REVIEW ARTICLE Bhartiya Krishi Anusandhan Patrika, Volume 38 Issue 1: 09-18 (March 2023)

Role of Animal Husbandry Practice in Upliftment of Socio-economic Status of Mizo Farmer: A Review

Dibyajyoti Talukdar[1], Kalyan Sarma[1], Girin Kalita[1], Saidur Rahman[1], Ranjana Goswami[1], G.E. Chethan[1], Hemen Das[1], Bedanga Konwar[1]

10.18805/BKAP572

ABSTRACT

Agriculture is the major source of livelihood for the majority (85%) of the rural population in Mizoram and livestock plays an important role in that. Livestock are socially and economically very significant due to its multi-functional outputs and socio-cultural security. Dairy cattle are mainly reared by medium-scale farmers, while poultry and pigs are important sources of livelihood for the landless, near landless, marginal and small farmers. Even the milk productivity of crossbred cattle which represents 45% of the cattle is higher than the Indian average. Meat production is the major livestock activity in Mizoram and bovine meat is relished. The yield of pork is nearly three times the average productivity of the nation and it can serve as viable instruments for enhancing the income of the household. The income from the sale of eggs, chicken and pork is furthermore important to finance the daily purchases of the household.

Key words: Animal husbandry, Economic status, Role.

In India, livestock is a vital constituent of the farming system. The farm animals sector is socially and economically very important due to its multi-functional outputs and socio-cultural safety. As per the report, Mizoram is the fifth smallest state in India with a geographical area of 21,081 sq km inhabited by the people called “Mizo” (Haokip, 2018). Mizoram is a hilly state with few plain areas. The slopes are steep on all sides and the average height is about 900 metres from sea level (Rahman *et al*., 2008). That is why, in Mizoram, agriculture is still dominated by the traditional method of shifting cultivation (Jhumming). Animal Husbandry has a specialized significance as it can play an important role in improving the socio-economic status of a sizable section of the weaker and tribal population. It gives safe guard to crop failures in the event of natural calamities where agriculture is the prime source of livelihood for the majority (85%) of the rural population in this state (Economic Survey of Mizoram, 2021-22). It is considered a low input-low output, technologically lagged mixed farming system. and is conquered by smallholders. Although cereals dominate the cropping pattern in this region, livestock is the source of income as well as endurance of family purchasing supremacy because of unprofitable agriculture due to unforeseen reasons. This enormous potential is inadequate to the traditional and tenure system and subsistence farming practices (traditional technologies) that unluckily seldom assures, or generate adequate returns which can promote the development of more commercially oriented livestock production systems (Shyam *et al*., 2017). Mizoram is the least populated state in Northeast India. Nearly 50% of the population lives in urban areas. Over 90% of the population is scheduled tribes. In Mizoram, the large and small ruminants, pigs and poultry were evenly dispersed across the state. Dairy cattle are mostly reared by medium-scale farmers, while poultry and pigs are important sources of livelihood for the landless, near landless, marginal and small farmers. The livestock sectors contribute 30% of the value of output from agriculture and its allied activities. The meat group accounted for 70% of the value of the output from livestock followed by milk (22%) and eggs (7%). As per the economic survey of Mizoram (2021-22), the total gross domestic product of the state at existing prices is calculated at Rs. 29076.42 crores in 2020-21 against Rs. 25148.57 crores in 2019-20, thus proving an increase of 15.62%. The primary sector comprising agriculture and allied activities contributed 25.93% (2020-21) to the gross state value added (GSVA).

Livestock and poultry rearing have emerged as important factors for improving the nutritional security of farmers in many developing countries. In Mizoram, almost every household keeps poultry and pig in the backyard. The income from the sale of eggs, chicken and pork is further

[1]College of Veterinary Sciences and Animal Husbandry, Central Agricultural University, Selesih, Aizawl-796 015, Mizoram, India.

Corresponding Author: Dibyajyoti Talukdar, College of Veterinary Sciences and Animal Husbandry, Central Agricultural University, Selesih, Aizawl-796 015, Mizoram, India.
Email: dibya26@gmail.com

How to cite this article: Talukdar, D., Sarma, K., Kalita, G., Rahman, S., Goswami, R., Chethan, G.E., Das, H. and Konwar, B. (2023). Role of Animal Husbandry Practice in Upliftment of Socio-economic Status of Mizo Farmer: A Review. Bhartiya Krishi Anusandhan Patrika. 38(1): 09-18. doi: 10.18805/BKAP572.

Submitted: 08-08-2022 **Accepted:** 24-12-2022 **Online:** 28-01-2023

more important to finance the daily purchases of the household (Roy *et al*., 2021). Piggery is the most popular venture among rural and urban mizos (Saikia *et al*., 2019). Mizo farmers rear five to 10 pigs for their consumption or sale. This is often one of the sources of income for the subsistence farmers because of unprofitable "Jhum" cultivation. Pigs are still considered scavenging animals and therefore the underprivileged are involved in pig production. Pig keeping is vital in the eastern states of the country and particularly for the tribal communities (Rangnekar, 2006; Roy *et al*., 2019).

