

Family Poultry Production for Household Nutrition and Income



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Preface

Poultry egg and meat are important animal protein sources and essential in providing balanced diets for human nutrition and health. It is an excellent source of high quality protein, vitamins and trace minerals. Rural poultry production has been considered as the quickest way to ensure food security, generate employment and income, and promote women's empowerment at a relatively low cost. Poultry represents an important system to feed the fast growing human population of India and to provide income to poor small farmers, especially women. Family poultry is defined as small-scale poultry keeping by households using family labour and locally available feed resources. Village poultry are generally owned and managed by women and children and are often essential elements of female-headed households. Family poultry production requires little initial investment and generates quick and frequent returns. The small income and savings provided by the sale of poultry products is especially important for women which enables them to meet out the urgent needs reducing economic vulnerability. While going for family poultry production, it is essential to understand the local production system, their limitations and opportunities, and how they can be improved further. Several key areas such as development of appropriate variety, utilization of locally available resources, proper health care and disease control, capacity building/training of farm women, proper marketing system, etc. need major attention to make family poultry a sustainable source of livelihood for farm families. I hope, the compilation made based on the results of action research carried out by the institute on Family Poultry Production will be useful for researchers, extension functionaries, development professionals and all the stake holder involved in rural poultry farming.

Dr. Anil Kumar
Director

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1. Present Status of Poultry Production in India

Poultry keeping for commercial production of egg and meat is one of India's most innovative industries. Having evolved from the backyard, Poultry sector in India has witnessed a phenomenal growth and transformed itself to a vertically integrated and organized dynamic agri-based industry during the last four decades. The development has not only been in size but also in productivity, sophistication and quality. The development of high yielding varieties in layer (320-330 eggs) and broiler (2.4-2.6 kg at 6 wks) along with standardized package of practices on nutrition, housing, management and disease control have contributed to spectacular growth rates in egg (6-8% per annum) and broiler production (8-10% per annum) in India. Consistent with increase in productivity, the annual per capita availability also increased to 79 eggs and 3.6 kg of meat (DAHD, 2019). However, it is far below the recommended (Nutritional Advisory Committee) consumption of 180 eggs and 10.8 kg poultry meat per person per year. The poultry sector has to grow 3 to 4 folds to meet the nutritional requirement.

Present Status

Chicken dominates the poultry production in India. Nearly 98 % of the total egg production comes from chicken and the rest is contributed by ducks. India stands 3rd position in egg production and 5th position in chicken meat production in the world. The Poultry Industry with the strength of 250 million layers and 4000 million broilers employs 5 million people and contributes over Rs. 1, 20, 000 crores to the national GDP. About 3.3 million tons of poultry litter, a valuable organic fertilizer, is produced as a by-product every year. Indian poultry sector is mainly divided into two sectors such as layer (egg) and broiler (meat) sector.

The total egg production in India is around 103.32 billion eggs during the year 2018-19 which has increased by 8.5% compared to the previous year. The top egg producing states in India are Andhra Pradesh (19.1%), Tamil Nadu (18.2%), Telengana (13.2%), West Bengal (8.3%) and Haryana (5.9%) producing around 65% of the total egg produced in India. The per capita availability of egg is 79 eggs per annum. The contribution of commercial and backyard poultry to total egg production is 84.91 billion eggs (82.2%) and 18.41 billion eggs (17.8%), respectively.

The poultry meat production is 4.06 million tons in India during the year 2018-19 (DAHD 2019) which has increased by 7.8% over previous year. The popularity of poultry meat is on the rise during the last three decades and is presently accounting for more than half of the total meat consumed in the country. In India, the top 5 broiler meat producing states are Maharashtra (15.6%), Haryana (11.8%), West Bengal (11.7%), Tamil Nadu (11.2%) and Andhra Pradesh (10.9%) and contribute to around 61% of broiler meat production in the country.





Fig. Production & Per Capita Availability of Egg (All India)

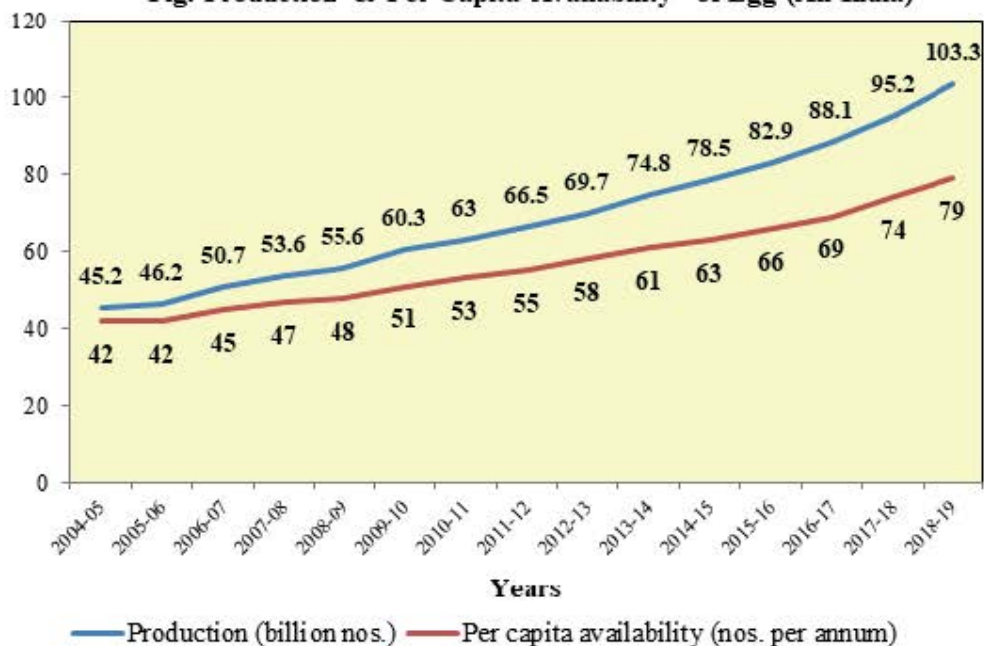
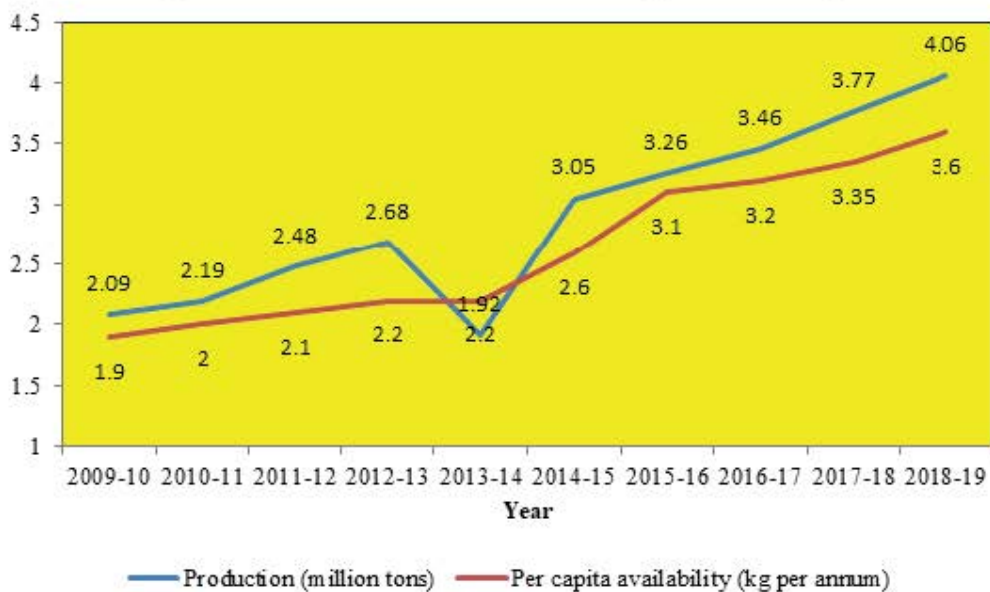


