

LEVEL OF ADOPTION AND CONSTRAINTS OF SCIENTIFIC BACKYARD POULTRY REARING PRACTICES IN RURAL TRIBAL AREAS OF SIKKIM, INDIA

B.G. NATH^{1*}, S. TOPPO², R. CHANDRA³, L.R. CHATLOD¹, A.K. MOHANTY⁴

¹ ICAR Research Complex for NEH Region, Sikkim Centre, Tadong-737102, Sikkim, India

² Central Institute of Freshwater Aquaculture (ICAR), Kausalyaganga, Bhubaneswar, Orissa, India

³ National Dairy Research Institute, Karnal, Haryana, India

⁴ Krishi Vigyan Kendra, East Sikkim, Ranipool, ICAR Sikkim Centre, Sikkim, India

*Email: drbichitra.nath@gmail.com

ABSTRACT: A study was conducted on level of adoption and constraints of backyard poultry rearing practices in rural tribal areas of Sikkim. The data were collected from 125 respondents of Dzongu area, North Sikkim through personal interview with the help of questionnaire. From the present study it was found that 64.8% respondents were medium level adopters followed by high level (19.2%) and low level (16%) adopters. Housing (43.2%) were highly adopted followed by feeding and watering (41.6%), marketing (40.0%), general management (39.2%), health care practices (36.8%) and breeding practice (33.6%). The overall adoption of different backyard poultry rearing practices showed medium level adoption. Non availability of backyard poultry chicks, non-availability of medicine, high incidence of diseases, lack of knowledge about scientific practices, lack of market, attack of predators etc. were the major constraints faced by backyard poultry farmers. The study also pointed some suggestions for solving the constraints regarding backyard poultry rearing practices in Dzongu, North Sikkim.

Key words: Adoption, Backyard poultry, Farming practice, Constraint, Scientific

INTRODUCTION

Backyard poultry is an important source of supplementary income and nutrition security for a large number of poor households across the country. Even with proliferation of the industrial poultry on a large scale, backyard poultry constitutes a significant proportion of the total poultry population at the national level. The demand of eggs and meat of rural areas is fulfilled by rearing of backyard poultry (Nandi et al., 2007; Panda et al., 2008). Village chickens provide cheap, readily harvestable protein-enriched white meat and eggs with high quality, digestible protein for immediate home consumption and sale for income generation (Dolberg and Petersen, 2000; Mapiye and Sibanda, 2005; Miao, 2005). There is need to understand the perceptions of the farmers on the functions of backyard poultry and the value of their products under the existing production systems in order to improve backyard poultry productivity and sustainability in rural areas. Therefore assessing the monetary value of chicken and eggs is important and estimate their contribution to household income and food security. Backyard poultry rearing also finds an important role to fulfill the need of stress free and harmful residues free birds (Mandal et al., 2006). There is no reliable information on performance levels, constraints and opportunities of backyard poultry in North Sikkim. This makes it difficult to design and implement village chicken-based developmental programmes that benefit rural livelihoods (Pedersen, 2002; Muchadeyi et al., 2005). The present study was undertaken to investigate the adoption of scientific poultry rearing practices by the backyard poultry farmers.

MATERIALS AND METHODS

Study area

The present study was conducted at Dzongu area, North Sikkim located in the North-Eastern part of India. Sikkim, the second smallest state of India is situated in the Eastern Himalayas. North Sikkim with a total geographical area of 4226 sq. km is the largest district of Sikkim but the least populated with population of 38352 (as per the 2001 census) which are scattered in an altitude range of 4800 feet to 15000 feet. Dzongu area of North

ORIGINAL ARTICLE



Sikkim specifically lying between 27°28" to 27°38" North latitude and 88°23" to 88°38" East longitude and is mostly inhabited by Lepcha (Tribal) people. In summer, the temperature during the daytime ranges from 15° C to 28° C, while during the winter the minimum temperature is as low as 5-6° C. The rainfall varies from 3000-4000 mm. The relative humidity is high in monsoon month that is about 90%.

Collection and analysis of data

Samples of 125 backyard poultry farmers were selected randomly from five Gram Panchayat Unit (GPU) of Dzongu area of North Sikkim namely Tingvong, Passingdang, Lingdong, Hee-Gyathang and Gor. The data were collected through questionnaire and respondent's personal interviews were also employed. The score one was assigned for the adoption of the improved practices while score zero was for non adoption. Data were collected, tabulated and analyzed for meaningful conclusion. Statistical analysis was done with the help of Microsoft Excel (2007) and Statistical Analysis System (2001).

