



## Nutritional and livelihood security through backyard poultry model in tribal regions of Maharashtra, India

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### ABSTRACT

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Backyard poultry production system is mostly found in rural, resource-poor areas that often suffer either from food/nutritional insecurity. Family or rural poultry farming provides households with income and access to nutritionally-rich food sources. In the present study, improved poultry birds of Giriraja, Vanaraja, Swarnadhara and Rhode Island Red (RIR) varieties, that are phenotypically similar to existing poultry population in the area, were distributed amongst 25 tribal households across five villages in Arvi and Karanja blocks of Wardha district, Maharashtra. Fifteen day old chicks were supplied to the households; they were trained on minimal management practices to be followed for brooding, maintenance, vaccination and feeding. Data were collected using designed questionnaire. The study revealed that an average net income of Rs.4000 per household was generated as an additional income during the year from backyard poultry farming.

**Key words:** Backyard poultry, Improved varieties, Eggs and Chicken, Nutrition and livelihood security, Rural tribes.

### INTRODUCTION

Backyard poultry production (BYPP) is accessible to vulnerable groups of society, and provides income, nutritionally-rich foods, contributing to mixed farming practices and women empowerment. Chronic malnutrition and micronutrient deficiencies are very high in developing countries (Quin *et al.*, 1990; Callens and Phiri, 1998) and promotion of backyard poultry among poor landless and marginal farmer households can help to address this problem. Backyard poultry plays a major role in income and food security of rural poor households by generating cash income through the sale of poultry and poultry products which they do not consume themselves (Islam *et al.*, 2014). Many rural poor households rely on their own poultry production to meet their requirement of animal protein sources. Poultry provides not only protein but also highly-bio-available essential micronutrients, such as iron, vitamin A and zinc, which are crucial especially for children (Iannotti *et al.*, 2008). There is also growing evidence to demonstrate the role of backyard poultry in enhancing the food and nutrition security of the poorest households, reducing livelihood vulnerability and insecurity, and promoting gender equity (Ahuja and Sen; 2007; Cabarles *et al.*, 2012).

Specific improved varieties of birds are now available for rearing for meat or eggs and few varieties for both (dual purpose). In rural areas of India, poultry reared in the backyard are mostly desi type with low egg and meat production (Ghosh *et al.*, 2005) and there is

need of introduction of improved dual purpose birds having capacity to lay more eggs and gain higher body weight than the local or desi birds. Few chicken varieties developed by Directorate of Poultry Research, Hyderabad with their multicolored plumage resemble the native chicken in their feather pattern; produce more meat and eggs than the natives e.g. Vanaraja. Giriraja breed of chicken suited for mixed and backyard farming developed by Karnataka Veterinary, Animal, and Fishery Sciences University, Bangalore which lays about 130-150 eggs per year, weighing 52-55 grams. Swarnadhara is a hybrid chicken breed developed at Department of Avian Production and Management, Hebbal, Bangalore. They lay about 180-190 eggs in a year. Rhode Island Red chicken is an American dual purpose chicken breed is a good egg layer, but can be raised for both meat and egg production.

This paper deals with the introduction of backyard poultry as a component of a Farming System for Nutrition (FSN) study under the research programme on Leveraging Agriculture for Nutrition in South Asia (LANSA) in Wardha district of Maharashtra (Das *et al.*, 2014). The FSN model envisages developing and demonstrating a sustainable framework of farming to improve nutritional outcomes that can be used for up scaling and wider adoption. Wardha district, one of the selected study sites, is one of the six agrarian distress districts where a special package to alleviate agricultural distress was launched by the Government of Maharashtra in 2005. Wardha was one of the thirty-one districts identified by the Government of India as prone to

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agriculture-related suicides and has been covered under a rehabilitation package.

Small and marginal farmers have limited land resources which make it difficult for them to get enough food production to meet their household nutritional requirements. In this context, backyard poultry was identified as an intervention to meet their nutritional requirements. With limited investment and low operational cost, poultry can give good returns and ensure adequate income even during adverse climatic situations leading to crop failure. The objectives of the study were to assess the role of backyard poultry farming in improving food, income and nutritional security.