Fig. Broiler Meat Production and Percapita Availability in India



2. Need for Alternate System of Poultry Production in India

India has achieved spectacular growth in commercial poultry production. But the commercial poultry activities are concentrated in the urban and peri urban areas of the country. Thus, the poultry products from the intensive system of poultry production are catering the needs of these people. Just 30% population living in urban and peri-urban areas consumes about 75-80 % of eggs and poultry meat. Eggs and meat are transported to long distances and thus, the prices are 25-30% higher in rural/tribal areas and thereby limiting the rural people for accessing the nutritious poultry products like egg and meat. Practicing poultry farming in rural/tribal areas utilizing chicken varieties which demand low inputs in terms of nutrition and management and perform better is a potential tool to increase the availability of poultry products in the rural area. Free range and small scale poultry production can be promoted in rural areas for poverty alleviation, eradication of malnutrition, creation of gainful employment and gender equity in vast rural areas.

Organized poultry production is still a dream in rural sector due to lack of basic infrastructure, compounded feed and availability of health coverage. Feed is a critical input for the poultry industry as it accounts for 75-80% of the production cost in poultry. Maize and soybean meal is the choice of energy and protein sources for poultry feed preparation. At present the feed requirement of the poultry industry is around 28 million MT and the demand is expected to increase 35 million MT by 2025 AD. The higher prices of these ingredients and limited availability may restrict the growth of the intensive system of poultry production. Adaptation of rural poultry farming in free range or semi intensive system of rearing will certainly cut down the pressure on the availability of ingredients. The rural people do not prefer processed dressed chicken like urban consumers. The lack of cold storage and refrigerated vans and high transportation cost increase the price of the processed products in rural areas. The people in rural areas prefer live and dressed chicken slaughtered before them. Practicing rural/backyard poultry farming will ensure the availability of live chicken/eggs in rural/tribal areas.

The rural people are practicing backyard poultry keeping since time immemorial in India. Poultry farming is an essential activity of the typical rural/tribal household system touching their social, cultural and economic lives. Traditionally, women are involved in backyard poultry keeping. Small and landless farmers especially farm women as well as those belonging to weaker sections, including tribal and scheduled castes people keep local breeds for their livelihood. These birds forage and scavenge for their food in the back yards of human habitation and produce eggs and meat at no input cost. They provide nutritious food and act as a regular source of supplementary income for the rural / tribal people. Adapting rural poultry farming in backyards of rural household can ensure the availability of eggs and meat in rural/tribal areas which will help in alleviating the protein malnutrition in growing children and women in these areas.

3. Addressing Nutritional challenges through Family Poultry Production

India is one of the fastest growing countries in terms of population with 1.38 billion people and with an annual growth rate of 1.2%. As per the World Bank estimates, India is one of the highest ranking countries in the world for the number of children suffering from malnutrition. As per the report of the UN's State of Food Security and Nutrition, 21% of children under 5 were stunted, 6.9% were too thin and 5.6% overweight. Malnutrition caused 69% of deaths of children below the age of five in India, according to a UNICEF report. Extreme poverty, low dietary diversity and mother's lack of education are among the key risk factors that contribute to malnutrition of children in India. The Global Hunger Index 2020 report has placed India 94th position among 107 countries, much behind Bangladesh, Pakistan and Nepal. Poultry egg and meat is important animal protein sources and essential in providing balanced diets for nutrition and health. Family Poultry farming could be a viable option for addressing malnutrition among children in rural areas. Egg has been introduced into the mid day meal scheme for improving nutritional status of children.

Nutritive value of egg

Poultry eggs are considered as a wholesome food because of its excellent nutritious properties. It is an excellent source of high quality protein, vitamins and trace minerals. Eggs are classified in the protein food group with meat, poultry, and fish. Egg contains 44 out of the 45 essential nutrients for the human body. Although, egg is a multifunctional food with superior nutritional quality, it is available at a relatively lower price. Thus, egg is within the reach of poor people. Availability, lower cost, ease of preparation and good taste give eggs a deserved place in diets of humans.

Eggs are composed of mainly three parts: shell, albumen and yolk. Egg contains 70-74% water. However, they have four major nutritional components: proteins (12 -13%), lipids (11-12%), all necessary vitamins (except vitamin C), and minerals. Hens' egg contains 73.6% water, 12.8% proteins and 11.8% lipid (Table 1). Egg proteins consist of an ideal balance of nutritionally indispensable amino acids. An egg will supply about 6.9g wholesome protein of the highest biological value (94). Egg proteins are distributed in both yolk and albumen and are nutritionally complete proteins. An egg provides about 6 g fat. Egg yolk contains triglycerides, phospholipids, and sterols. Hen eggs are a rich source of linoleic acid, which is essential in human nutrition. The hen egg is also a useful food as a source of minerals and vitamins. Eggs are valuable and readily acceptable in diets for the elderly people who may have low caloric needs but have greater difficulty in digesting and absorbing nutrients. Eggs are easily digested and absorbed to provide several essential nutrients. Thus egg yolk is considered a potentially important source of energy.

**Table 1. Composition (%) of edible portions of egg from different species**

Constituents	Chicken	Duck	Turkey	Quail
Water	73.6	69.7	72.6	73.7
Solids	26.4	30.3	27.4	26.3
Organic matter	25.6	29.3	26.6	25.2
Proteins	12.8	13.7	13.1	13.2
Lipids	11.8	14.4	11.8	11.0
Carbohydrates	1.0	1.2	1.7	1.0
Inorganic matter	0.8	1.0	0.8	1.1

The comparative nutritive value of eggs and other food stuffs is given in Table 2. When compared to other foods of vegetable and animal origin, egg is having superior nutritional value. The biological value of egg protein is highest (96) which is highest amongst all the foodstuffs.

