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## RESEARCH ARTICLE

### EVALUATION OF NEW MODEL OF RURAL POULTRY PRODUCTION FOR SELF EMPLOYMENT, LIVELIHOOD SECURITY AND POVERTY ALLEVIATION (MODEL-1)

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#### ABSTRACT

The continuous decrease in cultivable land and land holding pattern is making agricultural enterprises less economical. Keeping this point in view the present study was conducted to develop suitable model(s) of rural poultry production based on semi-range system. A total of 907 farmers, out of 5,250 families in 65 villages, were given the chicks for evaluation studies and 34 families were monitored for impact. Chicks of dual purpose strain, Nirbhik, developed by Central Avian Research Institute, Izatnagar were provided in the batches of 250-300 per farmer. They were fed with azolla based feeding practices by keeping in shelters according to the model I in this study. Some farmers adapted the birds under open range system, either out of fancy or for subsidiary income, in the strength of 20-30 chicks. Some farmers in the group of the 34 monitored families, upgraded and opened small broiler unit from the income generated and reared batches of 300-500 broiler chicks, side by side. The profitability was assessed on the basis of data provided by them. The cost of small shelter constructed by the farmers varied between Rs. 800-1,500/-. The lowest cost realized from the sale of birds on live weight basis in summer month of 2010 was Rs. 85/ kg and highest during winter of 2010-11 i.e. Rs. 160/ kg. The market rates varied between Rs. 100-150/ kg live weight which is about 10-15 % higher than the broiler. The net profit per bird varied between Rs. 100-125/- and the batch of 250 chicks fetched net profit of Rs. 23,000-30,000/-. The net profit from the broiler units varied between Rs. 6-9/ per chicks. Even the disease problem by this particular system of rearing was found to be negligible. The evaluation of profitability among the system i.e. small broiler unit, model-1 and open range system clearly evidenced a much higher profitability in the present model. A unit of 500 broiler chicks can produce net profit of Rs. 20,000- 35,000/- in 5 cycles while in the present model, it can cross Rs. 90,000/- in a year. In open range system, profitability could not be ascertained clearly as the birds were either consumed by the families or sold as per the need and no pattern was followed. Model-1 thus provides resource generation, self-employment, livelihood security and poverty alleviation as a whole and rural poultry has been established as the best tool for poverty alleviation.

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## INTRODUCTION

Over 80 per cent of the total poultry population is constituted by rural poultry that is raised as well as utilized by equal human population i.e. 80 per cent. The continuous decrease in cultivable land and land holding pattern is making agricultural enterprises less economical. Various reports advocate that smaller land holdings are uneconomical for agriculture. The increasing human population will demand more food and in the diminishing land holding scenario, continuous increase in production and productivity is needed. The livestock, including poultry, is a value added component in the agriculture. Livestock and agricultural (crop) activities are inter-dependant so that any one cannot sustain alone (Boehlje *et al.*, 1999; Garces, 2002; Fanatico *et al.*, 2006; Gallai *et al.*, 2009). The increasing competition between human population and livestock, particularly poultry, for grains and even for by-products (to certain extent) needs some alternate or radical changes in thinking for feed

and feeding practices (Gondwe *et al.*, 1999; Rai *et al.*, 2000; Mohanty and Rajendran, 2003; Renuka, 2003; Chatterjee *et al.*, 2004; Pandey *et al.*, 2007; Ravisankar *et al.*, 2007). Various surveys conducted in the process of creating reasonable livelihood security in India suggested that nearly 27-32% rural population has become landless in terms of cultivable land while 36-42% population is of marginal farmers. Most of the technologies being developed are aimed to small (22-26%) and large farmers. The major challenge is creating livelihood security to these nearly 70% of rural families, particularly the landless farmers (Kitalyi, 1997; Parthasarthy Rao *et al.*, 2005; Tim *et al.*, 2008). They are resource poor, cannot face risk of any uneventuality, have poor skill level, un-aware with recent technological improvement and face typical socio-political-economical penury. The livelihood security is not mere food and nutritional security but also include educational (children), health and economical security. All these cannot sustain without environmental security (Bruce, 1992; Doak *et al.*, 2004; Rai *et al.*, 2013). Thus, keeping in view these facts in mind, the economical return must be reasonably higher and inputs must be available in the vicinity so that exploitation of these resources poor masses by affluent sections is avoided. Poverty is a comparative

