

# Shelter Management of Dairy Crossbred Cattle in Small Household Milk Production System

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**Abstract**—Study was conducted at peri-urban areas of Kalyani, Nadia, West Bengal to evaluate the existing dairy cow shelters and animal housing management system being followed by the farmers. Livestock shelter plays an important role on protecting cows from thermo-environmental stress, shielding from predators, providing rest and laying comfort, which is very important aspects of ethical animal production. Prevailing shelter amenities for dairy cattle in peri-urban villages was investigated by on-spot visit. Livestock housing was mostly intensive, confined round the clock in a four side open shelter made by bamboo or wooden poles. The roof of shed was made by bamboo frames in combination of jute stick and top covered by polyethylene sheet (40%), tin roofing (40%), bamboo frame & polyethylene sheet (10%), earthen tiles (5%) and reinforced concrete cement (RCC) roof only in 5% cases. Average floor space (covered area) measured per shed was  $120.20 \pm 16.40$  ft<sup>2</sup>/ household and  $60.59 \pm 8.72$  ft<sup>2</sup>/ adult cow unit. Cows maintained are mostly crossbreds having Jersey / Holstein inheritance in native cattle. Average number of cows / household was  $1.90 \pm 0.40$ , calves ( $1.16 \pm 0.17$ ) and very less heifers ( $0.30 \pm 0.14$ ), because farmers' preference for lactating cows over replacement stock. Animal sheds was part of residence in 20% households and in 80 % cases located little away (15-50 feet) from residence. Axis orientation of animal shed was east-west (30%) and north-south direction (70%). Average roof height was  $7.03 \pm 0.29$  feet. For feeding of animals farmers' used plastic tub (35%), cemented tub (60%) and aluminum bowl (5%) as manger as well as water trough. Floor of shed was at 6-8 inches elevated from surroundings; mostly made up of brick-linings (90%) having moderate slope towards drainage side. Dairy sheds had no wall (70%) and outer gutter for drainage in 90% cases. Manure was disposed just adjacent to cattle shed in 30% households and become a source of contamination, unhygienic conditions and diseases like mastitis in cows. Average cleanliness score (1-4 scale) of floor of shed was  $2.65 \pm 0.19$ . Being mostly open, sheds were well ventilated and had  $3.35 \pm 0.13$  ventilation score (1-4 scale). Average daily milk yield per crossbred cow was  $6.75 \pm 0.73$  kg with average peak yield of 9.0 kg/ cow. It was concluded that in peri-urban villages, household milk production system was intensive in characteristics, provision of animal shelter was minimal, shed hygiene was less and had ample scope for improvement in dairy productivity.

**Keywords:** Shelter management, cow shed, milk, household, livestock housing.

## Introduction

Crop cultivation and associated agriculture is the prime source of livelihood for a majority of rural population in the Eastern and North-Eastern region (NER) of India, however, dependence on livestock as an alternative source of income, which adds on to total family revenue [1]. Among livestock, dairy cattle and goat rearing is predominant species in eastern India, where as pig rearing is in NER. Several factors identified to influence households' decision to rear livestock include availability of labour, occupation, caste, farm-size, availability of irrigation, and access to information sources etc [1]. Although a number of factors affect production and profitability of livestock and dairy farming, animal housing is one of the most important components. Designs of animal shelter and materials used in the shelter buffer the macro-environment, reduce the climatic stress and modulate the micro-environment of the shed to make stay comfortable for animals. Inadequate housing and ventilation, overcrowding and uncomfortable conditions restrict animals to enjoy five freedoms [9] and compromise with welfare issues and ethical animal rearing. There is reduction in milk production and animal welfare due to the stress, climatic condition and improper housing comfort [5-6, 8]. Some cost effective studies [3-8, 11] have been carried out on shelter modification and stress amelioration, depending upon regional requirements.

## Materials and Methods:

### *Location of the experiment*

Survey was conducted at the adopted and adjoining villages of ICAR-National Dairy Research Institute (ICAR-NDRI), Eastern Regional Station (ERS), Kalyani, West Bengal, India. The weather is mostly hot and humid; the maximum ambient temperature in summer goes up to 39°C and minimum temperature in winter comes down to about 8°C. The average

annual rainfall is 1000-2000 mm, most of which is received from early June to September.

### **Experimental design**

The experiment was conducted by visiting the dairy farmers' cattle sheds and recorded the housing patterns, designs, orientation, roofing material, drainage etc by direct observation and taking measurements as required. Information on dairy husbandry practices adopted by farmers was also recorded. Data was collected by personal interview technique.

### **Statistical analysis**

The experimental data was analyzed statistically and means were tabulated. Data collected by questionnaire and longitudinal survey were numerically coded and entered to a database and tested for critical difference. The data were analyzed by using SPSS software-16.0 versions [10]. The statistical methods used to analyze the data were one way analysis of variance and percentage distribution [12].

