



A survey on backyard poultry farming in Leh-Ladakh region

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ABSTRACT

Leh-Ladakh, India is situated at 3000-3500 m above mean sea level, where harsh climatic environment is characterized by hypobaric-hypoxia, low humidity, high UV radiation and extreme variation in ambient temperature (-20 to +30°C), which causes high-altitude stress to poultry. Hence, not much progress has been made in poultry rearing in this region, as high altitude causes high mortality and poor growth resulting in heavy loss of farm economy. The present field survey was conducted to study the farmer's choice, existing farm resources, market opportunity, and social awareness on modern poultry rearing. Hence, many villages, viz. Chuchot, Shey, Phyang, Thicksey, Basgo, Skurbuchan, Skara, Ranbirpura of Leh-Ladakh were surveyed. The survey findings indicated that few progressive farmers are practicing backyard poultry rearing which plays an important role in the rural economy and women empowerment. It was found that the average flock size reared per family was small and farmers preferred colour plumage birds. The coops for chicken are mainly made up of double walled under or semi-underground mud houses for better insulation and heat retention during winter. Shelters are provided during night, whereas pasture or open field grazing is practiced during day time even in winters. Farmers rear birds throughout summers and self-consume or even sell them in three to four times higher price during winters when the demand is very high. Poultry farming among more farmers in more villages with help from state departments and different NGO will definitely strengthen poultry farming in this region. DIHAR (Defence Institute of High Altitude Research) a premium institute, also working in poultry science can further help these farmers in providing a complete package of basic training on management practices and even in distribution of high altitude adapted chicks to uplift farmer's interest and promote poultry farming in this region.

Keywords: Backyard poultry farming, High altitude, Leh-Ladakh, Management, Practices

The Indian poultry industry has emerged enormously in recent years and India is currently ranked 3rd in egg production and 6th in chicken meat production in the world (FAO 2014). Backyard poultry farming is believed to be a low input or no input business (Mandal *et al.* 2006) and is characterized by rural ways of rearing birds with kitchen leftovers with or without any supplements (Dana 1998). Such farming system plays a major role in the rural economy and women empowerment (Sheikh *et al.* 2018). However, poultry farming remains a challenge in high altitude regions due to extreme climatic conditions. Leh-Ladakh is situated at the height of 3,500 m above mean sea level. In high altitude, conditions are very difficult for poultry farming due to variations in temperature, less atmospheric pressure, hypobaric-hypoxia and low relative humidity (Biswas *et al.* 2010). These adverse environmental conditions are the main constraints of poor development of poultry industry and backyard poultry rearing in high altitude region (Semenza 2012, Kalia *et al.*

2017). Therefore, till date there is no commercial poultry farm in this region. Other important constraints are failure of egg hatching under conventional hatchery, poor fertility and unavailability of high-altitude poultry ration (Bharti 2019).

Most of the local farmers of Leh-Ladakh traditionally practice cattle, sheep and goat farming. In addition to it, yak and double humped camel are also reared for logistics and valued dairy products. Chicken rearing is generally practiced either as a source of supplementary income, self-consumption or just out of interest. None of the families practice poultry farming here as their sole source of income. Leh-Ladakh has mixed population of mainly Buddhist and Muslims. Poultry rearing is more common in Muslim populated areas of Chuchot, Kargil, some families from Thikshey village, whereas, it is very less practiced by Buddhist communities (Biswas *et al.* 2011). There is huge demand of chicken here as tourism in Leh has increased enormously in recent years. Despite the huge demand, poultry farming has not been successful in Leh. The adverse climatic condition, unavailability of native chicken germplasm, high mortality, poor growth and production performance has made poultry farming unsuccessful in

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Leh-Ladakh (Swati 2020). However, backyard poultry farming with some scientific or veterinary assistance can help in strengthening poultry population in this region. Till date, no study has been carried out in this location to check the potential of backyard poultry farming. Therefore, the present field survey was carried out to obtain some baseline data and information on the potential of backyard poultry farming in Leh-Ladakh and identify the traditional methods of chicken rearing, housing system, feeding management, flock composition, their common practices, constraints and new strategies to popularize backyard poultry farming in Leh.