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term. However, the population having reasonable livelihood and able to fulfill various aspects of livelihood security can be characterized above poverty line. However, minimum physical facilities must also be available to these populations (Amin *et al.*, 1994; Ball *et al.*, 1997; Hofner and Folsch, 2001). Poultry production, one of the fastest growing sectors, is considered as a better option for self-employment. The sector is well organized in terms of chick production and supply, equipments, feed and marketing. However, it focuses on deep litter system which needs higher investment, infra-structure, balanced feed and assured marketing. These facts are major constraints in rural areas and with resource poor farmers (Bartussek, 1999; Soqunle *et al.*, 2012). The open range system, practiced since, ages is suitable for subsidiary income and cannot be source of livelihood security. Furthermore, ever increasing cost of balanced commercial feeds affects the profitability of deep litter system (Miao *et al.*, 2005; Singh *et al.*, 2013).

The present study has been conducted to develop suitable model (s) of rural poultry production based on semi-range system, including suitable low cost feeding practices and to evaluate its profitability in comparison with deep litter and open range system, aiming self employment, livelihood security and poverty alleviation in rural areas.

## MATERIALS AND METHODS

The present study was conducted in the world bank funded National Agricultural Innovation Project of Indian Council of Agricultural Research between 2009-2012 in 2 districts of Barabanki and Raebareli of U.P., representing northern plains of India in terms of resources, socio-economic penury and agro-climate. Though, the initially various aspects of the new production system were developed and evaluated in A&N Islands, but the technological development, integration and evaluation of impact was systematically completed in these 2 districts. A total of 907 farmers, out of 5250 families in 65 villages, were given the chicks for evaluation studies. Among these 907 farmers (landless and marginal), 34 families were monitored for the impact.

**Table1. Growth rate of Nirbhik strain**

Group (No. of families/chicks)	Average Body weight at 8 <sup>th</sup> weeks (g)	Average body weight at 16 <sup>th</sup> week (g)	Mortality at 16 <sup>th</sup> week (%)
Non-azolla fed chicks (4/505)	773.5±22.6	1384.2±32.1	7.01
Azolla based feeding practices (34/2450)	834.8±17.4	1910.6±24.6	5.1

### System of rearing and chicks

A shelter was made of earth/bricks, measuring 4x4x15 feet (W x H x L) or 8X4X8 feet. On front portion one door of chicken wire mesh framed in waste wood (2x3 feet) was incorporated. The roof was made of asbestos sheet to withstand rain. This night shelter was sufficient to accommodate 400-500 chicks. The system of rearing is based on semi-range system. Shelter was made in front of the house (on any side) or adjacent to house-wall to save the available space to the family. Some farmers made it under the orchards near to their house. Outside the shelter one earthen or plastic open container was provided as waters. An azolla pit with depth of about one feet and width of 2-3 meters and length as per the space available, was dugged near the shelter. The bottom of the pit was sealed with thick polythene (300 micron). The pit was filled with fresh water. About 2-3 kg one day old dung and 100g single super phosphate was dissolved/ mixed in the pit water after decanting. The pit water was repeatedly changed every week and during peak summer/winter, daily so that water temperature is nearer to the ideal temperature for azolla i.e. 15-25<sup>o</sup> C. the fresh *Azolla microphylla* was spread in the pit and allowed to grow. Chicks of dual purpose strain, Nirbhik, developed by Central Avian Research Institute, Izatnagar were provided in the batches of 250-300 per farmer. Later on it was provided at 2-3 months intervals. The disposal of chicks started after 12<sup>th</sup> week when the body weight

crossed around 1.5 kg. All the birds were disposed of around 16<sup>th</sup> week (the tender meat stage) and sold as country (desi) birds with premium prices.

### Feeding Practices

The chicks were provided mesh for about 10 days inside the shelter. Brooder was installed inside the shelter, particularly during winter months for heat. After about 10 days of age chicks were gradually allowed outside of shelter, initially for 2-3 hrs and later from morning to evening. Azolla was harvested by the farmers in the morning and spread over a sheet on which birds ate *ad lib*. The birds grazed in the open surrounding area of about 200 sq.m. Housewives provided kitchen waste or some grains (10-25g per bird) outside on a sheet.