Table 2. Comparative nutritive value of eggs and other foodstuffs

Foodstuffs	Biological value	Protein efficiency ratio	Net Protein utilization	Chemical Score	Digestibility%
Egg	96	4.5	93	100	97
Milk	85	3.0	81	65	94
Meat	80	2.8	76	70	82
Chicken	82	2.9	78	71	85
Fish	85	3.0	72	70	85
Soybeans	64	2.0	54	57	73
Peas	56	1.6	45	42	72
Potato	60	1.8	49	48	82
Rice	64	2.0	57	60	90
Wheat	58	1.7	47	42	90
Maize	45	1.3	34	35	85
Bajra	62	1.8	52	52	88

Nutritive Value of Poultry meat

Poultry meat is well accepted, relatively cheaper natural food and a valuable source of nutrients for human being. Nutritionally poultry meat is a valuable source of proteins, vitamins and minerals and has a relatively low fat content (Table 3). The protein content of chicken meat is about 22% with a biological value of 79. The fat content of cooked chicken varies depending on whether it is cooked with the skin on or off, the portion of the bird, and the bird's diet and breed. Breast meat contains less than 1 g fat/100 g. An average value for dark meat (skin off) is 3 to 5g/100 g. About half of the fat from chicken meat is made up of the desirable monounsaturated fats, and only one-third of the less healthy saturated fats. The poultry meat and meat products are good source of many B-group vitamins which only occur naturally in animal foods and cover a significant



part of recommended daily intake. Poultry meat is tender due to less connective tissue and requires less cooking, hence retain more nutrients. Poultry meat has less bone and cartilage and more muscle and adipose tissue with higher nutritional value.

Table 3. Composition of chicken meat (without skin)

Nutrients	(%)
Water	75
Protein	20
Fat	3
Ash	1-2
Energy (kcal/100g)	115

The major food and nutritional issues of concern in India are insufficient or imbalanced intake of nutrients. Extensive diet surveys carried out in different part of India (rural and urban areas) indicate that diets are predominantly based on cereals. Diets of poor income groups are deficient in several nutrients, namely; energy, vitamin A, calcium, riboflavin and iron. Dietary deficiency of these nutrients occurs more frequently and to a greater degree among children, pregnant and lactating women whose nutrients requirement is higher. The common nutritional problems of public health importance in India are low birth weight, protein energy malnutrition in preschool children, chronic energy deficiency in adults, micronutrient deficiencies like vitamin A, iron, iodine, vitamin B-complex etc. A large segment of population suffers from nutritional anemia which is more prevalent among pregnant women. Iodine deficiency disorders are very common in large sections of population in several parts of the country. Hence there is a need for nutritionally adequate diet balanced with all essential nutrients to ensure nutritional adequacy of these people. The cereal based diet have to be supplemented with food items like pulses, vegetables, fruits, animal products including milk, meat and egg to make the diet more balanced and adequate in all nutrients. A balanced diet is one which provides all the nutrients in required amounts and proper proportions. The recommended daily allowance (RDA), the estimated amount of a nutrient (or calories) per day considered necessary for the maintenance of good health by the Food and Nutrition Board of the National Research Council/ National Academy of Sciences. The contribution of nutrients to recommended daily allowance (RDA) through consumption of one hen egg and poultry meat (100gm) per day is given in Table 4 and 5, respectively.



Table 4. Contribution of nutrients to recommended daily allowance (RDA) through consumption of one hen egg per day

Group	Category	B. wt (kg)	Protein	%RDA	Energy	% RDA	Calcium	% RDA	Vit.A (µg)	% RDA
Man	Sedentary work	60	60	11.5	2320	3.6	600	4.5	600	30
	Moderate work	60	60	11.5	2730	3.1	600	4.5	600	30
	Heavy work	60	60	11.5	3490	2.4	600	4.5	600	30
Woman	Sedentary work	55	55	12.5	1900	4.4	600	4.5	600	30
	Moderate work	55	55	12.5	2330	3.6	600	4.5	600	30
	Heavy work	55	55	12.5	2850	2.9	600	4.5	600	30
Children	1-3 years	12.9	16.7	41.3	1060	7.9	600	4.5	400	45
	4-6 years	18.0	20.1	34.3	1350	6.2	600	4.5	400	45
	7-9 years	25.1	29.5	23.3	1690	4.9	600	4.5	600	30
Boys	10-12 years	34.3	39.9	20.1	2190	3.8	800	3.4	600	30
	13-15 years	47.6	54.3	12.7	2750	3.1	800	3.4	600	30
	15-17 years	55.4	61.5	11.2	3020	2.8	800	3.4	600	30
Girls	10-12 years	35.0	40.4	17.1	2010	4.2	800	3.4	600	30
	13-15 years	46.6	51.9	13.4	2330	3.6	800	3.4	600	30
	16-17 years	52.1	55.5	12.4	2440	3.4	800	3.4	600	30

Table 5. Contribution of nutrients to recommended daily allowance (RDA) through consumption of 100g poultry meat /day

Group	Category	B. wt (kg)	Protein	% RDA	Energy (kcal)	%RDA	Iron (mg)	% RDA	Zinc (mg)	% RDA
Man	Sedentary work	60	60	33.3	2320	5.0	17	5.9	12	10
	Moderate work	60	60	33.3	2730	4.2	17	5.9	12	10
	Heavy work	60	60	33.3	3490	3.4	17	5.9	12	10
Woman	Sedentary work	55	55	36.4	1900	6.0	21	4.8	10	12
	Moderate work	55	55	36.4	2330	4.9	21	4.8	10	12
	Heavy work	55	55	36.4	2850	4.0	21	4.8	10	12
Boys	10-12 years	34.3	39.9	50.1	2190	5.3	21	4.8	7.8	15.4
	13-15 years	47.6	54.3	36.8	2750	4.2	32	3.2	6.4	18.8
	15-17 years	55.4	61.5	32.5	3020	3.8	28	3.6	5.8	20.7
Girls	10-12 years	35.0	40.4	57.1	2010	5.7	27	3.7	7.8	15.4
	13-15 years	46.6	51.9	38.5	2330	4.9	27	3.7	6.4	18.8
	16-17 years	52.1	55.5	36.0	2440	4.7	26	3.8	5.8	20.7



Serving eggs in Midday Meal Scheme

Egg is an excellent source of protein and all essential nutrients, except vitamin C for young children. The National Institute of Nutrition, which works under the aegis of the Indian Council of Medical Research (Ministry of Health and Family Welfare, Govt. of India), made the provision of eggs compulsory in mid-day meals, as they are considered cheaper, safer, more nutritious and easier to procure than alternatives such as milk or bananas. The inclusion of eggs is recommended since egg protein also has high biological value and digestibility. Many states in India have introduced eggs in mid day meal scheme. At present, 12 states serve eggs in mid-day meal in schools varying from 1 to 5 eggs per week.