Meat production is the major livestock activity in Mizoram and bovine meat is relished. The yield of pork is almost three times the average productivity of the nation. Even the milk productivity of crossbred cattle which represents 45% of the cattle is above the Indian average. Given the reasonably good yield levels of pork and milk, they will serve as viable tools for enhancing the income of the household (Table 1).

Dairy farming in Mizoram

Although livestock is a crucial component of the mixed farming system and plays an important role in the economy of Mizoram, the assembly of milk and milk products in the state is the least compared to other states of the N.E region. The state shared only 0.91 per cent of the N.E Region's milk production within the year 2012-13. During the identical period, the milk production within the state was only 13639 tonnes and the per capita availability of milk per day was 33 grams (GoM, 2014) which was very low compared to the national average of 132.4 million tonnes and 299 grams, respectively (GoI, 2014). The entire bovine population in the state is 51767 out of which the cattle population is 45701 and buffalo 2109 while the Mithun population is 3957 (Table 2). The bulk of the livestock 32709 cattle heads (71.57%), 3912 Mithun heads (98. 86%) and 1813 buffalo heads (85.96%) are reared by rural people.

Mizoram doesn't have a registered indigenous cattle breed. The indigenous cattle found in Mizoram are small in size and have cylindrical bodies. The cattle have a well-built and compact body with strong legs. The typical adult body weight of cow and bullock weighs about 169 kg and 200 kg, respectively (Pundir *et al*., 2015). The daily milk yield ranges from 1.5 to 3.5 kg and lactation length varies from 150 to 210 days (average 178 days). The herd life is 15-20 years and therefore the number of calves during the lifetime is 8-10 calves. Milking is typically done once a day and also milking time is irregular which may be the reason for low productivity. Farmers mostly prefer Mithun and cattle cross because of better productivity in terms of milk, draft and beef. Though buffalo rearing isn't popular in Mizoram, few farmers reared swamp buffaloes and few Murrah buffaloes (Economic Survey of Mizoram, 2021-22).

Housing system of dairy animals

The housing system of dairy animals in Mizoram is generally intensive. The housing system is based on traditional practices with minimal scientific interventions (Fig 1). Locally available materials are used for the construction of the cattle barn. The roof of the cattle shed is mainly tin and the majority of the farmers (78.00%) used bamboo for the construction of sidewalls and wooden slated flooring systems (Rathore *et al.,* 2010; Singh *et al.,* 2015; Malsawmdawngliana and Rahman, 2016). In Mizoram, the dairy farmers were categorized into four according to their number of cattle owned by them (Ralte and Chhawna, 2021). These include farmers having less than 5 cows, farmers having 5 to 8 cows, farmers having 9 to 12 cows and farmers having more than 12 cows. The expenditure as reported by (Ralte and Chhawna, 2021) for preparation of their cattle shed and other fixed items; for less than 5 cows (Rs. 57750.00), 5 to 8 cows (Rs. 64952.00), 9 to 12 cows (Rs. 29798.00) and for more than 12 cows (Rs. 36240.00) was required. A large proportion of dairy farmers fixed electricity in their cattle sheds. Resources like bamboo were easily available in the vicinity of every village and did need not to be

Table 1: Livestock and poultry population in Mizoram (20th Livestock Census, 2019).

Species of animals		No. of animals
Cattle	Exotic cross breed	21455
	Indigenous	24246
	Total cattle	45701
Buffalo		2109
Mithun		3957
Sheep		485
Goat		14820
Pig		292465
Horse/pony		159
Mules		8
Dogs		69860
Rabbit		350
Fowls	Backyard poultry	2018495
	Commercial poultry farm	16404
	Total poultry	2034899
	Backyard duckery	12656
	Turkey	176
	Other birds	79

Table 2: Major livestock products in Mizoram (Integrated Sample Survey, 2013).

District	Milk (in tons)	Egg (in lakhs)	Meat (in tons)
Aizawl	15504	127	6031
Lunglei	1528	68	3183
Siaha	516	34	1112
Lawngtlai	310	47	1630
Kolasib	4100	34	998
Serchhip	1595	36	832
Champhai	2160	56	1663
Mamit	984	31	1085

purchased by the farmers which greatly reduced the capital expenditure of the farmers. All the farmers used aluminium vessels for the feeding of concentrate feeds (Malsawmdawngliana and Rahman, 2016). It was observed that the space required for each animal was insufficient and all the categories of the animals were kept in the same shed which might be due to the non-availability of land. Hence, cattle shed were building-upon the slopes of hills. The sanitary and drainage system of the majority of cattle sheds was found to be unhygienic and poor. The dung was usually dumped in the vicinity of the shed (Malsawmdawngliana and Rahman, 2016).