### Comparison of profitability in various systems

Some farmers adapted the birds under open range system, either out of fancy or for subsidiary income, in the strength of 20-30 chicks. Some farmers in the group of the 34 monitored families, upgraded and opened small broiler unit from the income generated and reared batches of 300-500 broiler chicks, side by side owing to easy availability of chicks and commercial feed. The profitability was assessed on the basis of data provided by them. All the chicks received vaccination against Marek's disease on the day of hatching and due to default could not be vaccinated later on against infections bursal disease or Ranikhet disease. Birds were sold on live weight basis and body weights at 8th and 16th week were recorded. The disposal of birds was on demand basis which was very high during winter months.

## RESULTS

The cost of small shelter constructed by the farmers varied between Rs. 800-1500/-. The location of shelter also varied depending on the space available but chicks were in the vicinity and monitored by housewives/ children/older people in the family. In north India, there are 2 distinct seasons when temperature goes either very high or low

viz. peak summer or peak winter. From last week of May to 3<sup>rd</sup> week of June (about one month) the water temperature in the azolla pit rose above 25<sup>o</sup> C, resulting in death of the algae, and growth was negligible. Similar situation occurred from last week of December to January when water temperature was below 15<sup>o</sup> C, resulting in death of algae. Farmers used devices like polysheet, thatch and daily change of water but the growth was stunted. During ideal temperature, the fresh yield of *Azolla microphylla* reached one kg/m<sup>2</sup>. The birds relished the Azolla and even waited for its harvest. During grazing, birds picked up insects, grains, new germinating grasses and such other inputs. In some houses, birds adapted to the sound of the house wife when she was giving the grain/kitchen waste. In the evening all the birds came into the shelter on the call of house wife. The body weights of chicks are given in the Table-1 along with the mortality. The lowest cost realized from the sale of birds on live weight basis in summer month of 2010 was Rs. 85/- kg and highest during winter of 2010-11 i.e. Rs. 160/kg. The market rates varied between Rs. 100-150/- kg live weight which is about 10-15 % higher than the broiler. The net profit per bird, varied between Rs. 100-125/- the batch of 250 chicks fetched net profit of Rs. 23000-30000/-. Out of 34 farmers, 14 families reared 4 batches of chicks in the first year while remaining 20 families only 3 batches due to unavailability of chicks. In second year also all these families reared 3-4 batches, as per the availability. A total of 56 farmers, out of 907 families in the project, who were

intervened with poultry, opened broiler unit from the income generated from these chicks. The batch size ranged from 300-500 and in a year 4-5 batches of broiler chicks were reared. The construction cost of shed was Rs.5-7/- per sq. feet. The net profit from these broiler units varied between Rs. 6-9/- per chicks. A comparison of net return from both units was made in terms of net return (Table 2).

**Table 2. Net returns after adapting new model of rural poultry production**

Group	Net return (Rs.)
Broiler unit (500 chicks x 5 cycle)	30000/-
Rural poultry – Model-1 (250 chicks X 4 cycle)	95000/-

There was no major disease problem observed in the project area. Out of 907 families only 2 incidences occurred during last 5 years. In 2009-10, one farmer reported predation of 85 chicks during first week of life and one farmer witnessed outbreak of IBD with 32% mortality. None of these 34 families reported any such out- breaks. All most all the 34 families diversified their livelihood base from the income realized from the rural poultry units and started either one or more ventures such as broiler unit, dairy, goat unit or family handicraft and constructed or renovated their houses.