4. Rural Poultry Production in India

Nearly 70% of India's population lives in rural areas and 58% of the rural households depend on farming activity for their livelihood. Livestock and Poultry production in the rural areas is generally considered as a key asset for rural livelihoods. Backyard poultry production (BPP) is an old age practice in India and mainly practiced by landless, small and marginal farmers and weaker section of the society living in rural areas. It acts as a source of supplementary income and liquid cash (ATM) compared to other livestock. It offers advantages over other agricultural sectors and is an entry point for promoting gender balance in rural areas. Rural women traditionally play an important role in BPP and are often in control of the whole process from day to day management to marketing. Rural Poultry is easy to manage, requires low inputs and provide good market demand and prices. Rural poultry production can be used to reduce poverty and malnutrition among women and children in rural areas. By increasing women's income, poultry farming also enhances women's social status and decision making power in the household.

Advantages of Rural/Backyard Poultry Production

- ✦ It is easy to manage and handle.
- ✦ It needs minimal use of land, labor and capital.
- ✦ There is huge demand and higher price for eggs and meat of birds produced in this system.
- ✦ It requires very little intervention in rearing and day to day management.
- ✦ It can easily integrate with other agriculture, aquaculture and livestock activities.
- ✦ It can contribute to the village economy.
- ✦ Women in rural areas can operate backyard poultry with maximum involvement.
- ✦ It ensures the availability of eggs and meat to cater the food need and also provides additional income.
- ✦ It has a potential to fight poverty and malnutrition and provide scope for high employment generation and solving gender issues.

Present Scenario of Rural Poultry Production

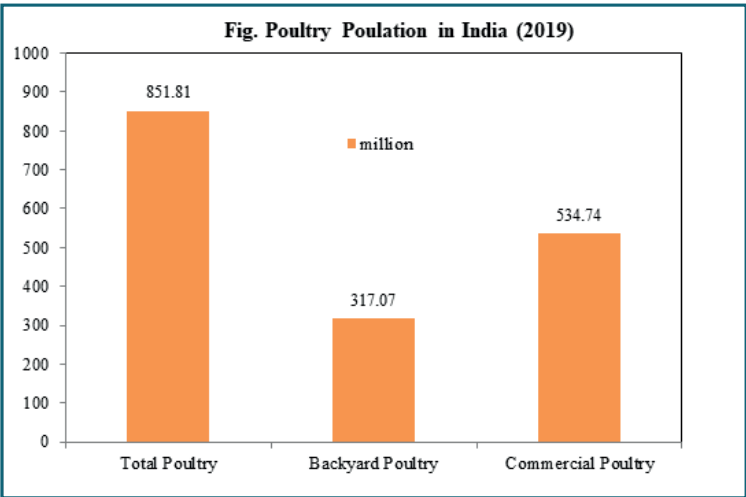
Poultry sector in India is mainly divided into two sub-sectors, one being a highly organized commercial sector and the other being an unorganized backyard poultry sector which plays an important role in providing supplementary income and family nutrition security to the poorest of the poor. As per the 20th Livestock Census, the total



poultry population in India is 851.81 million in 2019 which has increased by 16.8% over previous Census (729.21 million). The total backyard poultry population in India was 317.07 million in 2019 which has increased by 45.8% over previous Census (217.49 million). The total commercial poultry in India was 534.74 Million in 2019, increased by 4.5% over previous Census (511.72 million). Egg production from native chicken contributes only 17.8% of total egg production of the country.

Table 6. Poultry Population (million) in India

Poultry Population	2012	2019	% Increase
Total Poultry	729.21	851.81	16.81
Backyard Poultry	217.49	317.07	45.78
Commercial Poultry	511.72	534.74	4.50



The native/indigenous breeds of fowl is the choice for rural/backyard poultry production as they are hardy, resistance to common diseases, heat tolerant and do not need special attention as compared to exotic commercial breeds. However, the production potential of these native fowls is very low (40-50 egg/year). Hence, a need was felt to develop suitable varieties for rural / backyard production with improvement in the economic traits of the existing native breeds or the development of new stock with infusion of native blood. Research efforts were initiated in India around two and half decades ago for developing newer chicken varieties suitable for rural farming. These chicken varieties developed have multi coloured plumage and resemble the native chicken in their feather pattern, produce more meat and eggs than the natives. Due to these advantages the improved varieties of birds gained wider acceptability across the country. At present most of the birds grown in rural poultry production system are improved varieties of chicken developed by public and private sector institutions in India.

5. Rural Poultry Production Systems

The poultry production systems in India involve both the system of production such as traditional backyard system of production and the modern intensive system of commercial production. Rural poultry are kept under a wide range of conditions, which can be classified into major three production systems such as

- ✦ Free-range extensive
- ✦ Semi-intensive
- ✦ Small scale intensive

Free-range system: In the free-range system, birds are allowed free to roam for scavenging with provision for night shelter. This system is also called low input - low output system. The birds are let out for foraging during day time while in night they are provided shelter. Small number of birds (10-20) can be reared under this system and this is suitable for backyard poultry farming. Supplementary feeding is usually not practiced and often subject to the seasonal availability of surplus grain. This system is most common in rural areas. There is little or no linkage with input-output supply chain and the chicks are usually hatched from the broody hens at home. Most of the eggs produced (80%) go for hatching chicks and home consumption (20%).

Semi Intensive system: Under this system birds are reared partially in confinement and partially free range with the scavenged feed accounting for a substantial part of the total feed consumed. This system of production is suitable for rural poultry farming when limited numbers of birds (30-40) are kept for rearing. In this system, improved varieties of chicks are reared. Regular water supply with supplementary feeding is practiced. Most of the eggs (70%) produced are sold at household levels while rest (30%) goes towards home consumption.

Small scale intensive system: This system is suitable for commercial poultry production. In this system of production birds are confined entirely to the poultry shed. This system is most efficient, convenient and economical as compared to other systems. Nutritionally balanced feed is provided and routine vaccination procedure for vaccinating the chicks is followed. Flock sizes may vary based on the type of birds reared like 200 for broilers and 100 for layers. This system is well linked with input-output supply chain.

Whatever may be the system of rural poultry production, emphasis should be given to increase the income of poultry farmers by improving the existing system of farming rather than changing the dimension completely. The choice of poultry rearing system should be determined as per the availability of resources and inputs. Several factors influence the success of backyard poultry keeping and the most important one is scavenging based feed resources (household waste, crop residues, etc.). The performance of the bird is better where there is abundance of biomass. Health care facilities are another factor which influences the backyard poultry production. The vaccination against Ranikhet disease is essential as it is the major cause of death in poultry.