Breeding system

Cross-bred dairy cattle mainly Holstein and Jersey cross are reared by most Mizo farmers (Malsawmdawngliana and Rahman, 2016). The breeding system of dairy cattle mostly depends on the Artificial Insemination (AI) technique and all the farmers are found to be aware of the timing of insemination and they are inseminated within 12-18 hours of heat detection. All the farmers are quite aware of the heat signs in dairy animals. AI is preferred by the farmers over natural service, as the rearing of the bull for breeding purposes is a costly affair. An overpowering majority of the dairy farmers achieved pregnancy of the respective cow with 2 times of AI whereas the average number of AI per pregnancy of the cow is 1.98. The major reasons for the failure of AI in various cases are mainly mineral deficiency or ovarian disorders or faulty AI. The study reported that only 3.00 per cent mizo farmers practised pregnancy diagnosis because there is an unavailability of qualified personnel to perform the diagnosis as well as the high cost (Rs. 1000-1500/- per visit of qualified personnel) involved in it (Malsawmdawngliana and Rahman, 2016). The overall veterinary expenses and labour cost accounted 35% of the gross cost of maintenance of dairy animals in Mizoram (Sangpuii and Malhotra, 2016). The farmers (52.00%) reported that the calving intervals ranged from 13-15 months. The long calving intervals may be due to repeat breeding as well as the farming practices followed by the farmers. However, treatment of repeat breeders was found to be practised by only 38.00 per cent of the farmers (Malsawmdawngliana and Rahman, 2016).

Feeding practices

In Mizoram, stall-fed feeding systems are one of the most common livestock rearing practices. The bulk of the mizo dairy farmers uses green fodder (forest) + concentrate feeding while few farmers practised green fodder + concentrate + dry fodder feeding as a ration for their dairy cattle (Malsawmdawngliana and Rahman, 2016). All the farmers carry green fodder from forest land (Fig 2). Among the farmers, 53.00 per cent of the farmers fed 3 to 5 kg of concentrate per day to their lactating cow while 45.00



Fig 1: Intensive management of cattle A. and B. Organize farm C. Unorganized village farms.



Fig 2: Forest grass carries by the farmers for their cattle farm.

per cent of them fed 2 to 3 kg of concentrate per day (Malsawmdawngliana and Rahman, 2016). Due to the lake of dry fodder in all the areas, a few farmers in the Aizawl district bought dry fodder from Thenzawl Village during the dry season. The concentrate mixture mainly consisted of wheat bran, wheat flour, oil cakes and salt. Though the farmers are not practising fodder cultivation due to a lack of cultivable land and irrigation facility (Malsawmdawngliana and Rahman, 2016), some of the farmers cultivated green fodder for dairy animals whose are having land. About 20-25 kg amount of green fodder (broom, banana tree leaves, Jack fruit tree leaves *etc*.) is fed to the adult stock at each feeding time (Malsawmdawngliana and Rahman, 2016). The majority of the Mizo farmers harvested rainwater as their main water source, for use in the winter season. The mineral mixture is offered regularly twice a day to pregnant and nursing cattle at about 500 g per animal at a time, *i.e*. 1 kg animal^{-1} day^{-1}.

Health care and management

The majority of dairy farmers are not practising deworming in milch animals as well as calves. The farmers might be having poor knowledge about the harm caused by endo-parasites in the animal. Rather some dairy farmers practise an ecto parasite control regime. Barman *et al.* (2020) reported that the prevalence of various livestock diseases in NER of India were foot-and-mouth disease (21%), bluetongue (28%), brucellosis in bovine (17%), brucellosis in caprine (2%), brucellosis in porcine (18%), brucellosis in sheep and goat (3%), babesiosis (6%), theileriosis (26%), porcine reproductive and respiratory syndrome (1%), porcine cysticercosis (6%), classical swine fever (31%), *Porcine circovirus* (43%) and *Peste des petits* ruminants (15%). Concerning prophylactic measures for infectious diseases, only a few farmers were going for vaccination against contagious diseases such as foot and mouth disease (FMD). Malsawmdawngliana and Rahman (2016) reported that lack of awareness and insufficient attention of the Veterinarian and high cost associated with the vaccination might be the probable causes of low vaccination. They also found that the majority (63.00%) of the farmers were getting treated their sick animals by paravets and the rest by veterinarians (43.00%) and the use of indigenous technical knowledge (ITK) accounted for about 4.00 per cent of the treatments (Talukdar *et al*., 2015). Although health care facilities such as a vaccine, deworming drugs *etc*. were available to some extent, the farmers did not give much attention to it and they were not aware of regular checkups and disease preventive measures for their animals (Malsawmdawngliana Rahman, 2016; Boro *et al*., 2021).

The majority of dairy farmers fed colostrum to newborns. Castration of male calf was rarely practised rather they usually sold them. It was noticed that there was high demand for the male calf in the local market and it fetches a good price. Almost all the dairy farmers did not practice special care for heifers whereas the majority of them practised special care for pregnant cows. All the farmers were aware of special care for pregnant cows after calving. It was observed that cow shed cleaning was practised at least two times a day by the majority and cleaning of cow sheds was mainly done after feeding cattle (Malsawmdawngliana and Rahman, 2016). A dry period of about 60 days was practised by the majority of the farmers. The reason for the less dry period as reported by the farmers was that they believed it reduced the occurrence of milk fever (Malsawmdawngliana and Rahman, 2016). Singh *et al*., (2015) also reported that most of the farmers were feeding colostrums to the newborns and special care was taken to the pregnant animals. Malsawmdawngliana and Rahman (2016) observed that majority (71.00%) of the respondents used dung solely for manuring the agricultural field and that 21.00 per cent of them, used it as fertilizer and a little quantity used for gobar (Cow dung) gas plant. Cow dung was mainly used for two purposes in Mizoram: fuel and manure. From an environmental angle, using dung as manure is desirable and beneficial to soil health (Malsawmdawngliana and Rahman, 2016).

