HOUSING AND MANAGEMENT OF DAIRY CATTLE IN SMALL SCALE FARMS OF EAST JAVA, IN INDONESIA

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Summary

A study on housing and management of dairy cows was conducted in three villages. All activities of husbandry related to the housing and the condition of the cows were observed and farmers were interviewed using a questionnaire. The main type of housing was a tie stall mostly in the back yard area with a gable or shed type roof. Inside the shed the temperature ranged from 17 to 29℃ and the relative humidity ranged from 62 to 73%. Drainage and manure handling was poor which lead to poor cleanliness of the stables and animal skins. The floor space was mostly wide and the roof level was low (less than 2.5 m). The slope of the floor (1-3%) was sufficient, the roughness of the floor was of medium quality. The shape and size of the feed trough was good with a surface of mostly irregular forms. Concentrate was mixed with water and offered in liquid form in pails made from plastic or from parts of rubber car tires. Hoof length was too long which could lead to unstable position and self injury. It is concluded that the housing conditions of dairy cattle need to be improved in order to improve the condition of the animals and the production performance.
(**Key Words**: Dairy Cattle, Housing, Management, Small Holders, Indonesia)

Introduction

Housing or confinement of livestock has many important effects on production, and in the tropics various types of housing could be seen. Many of the management aspects such as feeding, breeding, disease control and labour inputs is invariably influenced by the type of housing. Under small scale low capital input livestock production system as that found in many tropical region, improvements achieved via small changes or improvements to the existing housing and/or management systems could result in greater economic benefit to the small farmer. Housing refers to the confinement of, or enclosure for animals and activities which provide shelter and/or restrict the movement of the animals. Housing can also be defined as a location where animals are placed, fed and protected against the adverse effects of an extreme environment such as, too hot or too cold, heavy rain, strong wind, and disturbance from predators, other animals or organisms (Macfarlane, 1981). The animal house and its equipment should be planned in such a way to reduce the laborious work, equipment cost, and to make its utilization as efficient as possible (Diggin et al., 1984). A well designed animals house will give opportunities to the manager for future development, should be easy to clean, reduce feed cost and provide easier manure handling and or by-products.

As in many countries in the region, in East Java more than 80% of the dairy cattle are in the hands of the small holder. Since 1978 the Government of Indonesia has placed major emphasis on the development of the small scale dairy sector. The dairy development programmes designed focused on improving the milk marketing system, supply of replacement stock feed supply, artificial insemination service and animal health. These programmes have been supported by milk industries and the association of dairy cooperatives. Since 1979 the government has provided loans to the dairy cooperatives to import dairy cattle from Australia, New Zealand and USA. The main aim was to increase domestic milk production, job opportunities, income of farmers and save foreign exchange.

Small scale dairy cattle production is usually

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located in the village areas of the low and upland areas. The cows are housed in stables and kept permanently tied all around the year with limited access to exercise, water and feed. Occasionally, the cattle are tethered outside after being washed or during cleaning the platform of the stables. Cows are fed with low quality roughage such as roadside and wasteland grasses, crop offal, green maize with or without young ears, elephant grass or king grass, weeds, tree leaves, cassava by-products, by-products of the soybean curd industry (Tofu), rice bran, coconut cake meal, kapok seed meal, white pollard, maize flour etc. Water is offered twice a day mixed with concentrate.

Management practices done by the small farmer is related to the existing housing system since most of the animal care is done inside the stall. The present study was therefore undertaken to know the housing conditions and level of management in small scale farms of East Java, Indonesia. This information could be useful for the government and other institutions for improving small scale farm management.

Materials and Methods

A survey was under taken in three villages of Malang regency, Bocek (Karang Ploso district); Oro-oro Ombo (Batu district); and Ngroto (Pujon district). The selection of these villages was based on the duration of dairy cattle establishment: less than 10 years, 10 to 15 years and more than 15 years, respectively. A questionnaire on the subject of practical farm management and housing was used for collection of data. Simple random sampling was used for respondent selection at 15 respondents per farmers group in each selected village. Type and size of platform, manger, feeding passage, gutter, slope of platform and gutter, site and location of the animal house, air movement, relative humidity, roughness of the floor and building materials were observed. In addition, cleanliness of the animal house and skin, any skin defects as well as the condition of feet and hooves were observed.

Results and Discussion

A summary of the information on housing and practical farm management collected from the 3 villages is presented in table 1.

