

ECONOMIC OF REARING, PRODUCTIVE AND REPRODUCTIVE PERFORMANCE OF INDIGENOUS CHICKEN RAISED AS BACKYARD FARMING IN NEPAL

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This present paper studied the productive and reproductive performance of indigenous chicken and their habitat. In addition, research was also aimed at finding socioeconomic status of farmers raising indigenous chicken. Semi-structured questionnaire was prepared and completely filled in the respective household to find out this information. Biological data were collected by taking measurements at regular intervals. Result of the above study revealed that, average age at first lay, clutch size, hatchability and egg weight of local hen were found 161.62 ± 0.51 days, 2.89 ± 0.42 , 74 ± 1.4 % and 42.06 ± 0.36 gm. respectively. The effect of breed on age at first lay and hatchability were found significantly different ($p < 0.05$ and $p < 0.001$) respectively. In addition, the effect of location on age at first lay, hatchability and egg weight were also found significant ($p < 0.001$, $p < 0.01$ and $p < 0.01$) respectively. Average weight of pullet and mature chicken were found 1265.92 ± 10.96 gm. and 1763.45 ± 27.17 gm. respectively. It was found that Sakini performed better in inner terai, while Naked Neck performed better in hill and the effect was significant ($p < 0.05$). The flock size of birds raised by individual farmers was 1 to 29 in numbers with annual average income of Rs.8, 564.59 with profit of Rs. 5,580.

Keywords: Indigenous, Hatchability, Fertility, Inner Terai, Hill

Poultry is one of the most important livestock commodities contributing substantially in national economy of Nepal. Poultry rearing alone create 8.3% of the livestock GDP and 4% of the Agricultural GDP of the country (MOAC, 2012). Poultry

rearing create employment, supplementary income as well as contribute to the supply of animal protein. Poultry industry is becoming booming industry in recent days with turnover of 64.62 billion rupees in the past fiscal year (Bhattra, 2013). Poultry production is growing at the rate of 15 per annum involving over 30,000 farm families directly or indirectly (Dhakal, 2005) and major portion come from high yielding synthetic breeds. There are 48 million chickens in the country (DLS, 2014/15) and number is increasing year after year.

Sakini, Naked Neck and Frizzle feathers are three indigenous chicken breed of Nepal. These breeds represent the huge reservoir of poultry genome. These breeds were reported to perform better in low input and scavenging condition. They are hardy, adaptable to harsh condition and have tasty egg and meat (Parajuli, 2008). It has high broodiness and do not require artificial incubation to hatch their eggs. The frizzling and naked genes in particular have been described as adaptable gene acting as sex marker and disease resistant factor (Islam and Nishibori, 2009). These native chickens provide cheap source of animal protein to poor and people of remote area of country. Not much research has been done to find out the productive and reproductive performance of native chicken in different location. Inefficient breeding plan; improvement with conservation has resulted possibility of decreasing Animal Genetic Resource (AnGR) of the country. These chickens are huge reservoir of poultry genome. So, it is necessary to find out performance of these breeds in farmer managed condition of Nepal. Location is important non genetic

factors affecting the performance of animals. So, it is necessary to find out the effect of location on performance of these chickens.

MATERIALS AND METHODS

Site Selection and method of data collection

To find out the performance of local chicken in farmers managed condition, their habitat and economic of raising, a semi-structured questionnaire survey and performance recording was conducted from March to December, 2014. Two regions of Chitwan district were selected comprising of 25 farmers in each survey site. General random sampling was followed to select the farmers. One region was taken from low altitude (500 MASL), near from Chitwan National Park comprising of 3 V.D.Cs. This area was major pocket area of indigenous chicken mainly reared by minority people and chicken from these areas have less adverse effect from the crossing with exotic breeds. On the other hand, second pocket area was taken from hilly area (1200 MASL) of Siddi V.D.C of Chitwan district, which was also a major pocket area of indigenous chicken mainly reared by Chepang community and is less affected by crossbreeding from exotic breeds. .

In addition to semi-structured questionnaire survey, biological data were taken at regular intervals and filled in the data book. Weight traits of birds were measured by digital balance for both eggs and chickens and disease of the birds were verified by dissection of affected birds by experienced veterinarian. In the case of confusion in identifying disease, it was verified in laboratory of Agriculture and Forestry University, Rampur.

Data entry, recording and Analysis

Biological data were entered in Microsoft excel and coded and finally analyzed using Harvey software package 1990 developed by Walter Harvey. Social data were entered in Statistical Package for Social Science (SPSS) and analyzed using same software package. Mean comparison is done using Duncan Multiple Range Test (DMRT).

Fixed effect model used for the study on different productive traits (Harvey, 1990)

$$Y_{ijk} = \mu + \alpha_i + \beta_j + e_{ijk}$$

Where, Y_{ijk} = Effect of k^{th} observation on i^{th} breed and j^{th} location.