Marketing

A total of 49.00 per cent of the dairy farmers were found to sell their milk to the Cooperative Union (Table 3 and 4) whereas 21.00 per cent of the dairy farmers were selling their milk both to Co-operative Union and the local consumers directly (Fig 3) (Malsawmdawngliana and Rahman, 2016). It was found that only 17.00 per cent of the farmers sold their milk directly to the local consumers alone. The main dairy cooperative plant that procured milk from various regions of the Aizawl district is Mizoram Milk Producers Co-operative Union Ltd. (MULCO). Milk is collected by the MULCO people in the morning and evening at a rate of about Rs. 39.00 per litre of milk based on the fat and SNF (Solid-not-fat) content. The price of milk varies depending upon the fat and SNF percentage. The fat and SNF contents for milk procurement are 3.5-4.0% and 7.0-8.5%, respectively. The retail price of milk in the market is approximately Rs. 50.00 per litre.

Table 3: Number of co-operative societies category-wise in Mizoram.

Category	2007-08	2008-09
Dairy and livestock, multi commodity	117	121
Piggery	189	197
Poultry farming	14	22
Meat processing/butcher	9	14

Table 4: Membership of co-operative societies category-wise in Mizoram.

Category	2007-08	2008-09
Dairy and livestock, multi commodity	2,550	2,590
Piggery	4,514	4,141
Poultry farming	315	407
Meat processing/butcher	171	244

Pig farming in Mizoram

Pig farming is one of the essential elements for the economic activity of the Mizo farmers. The North-Eastern region has a sizeable population of pigs *i.e.*, 24.63 per cent of the total pig population of India (Vanlalmalsawma and Sharma, 2015). About 50 per cent of the country's pork is consumed in North Eastern Region alone (Economic Survey, 2012-2013). Pig rearing in Mizoram is very common and is attributed to culture as well (Vanlalmalsawma and Sharma, 2015) and among the livestock population, pigs constitute the largest group followed by Cattle *i.e.* 73 and 9.62 per cent, respectively. In Mizoram, pig farming is classically divided into two systems-backyard pig farming which is practiced in villages and intensive farming practiced in commercial farms. In case of village and traditional farming, the farmers reared small numbers of pigs. The majority of the livestock is occupied by the swine at 73.35 per cent and the meat production comprises 56.18 per cent of the total meat production during the year 2011 to 2013 (Economic Survey, 2012-2013). Pork is the major meat consumed in the state of Mizoram and the contribution of pork to the total meat consumed is as high as 71 per cent (Kumaresan *et al.*, 2008), but in recent years the supply of pork has been short (Vanlalmalsawma and Sharma, 2015). This may be due to the rise in population and economy which increases the demand as well. The economic survey Mizoram 2012- 2013 lays out the demand gap to be 807 tonnes of meat in Mizoram as per the recommendation. Mizoram is a part of North-East India where the majority of the people consumed pork (Talukdar *et al.*, 2019). Due to enormous supply scarcity in Mizoram, nowadays it is experiencing unorganised import of livestock from the border region of Myanmar and Bangladesh (Vanlalmalsawma and Sharma, 2015). Because of these, many diseases are outbreak especially swine flu, PRRS, CSF, FMD and other diseases and as a result, the economies of the state are worst (Rahman, 2007).

The housing of pigs

The pig farmers of Mizoram constructed their pigsty with locally available materials like bamboo and woods, situated in a roadside slope area with a raised platform above 2-3 feet from the ground (Fig 4). The farm equipment included mainly iron vessels (Kerahi) for boiling feeds, empty mustard oil tin (modified form) or cut pieces of wood or bamboo and tyres as a feeding trough. Water supply is mostly dependent on either rain or nearby streams (Rahman *et al.,* 2008; Talukdar *et al.*, 2019). The majority of the pigs are reared in an intensive system and fed with homemade cooked feed (kitchen waste and locally available plants)



Fig 3: Marketing of milk by the mizo farmers. A. Selling their milk to the cooperative Union; B. Selling their milk to local consumers directly; C. Selling their milk in bazar.



Fig 4: Pig farms of Mizoram constructed with locally available materials like bamboo and woods, situated in roadside slope area.

(Kumerasan *et al*., 2008). The study reported that the smallholder resource-driven pig production is economically viable and sustainable at the household level and there is enough scope to improve the smallholder resource-driven pig production system (Kalita *et al*., 2016).

Breeding practices

In the breeding practice, the majority (92%) of farmers are rearing cross-bred pigs on the farms and they (55%) are applying the first service to the female pigs at the age of 10-12 months (Rahman *et al*., 2008). The majority (75%) of the farmers are following artificial insemination practices for breeding and practise two services to the sow at 12 hrs intervals during the second day of heat. A great majority of the farmers have followed the practice of twice farrowing the sow in a year. Some of the farmers are rearing breeding boars for natural service. The average litter size at birth is 6-8 while that for weaning is 6 (Rahman *et al*., 2008) and farmers follow the practice of sow farrowing twice a year (Kumar *et al*., 2002). The farmers are preferred to rear cross-bred on their farms since in their opinion crossbred pigs have better growth performance, are healthier than indigenous ones, have large litter size, low mortality rate and have high backfat thickness. Adopting the artificial insemination technique, they said that it is cheap and easily available, they get improved progeny and they save on the cost of rearing breeding boars. The farmers are preferred Hamshire and Saddle Back breed for crossing. Liquid semen is used for artificial insemination and farmers pay Rs.100 per insemination (Rahman *et al*., 2008).

