Chicken biodiversity and their management under backyard production system in Southern Rajasthan

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ABSTRACT

The characterization of chicken biodiversity of southern Rajasthan was undertaken through stratified random sampling survey of 300 poultry keepers from 60 villages in 12 tehsils of 6 districts. The information were collected on flock size, physical characteristics, egg production traits, egg characteristics, management practices and constraints in backyard poultry production system. All the surveyed farmers maintained coloured non-descript birds and followed backyard/free range system of rearing. The first choice was dual type in rural areas, closely followed by egg type in nearby cities. The native birds had mixed plumage colour, dull colour pattern, yellow skin and shank colour, red ear lobe, red single comb, and black eye. Average age at first egg production was 6.78±0.05 months and annual egg production was 43.16 ± 0.39 eggs. The average clutch size and pause period were 12.59 ± 0.13 and 107.05 ± 0.52 days, respectively. The number hatch brooding per year by a hen was 2.88 ± 0.08, while average chick hatched out per hatch was 9.52 ± 0.09. The average egg weight, length and breadth were 40.50±0.34 g, 4.75±0.02 cm and 3.47±0.01 cm, respectively. The average body weight in adult male and females were 1.91±0.02 and 1.25±0.04 kg. The average shank length in adult males and females were 8.35± 0.03 and 6.73±0.02 cm, respectively. The chickens were housed in katcha houses without proper bedding material. Predators posed major constraint for backyard poultry production in the region.

Key Words: Backyard poultry, Plumage colour, Egg production, Clutch size, Pause period, Adult weight

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INTRODUCTION

The quantum leap in poultry production in the country during last three decades is manifestation of the remarkable development primarily due to commercial poultry production system. The backyard poultry production system is still traditional in most rural and peri-urban areas of Rajasthan, more so in disadvantaged tribal communities. Traditional rural poultry farming, which was the primary source of animal protein and supplementary income for more than 50 per cent population of this country, has suffered in wake of commercialization. Due to the changing rural scenario, backyard poultry farming has taken a back seat and unless the planners lay down a sound strategy, it would be impossible to review this age old practice which is an important tool for rural nutritional security. Backyard or semi-scavenging poultry farming is considered to be the cheapest eggs and poultry production system but suffer from lack of authentic information and proper documentation. The information on available chicken type in southern Rajasthan and their performance under field conditions is completely lacking. In view of this, the present study was undertaken to generate information on physical characteristics and production performance of native chicken vis-à-vis prevailing management practices in the region.

MATERIALS AND METHODS

The study was undertaken in Udaipur, Rajsamand, Chittorgarh, Dungarpur, Banswara and Bhilwara districts of southern Rajasthan. A stratified random technique was adopted to identify two tehsils from each district, five villages from each tehsil and five chicken keeping house-holds from each village for collecting the information. Thus, a total of 12 tehsils, 60 villages and 300 poultry keepers were the respondents for the survey. The process of data collection essentially involved the ways and means of approaching and

gaining access to different sections of information in order to fulfil the purpose of the study. The process also involved rapport building with local people who enable them to express themselves and generate information reliably and in relaxed atmosphere.

A structured questionnaire was developed for interview based data collection. The methodology was pre-tested under the field conditions at the place other than the locale of the present study. Based on the experience from pre-testing the questions were reconstructed and their sequence modified to get succinct and reliable information. The collected data were compiled, tabulated, subjected to statistical analysis and the results interpreted.

RESULTS AND DISCUSSION

Flock size: All the poultry keepers reared the birds under backyard, free range system. The overall average stock size per household was 15.61±1.67 with a composition of 4.46±0.40, 2.38±0.10 and 8.72±0.36 unsexed young stock, adult males and adult females respectively. The birds were exclusively coloured deshi and no poultry keeper reared egg, meat and dual type improved birds in any of the six districts.

Physical characteristics: Information on physical characteristics was recorded on a total of 3338 native birds. Majority of the birds exhibited mix plumage colour (53.89%), followed by pure brown (23.43%), pure white (8.90%), pure black (8.36%) and golden colour (5.42%). In female birds, the mixed colour varied from light brown to dark brown and occasionally dark grey with pencil lining while males had bright golden, silver and bronze feathers forming a "shawl" or "cap' from neck to lower back. The tail is composed of long arching black feathers shimmering blue, purple and green in good light. Vij et al. (2006) have reported brown plumage colour in Danki and Gangus breeds while bluish black in Kalasthi breed.

The recorded birds were categorized according to their colour pattern. Major proportion of the birds constituting 47.21, 17.91, 16.75, and 11.47 per cent exhibited dull, striped, solid and patchy pattern while a low proportion i.e. 6.26, 0.27 and 0.12 percent birds were spotted, other and bared respectively.