## DISCUSSION

The main focus of all Government policies, not only in India, but in all the developing countries having agriculture base, is to create sustainable livelihood to its rural masses. The problem is more serious in case of landless and marginal farmers who do not have economical cultivable landholdings (Misra *et al.*, 1997; Francis and Sibanda, 2001). In our base line survey, like others, we also observed that nearly 30% population has become landless while about 38% is marginal with less than 1 ha cultivable land holdings. The annual income of landless and marginal farmers was found to be around Rs. 14750/ and Rs. 25500/, respectively, in early 2009. The survey also reported the expectations of the farmers in terms of net monthly income which can fulfill the livelihood security needs of the family as Rs. 7000-8000/ per month i.e. around Rs 90000/- annually. The average family size was 7.1 (<http://rurallivelihood-ivri.org/>). The poultry sector is emerging as one of the most important sub-sector of agriculture in terms of value added component. It is one of the fast growing sectors with annual growth rate of 8-10% (Patil and Kayala, 1992; Bhardwaj *et al.*, 1996; Kumar and Rai, 2011). The major stress is on deep litter system, which provides maximum production within minimum space (Iqbaluddin, 1996). The floor space required for broiler is 1 sq. feet while for layers it is 2-2.5 sq. feet. Various reports have established that a minimum stock size of layers and broilers is must for economic viability which is unaffordable for rural masses in terms of capital cost, infra-structure, skill and market accessibility (Kazi, 2003; Singh *et al.*, 2005; Kumar and Rai, 2006). The produce prices fluctuate in the market depending on the season and production level. A mature broiler is to be disposed of within days; otherwise loss in terms of higher feed consumption with slow growth rate is witnessed. The balanced feed for poultry is costing around Rs. 24-26/- per kg and fear of mycotoxicosis and erratic electric supply poses more problems. The feed cost in intensive system alone cost about 65-70% of all input cost.

The present system of rural poultry production (Model-1) has been developed to use poultry as a tool for resource generation, self-employment, livelihood security and poverty alleviation as a whole. There is no dependence on infra-structure, balanced feed, electricity and highly reliable market. Any strain having a better growth rate under backyard system viz. around 1 kg body weight by 10<sup>th</sup> week of age will suite the purpose as this will reduce the cost of rearing and feed consumption. In remote places, even chick production through brooder hen using egg production from parental stock of these strains can be taken up. A separate model (Model-3) is under validation by us to cope up the erratic chick supply problem, as encountered in the present study. The feeding practices in the present study, is based on

the azolla for proteins, minerals and vitamins. One added advantage of azolla cultivation is that it can be grown during major portion of the year because of conducive temperature (Wagner, 1997; Tadelle and Ogle, 2002, Rai *et al.*, 2012). The *A. microphylla* contains crude protein around 22-25% and amino acid profile is nearly similar to soybean meal. The digestibility is also reasonably good (48-50%) and the cost of production is negligible. The energy requirement is fulfilled by grazing and kitchen waste or grain/ grain by-products. Thus requirement of all the nutrients is nearer to their need (Portsmouth, 2000; Tadelle and Ogle, 2000; Fuller *et al.*, 2004). The cost of feeding up to 16<sup>th</sup> weeks is around Rs. 10/ per bird and housing cost is negligible. The profit per bird is thus, between Rs. 100-130/. Moreover, the average body weight of the birds show a better growth rate between 8<sup>th</sup> – 16<sup>th</sup> week of age with lower mortality rate (due to infectious diseases) due to azolla feeding (Wills, 2002; Dou *et al.*, 2009). The system has no alternative when improving the profitability of homesteads is considered (Pandey *et al.*, 2006). To boost rural poultry production system and propagation of poultry rearing in rural areas, strengthening of disease diagnosis, prevention and control facilities along with regular vaccination practices need to be adapted for protecting poultry health, production and wealth, which would altogether popularize and promote poultry farming as a business and a valuable source of sustained income (Kataria *et al.*, 2005; Dhama *et al.*, 2008; Sharma, 2010; Dhama *et al.*, 2011; Dhama *et al.*, 2013a,b,c). The evaluation of profitability among the system i.e. small broiler unit, model-1 and open range system clearly evidenced a much higher profitability in the present model. A unit of 500 broiler chicks can produce net profit of Rs. 20000-35000/- in 5 cycles while in the present model, it can cross Rs. 90000/ within the same period. In open range system profitability could not be ascertained clearly as the birds were either consumed by the families or sold as per the need and no pattern was followed. Thus, it can at the best is for some subsidiary income.

## Conclusion

Azolla based feeding practices seems to be profitable as it increase the body weight of the birds within 8-16 weeks period by acting as a source of protein, minerals and vitamins and reduces the mortality. Model-1 has been developed on this ground to use poultry as a tool for resource generation, self-employment, livelihood security and poverty alleviation as a whole.

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