Feeding practices

The stall feeding practice is the main feeding practice which is followed by almost all of the Mizo farmers. Half (50%) of the farmers are provided feed kitchen waste to the pigs with a small number of concentrates (maximum one kg) given the high cost of feeds (Rewar *et al*., 2021). Kitchen waste (Fig 5) is mixed with locally available weeds *e.g*. Japanhlo (Mikaniamicrantha), *Mau tak (Melocannabaccifera), Anhling* (*Solanum nigrum*), Vaivakawnpar (Tithoniadiversifolia) *etc*. and boiled before providing to the pigs asboiling make soften the feeds (Rahman *et al*., 2008) and fed twice a day (Vanlalmalsawma and Sharma, 2015) (Fig 5). The supply of feed from the market may perhapsbe expensive for poor farmers. Some farmers (11.1%) have the opinion that the use of readymade feeds from the market is more economical than boiling the feeds prepared from vegetation and kitchen waste (Vanlalmalsawma and Sharma, 2015) as readymade feed gives the maximum growth rate. On the other hand, some farmerspractice the method of boiling green leaves and other vegetation as feeds which is convenient in rural areas. On the other hand 22.8 per cent use both kitchen waste and feeds, while 29.7 per cent utilise a mixture of available feeds, vegetation and kitchen waste (Vanlalmalsawma and Sharma, 2015). It was observed that about 2 to 3.5 kilograms of dry feeds were given to adult pigs in a day. Occasionally, pigs are fed with the mineral mixture, calcium and iron preparation, liver tonic, *etc*. Some farmers are given a mineral mixture twice a day starting from one month before furrowing in pregnant sows. Generally, feed and water are given in Chawkuang (wooden trough or trough made of the tyre).

Marketing practice

In Mizoram, per capita income was estimated at Rs. 54,689/- in 2012 while the national per capita income during the same period was estimated at Rs. 61,564/- (Economic Survey, 2012-13). Pig rearing is economic activity due to the fulfilment of demand and supply of pigs which may be in the form of piglets, meat, *etc*. Those who are engaged in pig rearing are more or less self-employed and are generating revenue for the state (Kalita *et al*., 2018; Talukdar *et al*., 2019). The pigs are reared for selling live after about one year at 70-80 kg body weight in the village. Besides, the piglets are also sold. The cost of a piglet is around Rs.5,000. The pork is sold at Rs. 400 per kg meat. So, the price of an 80 kg pig would be Rs. 32,000. Based on heart girth, the live pig is sold. In a pig, heart girth is calculated by using a rope. The rope is then folded into halves and its length is measured by holding it under the fist. One fist is called one Sum. Since measurement will vary depending on the size of the fist, a person having a big fist will be chosen to measure the heart's girth. Six Sumsare equivalent to 45-50 inches weighing 80-90 kg (Lalhmunmawia and Das, 2018).



Kitchen garbage | Home made cooked feed

Fig 5: Feeding practice for pig farming.

The majority of the pig market in Mizoram can be claimed to comprise meat and the piglet bazaar. Pork is the major item in the market and 87.4 per cent of the producers do not practice further processing of the meat for reselling, while 12.6 per cent of respondents in the market sell and prepare smoked meat for preservation and taste enhancement. The main motive of the sellers can be said that "it adds value to the meat" and can be sold at a higher price than the non-smoked. Likewise, there is very little requirement for cold storage and there is only 13.2 per cent of the respondents require extra storage for their produce. Most of the farmers can sell their piglets proving that there is a ready market for the piglets. Although there are ready markets for meat and piglets, there has been a scarcity of these in the market recently. The maximum of the sales occurs in the festive seasons as they are usually the main dish in the feast. There are few markets where the butchers have their stalls in line in the specified area. These butchers, however, sell quite a large amount of meat in a week, the sample shows 91.6 per cent of these butchers sells more than 500 kgs of meat in a week, one supporting fact is that most families buy meat and pork bring their favourite food item. There are 23.9 per cent of the farmers who sells their pig to other farms, which are usually bought for rearing purposes. There is also 61.9 per cent who sells to butchers and 11.6 per cent who slaughter the produce for selling meat.

Poultry farming in Mizoram

Poultry production in Mizoram is conquered by village poultry or backyard poultry production. The total poultry population in Mizoram is 20,31,406 and among that 20,18,495 are backyard poultry (20th Livestock Census). Backyard poultry production uses family labour and birds are confined within a fenced yard or an overnight shelter (Uro, 2019). The semi-intensive or semi-scavenging system is referred to as the backyard system when birds are partly confined for feeding and watering. The backyard poultry rearing is intended for egg and meat purposes of the family and supplementary income. It provides protein through a low input system which is 30% or more of all protein consumption.