6. Action Research on Family Poultry Production

Research Methodology

The present study was conducted during 2017-2018 in Chanrapada and Parichanrapada villages of Nimapada block of Puri district, Odisha. In the first phase, household surveys of farm women were conducted through a structured interview scheduled to study the existing production system and constraints faced by them. In the second phase, an action research was conducted with farmwomen to develop a suitable model for family poultry production (FPP). Focused group discussions were carried out with women in the selected locale to find out gender related constraints, needs and opportunities in FPP for improvements.

Major constraints identified in Family Poultry Keeping

The various problems identified in family poultry keeping were low production potential of birds, lack of supplementary feeding, lack and difficult access to veterinary services (vaccines and quality chicks), lack of awareness and knowledge on improved practices and limited access to knowledge, technology and extension services such as market information, credit etc. One of the major problems identified was lack of scientific management of chicks during initial four weeks of age.

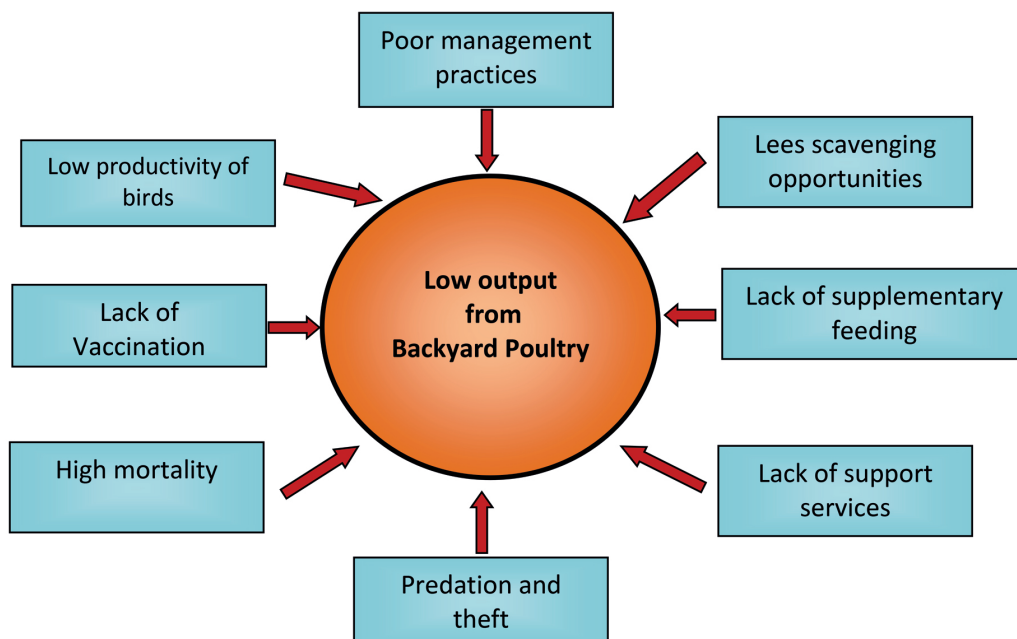


Fig. Reasons for low output from Traditional backyard poultry farming



Base line information on status of rural poultry from 100 households revealed that 28% of households were engaged in backyard poultry farming with capacity ranging from 5-15 non-descriptive chickens with traditional method of rearing and women play major role in it. With regards to gender role in FPP, it was found that most of the day to day work of FPP was performed by women. The construction of shelter of birds was joint responsibility while health coverage was taken by the men. Women looked after the feeding aspects of poultry. Most of the decision related to FPP was taken jointly. The information on gender based needs and constraints in FPP identified through focused group discussions revealed that lack of participation of women in training programmes could be due to cultural factors, lack of access of information on training programme, schedule venue, and duration of training, lack of access to inputs, technical assistance and marketing system, etc.

Table7. Gender based constraints and needs in FPP

Parameters	High (%)	Low (%)
Participation in Training	22	78
Decision Making	48	52
Access to Resources and Services	25	75
Marketing	38	52

The study further revealed that most of the birds reared under FPP are non descriptive chickens with low production potential (50-60 eggs annually) and are allowed to scavenge outside during day time and temporary shelters are provided during night to protect from predators, adverse weather and to provide laying shelter. The birds largely subsist on scavenging in gardens, village alleys and surroundings of the farms by feeding on crop residues, green forage, insects and worms. No formulated balanced supplementary feed is given to the birds, but they are accessed to kitchen waste as and when available. Although the birds are able to meet the nutrients for maintenance, but do not get enough nutrients for optimizing the production.

With this backdrop, an action plan was prepared to alleviate the major challenges faced by the farm women in FPP. The various domains identified are

- ✦ **Suitable chicken variety** – The production potential of native fowl is very low. Therefore, there is a need to introduce improved chicken varieties which can perform well in the low input system. Realizing the importance of rural poultry farming in India, research efforts were initiated two and half decades ago at ICAR Institutes and SAUs for developing suitable chicken varieties for rural farming. These chicken varieties developed have multicoloured plumage and resemble the native chicken in their feather pattern, produce more meat and eggs than the natives. Some of the chicken varieties developed for rural poultry farming are Giriraja, Girirani, Vanaraja, Gramapriya, Srinidhi, CARL Debendra, CARIBRO Dhanraja, Kamarupa, Narmadanidhi, Jharsim, etc.

Table 8. Promising improved chicken varieties for rural poultry production

Variety	Type	Developing agency
Giriraja	Dual	KVAFSU, Bangalore
Girirani	Egg	KVAFSU, Bangalore
Vanaraja	Dual	ICAR-DPR, Hyderabad
Gramapriya	Egg	ICAR-DPR, Hyderabad
Srinidhi	Dual	ICAR-DPR, Hyderabad
CARI Debendra	Dual	ICAR-CARI, Izatnagar
CARIBRO Dhanraja	Meat	ICAR-CARI, Izatnagar
CARI Nirbheek	Egg	ICAR-CARI, Izatnagar
CARI Shyama	Egg	ICAR-CARI, Izatnagar
Narmadanidhi	Dual	JNKVV, Jabalpur
Nandanam IV	Dual	TANUVAS, Chennai
Gramalakshmi	Egg	KAU, Kerala
Kalinga Brown	Egg	CPDO, Bhubaneswar
Kamrupa	Dual	AAU, Guwahati
Pratapdhan	Dual	MPUAT, Udaipur
Jharshim	Dual	BAU, Ranchi



Vanaraja



Gramapriya



Giriraja



CARI Debendra



Kamrupa



Narmadanidhi



- ✦ **Supplementary Feeding** - Under free range conditions the necessity of supplementary feed mostly depends on the scavenging area available in the backyards, intensity of vegetations and on the availability of household waste and crop residues. Generally the birds under free-range conditions can meet their protein requirement through scavenging but the possibility of energy deficit is more common. Therefore, supplementary feed with different cereals available under rural conditions is always beneficial to sustain production under extensive system of production.