MATERIALS AND METHODS

The survey was conducted in Leh city, Ladakh UT, India and its nearby localities and villages e.g. Chuchot, Shey, Phyang, Thicksey, Skara, Basgo, Skurbuchan, and Ranbirpura. A total of 55 families were surveyed randomly from these places (20 families' personal visit and 35 families interviewed based on questionnaire). The geographical features and location of these villages were studied. A questionnaire (Supplementary Table 1) was prepared based on which data regarding farmer's economic profile, bird's housing system, feeding management, flock composition, poultry health care, technical consultancy, economic benefits, marketing and their future requirements were asked from the owner itself. Farmer's details regarding their main occupation, family members, education and duration involved in chicken farming were asked in detail. The details of local housing material used in the poultry shelters, lighting and artificial heating were recorded. Further, the kind and quantity of poultry ration and watering management along with local feed supplements were surveyed. The number of chickens available per family, bird's age, gender and breed were also recorded. The traditional system of poultry rearing in these villages and their different management practices were observed and recorded. This survey was conducted for a period of one year to record season wise management practices. All the data were statistically analyzed using SPSS Statistics Version 16.0 software. Differences were considered statistically significant at $p < 0.05$ and the values were presented as the mean $\pm$ SD.

RESULTS AND DISCUSSION

Farmer's details: On survey, it was found that many of the farmers had traditional experience of backyard poultry farming and some of them have been involved for 10-20 years in rearing chicken in their home. They usually procure chicks from State Animal Husbandry-Leh, DRDO-DIHAR and from Delhi during early summer season (April-May). They rear these chicks throughout the year and generally consume eggs and chicken during winter when availability of fresh food, vegetable, meat becomes scanty. Even they sell these eggs and chicken in winters at almost 3-4 times higher price, i.e. 150 to 300 ₹/tray eggs and 300 to 550 ₹/kg meat and people are ready to pay the high prices as they

are getting fresh meat in winters which otherwise is rare to get. This is a normal practice followed by the farmers here. It was observed that women were more involved in rearing and taking care of these birds and the male were involved in their main occupation either in transportation or in hotel management. The same had been reported earlier that women are the main care taker of the birds in backyard poultry farming (Sankhyan *et al.* 2013). These women were mainly of mid age group, i.e. 40-50 years. It was also found that few of the owners were the older retired personnel taking care of their chicken. Most of the families who were involved in rearing chicken were Muslim families and some of them were even primarily educated. Maximum of these families were also involved in other livestock rearing especially sheep, goat and cattle (Supplementary Figure 1). The same was reported that backyard poultry farming was mostly integrated with other agricultural and livestock farming (Kumar *et al.* 2013). But none of these families in Leh reared chicken with the only purpose of marketing or as the only source of their income and was always integrated with other livestock activities.

Housing system: In Leh, extreme cold and arid climatic conditions occur followed by high wind velocity. Winters generally have low temperature which goes below -20°C . Local farmers generally use mud and stone walled, mud brick, clay or ash filled layered under brick wall for construction of semi-underground mud or stone wall rooms for rearing poultry. It helps in conservation of heat energy and protects birds from inclement weathers. In brief, these semi-underground sheds are a double wall constructed with mud and stone up to the ground level, with mud bricks being used to construct the rest of the wall and the roof. The double wall had either straw or husk mixed with mud sandwiched, which helped as insulators. The roofs were also double layered with mud bricks and were supported with wooden logs and locally available materials. But these houses do not provide much protection from cold and have poor ventilation and floor hygienic conditions. These houses are very much prone to ammonia accumulation and colonization of coccidian and bacterial species, which are responsible for poor growth and compromised health conditions of poultry birds. Many farmers also made cage boundaries outside poultry house so that in day time, these birds can freely roam around and provides small sheds during night (Fig. 1). The shed direction and window placement is another important factor for hilly terrain and should be towards side which can help in maximum trapping of sunlight.