Majority of birds had yellow (61.29%) skin colour followed by white (37.39%) and a very few exhibited black (1.32%). Eriksson et al. (2008) reported that yellow skin is genetically determined and is caused by cis-acting and tissue-specific regulatory mutation(s). Domestic chickens with white skin are homozygous for a recessive allele (W*W) and yellow skinned chickens carry the dominant allele (W*Y). The dominant allele inhibits expression of the beta-carotene dioxygenase 2 (BCDO2) enzyme in skin, but not in other tissues. Because BCDO2 cleaves colorful carotenoids into colorless apocarotenoids, a reduction in expression of this gene produces yellow skin. The skin colour is also affected by diet; the maize fed chickens have been reported to exhibit yellow skin colour. However, this needs to be validated in the local chicken population.

Similarly, 77.47 and 21.27%, % birds had yellow or white shank colour and only 1.26% had black. The ear lobe colour was either red (68.27%) or white (31.73%). The comb colour was predominantly red in 99.70% birds and only 0.30% had black. These findings are similar to the findings of Vij et al. (2006) in Danki, Gangus and Kalasthi breeds. In all 63.75% birds had black eye colour, followed by brown (21.78%) and grey (14.47%). Majority of the birds (79.06%) bore single comb, while pea and rose comb was found in 16.18 and 4.76% birds, respectively. Observation on other specific variable traits viz. dwarfism, feathered legs, naked neck, silky frizzle, multiple spur revealed only 2.37% of the birds to be naked neck in the area.

Egg production characteristics: The egg production characteristics are presented n Table-1. The average age at first egg was 6.78±0.05 months and ranged from 6.08±0.03 (Bhilwara) to 7.52±0.15 months (Chittorgarh). The reported values of 5.75, 7.37 and 5 to 8 months for average age at first egg in Ghagus, Danki and Tellicherry indigenous backyard chicken breeds respectively (Vij et al., 2006 and Vij et al., 2008) were in close proximity to those observed in the present study. The annual egg production per hen per year averaged 43.16±0.39 and varied from 37.40±0.62 (Banswara) to 52.06±1.23 (Chittorgarh) (Table-1). The annual egg production in the native breed of southern Rajasthan in the present study was higher than 32 and 34 eggs in Danki and Kalasthi breeds but lower than 54 eggs in Gangus and 60-80 in Tellicherry (Vij et al., 2006, 2008).

The poultry keepers under the backyard poultry production system were, in general, interested in producing chicks rather than selling eggs. The clutch size and pause period for broody hens averaged 12.59±0.13 and 107.05±0.52 days respectively and

Table-1: Egg production characteristics

District	Age at first egg (month)	Annual egg production	Clutch size	Pause period (days)	No. of times hens hatch eggs per year	Egg weight (gm)
Banswara	7.14±0.09	37.40±0.62	12.80±0.22	110.10±1.01	2.38±0.07	40.72±0.53
Bhilwara	6.22±0.05	41.10±0.29	14.90±0.09	104.22±0.32	2.96±0.02	36.94±0.87
Chittorgarh	7.52±0.15	52.06±1.23	10.02±0.39	103.90±1.21	3.60±0.07	42.26±0.36
Dungarpur	6.90±0.31	43.02±0.83	11.08±0.21	108.80±1.73	3.02±0.04	44.78±0.48
Rajasamand	6.84±0.12	42.60±0.83	13.52±0.27	117.10±1.06	2.34±0.09	39.63±1.43
Udaipur	6.08±0.03	42.80±0.38	13.22±0.24	101.76±1.09	3.00±0.00	38.53±0.52
Overall	6.78±0.05	43.16±0.39	12.59±0.13	107.05±0.52	2.88±0.08	40.50±0.34

ranged from 10.02±0.39 to 14.90±0.09 and 101.76±1.09 to 117.10±1.06 days. The egg production per cycle, in present study, was comparable to that in Danki, Kalasthi and Ghagus breeds (Vij et al., 2006). The number of times hen hatch the eggs per year averaged 2.88±0.08 and ranged from 2.34±0.09 to 3.60±0.07. The average number of chicks hatched per hatch was 9.52±0.09. The average marketing age was 15.68±0.24 and 24.19±0.24 months for males and females, respectively.

Egg characteristics: The egg characteristics like egg length, breadth, weight and colour was measured or observed on at least 5 eggs for each household during survey. The egg weight varied from 36.94±0.87 gm (Bhilwara) to 44.78±0.48 gm (Dungurpur) between the districts with an average weight of 40.50±0.34 gm, which was similar to Tellichery and Ghagus but lower than Danki chicken (Vij et al., 2006; 2008). In addition to genetic differences, the variations in feed resources as well as age of birds affect the egg weight. The overall average egg length and egg breadth were 4.75 + 0.02 and 3.47 + 0.01 cm, respectively. The colour of eggs shell varied from cream, light brown to dark brown.