Commercial poultry farming in Mizoram has introduced in the late eighties by the establishment of broiler farms in various places. In Mizoram, there is no large size poultry farm and nearly 70.00 per cent of the Mizo farmers have poultry farms for their ancillary income. The approximate number of broilers available for consumption in the state was 847,763 and net meat production was 1,561 tonnes. As per the Integrated Sample Survey (2012-13) report, the per capita availability of broiler meat for the year 2012-13 was estimated at 1.39 kg per year. Rahman (2015) study revealed that farmers were rearing adult birds on raised slatted floors made up of bamboo. An overwhelming majority of farmers (96.67%) did not vaccinate their birds and the mortality rate of the poultry was very high (17.67%) due to the diseases like enlargement of the liver, diarrhoea, paralysis, dysentery *etc*. Most of the farmers (60.00%) sold their birds at the age above 3 months or when the birds gained bodyweight of 3-4 kg to the wholesalers. There is a huge gap between the supply and demand of poultry meat in Mizoram (Rahman, 2017). Private commercial poultry producers are not able to attend to the needs of consumers of Mizoram.

Management practices followed by the Mizo farmers

It was reported that nearly 63.33% of the Mizo farmers provided water with glucose to the chicks after they arrived on the farms (Rahman, 2015). Rainwater and natural fountains were the main source of water for the majority of farmers. Most of the farmers did not treat the water before providing it to the birds. Some of the farmers fumigated their poultry shed before entering new batches of chicks. They were using electric lamps as a source of heat on the farm. An overwhelming majority (83.33%) of the farmers used sawdust as the litter material for the chicks (Rahman, 2015).

Feeding practices

Feeding is one of the most important aspects of poultry farm management. The performance of the farm mostly depends on how the farmers are managing the feeding practices on the farm (Talukdar *et al*., 2016). Most of the Mizo farmers did not provide a pre-starter ration to the chicks and only used a starter ration for the chicks. They did not supplement any feed additives to the birds but sometimes they mixed the ration with fine rice grain. This might be due to the high cost of feed that the farmers could not manage to pay for it. The farmers supplied three times feed a day to the birds depending upon the number of birds on the farms.



Fig 6: Housing system of poultry practiced by Mizo farmers.

Housing practices

Most of the Mizo farmers used locally available materials for the construction of poultry houses (Fig 6). They used bamboo for the construction of walls. The majority of the farmers reared the adult birds on the raised slatted floor (platform) made up of bamboo (Rahman, 2015). They were rearing birds on the raised platforms because rice husk and sawdust were very difficult to get and costly but bamboos were easily available and cost-effective. Another reason might be that water entered the poultry shed during the rainy season and dampened the floor of the farms. Some farmers reared poultry by the backyard method also. Most of the Mizo farmers harvested water from rain and natural fountains.

Egg production

The average number of eggs/hen/clutches was 18.08 with a range from 1230 (Rahman, 2015). Mekkonen (2007) recorded a lower number (14.90) of eggs/clutch/hen in village poultry. The overall mean annual egg production was 70.35 with a range from 35-150 (Rahman, 2015). The study showed early maturity in village poultry with slightly more clutches/year/hen, several eggs/clutch/and total eggs/hen/year which might be due to the preference for crossbred variety in addition to Aseel and local ecotypes. The annual egg production in a flock is influenced by egg production/hen/clutch, clutch size and proportion of matured hens in a flock besides breed-wise genetic potential and managemental conditions. The average weight of the egg was found to be 42.17 g, ranging between 38-60 g (Rahman, 2015). Halima (2007) also reported the average egg weight of 42.80 g in semi scavenging system.

Health care practices

The accessible services and awareness of the farmers regarding properly rearing poultry are probably the best reflected by the existing health practices followed by the farmers. Vaccination against diseases which is the minimum requirement of poultry farming was almost absent, only a few farmers vaccinated their birds against one disease (Newcastle disease). It might be due to the non-availability of the vaccine in the market and lack of knowledge on the importance of vaccination to the birds. The same percent of the farmers dewormed their birds against worms while the majority of the farmers used antibiotics when the birds suffered from any diseases. The average mortality rate on the farms was very high (17.67%) and in nearly two-thirds (63.33%) of the farms, the mortality rate was above 10.00 per cent (Rahman, 2015). The high mortality rate might be due to the poor health care practices followed by the farmers and keeping the birds beyond the standard rearing period of the broilers. Many studies reported that the mortality was below 10.00 per cent (Jadhav *et al*., 2009). Most poultry suffered from Ascitis, Chronic Respiratory Diseases, Enteritis and Coccidiosis and these might be the main causes of mortality among the birds (Rajkhowa, 2004; Sarma and Borthakur, 2006; Pugashetti and Shivakumar, 2007).

Marketing practices

The selling of birds at profitable prices can make the system feasible. The poultry sector in this state is an unorganized one and the marketing system is oriented neither to the producers nor to the consumers, but the middleman. It is observed that the farmers procured the chicks from the local market of each district at the price ranging from Rs. 40 to Rs.50/- per chick, while the price of feed varies from Rs.30/- to Rs.45/- per kg (Rahman, 2015). The farmers (60.00%) sold the birds at the age above 3 months or when the birds attained 3-4 kg live body weight (Rahman, 2015). These might be due to consumers' interest which only preferred birds of more than two kg weight. The majority of the Mizo farmers sold their birds to the wholesale market at a price ranging from Rs.130/- to Rs.150/- while the retail price was Rs.160/- to Rs.180/-. It is shown that a major share of the profit goes to the middleman only.