### **Results and Discussion:**

In tropical conditions thermal stress is one of the major factor for reduced milk production and lower levels of dairy cow welfare. Animal housing is very important part that acts on buffering between the external environmental stress and internal (cow-shed) micro-environment. In the present study investigation was focused on housing of dairy cows in peri-urban rural areas. Selected farmers were dairy cow keepers. Average number of dairy cows was  $1.90 \pm 0.40$  (range 1-8), heifers  $0.30 \pm 0.14$  (range 0-2) and calves  $1.16 \pm 0.17$  (range 0-3) per household. Farmers had preference for purchase lactating cows over rearing of heifers as replacement stock and one of the reason for very less number of heifers per household. Very less numbers of households (10%) are maintaining bullocks (range 0-2) for agricultural operation like ploughing of land, carting and transportation. General opinion of farmers was of no advantage in bullock keeping even for agricultural purpose. Farmers sell the male calves within 1-2 months after birth and they prefer sale as early as possible.

Housing system being followed by the dairy cow keepers in the study area was conventional tie-stall housing with limited or no access to open area. In very limited cases, dairy cow owners provide access to graze occasionally by tethering method -cow tied with long rope to a stanchion (khuti/khunti) or plant (coconut/ areca nut), or any other suitable pillar. Dairy cow sheds are small enclosures with or without side walls. The roof of shed was made by bamboo frames in combination of jute stick and top covered by polyethylene sheet (40%), tin roofing (40%), bamboo frame & polyethylene sheet (10%), earthen tiles (5%) and reinforced concrete cement (RCC) roof only in 5% cases. Farmers are not much aware about the advantage or disadvantage of axis orientation of cow-shed and having no preference for it. The axis orientation of the cow

shed is governed by the available plot's size and shape to accommodate the cow-shed. In the present study the main axis orientation of animal shed was east-west in 30% cases and north-south direction in 70% cases.

Adequate floor space of cows is important for standing, lying, rising and resting without injury, pain or fear. Floor space requirement also depends upon breed size, stage of development, age, lactation status, pregnancy etc. Average floor space (covered area) in animal shed was  $120.20 \pm 16.40$  ft<sup>2</sup>/ household and  $60.59 \pm 8.72$  ft<sup>2</sup>/ adult cow unit. The study revealed that the floor space per adult cow unit was adequate; however, in 5% cases floor space less than 40 square feet / cow were also observed. Floor of shed was at 6-8 inches elevated from the ground levels of surrounding places. Floor was mostly made up of brick-linings (90%) having moderate slope towards drainage side. About 10 % of cow shed had concrete floor in the present study. The type of floor bedding affects the animal behaviour and staying comfort. There are more chances of lameness on concrete floor as compared to sand floor [13]. Farmers chosen brick linings because of low construction cost compared to concrete floors. Concrete floors are easier to clean; however, it may cause hoof problems.

Location of cow shed is very important from hygienic point of view both for owners and animals. Animal sheds was part of residence in 20% households and in 80 % cases located little away (15-50 feet) from owners, residences. Present findings suggested that animal management awareness was low, like reported in other regions [2]. Dairy sheds had no walls (70%) and outer gutter for drainage in 90% cases. Provision of no gutter in cow shed was one of the reasons for poor cleanliness score in the observed cow sheds. Manure was disposed just adjacent to cattle shed in 30% of households and become a source of contamination, unhygienic conditions and diseases like mastitis in cows. Average cleanliness score (1-4 scale) of floor of shed was  $2.65 \pm 0.19$ . Thus, it indicated requirement for hygienic improvement in the study area. Being mostly open, sheds were well ventilated and had  $3.35 \pm 0.13$  ventilation score (1-4 scale). The study revealed that the ventilation was very good. In 5% cases ventilation was just average.

Roof provides protection from direct heat and higher roof height reduces exposure to direct radiation. Average roof height at edge of cow shed was  $7.03 \pm 0.29$  feet. Observations indicated that roof height was quite less. In 40% of animal shed's roof height at edge was even below 7 feet. Higher roof height increases the thermal comfort, however, simultaneously escalate construction cost. Lower roof height in study area was probably because of economization of construction cost by farmers.

Cows maintained are mostly crossbreds having Jersey / Holstein inheritance in native cattle. Average daily milk yield per crossbred cow was  $6.75 \pm 0.73$  kg with average peak yield of 9.0 kg/ cow. The average milk yield per cow ranged from

3.5 to 10 kg / day. The peak yield in a lactation ranged from 6-12 kg /cow.

### Conclusion

It was concluded that in peri-urban villages, household milk production system was intensive in characteristics, provision of dairy cow shelter was minimal, shed hygiene was poor and had ample scope for improvement in dairy productivity. It was suggested that scientific dairy cow management practices might be improved by providing effective extension facilities to the dairy farmers.

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