Body weight and measurement: Body weight and measurements of all the adult males and females kept by the respondents were recorded and the results are presented in Table 2. The adult body weight ranged from 1.67±0.08 kg (Chittorgarh) to 2.29±0.02 kg (Banswara) with an averages of 1.91±0.02 kg in males, and from 1.09±0.01 kg (Dungarpur) to 1.47±0.01kg (Banswara) in females with an average of 1.25±0.01 kg. The adult body weight in present study was lower than for Danki, Kalasthi and Ghagus breeds and higher than that for Tellicherry and Miri chickens (Vij et al., 2006, 2008; Haunshi et al., 2009). The average shank length was 8.35±0.03 cm which ranged from 7.88±0.08 to 8.94±0.07 cm in adult males whereas it averaged 6.73±0.02 cm and ranged from 6.39±0.05 to 7.29±0.04 cm in females. The results were comparable to those reported by Haunshi et al. (2009) in Miri type chicken.

Housing management: Of the total of 300 respondents, majority poultry keepers (165 or 55%) provided no housing to their birds whereas 105 (35%) and 30 (10%) housed their birds in kachha and pucca houses, respectively. Majority of the poultry houses (116 of 135 or 85.9%) were without ventilation whereas ventilation was observed in 14.1% houses only. The floor of kachha houses were prepared by mud plastering and the house by using locally available material viz. wood, mud, broken

Table-2 Body weight and measurements

District	Adult weight of (kg)		Shank length of (cm)	
	Male	Female	Male	Female
Banswara	2.29±0.02	1.47±0.01	8.94±0.07	7.29±0.04
Bhilwara	1.90±0.02	1.22±0.01	8.51±0.01	6.59±0.02
Chittorgarh	1.67±0.08	1.16±0.02	8.06±0.06	6.68±0.05
Dungarpur	1.68±0.02	1.09±0.01	8.23±0.02	7.03±0.03
Rajasamand	2.23±0.03	1.39±0.04	8.50±0.08	6.41±0.05
Udaipur	1.71±0.02	1.15±0.01	7.88±0.08	6.39±0.05
Overall	1.91±0.02	1.25±0.01	8.35±0.03	6.73±0.02

bricks, tiles, wire nest. No bedding was provided in these houses.

In pucca type house the floor was made up of cement, concrete and stone. Litter was provided in 10 (33%) of the pucca houses and remaining 67% did not provide any litter material for their poultry birds. Majority of the farmers used dry leaves, wheat straw, gunny bags as bedding material. For their poultry house bedding, none of the backyard poultry keepers reported use of rice husk which otherwise is a commonly bedding material in commercial as well as organized poultry farms. The backyard poultry keepers reported stirring of litter at regular intervals, removal of wet litter by replacing it with a new dry one.

Feeding management: All the farmers reared the birds in backyard/free range system allowing the birds to scavenge in search of food during day time in the surroundings of house, alley, village, gardens, fields etc. to fulfil their feed requirement. During scavenging, the birds feed upon earthworms, grasshoppers, ants, grains, seeds, green grasses, leafy vegetables etc. The farmers released their birds for scavenging in the early morning and housed before sun set therefore scavenging hours per day varied from season to season.

In addition, farmers also provided kitchen waste and whole grains produced at their field. 58.33% of the poultry keepers supplemented once a day in the morning and remaining 41.67% twice a day in the morning as well as evening. None of the farmers supplemented readymade feed or balanced ration available in the market indicating absence of semi-intensive and intensive system of backyard poultry production in Rajasthan. None of the farmers used feeders to feed the supplementary feed to their birds. They usually spread the grains on clean floor outside the house. All the poultry keepers provided water to the birds in containers kept in courtyard. During scavenging birds also used stagnant fresh/sewage water in drainage for drinking.

Health care: Health care is a vital component of management which greatly affects the economics of poultry farming. The present study revealed that only 4% of the backyard poultry keepers in rural Rajasthan treated their sick birds; all by themselves or by the local quacks using local treatment. None of them consulted a qualified/experienced veterinary compounder or a veterinary doctor.

Constraints: The constraints, as perceived by the rural poultry keepers, were recorded in the schedule prepared for the purpose of the study. The constraints were ranked based on their frequency distribution. Attack by predators, non-availability of improved germplasm, disease incidence, Inadequate health services, lack of proper market for the poultry products, non-provision of balanced ration were the major problems faced by 87.33, 85.67, 76.00, 65.33, 58.67 and 57.33 per cent of the poultry keepers.

It is apparent that efforts in terms of planning and

execution of improved backyard poultry production including educating, training and sensitization of the poultry keepers may greatly enhance remuneration from backyard poultry production. This will also enhance livelihood and nutritional security of the rural poultry keepers and consumers. The input: outcome ratio in rural backyard poultry production system is fairly promising.

Thus, majority of native birds (53.89%) of southern Rajasthan are of mixed plumage colour, dull colour pattern, yellow skin and shank colour, red ear lobe, single red comb and black eye colour. The birds are of medium body size, long shanks and produce medium size egg of light brown to dark brown colour. It emerged that such type of birds are maintained since immemorial. The native birds of mixed plumage colour in Southern Rajasthan may represent a different gene pool and thus necessitate detailed investigation.

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