CONCLUSION

Livestock rearing creates a major role in the economic upliftment of Mizo farmers. But regular and scientific training is required for dairy farmers in the areas like vaccination, deworming, fodder cultivation, AI, herd recording *etc*. should be undertaken to make the dairy sector sustainable in Mizoram which is an important hill state of India. In Mizoram, every household reared pigs and poultry in the backyard method for their economic as well as consumable purposes. Milk, meat and eggs were sold in the local market for their livelihood. The kitchen waste with a small quantity of concentrate mixture (maximum 1 kg) and locally available weeds was used to feed the pigs the practice reduces the cost of feeding. The poultry sector helps in generating employment among the Mizo farmers. To improve the productivity of the farms the management practices need to be improved. The extension workers should provide management information through training and farm visits, to improve the knowledge level of the farmers to enhance the profitability and productivity of poultry farms. The marketing system for poultry is disorganized and most of the middlemen and agents control the whole market. There is an urgent need to form cooperatives or common interest groups to prevent the exploitation of the Mizo farmers.

Conflict of interest: None.

REFERENCES

Barman, N.N., Patil, S.S., Kurli, R., Deka, P., Bora, D.P., Deka, G., Ranjitha, K.M., Shivaranjini, C., Roy, P. and Suresh, K.P. (2020). Meta-analysis of the prevalence of livestock diseases in North Eastern region of India. Veterinary World. 13(1): 80-91.

Boro, U., Talukdar, D.J., Ahmed, F.A., Lalrintluanga, K., Kalita, G. and Tolenkhomba, T.C. (2021). Incidence of postpartum anestrus among crossbred cattle in and around Aizawl district of Mizoram. Journal of Entomology and Zoology Studies. 9(1): 179-180.

Economic Survey of Mizoram. (2013). Directorate of Economics and Statistics, Government of Mizoram, India.

Economic Survey of Mizoram. (2022). Planning and Programme Implementation Department. Govt. of Mizoram, India.

GoI. (2014). Basic Animal Husbandry and Fisheries Statistics. Department of Animal Husbandry, Dairying and Fisheries, Ministry of Agriculture, Krishi Bhawan, New Delhi.

GoM. (2014). Report on Integrated Sample Survey for the Estimation of Annual Production of Milk, Eggs and Meat for the Year 2013-2014. Directorate of Animal Husbandry and Veterinary. Government of Mizoram.

Halima, H., Neser, F.W.C., van Marle-Koster, E. And DeKock, A. (2007). Phenotypic variation of native chicken populations in northwest Ethiopia. Tropical Animal Health and Production. 39(7): 507-513.

Haokip, P. (2018). Clans, Tribes and Unions of Tribes: Nomenclature of North East India. Economic and Political Weekly. pp. 61-66.

Integrated Sample Survey. (2013). Estimation of Annual production of Milk, Eggs and Meat. Directorate of Animal Husbandry and Veterinary, Government of Mizoram, Aizawl, Mizoram.

Jadhav, N.V., Maini, S. and Ravikanth, K. (2009). Comparative Efficacy studies of herbal and synthetic Choline supplements on broiler growth and performance. The Internet Journal of Veterinary Medicine. 5: 2.

Kalita, G., Rouchoudhury, R., Kalita, D., Saikia, B.N., Saharia, J., Bora, M., Nath, M.K., Talukdar, D.J. (2016). Effect of weaning management on carcass characteristics of T and D pigs. International Journal of Scientific Research in Science and Technology. 2(2): 342-350.

Kalita, G., Sarma, K., Rahman, S., Talukdar, D., Ahmed, F. (2018). Morphometric and reproductive attributes of local pig of Mizoram. International Journal of Livestock Research. 8(2): 173-177. http://dx.doi.org/10.5455/ijlr.20170814025008.

Kumaresan, A., Bujarbaruah, K.M., Pathak, K.A., Das, A., Bardoloi, R.K. (2008). Integrated resource-driven pig production systems in a mountainous area of Northeast India: Production practices and pig performance. Tropical Animal Health Production. 41: 1187-1196.

Lalhmunmawia and Das, S.K. (2018). Animal husbandry practices of livestock keepers in Mizoram: A case study. International Journal of Bio-resource and Stress Management. 9(5): 580-584.

Malsawmdawngliana, R. and Rahman, S. (2016). Management practices followed by the dairy farmers of Mizoram, India. Journal of Livestock Science. 7: 220-225.

Mekonnen, G. (2007). Characterization of smallholder poultry production and marketing system of Dale, Wonsho and Lokaabayaweredas of Southern Ethiopia. M. Sc. thesis. Awassa College of Agriculture, Hawassa University.

Pugashetti, B.K. and Shivakumar, M.C. (2007). Mortality incidence of various causative agents in an organized poultry farm. Karnataka Journal of Agricultural Science. 20(100): 187-188.