μ = General mean

B_i = Effect of i^{th} breed

L_j = Effect of j^{th} location

e_{ijk} = random error assumed to be normally distributed with 0 means and common variance σ^2

RESULTS AND DISCUSSION

Socio Economic Status of the farmers:

Majority of the farmers in the survey household were illiterate (48%), followed by literate who have got informal education (28%), 22% of the farmers had education level of below SLC and only 4% farmers had SLC and other higher degrees. Regarding major source of income of the farmers were concerned, 59% respondents were farmers, 29% of the respondents were foreign employed, 9% of the respondents were businessman and 5% had service job. Chicken rising was found to be done mainly by female (88%) than their male counterpart (12%), though either of the members helps in the chicken management in the absence of another. In addition, the major age group rearing indigenous chicken was found between 30-60 years (62%). Majority of the respondents (40%) were raising their indigenous chickens for more than 20 years. The number of chickens raised by the farmers were found between 1 and 29 with the mean number of chickens raised by farmers were 13. Annual income of individual farmer from the sale of poultry was NRS. 8,564.59 With a range between NRS.1, 218 to NRS. 22,750.

System of management of Indigenous Chickens:

Majority of the respondent (69%) had constructed wooden cage for housing of their chickens at night while (31%) household keep their chickens in bamboo basket at night. Majority of the farmers (55.38%) fed their poultry 3 times a day and 80% of the farmers throw feed to their poultry for collective feeding.

Morphological characteristics of Indigenous Chickens

In both male and female Sakini breed, different plumage color pattern were observed. In male chestnut red in back and neck, red mixed with black in breast, yellow color of shank and black with shining blue in sickle feathers were most dominating character in most of the breeds in both places. Though, some black tinge in red and white tinge in black color was also observed. Comb shape in all the breeds is single. In female, different color of red, black, yellow and ash color had been observed with some tinge of either color on main color on neck, back and breast. In case of Naked Neck, white, light red, ash color are more dominating in both male and female in back as well as in breast and black color with some white tinge on sickle feathers were noticed. Comb shape for Naked neck in both location were single comb.

Disease and Mortality Problems

Major threats for mortality of indigenous chickens were found disease and predators problems with each contributing 15.57% and 15.51% respectively. In terai region, major problem was disease (particularly due to high temperature around 35°C in summer). While, in hilly region major problem was predators. In terai region, rearing of dog to safeguard the home as well as their chickens has drastically reduced the mortality percentage of chickens. Poultry diseases like New castle disease and fowl pox are prominent disease of poultry in those household. Round worm was the major internal parasites recognized in poultry. Majority of the farmers (64%) use veterinary medicine to cure the disease in chickens while 36% of the farmers use local medicine to cure their chickens. Local medicines used by the farmers were garlic and onion extract, jad (local wine), extract of tomato leaf for internal parasites and kerosene oil for external parasites.

Weight Traits of indigenous chicken

Results of the above study revealed that average weight of mature chicken was 1265.92±10.96 gm., and the weight of cockrel 1442.10±13.38 gm. was found highly significant ($p<0.001$) than pullet 1089.75±15.59 gm. (Table 1). Sah *et al.*,

(2000) also reported wt. of local chicken were 390.1, 900.1, 1480.4 and 1775.1 gm. at 8,14,22 and 32 weeks for male birds and 350.1, 830.2, 1200.1 and 1250.3 gm. for female at the same age respectively. Moreover, weight of Naked neck was found significant ($p<0.001$) than Sakini 1220.50±9.50gm. In addition, wt. of chicken of Inner Terai was found significantly different ($p<0.05$) than chicken in hilly region. As far as interaction is concerned, breed and location effect on body wt. was also found significant at $p<0.05$. Likewise, adult body weight of chicken was found 1763.45±27.17 gm.

and effect of sex on adult wt. was also found significant. However, the effect of breed on adult body wt. was found non-significant. Effect of location and interaction effect of breed and location was found significant at ($p<0.05$) and ($p<0.01$) respectively. The faster growth of Naked Neck till mature stage was due to its genetic potential of earlier maturity as well as more hardy and disease resistance genetic factor. Significant effect of location might be due to the good management practice as well as availability of more insects and crustaceans in plain land in comparisons to hilly area. Aganga *et al.*, (2000) reported that the growth performance of mature village local chicken were 2.2 kg for male and 2.0 kg for female. Similarly, Bhurtel, (1993) reported that the average weight of local male and female chicken under scavenging system were 1.67 and 1.42 kg respectively. However, Basnet, (1989) argued that the performance of indigenous chickens are not homogenous because of their natural condition of rearing and high genetic variability that exist in different population.

Age at first Lay of Indigenous Chickens

Age at first lay of indigenous chickens was found 164.94 ±0.52 days in Sakini breed and 162 ±0.50 days in Naked neck (Table 2). Effect of breed was found significant ($p<0.05$) at age at first lay of local chicken. Moreover, effect of location and interaction effect of breed and location on the above factor was also found significantly different ($p<0.001$) as shown in table 2. In general, Sakini chicken of hilly region because of their small size matures earlier and produces

Table 1. Least square mean and SE of mature and adult chicken (gm.)