RESULTS AND DISCUSSION

Age, gender, education standard and flock size of backyard poultry production

Age, gender of the farmers, education and the scale of poultry production in Dzongu area are presented in Table 1. Majority (46.4%) of the poultry farmers were old which was followed by middle (27.2%) and young (22.4%) farmers.

Table 1 - Age, gender, education and flock size of poultry among the poultry farmers in the study area (n= 125)

Criterion	Percentage
Age	
Young (15-20 Years)	22.4
Middle(21-30 Years)	31.2
Old(Above 30 Years)	46.4
Gender	
Male	27.2
Female	72.8
Education	
Never Attended	12
Primary	76
Secondary	10.4
Tertiary	1.6
Flock Size	
Large (11 And Above Birds)	13.6
Medium (6-10 Birds)	65.6
Small (1-5 Birds)	20.8
<i>n= Total nos. of respondent</i>	

The study showed that majority (72.8%) of the poultry farmers in Dzongu area were females. The number of females participated in terms of rural poultry production is always higher than males (Nielsen et al., 2003; Okitoi et al., 2007; Ogunlade and Adebayo, 2009). Among the respondents, 76% were primary educated followed by uneducated (12%) and secondary educated (10.4%).

Performance of backyard poultry

The information regarding the productive performance of poultry birds of Dzongu area are presented in Table 2. In native birds, the average body weight at 6 weeks, average age at first laying, average egg weight at 40 weeks, average yearly egg production and survivability % (up to 6 weeks) were recorded 240- 400 g, 221 days, 32-40 g, 45-50 nos. and 78 respectively.

Table 2 - Performance of different poultry birds rearing in Dzongu area

Economic trait	Result	
	Local /Desi	Broiler
Body weight at six weeks	240-400 g	-
Average age at first laying	221 days	-
Average egg weight at 40 weeks	32-40 g	-
Average egg laying (1 yr.)	45-55 nos.	-
Survivability, % (up to 6 weeks)	78	-
Average body weight at 42 days of age	-	1.75 kg



Adoption of backyard poultry

In the present study it was found that majority of the respondents (64.8%) were found to be medium adopters followed by high (19.2%) and low (16.0%) adopters (Table 3). This could be due to low annual income, poor knowledge and less utilization of information sources. The similar findings were reported by Ahire et al. (2007), Sasidhar et al. (2008), Khandait et al. (2011).

Practice wise adoption level of farmers about backyard poultry rearing practices are given in Table 4.

Table 3 - Numbers of backyard poultry owners according to their levels of adoption of backyard poultry rearing practices N = 125

Category	Percentage
Low (Score up to 17)	16
Medium (Score 18-34)	64.8
High (Score 35 & above)	19.2

(mean 25.28, SD 7.669)

Table 4 - Adoption level of backyard poultry rearing practices in Dzongu, North Sikkim (N=125)

Practices	Percentage
Housing	
Provision of night shelter	100
Provision of separate house	80.8
Litter material provide	0
Feeders/ Waterer provide	72
Feeding	
Feeding material available in scavenging	100
Kitchen waste	71.2
Additional feed provision(Maize, rice bran)	91.2
Provision for adequate clean water supplement	70.4
Breeding	
Purchased from local market	74.4
Purchased from Govt./Pvt. Hatchery	1.36
Hatching of eggs naturally at home	100
Desi(Local) birds reared	100
Improved backyard poultry breeds reared	5.6
Management practices	
Brooding of chicks naturally	100
Care from predators	60.8
Care of laying hen	67.2
Provision of laying box with dry bedding	75.2
Health care	
Vaccination	7.2
Control of parasites	49.6
Self-treatment of birds	46.4
Treatment of birds by Veterinary doctor	8.8
Marketing	
Sale of eggs and birds in village market	100
Selling at own doorstep	100
Selling of birds when attain a specific wt. gain/age of birds	82.4

Housing practice

Proper housing must not only provide microenvironment or meso-environment that moderate environmental impact but must provide adequate ventilation for birds to lay eggs in nest boxes, as well as to feed and sleep in comfort and security (Kusina and Kusina, 1999).

During the present study, it was found that all the farmer's rear backyard poultry in extensive system where they provide night shelter to their birds. Among them 80.8% per cent respondents constructed a separate house with wooden floor about 1 to 1.5 feet over the ground level made of locally available material viz. wooden material, tin/plastic sheet, wire net etc. The rest of the farmers kept their birds in a temporary box like structure made of wood. The well ventilated shelter was provided by a small number of farmers. Majority of them used small plastic/aluminum pot as feeding trough and water trough and are kept inside poultry houses. The temperature maintaining in poultry house is necessary as there is low temperature in winter season in the study area. But only a few farmers supplied electricity in poultry houses. The similar findings were also reported by Khandait et al. (2011).