**MATERIALS AND METHODS**

*Study area*

The five Farming System for Nutrition (FSN) study villages in Wardha district comprising 556 households with population of 2,254, were purposively selected on the basis of agro-climatic and socio-economic status, landholding pattern, farming practices and food consumption pattern.

*Baseline survey assessment*

A majority of farmers were either small or marginal land holders (63%) with an average land holding size of 1.2 ha. Farming in their own fields supplemented by wage labour work in other farmer’s fields was the primary economic activity. It was found that backyard poultry was being practiced by only 3% households (Bhaskar et al., 2018). Anemia and protein deficiency were major nutritional deficiencies observed (Das et al., 2014; Nagarajan et al., 2014).

Out of 556 households in the five villages, 175 (32%) were landless with agricultural and non-agricultural wage labour being the primary occupation and 39% belonged to small and marginal category having agriculture as their primary occupation. More than 80 per cent of children (< 5 years age), adolescent girls (12-17 years) and women (18-45 years) were found to be anemic. There was high prevalence of undernutrition particularly underweight among the population (43% of 0 to 5 years’ children; 39% of adult women and 50% of adult men). Vitamin A deficiency was also found to be high at 35% among 1 to 5 years’ children (Pradhan et al., 2017).

*Animal source food consumption pattern*

The mean intakes of food were compared with

the suggested balanced diet provided in Recommended Dietary Intakes for Indians (RDI) by the Indian Council of Medical Research (ICMR, 2012). Using this reference, the frequency distribution (%) of households according to a level of food intake of less than 70% of RDI was estimated. Animal source foods were consumed in higher quantities during harvesting season, due to the availability of money by selling their commercial produce. The average consumption of animal source foods are given in table 1. The proportion of households consuming fish and sea foods was very low (about 10%), that too only once or twice a month. About 55% of households consumed meat and poultry once every week, about 20-25% consumed once or twice a month, while about 15-20% never consumed. Most commonly consumed items were egg, chicken and meat. The average intake was about 100g/CU/day in study areas, and mostly purchased from open market. It was observed that animal source foods were consumed in higher quantities during harvesting season, due to the availability of money from sale of produce.

*Intervention, data collection and analysis*

For improving the backyard poultry with improved birds in the study areas, twenty-five households were given 16 chicks, each 15 days old and comprising mixed breeds viz., Girirajaa, Vanaraja, Swarnadhara and Rhode Island Red (RIR) varieties based on the availability and sustainability. Given high mortality of birds during the early growing stage and the need for extra care (such as brooding), it was strategically planned to provide slightly older chicks rather than day old chicks. Chicks were obtained from the Central Hatchery, Nagpur and were collectively reared together for about two more week. The two weeks old chicks were then supplied to 25 identified households in January 2016. Training was imparted on scientific backyard poultry farming (comprising balanced feeding, handling of feed and drinkers (watering), use of low cost poultry feed (comprising of grain, bran, cake calcite, salt, minerals and vitamins etc.) besides information with regard to purchasing feed from market and health management in technical consultation MAFSU, Nagpur was also provided. The required critical inputs, handholding to follow recommended vaccination schedule was also provided to the households with technical support from the District Animal Husbandry Department, Wardha and MAFSU.

**Table 1:** Frequency of consumption (g/cu/day) of animal source food.

Food groups	Daily	Twice/ Thrice a week	Once a Week	Once a Fortnight	Once a Month	Occasional	Never	Average Intake (g/CU/day) when consumed
Milk & Milk products	85.4	1.3	4.0	0.0	0.0	3.8	5.6	86
Fish & Other Sea Foods	0.0	0.2	3.1	1.3	3.6	1.1	90.8	99
Meat & Poultry	0.2	5.6	53.6	7.6	16.8	0.0	16.2	107

Source: Baseline Survey-2014; CU: Consumption Unit

Both quantitative and qualitative methods were used for data collection. In order to assess the impact a survey and focus group discussion was conducted among the participating households in study villages in 2016-17. Data about economics and utilization pattern of produce were collected with the help of a one-page structured questionnaire and group discussion. The data was collected on monthly basis by trained village volunteers and project staff. Quantitative data analysis was done using statistical tools.