Table 9. Making of feed with locally available Feed ingredients

Inpatients	Quantity
Maize/ Bajra/ Jowar/ Broken Rice etc.	50 parts
Rice bran/ wheat bran/ De-oiled rice bran etc.	20 parts
Soybean meal/ groundnut meal/ Sunflower meal/ Till cake/ Linseed cake	28 part
Vitamin and minerals	2 parts



Fig: Low Cost Feed for Poultry

- ✦ **Health care** - The single most important disease concerning to rural poultry production has been reported to be Ranikhet Disease (RD) which is accountable for 60-80 per cent mortality. Hence, vaccination against most common poultry disease (Infectious bursal disease and fowl pox) in general and Ranikhet disease in particular is very essential for success of rural poultry. Also there is a need for reliable diagnostic tests and facilities to differentiate various poultry diseases and also efficient vaccines must be made available at reasonable cost. Women should receive training in husbandry practices and gain access to poultry health services (Vaccination) for successful poultry activities.

Table 10. Vaccination Schedule for rural poultry

Age	Vaccine	Dose	Route
1st day	Marek's disease	0.2 ml	Subcutaneous (S/C)
7th day	Newcastle disease	1 drop	Ocular or nasal
14th day	Infectious bursal disease	1 drop	Ocular or oral
24th day	Infectious bursal disease	1 drop	Ocular or oral
28th day	Newcastle disease	1 drop	Ocular or nasal
6th week	Fowl pox	0.2 ml	Intramuscular (I/M)
8th week	Newcastle disease	0.5ml	I/M
18-20 weeks	ND+IBD killed	0.5ml	I/M or S/C
40th week	ND+IBD killed	0.5ml	I/M or S/C

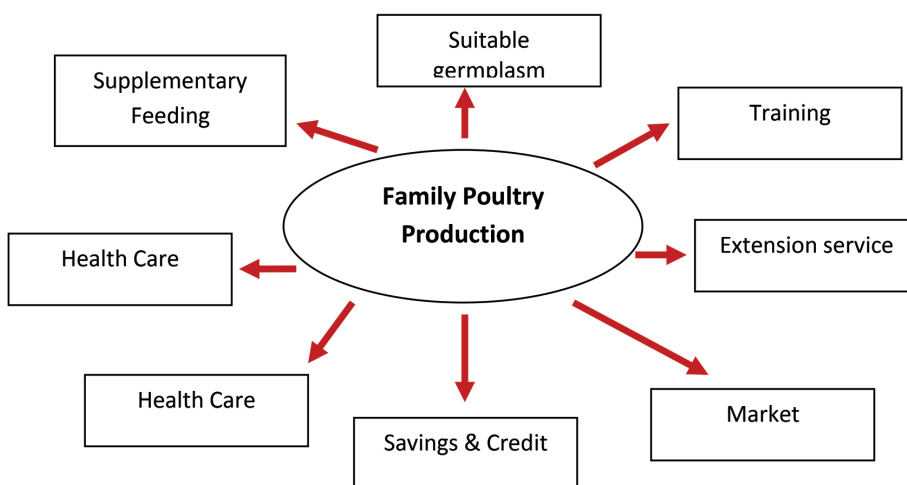


Fig: Various aspects of Poultry Production

- ✧ **Training and Exposure visit-** Many times failure in backyard poultry rearing is observed due to lack of knowledge, experience and sufficient exposure to poultry rearing. Training programs at village level targeting the stakeholders, women and youth should be organized for effective implementation of the farming.
- ✧ **Extension services** - Providing extension services including management, vaccination, disease diagnosis, market information and other inputs like supply of chicks, quality feed etc. is a major challenge for the system to be successful.
- ✧ **Marketing system** - Most of the birds in rural areas are sold live. Sometimes the birds are slaughtered and displayed for sale in the open air without any concern for hygiene. Therefore, there is a need for development of reliable and stable market



chain round the year for proper marketing of the poultry products. The farmers should be encouraged to develop the market structures required for them. It has been observed that women's groups proved to be effective in marketing of eggs along with other products at the local market. Also facilities for hygienic slaughter and preservation of eggs should be made available at market places in rural areas.

- ✦ **Credit Flow-** Access to Micro credit to farm women should be given priority with minimum interest rate.

Table 11. Technical constraints and Measures need for family poultry production

Attributes	Measures required
Housing	Advice of improved poultry housing with proper ventilation
Feeding and watering	Suggesting to make homemade feed using locally available feed resources Provision for feed and water troughs
Health care and vaccination	Advice on sanitation and health Women should be trained as vaccinators
Marketing	Training o handling and storage of eggs as well as marketing

Implementation of Action Research at the field level

Forty farm women were sleeted from Chanrapada and Prichanrapada (20 from each village) for undertaking family poultry production under the project. During awareness campaign farm women were explained about the advantages rearing of improved varieties of chicken compared to Desi/indigenous variety. On farm and off farm trainings were conducted on various aspects of poultry production such as handling of birds, preparation of suitable house, preparation of homemade feed for supplementary feeding, identification of sick bird, vaccination procedure, record keeping etc. Exposure visit was also made to the Poultry demonstration Unit of ICAR-CIWA and Central Poultry Development Organization, Bhubaneswar. Leaflets and pamphlets were also distributed to them, which explain about the package of practices to be followed.





Twenty (20), four weeks straight run chicks of dual purpose coloured Vanaraja were distributed to each selected farm women for rearing in scavenging conditions. The farm women reared the chicks by allowing them scavenge outside during day time and during night they were provided night shelter (low cost house), constructed using locally available bamboo and paddy straw with provision of drinking water. Two system of management were followed in rearing these birds like with or without supplementary feeding (30g/bird/day). The performance of the birds was monitored at regular intervals and technical support on feeding and health care was provided as and when required. The farm women were advised to sell the male birds, when they reach around 1.5 kg body weight (at around 10-12 weeks of age and to retain the females for egg production.

Some of the important observations noticed during field study are as follows.

- ✦ Most of the beneficiaries constructed poultry house by the side of their house and made up of locally available materials like clay, brick, bamboo, wood, polythene sheets, etc. Paddy husk was mostly used as litter material.
- ✦ The birds were allowed to scavenge outside during day time. Birds met most of their nutrient requirements from scavenging. Broken rice, rice barns, kitchen waste were usually offered once a day. Few farm women grown Azolla and fed to the birds.
- ✦ The trained women (Women vaccinator) used to vaccinate all the birds in a particular village. All the beneficiaries were bringing the birds to the door step of the women vaccinator during the vaccination day and were charges one rupee per bird for vaccination.
- ✦ No major outbreak of diseases was noticed during the field trials. The major cause of death was due to predator (mostly by wild cats).