Pundir, R.K., Singh, P.K., Sadana, D.K., Dangi, P.S., Lalhruaipuii Vanlalpeka, K., Laldinthara, F., Singh. N/M. and Andrew, L. (2015). Characterisation of Mizoram native cattle of Indian origin. Journal of Animal Research. 5(4): 801-806.

Rahman, S. (2007).Adoption of improved technologies by the pig farmers of Aizawl district of Mizoram, India. Livestock Research for Rural Development. 19: 1.

Rahman, S. (2015). Management of Broiler Farms in Aizawl District of Mizoram, India. Livestock Research for Rural Development. 27: 4 http://www.lrrd.org/lrrd27/4/rahm27061.html.

Rahman, S. (2017). Status and constraints of backyard poultry farming in mizoram. Indian Journal of Hill Farming. Pp. 76-82.

Rahman, S., Barthakur, S. and Kalita, G. (2008). Pig production and management system in Aizawl District of Mizoram, India. Livestock Research for Rural Development. 20(9): 1-3.

Rajkhowa, T.K. (2004). Clinical and histopathological study of ascites syndrome in chicken from Aizawl, Mizoram. Indian Journal of Veterinary Pathology. 28(2): 142-143.

Ralte, L. and Chhawna, V. (2021). Milk production and its marketing in Mizoram- findings from Aizawl district. Economic Affairs. 66(04): 699-705.

Rangnekar, D.V. (2006). Livestock in the livelihoods of the underprivileged communities in India: A review. International Livestock Research Institute, Nairobi, Kenya. Pp 32, 45 http://www.ilri.org/Infoserv/webpub/fulldocs/LivestockInTheLivelihoods/LivestockUP_India_Final.pdf.

Rathore, R.S., Singh, R., Kachwaha, R.N. and Kumar, R. (2010). Existing management practices followed by the cattle keepers in Churu district of Rajasthan. Indian Journal of Animal Science. 80(8): 798-805.

Rewar, R., Kalita, G., Goswami, R., Das, B.K., Talukdar, D., Choudhary, J.K., Kumar, S. and Das, H. (2021). Effect of feeding fermented liquid feed on haemato-biochemical parameters of pre-weaned and post-weaned young pigs of large white Yorkshire breed. Journal of Entomology and Zoology Studies. 9(1): 479-483.

Roy, N.K., Kalita, G., Hmar, L., Goswami, R., Ahmed, F.A., Buragohain, R., Talukdar, D.J. and Sarma, K. (2019). Effect of nutritional supplementation on haematological profile of neonatal pig during pre-weaning period. Journal of Entomology and Zoology Studies. 7(5): 356-359.

Roy, N.K., Kalita, G., Hmar, L., Goswami, R., Rajkhowa, T.K., Sarma, K. and Talukdar, D. (2021).Mortality pattern of large white Yorkshire pigs in an intensive farm of Mizoram. Journal of Entomology and Zoology Studies. 9(1): 2096-2098.

Saikia, K., Kalita, G., Hmar, L., Goswami, R., Talukdar, D.J., Samanta, A.K. and Tolenkhomba, T.C. (2019). Effect of early and split weaning management on growth performance of large white Yorkshire pigs. Indian Journal of Animal Sciences. 89(2): 172-175.

Sangpuii, L. and Malhotra, R. (2016). Dairy based farming: Economic analysis for viable livelihood opportunity for Jhum practicing tribal people of Mizoram State. International Journal of Bio-resource and Stress Management. 7(3): 480-484.

Sarma, K. and Borthakur, S.K. (2006). A costliest disease-CRD. Its control and prevention. Poultry Line. 6: 35-38.

Shyam, J., Borgohain, A. and Talukdar, D. (2017). Management practices and constraints perceived by piggery farmers in Kamrup district of Assam. Indian Journal of Social Research. 58(1): 65-70.

Singh, M., Chakravarty, R., Bhanotra, A. and Kumar, M. (2015). Dairy animal health and housing management practices followed by tribal dairy farmers of Ranchi, Jharkhand. International Journal of Farm Sciences. 5(3): 199-206.

Talukdar, D.J., Talukdar, P. and Ahmed, K. (2016). Minerals and its impact on fertility of livestock: A review. Agricultural Rev. 37(4): 333-337.

Talukdar, D.J., Shyam, J., Talukdar, P., Ahmed, K. and Gogoi, R. (2015). Documentation of traditional herbal medicines for reproductive disorders of livestock in Kamrup District of Assam. Int. J. Agri. Sci. Res. 5(6): 221-228.

Talukdar, P., Talukdar, D., Sarma, K. andSaikia, K. (2019). Prospects and potentiality of Improving pig farming in north eastern hill region of India: An overview. International Journal of Livestock Research. 9(1): 1-14. doi: 10.5455/ijlr. 20180508053437.

Twentieth Livestock Census. (2019). All India Report Ministry of Agriculture, Department of Animal Husbandry, Dairying and Fisheries, Krishi Bhawan, New Delhi.

Uro, T.W. (2019). Implementation of poultry production activities: A review. International Journal of Advanced Research in Biological Science. 6(12): 19-34.

Vanlalmalsawma and Sharma, L.S. (2015). Indigenous pig production in rural areas of Mizoram. International Journal of Research in Management and Social Science. 3(1): 42-50.