#### Housing for poultry

Besides 16 poultry chicks, each 15 days old comprising mixed breeds each household was supported with one unit of poultry including double layered iron poultry cage, poultry feed of 25kg, and to protect birds from cold in the initial stage an electric wire with electric bulb was provided. The total poultry package cost per unit was around Rs.3000/-, which was supported with 50% contribution from poultry grower and 50% contribution from the project. Feed was provided for the period of initial two months to ensure better growth and subsequently, they started giving feed comprising mixture of sorghum, wheat, rice, gram, tur, maize etc. as a regular feed. The 100-watt electric bulbs and wires were provided to maintain temperature for the chicks as a homemade heater.

#### Vaccination for the poultry

Vaccination was arranged for the chicks and in addition the farmers were also advised to practice routine deworming of the birds at regular intervals of 35 to 40 days. The technical support was provided by District Animal Husbandry Department, Wardha and MAFSU, Nagpur.

**Table 2:** Nutritive Value of chicken and eggs. (All values are expressed per 100 g of edible portion)

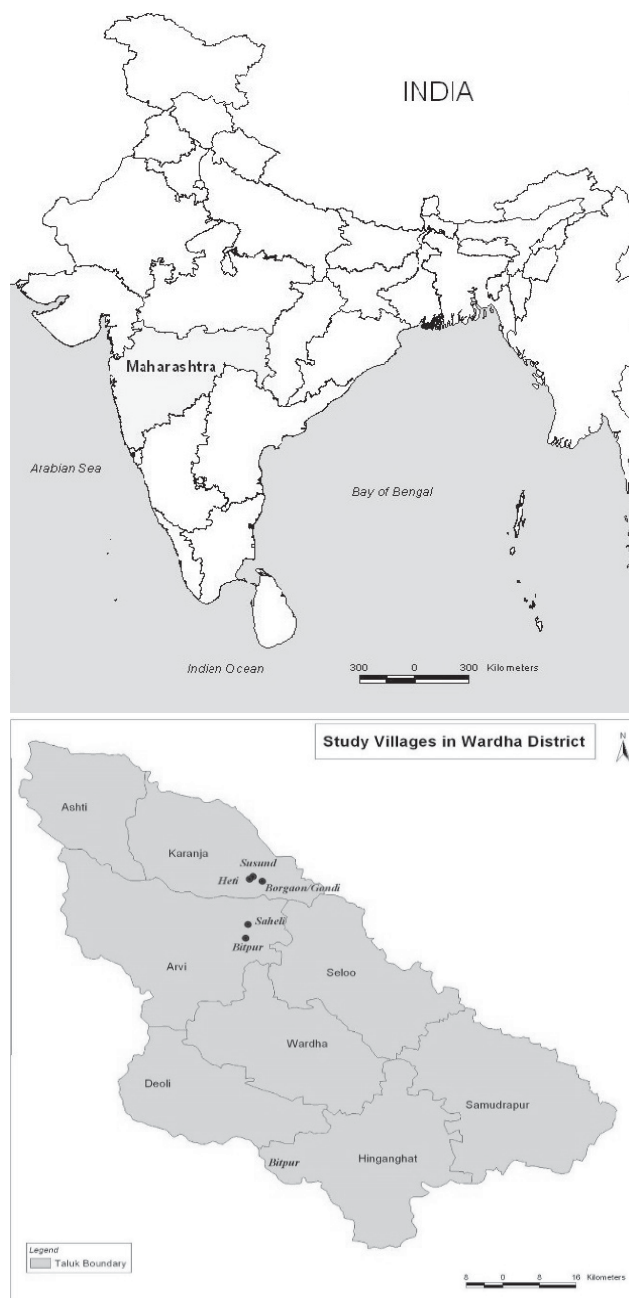
Nutrient Content	Chicken	Eggs
Moisture (g)	67-78	51-83
Protein (g)	17-21	12-16
Fat (g)	2-14	10-27
Energy (Kcal)	386-1605	220-1290
Calcium (mg)	12-28	53-55
Phosphorous (mg)	178-199	23-586
Iron (mg)	0.83-1.43	0.15-4.92