Feeding and watering practice

Timing and frequency of feeding, what, how to feed and quantity to feed are important aspects to consider in developing strategies to improve nutrition of village chickens (Mapiye and Sibanda, 2005). The backyard poultry



farmers kept their bird's free whole day in the backyard to find their own feed. The birds ate insects, earthworms, grains, crop residue and vegetable. There was limited scavenging area for backyard poultry in the study area. In addition to the material available in scavenging, 91.2% and 71.2% of respondents provided cereals (maize, rice bran) and kitchen left over, respectively. The practice of supplementary feeding to the birds with locally produced feed to bridge the fluctuating feed supply gap (Mapiye and Sibanda, 2005). About 70.4% of backyard poultry farmers provided adequate and clean water to the birds. These observations are in confirmation with the observations reported by Mandal et al. (2006).

Breeding practice

Crossbreeding of local strains with some imported strains can increase productivity of flocks (Pedersen, 2002) but should be coordinated to avoid replacement of indigenous stock (Mhlanga et al., 1999). Li et al. (2006) reported that development efforts in Africa and Asia are more focused on introduction of exotic high yielding breeds than understanding the production potential of indigenous chickens. In the study it was found that all the farmers allowed eggs to hatch at home under broody hen naturally for chicks and also made use of other source for procurement of chicks. The cent percent of farmers rear desi birds whereas only 5.6% farmers adopted improved backyard poultry breeds (i.e. Vanaraja, Gramapriya etc). Majority (74.4%) of them purchase poultry chicks from the local market and 1.36% purchased from Govt/ private hatchery.

General management practice

Chicks are the most vulnerable and mortalities of chick recorded up to 60% (Pedersen, 2002; Muchadeyi et al., 2005). Farmers are encouraged to provide extra care to their chicks by the use of locally made Hay-box brooder to reduce chick mortality. The cares of chicks were taken by majority of respondents in the study area and 60.8% farmers were protecting their chicks from predators. Around 75.2% of the respondents made provision of laying box with dry bedding materials in shallow and roomy bamboo basket kept in the corner of house. Half of the farmers collected egg frequently. Majority of respondents' brood chicks naturally in sun rays whereas a small number of respondents used chick guards for protection from predators and for natural brooding.

Health care practice

Poor health management resulting in high mortality rates and compromised productive performance characterize most smallholder chicken production systems (Kusina et al., 2001; Pedersen, 2002). Majority of respondents were cleaned the poultry houses daily. The controls of ectoparasite were practiced by 49.6% respondents. During the time of disease infection, 46.4% were involved in self medication to the birds and some of them approached local expert for treatment. Only 8.8% respondents were taking help from veterinary doctors for treating the birds. A small number of backyard poultry farmers practiced deworming and vaccination of birds. It was because of non availability of vaccines and medicines as well as the lack of extension worker expert in veterinary practices. Development of chicken health programmes is required to give reliable information on the epidemiology of diseases and the possibilities of reducing outbreaks (Miao, 2005).

Marketing

The success of a poultry production enterprise is judged by the quantity and quality of products sold (number of chickens and eggs) and consequently, the amount of profit gained. In areas where markets are a problem, farmers are forced to keep the birds longer and this increases the costs of production by increasing the amount of feed required to keep the birds alive (Pedersen, 2002). The backyard poultry owners of Dzongu area were selling their birds at their own doorstep, village market when the birds attain a specific weight gain of 1.5 to 2 kg. The birds were being sold on specific occasion, on demand of customers, on religious function and requirement of money. The respondents expressed that the care of backyard poultry was taken by female. The farmers used poultry manure in agriculture as well as horticulture crops.

The overall adoptions of different backyard poultry rearing practices were presented in Table 5. From the table it was found that the overall adoption of backyard poultry was 39.06%. The practices wise adoption showed that housing (43.2%) was highly adopted followed by feeding and watering (41.6%), marketing (40.0%), general management (39.2%), health care practices (36.8%) and breeds (33.6%). This is because of low level of knowledge of respondents, few sources utilized for acquiring information, low level of education and income. The adoption rates in different practices are almost similar with the findings of Sasidhar et al. (2008) and Khandait et al. (2011).