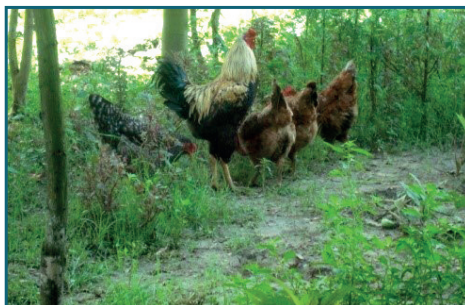


Table 12. Performance of Vanaraja cockerels in Field condition

Attributes	Supplementary Feeding	
	No	Yes (30 g/day)
No of birds reared	200	200
Body weight 28 days	350	450
Body weight 56 days	900	1050
Body weight 84 days	1450	1800
Mortality (%)	4.5	3.0
Income/birds (Rs.)	435	540
Supplementary Feed cost (Rs.)	----	34
Net profit/bird (Rs.)	435	506

The growth rate of the birds was monitored at monthly intervals. Supplementary feeding @ 30g/bird/day resulted in higher weight gain compared to those of without supplementation. The cockerels (male) of supplementary feeding group attained 1800 g at 12 weeks of age compared to 1450 g in the non supplementary feeding group. Thus the birds of supplementary group gained 350g higher body weight compared to non supplementary one. Calculating the feed cost at Rs.20/kg, the net return was higher by Rs. 714 per beneficiary due to supplementary feeding (Around Rs. 71/ male bird).



Table 13. Performance of Vanaraja hens in Field condition

Attributes	Supplementary Feeding	
	No	Yes (35 g/day)
No of birds reared	160	160
Age at first egg	168	162
Egg weight, 32 wks	51.90	52.40
Egg weight, 40 wks	54.80	55.60
Egg weight, 48 wks	55.60	56.20
Egg production, 48 wks	69	91
Mortality (%)	3.0	2.0
Income/birds (Rs.)	690	910
Supplementary Feed cost (Rs.)	-----	137
Net profit/bird (Rs.)	690	773

The female chicks were allowed to scavenge during day time. Broken rice, rice barns, kitchen waste were offered to them as and when available. At 20 weeks of age, supplementary feeding @ 35g/bird/day was given to one group (birds reared by 10 farm women). Egg production was recorded daily. Egg weight was taken at 32, 40 and 48 weeks of age. Supplementary feeding @ 35g/bird/day during 20-48 weeks of age resulted in significantly higher egg production compared to those of without supplementation. The birds of supplementary fed group produced more eggs with higher egg weight compared

to non supplementary one. Calculating the feed cost at Rs.20/kg, the net return was higher by Rs. 830 per beneficiary due to supplementary feeding (around Rs. 83/ bird). From the results of the present study, it is concluded that supplementary feeding @ 35g/ bird/day to Vanaraja laying hens in extensive system of production resulted in higher egg production and economic return.



Impact of Family Poultry on Women Empowerment

The impact of family poultry on farm women empowerment was studied through focused group discussion. The major findings came out were described here under.

Household income: The rearing of 20 birds (10 males and 10 females) by household has increased their net income. Around Rs. 3500/ net income was earned by each family through sale of male birds at 3 months of age. Subsequent rearing of females further increased their income by another Rs 5400/ through the sale of eggs. Taking eggs and meat, net income per household per annum was around Rs. 8500-9000/. The higher net income is attributed to the higher price of meat (Rs. 300/kg live weight) and egg (Rs. 10 per egg). If household consumption of eggs and meat are accounted, net income



ranges from Rs. 9800-1000/ per family per annum. The women spent the earned income towards payment of school fees of their children, medical expenses besides purchase of household items.

Nutrition security: Poultry egg and meat are important animal protein sources and essential in providing balanced diets for nutrition and health. Rearing of improved varieties of chicken has enhanced their food security and household nutrition. Survey revealed that around 28% of eggs produced were consumed by the family. About 60% of the women reported that, meats of 1 to 2 cockerels were consumed by the family. One of the most important observations was family poultry keeping provided an opportunity to the farm family to make egg an integral part of their diet.

Women empowerment: Family poultry had a significant positive influence on livelihood of farm women. As most of the women were looking after the day to day activities and involved in marketing of the produce, they also retained the earnings from the poultry. The constant involvement in purchasing and marketing eggs and birds, built of their confidence slowly. Over a period of time, the improvement in decision making was observed. Thus, family poultry provided an opportunity to empower them.

The study conducted at the field level with improved varieties of chicken (Vanaraja) not only increased income but also improved nutrition security of the farm family. It also paved the way for women empowerment. A family poultry production model was developed for enhancing income and improving nutrition security of farm families through family poultry production which is depicted below.