**Source:** Indian Food composition tables, 2017, NIN, Hyderabad

## RESULTS AND DISCUSSION

#### Production utilization and economics of backyard poultry

Chickens weighed about 26.16 kg per household during the course of the experimental period. Out of this 12.23 kg chicken were used for household consumption and 13.97 kg was marketed. An average of fifty eggs were produced per household and out of these 34 were consumed at home level and other surplus 16 eggs were



**Fig. 1:** Location of Study Area

**Table 3:** Total production & utilization data of Poultry (Jan-Dec, 2016).

S.No.	Particulars	Total	Average per HH
1.	No. of households (HH)	25	—
2.	Chicken consumption by practising HH in Kg	305.65	12.23
3.	Chicken Sold in (No's)	135	5.4
4.	Sale of chicken in Kg (Rs.250/kg)	349.20	13.97
5.	Total egg production (Nos)	1250	50
6.	Eggs consumption at Household level	850	34
7.	Eggs sold@10Rs/ egg	400	16

**Table 4:** Economics of Backyard Poultry per household.

Particulars	Per household details
Fixed cost (Housing/Electric bulb)	1700.00
Variable Cost (Cost of Chicks/Feed/Medicines etc)	1300.00
Total Cost (Fixed + Variable Cost)	3000.00
Gross Return (Production cost of Eggs and Chickens)	7000.00
Total Profit	4000.00
Cost benefit Ratio	1:1.75

Source: Impact Survey of sampled Households, 2016.

marketed. This suggests that this is a promising intervention for improving household food security. The details of sample respondent production and utilization of poultry are given in Table 3. The data in table 4 shows that the average annual income per household having backyard poultry/unit was Rs. 4000. This was earned from sale of eggs and birds in one year after deducting cost of feed, medicine and other costs in management of backyard poultry. Backyard poultry farming with low input and scientific management practices can thus give good income with employment to women and educated rural youth. Consumption of eggs and also chicken by households was also observed to have gone up.

*Additional nutrients due to backyard poultry farming*

The chicken (654.20 kg) and eggs (1250 nos.) that were produced at sample respondent level were converted to nutrition equivalence in terms of protein, calcium fat, phosphorous, iron and energy to examine the additional nutrients harvested through this activity (Table 5 and Fig. 2). Encouraged by the results of the first round, twenty-five households were again facilitated to procure chicks