Table 5 - Overall adoption of backyard poultry rearing practices (Total No. =125)

Area	Percentage
Housing	43.2
Feeding and Watering	41.6
Breed/ Breeding	33.6
General Management	39.2
Health Care	36.8
Marketing	40.0
Overall Adoption	39.06



Correlates of adoption behavior

The adoptions of scientific poultry farming also depend on farmers' personal as well as social and economic condition. Correlation coefficients of six independent variables were presented in Table 6. These indicated the relationship between variables of poultry farmers with adoption behavior. Age had a significant relationship with adoption level. It gave an idea that young generation might be try to adopt new technologies in their farms. But, Rahman (2007) got negative correlation between age and farmers. Education was negatively and significantly associated with adoption level. It indicates that educated persons had less interest to do farming than other Govt job. The present finding was opposite to the findings of Motamed and Singh (2003) and Rahman (2007). Flock size of poultry had a positive and significant relationship with adoption level. It indicates that farmers having large number of poultry in their farms adopted improved technologies in their farms. Training received showed a positive and significant correlation with the adoption level of the respondents. Training might have given knowledge to the farmers to know the scientific poultry rearing practices. Financial help received was positively and significantly associated with adoption level. It indicated that those who received financial help either from government or financial institution adopted new technologies in their farms. This was similar with the findings of Rahman (2007).

Table 6 - Correlations of adoption of improved poultry rearing practices with independent variables

Sl.no.	Variables	Coefficient of correlation (r)
1	Age	0.547**
2	Education Level	-0.309**
3	Flock Size	0.668**
4	Income from poultry	0.936**
5	Training received	0.475**
6	Credit facility	0.227*

* Correlation is significant at the 0.05 level; ** Correlation is significant at the 0.01 level

Constraint of backyard poultry rearing practices in the study area

In the study it was observed that majority of the backyard poultry farmers faced problem like non-availability of high yielding breed of poultry chicks, mortality of day old chicks/young birds, high rate of morbidity, inability to diagnose sick birds in Dzongu area. Non-availability of medicines and vaccines at Dzongu resulted in the devastation of the poultry flock by diseases mainly by Ranikhet disease (New Castle disease). Contacts between flocks of different households and the livestock shandies are the important sources of disease transmission. It is therefore, necessary that government and other external agency should take necessary steps for regular supply of vaccines, medicines and other health care services so that the minimum required vaccination should be completed before chicks reach 6 weeks of age i.e. in nursery period. Lack of market for birds and eggs, loss of birds and eggs due to predators etc. were the other important constraint for poultry farmers. Due to lack of proper market in local area poultry farmers of the study area could not able to get their actual benefit as one third of their benefit were spent for high transportation cost. These constraints were also documented by McAinsh et al. (2004) and Omonona and Oni (2004).

Suggestions to improve backyard poultry in Dzongu, North Sikkim

Availability of good germ-plasm: There should be available of high yielding varieties of backyard poultry chicks.

Availability of feed: The improved backyard chicken varieties could not sustain only on scavenging. A small quantity of compounded layer feed should be provided to the birds.

Veterinary and health services: Availability of veterinary aid and skilled persons for vaccination is important. Threat from Newcastle disease is persistent. Supply of immunized birds to backyard is important.

Predators: This is highly devastating factor to the village poultry. As chick stage is most vulnerable, so care should be taken at this stage.

Marketing: A proper market should be established so that the poultry farmers can get proper benefit from poultry and poultry products. To aggregate the produce, farmer's co-operative societies need to be facilitated at village or higher level.

CONCLUSIONS

Backyard poultry rearing is playing an important role in increasing socio-economic status of rural community and employment in rural areas. It was realized that the poor can gain from the opportunities in poultry sector if small-holder poultry which is technologically similar to industrial poultry is taken up. Focus should be on augmenting the advantages of smaller decentralized units in terms of better efficiency, faster and better disease control. There are certainly some production technology advantages for poor; in terms of adaptability for scaling down and the significant labour component. It is important to conserve the indigenous gene pool, and there should be check on introducing high yielding breeds of backyard poultry. It is necessary for an effective disease surveillance mechanism and quick response system to overcome related problems. There is also need for more information to update and validate existing constraints and opportunities in light of the land redistribution process



and current economic challenges in North Sikkim. The present study viewed that introduction of high yielding dual purpose birds and providing basic health care facilities can bring a significant improvement in sustainable backyard poultry production in Dzongu, North Sikkim.

ACKNOWLEDGEMENTS

The author is grateful to the local farmers of Dzongu area, North Sikkim for their participation and valuable information in this survey and to the Joint Director, ICAR Sikkim Centre for his support during the investigation.