Another main reason for making such boundaries is to protect birds from predators like stray dog and wild fox. Dogs are one of the biggest threats for poultry rearing in Leh region. It is always good to keep the bird's at least one time out in open space, as formation of ammonia increases in closed rooms with poor ventilation. Secondly, the birds remain more active by roaming freely in open space under sunlight and scavenging on open farms which may contain insects and different forage. During the survey, it

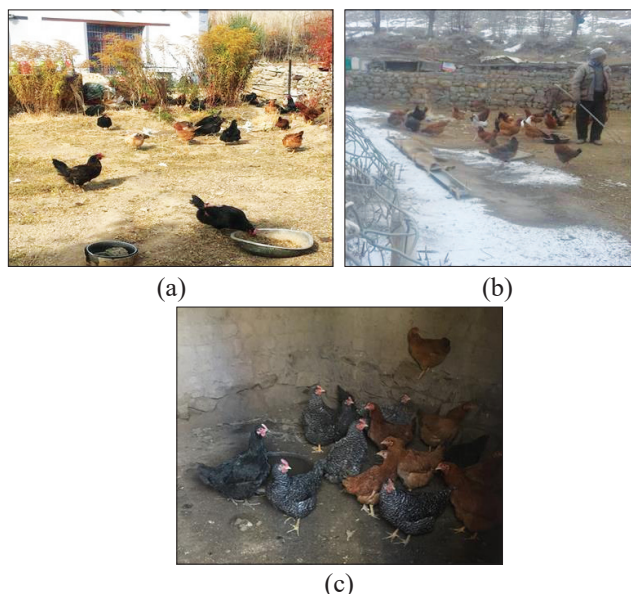


Fig. 1. View of village backyard farming (a) chickens in free-range during summer day time, (b) chickens in free-range during winter day time, (c) chickens inside the shed during night time.

was found that maximum of the new farmers interested in poultry farming had provision of such fencing boundaries around or in front of these birds main room for easy access of sunlight and protection from predators. Different types and material of the coops for rearing chicken traditionally in these regions are shown in Fig. 2.

It was also observed that most of the poultry farmers (60%) made a small room or some kept small wooden boxes inside the shed where the hen goes for nesting purpose.

These rooms were either made up of mud or stones and were dark enough. The floor of such rooms was covered by straws. It was observed that many farmers made these rooms outside or adjacent to the main sheds in order to not disturb the laying hens. Some of such types of nesting rooms are shown in Fig. 3.

Feeding and water management: Till date, no successful commercialized poultry farm is there in Leh and therefore, there is non-availability of poultry readymade ration here. Unavailability of poultry ration is a big hurdle for poultry farming in Ladakh where ration needs to be brought from lowland via roadways which remains open for only summer seasons (approximately for 6 months) and due to which transportation and storage of feed from distant places causes extra economical load in rearing poultry at such high altitude. On survey, it was noticed that maximum farmers used crude whole or broken wheat to their birds.



Fig. 3. Nesting rooms: (a) inside the main shed, (b) outside the main shed.

Also, many of them preferred mixing of wheat flour with water, making soft small balls and feeding them. Cooked rice and left-over kitchen items were also used to feed the birds. Sometimes they also provided their birds with