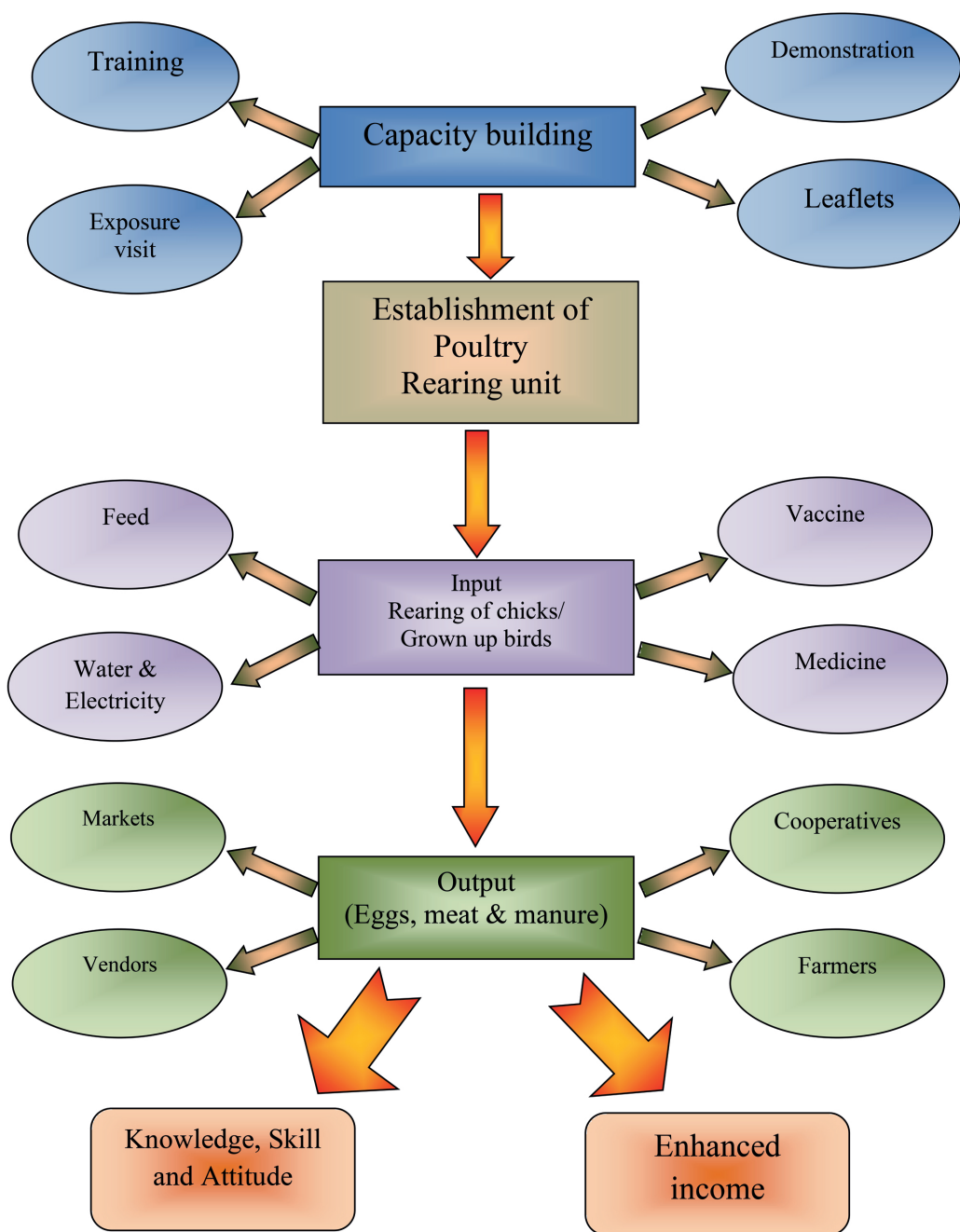


Fig : Family Poultry Production Model



Way forward

Family poultry is the small-scale poultry rearing by households using family labour and wherever possible, locally available feed resources. The poultry scavenge freely in the household compound to meet most of their own food and getting supplementary feed from the householder. Poultry provides a major income-generating activity from the sale of birds and eggs and also a valuable source of protein in the diet. Women play an important role in major aspects of family poultry production and family poultry represents one of the few opportunities for saving, investment and security against risk. The family poultry production model developed by the institute is worthy of replication because it improves the livelihood of farm family. With minimum effort, women can manage family poultry, and generate income and provide nutrition security to the family. It has been observed that capacity building of farm women is a prerequisite to make the family poultry a success. There are many issues which need to be addressed for making the family poultry production a great success.

Availability of chicks: Although many women are interested in small scale poultry rearing, they are not getting the chicks. The existing available set up is not able to meet the demand of day old chicks suitable for rural poultry farming. In the present scenario most of the Govt. organizations with their limited set up are involved in developing and propagating chicken varieties for rural poultry farming and confined to few states. There is a need to create more such multiplication and propagation unit involving both public and private sectors to cater the need of entire country. There is a need to develop mechanism so that chicks should be available at farmer's door.

Establishment of mother units: It has been observed that there is higher mortality of chicks during initial one month of life due to lack of brooding facility at the farmer's door. This is due to lack of electricity supply and also rural areas receive 6 to 8 hours electricity a day. This necessitates the establishment of Mother Unit where chicks for rural poultry farming are grown during initial four weeks of life. Growing newly hatched chicks in mother unit reduces the neonatal mortality significantly. Establishing mother unit will offer a small scale enterprise development in rural poultry where progressive farm women can establish a rearing facility for day old chicks (1000-2000) by availing loan or self financing.

Supplementary feeding practice: The nutrient intake of scavenging birds varies from place to place according to the seasons, the crops grown and the natural vegetation available. The field trial results revealed that supplementary feeding to the hens during laying period has increased the egg production. There is a need to identify and use locally available feed resources to formulate diets that are as balanced as possible.



Efficient health care facilities: In most family flocks, disease is an important problem. The minimum veterinary services should be made available to the farmer locally. Vaccination against poultry disease like Ranikhet disease (RD) in particular is very essential for success of rural poultry. Community level vaccination keeping a village as unit should be promoted to reduce the incidence of disease. Training on proper management and bio-security should be imparted to prevent spread of diseases.

Farmer organizations: There is a need to develop producer groups, for easier access to essential inputs (such as chicks, feed, medicine, vaccines, technical advice, etc.) and for credit, training, transportation and the marketing of poultry products. An improved marketing strategy may enable women to get better profits than a commercial large scale producer.

Training of farm women: It has been noticed that, where women received training in management practices and gain access to health services, family poultry production was more successful. Hands on practical training programs on management of chicken varieties for rural poultry farming in the areas like feeding, housing and equipment, disease control, and marketing should be organized. Training programs at village level targeting the stakeholders, women and youth should be organized for effective implementation of the farming.

7. Success Story

Empowerment of Farm Women through Family Poultry Production

Smt. Sasmita Bhoi was identified as one of the beneficiary under the institute project for livelihood improvement through family poultry production. She had participated in the capacity building program organized by ICAR-CIWA on various aspects of backyard poultry production such as handling of birds, preparation of suitable house, preparation of homemade feed for supplementary feeding, identification of sick bird, vaccination procedure, record keeping etc. As a part of exposure visit, she also visited the Poultry demonstration unit of ICAR-CIWA and Central Poultry Development Organization, Bhubaneswar.

Thereafter, thirty Vanaraja chicks of four weeks old were provided to her for backyard rearing. Low cost



poultry house was constructed by using locally available bamboo and paddy straws. The chicks were allowed to scavenge during day time. Broken rice, rice barns, kitchen waste were offered to them as and when available. Body weight of the birds was recorded at monthly intervals. Male birds weighed on an average 1.6 kg in three months. She sold the male birds @ Rs.300/ per kg live weight and earned Rs. 7200/. Female birds were reared for egg production and Rs. 7500/ (Rs. 10/egg) were earned in one year by selling eggs. Old hens were sold at Rs. 200/ each and Rs. 2600/ were earned by selling 13 hens. Thus, she had a net income of around Rs. 17, 300/ in one year through backyard poultry rearing. The money gained by poultry rearing was utilized towards education of her children, purchasing household items, medical expenses, etc. She also purchased a bicycle for her school going daughter worth Rs. 6000/. Around 20% of the eggs laid by the hens were also utilized for home consumption, which provided nutrition security to her family. The training and skill learned from ICAR- CIWA, the experience gained from her own poultry unit, and realizing good income made her confident enough to continue with the poultry farming and now it is maintained by around 50 birds. Smt. Sasmita Bhoi is the successful role model and an eye opener by showing path and hope for improving livelihood of rural women through family poultry farming.

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