REFERENCES

- Ahire MC, Birari D and Kamble DK (2007). Adoption of poultry management practices in Solapur, India. *The Asian Journal of Animal Science*. 2(1/2): 55-58.
- Dolberg F and Petersen PH (2000). Poultry as a tool in Poverty eradication and promotion of gender equality. Proceedings of a workshop, March 22-26, 1999, Tune Landboskole, Denmark.
- Khandait VN, Gawande SH, Lohakare AC and Dhenge SA (2011). Adoption Level and Constraints in Backyard Poultry Rearing Practices at Bhandara District of Maharashtra (India). *Research Journal of Agricultural Sciences*, 2(1): 110-113.
- Kusina JF, Kusina NT and Mhlanga F (2001). A survey on Village chicken losses: Causes and solutions as perceived by farmers (Ed. R. G. Alders and P. B Spradbrow), Proceedings of SADC planning workshop on Newcastle disease control in village chickens, Maputo, Mozambique, 6-9 March 2000, Australian Center for International Agricultural Research. Canberra Proceedings 103: 148-155.
- Li CC, Li J, Mo DL, Xu RF, Chen GH, Qiangba YZ, Ji SL, Tang XH, Fan B, Zhu MJ, Xiong TA, Guan X and Liu B (2006). Polymorphism of ghrelin gene in twelve Chinese indigenous chicken breeds and its relationship with chicken growth traits. *Asian-Aust. J. Anim. Sci.* 19(2): 153-159.
- Mandal MK, Khandekar N and Khandekar P (2006). Backyard poultry farming in Bareilly district of Uttar Pradesh, India: An analysis. *Livestock Research for Rural Development*, 18(7), <http://www.lrrd.org/lrrd18/7/mand18101.htm>.
- Mapiye C and Sibanda S (2005). Constraints and opportunities of village chicken production systems in the smallholder sector of Rushinga District of Zimbabwe. *Livestock Research for Rural Development* 17 (10), <http://www.lrrd.org/lrrd17/10/mapi17115.htm>.
- McAinsh CV, Kusina J, Madsen J and Nyoni O (2004). Traditional Chicken Production in Zimbabwe. *World's Sci. J.*, 60: 233-246.
- Mhlanga FN, Khombe CT and Makuza SM (1999). Evaluation of indigenous livestock in Zimbabwe. A report prepared for the Department of Animal Science, University of Zimbabwe.
- Miao ZH, Glatz PC and Ru YJ (2005). Free-range poultry production - A review. *Asian Aust. J. Anim. Sci.* 18(1): 113- 132.
- Motamed M-K and Singh B (2003). Correlation of Adoption of Improved Sericulture Practices. *Indian Journal of Extension Education XXXIX (1 and 2): 51-57.*
- Muchadeyi FC, Sibanda S, Kusina NT, Kusina JF and Makuza S (2005). Village chicken flock dynamics and the contribution of chickens to household livelihoods in a smallholder farming area in Zimbabwe. *Trop. Anim. Health Prod.* 37(4): 333-334.
- Nandi S, Sharma K, Pawan Kumar and Nandi D (2007). Poultry farming: A rapidly growing profitable business. *Poultry Line*, 7(12): 19-20.
- Nielsen H, Roos N and Thilsted SH (2003). The impact of semi-scavenging poultry production on the consumption of animal source food by women and girls in Bangladesh. *J. Nutr.*, 133, 4027S- 4030S.
- Ogunlade I and Adebayo S.A (2009). Socio-economic status of women in rural poultry production in selected areas of Kwara State, Nigeria. *Int. J. Poult. Sci.*, 8: 55-59.
- Okitoi LO, Ondwasy HO, Obali MP and Murekefu F (2007). Gender issues in poultry production in rural household of Western Kenya. *Livestock Research for Rural Development*, 19(2), <http://www.lrrd.org/lrrd19/2/okit19017.htm>.
- Omonona BT and Oni OA (2004). Economics of Table Egg Production in Ibadan Metropolis, Oyo State, Nigeria. *Trop. J. Anim. Sci.*, 7 (2): 67-73.
- Panda AK, Raju MVLN and RamaRao SV (2008). Poultry Production in India: Opportunities and Challenges Ahead. *Poultry Line*, 8(1): 11-14.
- Pedersen CV (2002). Production of semi-scavenging chickens in Zimbabwe. PhD Thesis. The Royal Veterinary and Agricultural University, Copenhagen, Denmark.
- Rahman S (2007). Adoption of improved technologies by the pig farmers of Aizawl district of Mizoram, India. *Livestock Research for Rural Development*. 19(1), <http://www.lrrd.org/lrrd19/1/rahm19005.htm>.
- Sasidhar PVK, Semmaran M, Majumdar S, Chander MA and Tripathi H (2008). Factors Influencing Adoption of Backyard Poultry by Farmers in India. *World Poultry Science Journal* 2: 315.