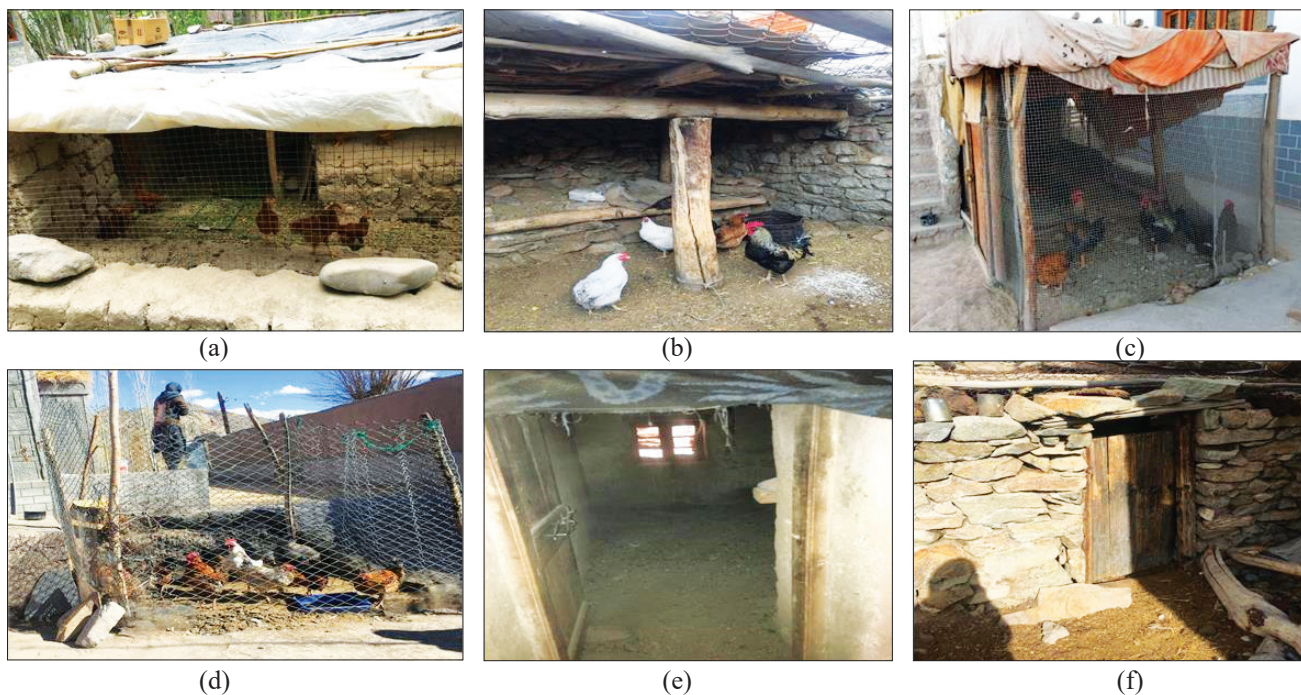


Fig. 2. Different types of housing facilities and materials: (a) semi-underground mud house with front wire mesh, (b) underground double walled mud brick house with wire mesh on roof for sunlight, (c) wire mesh walled room with plastic and blanket sheet on roof, (d) wire mesh boundaries without roof for keeping birds in day time only, (e) semi-underground double walled mud brick house with windows, (f) double walled room made up of stones.

jaggery which was soaked in water making small clumps or balls. Time to time, these birds were also fed on left over kitchen wastes. Feeding was done twice to thrice per day. The best part is that the owners of these birds leave them in open during day time, where these birds roam around freely, eat green grasses and receive direct sunlight. Free roaming around in open space or garden is good for these birds in terms of some physical exercise and to keep their active enough. Generally during summer, backyard space or garden in the house have some green grasses, alfalfa, small flowering plants, etc. on which these birds fed freely. Also in open space, few insects, ants, worms or flies are present in soil and grasses on which these chicken usually feed, which in fact is a source of natural protein for them. When these birds are out of their rooms, they get direct exposure to sunlight, which is a source of heat. No special health supplement was provided to the birds. Normal household water was given twice or thrice in a day. Different feeding materials are shown in Supplementary Fig. 2.

Feed and water were generally given in separate vessels made up of plastic, wooden, metal or even earthen pots. The quality of the feeder and drinker were poor and unhygienic. Different types of containers used for feeding and water purpose has been shown in Supplementary Fig. 3.

Flock structure: In the survey, it was found that the farmers had an average of 10-25 birds at a time with the average flock size of 10 ± 3.5 . Number and composition of these birds differ during summer and winter season. As mentioned earlier these farmers collect birds in summer season and rear them till complete winter till March. The actual demand of this chicken is in extreme winter when the road and transportation remains closed for at least six months. These farmers keep the lot for one season and then either consume or sell them at much higher prices during winter. They sell maximum of their flock before the next summer comes except those with good laying. The chicks which they bought in summer possess mixed sex ratio. Upon rearing them they cull excess male grower with time by either self-consumption or selling it off and maintain more number of female grower. At a particular time, it was observed that 60% of flock consists of adult female for laying purpose with only 1-2 best roosters. A typical composition of the flock is shown in Supplementary Fig. 4. During the survey it was found that these local farmers preferred more colored plumage birds. The solar intensity in this region is very strong throughout the season and it is believed that the coloured plumage birds, especially the black ones can absorb more heat and can stay stronger in winters.

Constraints of backyard poultry farming in Leh: Early in 1960's, poultry farming was more practiced in Kargil area and in few places near Leh like Chuchot, Phyang and Thicksey. Majority of these areas are Muslim populated where poultry farming was more popular. Maximum places in Ladakh have Buddhist community where poultry farming is not that appreciated and practiced. Earlier local breed of chicken which were small in size were reared in

some areas. But today the native breed of this region is almost negligible. There are many reasons of deterioration of native breed and unsuccessful poultry farming in this region like non-availability of native germplasm; non-availability of day old chick (DOC); poor natural hatching; huge variation in atmospheric temperature; hypoxia with low pressure and humidity; traditional and cultural beliefs; poor productive and reproductive efficiency; high mortality in high altitude; veterinary health care and extension services and presence of predators.