Factors		LS Mean± SE (Pullet and cockerel wt.)	LS Mean ±SE (Adult body wt.)
	Mean	1265.92±10.96 (162)	1763.45±27.17(97)
Sex	Male	1442.10±13.389(86)	2078.11±33.0(51)
	Female	1089.75±15.59(76)	1448.78±39.65(46)
	L. sign.	***	***
Breed	Sakini	1220.50±9.50(121)	1726.57±24.21(74)
	Nacked Neck	1311.35±19.72(41)	1800±48.66(23)
	L. Sig.	***	NS
Location	Inner Terai	1289.75±18.50(81)	1703.67±43.98
	Hill	1242.09±11.65(81)	1823±31.25
	L. sign.	*	*
Interaction	S × IT	1269.16±12.11(72)	1803.54±28.70(72)
	S× H	1171.83±14.64(49)	1649.6±39.0(49)
	NK × IT	1310±34.89(9)	1603.80±83.14(9)
	NK × H	1312.35±18.14(32)	1996.84±48.85(32)
	L. Sign	*	***
	CV	8.12	11.04
	R ²	0.882	0.755

S= Sakini, H= Hill, NK= Naked Neck, IT= Inner Terai, Sig.= Significance

Table 2. LS Mean and SE of LS mean of age at first lay of local chicken (days)

Factors		Age at first lay	Level of Significance
	General mean	161.62±0.51 (124)	
Breed	Sakini	160.94±0.52 (91)	*
	Naked Neck	162.30±0.50 (33)	
Location	Inner Terai	159.59±0.50(71)	***
	Hill	162.30±0.908 (53)	
Interaction(B×L)	S×IT	166.73±0.56 (63)	***
	S×H	152.46±0.84 (28)	
	NN× IT	164.01±1.58 (8)	
	NN × H	160.61±0.89 (25)	
C.V		2.76	
R ²		0.62	

egg earlier. Basnet, (1989) stated that egg laying performance of indigenous chickens ranged between 30-100 eggs per annum with their maturity age at 5 to 8 month.

Clutches per Year of Local Hen

The average clutch per year of indigenous chickens was found 2.89 ±0.42 (Table 3). The effect of breed and interaction effect of

Table 3. LS Mean \pm SE of clutch/year, Hatchability and Egg weight of Local hen

Factors	No of Obs.	Clutch /year	Hatchability (%)	Egg wt.(gm)
Overall Mean	124	2.89 \pm 0.42	74.53 \pm 1.4	42.62 \pm 0.36
Breed				
Sakini	91	2.90 \pm 0.41	80.54 \pm 1.4	41.96 \pm 0.41
Nacked Neck	33	2.89 \pm 0.74	68.50 \pm 2.55	43.28 \pm 0.59
Level of Signi.		NS	***	NS
Location				
Inner Terai	71	2.77 \pm 0.068	71.83 \pm 2.35	43.71 \pm 0.48
Hill	53	3.02 \pm 0.05	77.24 \pm 1.72	41.53
Level of signi.		**	NS	**
Interaction				
CV		12.68	16.20	8.03
R ²		0.083	0.12	0.083

breed and location on clutch per year of local hen was found non-significant. However, the effect of location was found significant. This statement is in accordance with (Basnet, 1989), he stated that indigenous hens hatched eggs for 2-3 times per year.

Hatchability of Local Hen

Farmers use broody hen for hatching their chicks. They generally use bamboo basket with straw and paper box for resting their broody hen for hatching. Farmers generally give 10 eggs for their chickens for hatching their chicks in a feeling that it is sufficient for its capacity to hatch.

Hatchability of local hen was found 74 \pm 1.4 % (Table 3). Effect of breed on hatchability was found significant ($p < 0.001$), whereas effect of location and interaction effect of breed and location was found non-significant. The higher hatchability of Sakini than naked neck is, presence of immense feather in Sakini can take more egg and trap more heat facilitating more hatch able eggs.

Egg weight of Local Hen

Egg weight of local hen was found 42.06 \pm 0.36gm (Table 3). Effect of breed and interaction effect of breed \times location on egg weight was found non-significant. However, the effect of location was found significant ($p < 0.01$).

Sah *et al.*, (2000) reported the hatchability of (83.26 \pm 0.93%) for backyard chicken New Hampshire in Nepal. Lapao *et al.*, (1999), Yang *et al.* (1999) and Tona *et al.*, (2003) reported that the hen age, egg storage conditions, and genetic strain influence the

hatchability, chick quality, and broiler growth of poultry. The higher hatchability of Sakini was due to high feather in Sakini than Nacked Neck. In addition, high hatchability in cool environment of hill to terai is that birds often leave the incubated eggs due to hot environment reducing the temperature for incubation.

CONCLUSION

Local chicken are immediate cash for poor farmers as well as source of many genes. There is high variability of productive and reproductive performance among these breeds within the same location as well as outside the same location. So, selection among these breeds serve in one hand to the improvement of these breeds for backyard farming for rural people; on the other hand, serve as a important gene pool for resistance to many disease and parasites in the world which is dominated mostly by the few synthetic line. Effect of breed and location on the desired traits of considerable importance such as body weight, age at first lay, clutch/ year, egg weight was found significantly different. So, important genetic and non-genetic factors need to be considered for improvement in the breed.

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