**Table 5:** Additional nutrient due to poultry promotion.

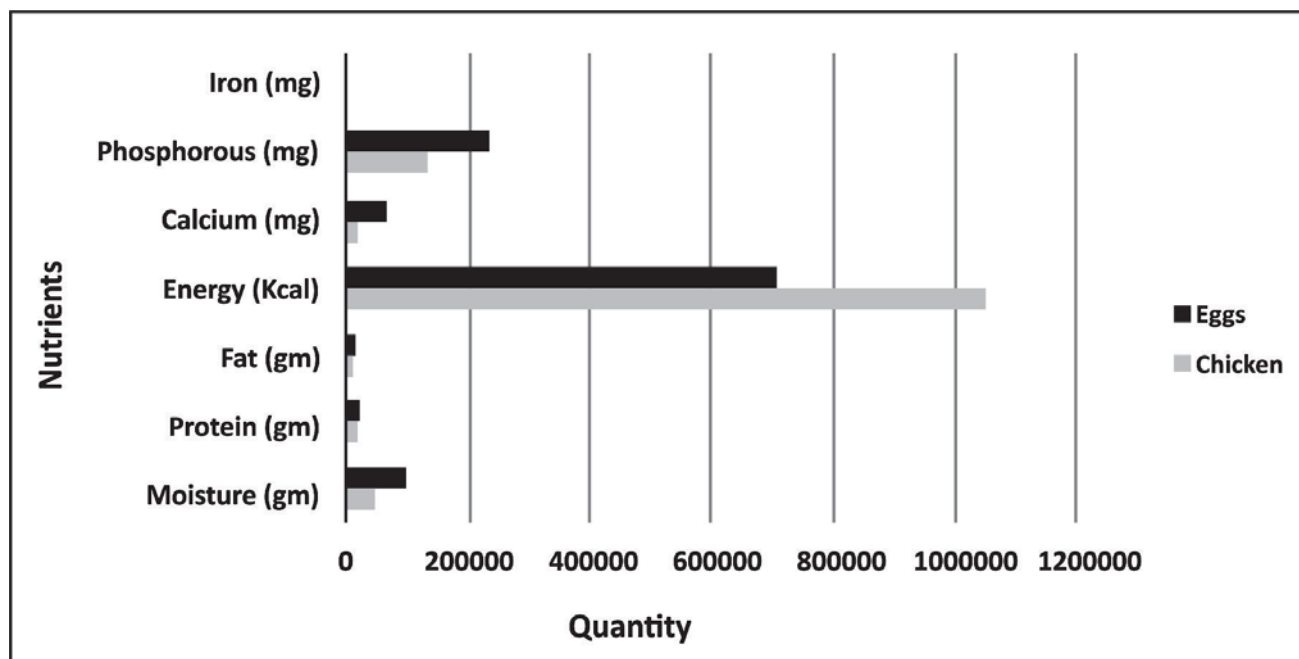
Nutrient Content	Chicken	Eggs
Moisture (gm)	47429.50	83750.00
Protein (gm)	12429.80	17500.00
Fat (gm)	5233.60	23125.00
Energy (Kcal)	651256.10	943750.00
Calcium (mg)	13084.00	67500.00
Phosphorous (mg)	123316.70	380625.00
Iron (mg)	739.25	3162.50

(All values are per 654.20 kg of chickens and 1250 numbers of eggs consumable portion)

in January 2017. End line survey in 2017 revealed that compared to baseline in 2017, when only one per cent households were having eggs twice or thrice a week, the figure was ten per cent households at end line, Households that had taken up the activity reported increased consumption of both eggs and chicken, during focus group discussion.

Backyard poultry needs little investment in terms of money, space or feed and capacity building. Increase in consumption of eggs and chicken, setting up of backyard poultry with high egg/chicken yielding breeds suggests this to be a promising intervention. Few eggs that are produced are consumed at home and surplus was marketed. Promising as this approach is to increase access to eggs and chicken, both of which are rich sources of animal protein, its sustainability will depend on easy access to the improved breeds of birds to replenish the old birds. However, it was also observed that improved breeds perform better in relation to body weight at different age of growth and annual egg production as compare to local poultry.

Findings also indicated that average annual income



**Fig. 2:** Additional nutrients due to poultry production

of backyard poultry/unit was Rs. 4000 with 16 birds, if the number is increased to 50, it will be a source of subsidiary income for small and marginal farmers and the landless. Ensuring that the backyard poultry with improved breeds and certain inputs like quality feed, vaccinations can be a viable source of income and nutrition particularly for resource poor rural families. There are benefits of backyard poultry in terms of nutritional and livelihood security; but, there are also some major constraints to their sustainability. The key constraints are access to availability of quality breeds, lack of knowledge on scientific backyard poultry farming, assured market, access to veterinary services and appropriate extension materials. To successfully address these barriers, management practices need to be assessed for local sustainability, cost effectiveness and the greater involvement of women.

In the present case, for sustainability of backyard poultry, selected individuals from the community in the core study villages were trained on understanding the economics and nutritional benefits by the local trained village volunteers. The idea is that they will be the champions to take forward and generate greater awareness on scientific backyard poultry farming at the ground level.

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