Importance of backyard poultry farming in Leh: Backyard poultry farming could be important for nutritional security in rural areas. Birds grow on kitchen waste, homemade ration and convert into high protein rich meat. No special feed supplements are required with any special interventions. In addition, it is a good way to increase farmer's economy, provide employment opportunities, especially for women as a side business. If self consumed, it is a good source of protein nutrition. So, backyard poultry rearing always can be integrated with some other agricultural or livestock farming. It is considered that free range chicken are always more preferred than chicken of commercial farm, even it is costlier as they are stress free and have low cholesterol in their meat and eggs (Sheikh *et al.* 2018).

The manure or droppings of these birds are also used as vegetables and crops fertilizers (Supplementary Fig. 5). Since, poultry droppings are rich in nitrogenous substances, and extensively used as an organic fertilizer. It is a well-known fact that of all animal manure, chicken manure has the highest amount of nitrogen, phosphorous and potassium. Composition of fresh chicken manure contains 0.8% potassium, 0.4% to 0.5% phosphorus and 0.9% to 1.5% nitrogen (Foreman *et al.* 2013). Use of inexpensive organic manure in form of poultry droppings in their agricultural fields is very economical and productive. Therefore, backyard poultry farming in such harsh environment will always be a boon for the local villagers as they can have their own fresh meat and eggs for either self-consumption or sale marketing with huge profitable price due to Ladakh's seasonal variations. However, during winter these remain more difficult for backyard poultry farming, which leads to food security of poor farmers.

DRDO-Defense Institute of High Altitude Research (DIHAR) is working on agro-animal based technology in cold dessert of Leh and providing fresh animal origin food to the Indian Army and local population. DIHAR also maintains poultry line and are working on selection and establishment of parental poultry line adapted to high altitude. To promote commercial and backyard poultry rearing in Leh-Ladakh, DIHAR has been working consistently on poultry technology development and dissemination in this region. In addition to it, DIHAR provides technical consultancy and different inputs to local farmers for poultry rearing. In brief, many stakeholders are well aware of DIHAR solar poultry shed, multi-tier cage system for layers, poultry feed additives, normobaric egg

hatchery chamber, high altitude poultry breeding stocks, etc. Some of the poultry farmers are rearing DIHAR developed poultry lines and using DIHAR hatchery facility for hatching of their farm's egg. This institute is also providing fresh chicken to army personnel and distributes birds to local farmers in limited numbers throughout the season. The birds distributed by DIHAR are high altitude adapted chickens as they have been maintained through 3-4 generations with less mortality. Several trainings related to scientific way of poultry farming has been imparted by the scientists of DIHAR to locals and retired army personnel's interested in backyard poultry farming in this region. Hence, to further encourage farmers in poultry rearing, DIHAR will be providing a complete package of scientific training on the management, feeding, disease control, medicine, health supplements, vaccination, marketing strategies, demonstration and installation of hatchery chamber in some villages and distribution of high altitude adapted chicks to maximum number of farmers from different villages. This strategy will strengthen and uplift their interest in poultry farming which will increase their economy and ultimately promote backyard poultry farming in Leh-Ladakh region.

This survey revealed that backyard poultry farming is very important in popularizing the poultry rearing with very less inputs and more outputs in Leh-Ladakh. Further, this survey revealed that unavailability of day old chick (DOC), readymade ration and high mortality rate especially during winters, and low hatchability and growth performance are the main constraints of poultry rearing. Nevertheless, to address these constraints there is need to develop high altitude poultry breed, hatching technology, and feed formulation suitable for high altitude poultry rearing. The institutional supports from DIHAR (DRDO) and Department of Animal Husbandry, Leh need to be strengthened for improving existing poultry farming. More involvement of state departments and NGO's will be required in context of supplying day old chicks, providing various veterinary services door-to-door, establishing co-operative marketing societies and educating farmers on scientific chicken rearing practices for successful rural

poultry farming.

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