Characteristics of the areas studied

Malang regency is located in the upland area of East Java from about 300 to 1,400 m above sea level. Bocek (Karang Ploso district), Oro-oro Ombo (Batu district) and Ngroto (Pujon district) are located at 715, 800 and 1,100 m above sea level, respectively. Relative humidity ranged from 62 to 89%, and the temperature between 16 to 29℃.

The housing system in small scale dairy cattle production in Indonesia is usually a back yard system with a stall. In most dairy farms the animals were tied with a piece of rope fitted around the horns and passed through a small hole in the nasal membrane, which is usually made by inserting a stick of bamboo when the animals are 6 months old. For Holsteins imported from the USA, this practice, has been forbidden by cooperative regulation. In this case the rope is passed around the upper part of the neck and tied to the side poles made of bamboo, wood or even nailed into the manger.

Characteristic of the respondents

Most of the respondents completed elementary education; 75% in Batu, 93% in Pujon and 75 % in Karang Ploso district, however, only 10% of the farmers had attended dairy cattle extension classes. In another study conducted on the socioeconomic aspects of small dairy farming in the Malang regency (Noegroho et al., 1992), it was revealed that meetings between farmers and extension officers of the dairy cooperatives were held once or twice per year. Despite the fact that the extension agents were important, majority of the farmers indicated that families, friends and neighbours were the most widely used source of information.

Site and location of animal house

In most farms the distance of the barn or cow shed to the farmer's dwelling was less than 10 m or even leaning against the wall of the farmer's house. This is partly due to the limitation of the land owned by the farmer, labour, monitoring and security reasons. With many farms visited there was no room for any further expansion. Infact, due to this reason, many of the farmers do not rare their own replacement.

TABLE 1. SUMMARY OF THE INFORMATION COLLECTED ON HOUSING AND MANAGEMENT

	Pujon (P)	Batu (B)	Karang-Ploso (KP)	Score* P	B	KP
Environmental condition inside the stable:						
Rel. hum. (%)	61.7 (12.2)	65.0 (10.0)	73.3 (10.3)	B	B	C
Ambient temp. (°C)	16.6 (1.7)	25.6 (1.8)	24.7 (1.0)	B	B	B
Floor size:						
Length (m)	2.08(0.29)	1.93(0.25)	1.99(0.19)	B	A	A
Wide (m)	1.42(0.22)	1.48(0.18)	1.45(0.22)	B	B	B
Slope (%)	1-2.5	2-3	1-3	A	B	B
Type of roof (% of farms):						
Shed	7	0	0			
Gable	93	100	100			
Roof height (m)	2.17(0.19)	2.33(0.43)	2.35(0.39)	B	B	B
Floor material (% of farms):						
Concrete	27	15	27			
Stone	0	15	0			
Bamboo	46	40	46			
Wood (cover)	6	20	26			
Wall material (% of farms):						
Bamboo	67	27	80			
Brick	13	13	7			
Without wall	20	60	13			
Surface condition of the floor (% of farms):						
Smooth	7	20	20	C	C	C
Rough	60	13	40	B	D	C
Irregular	13	40	27	B	D	C
Slippery	7	13	20	A	B	B
With divider	7	13	13	D	C	C
Feed trough:						
Height (m)	0.71(0.09)	0.64(0.14)	0.57(0.13)	B	B	B
Wide (m)	0.69(0.11)	0.57(0.08)	0.71(0.11)	A	A	A
Depth (m)	0.45(0.06)	0.36(0.08)	0.40(0.14)	A	A	A
Feeding management:						
Forage offered (kg)	36.3 (13.7)	45.0 (8.3)	45.7 (13.5)			
Concentrate offered (kg)	5.6 (1.9)	4.2 (1.4)	6.3 (2.1)			
Water offered (kg)	38.5 (20.9)	31.2 (11.4)	38.9 (13.3)			
Feed on ground (%)	0	0	20			
Reproductive parameters:						
AI programme (%)	67	82	100			
Age at 1st service (months)	18.0 (2.6)	23.4 (4.8)	21.3 (3.0)	A	C	B
Age at 1st calving (months)	28.2 (3.6)	32.8 (4.3)	30.8 (4.1)	A	C	B
Service/conception	2.5 (0.6)	2.4 (0.7)	2.3 (0.8)	B	B	B
1st service post-partum (days)	47 (9.7)	46 (12.8)	71 (29.2)	C	C	B
Hoof condition				D	D	D

* A = Very good; B = Good; C = Fair; D = poor: P = Pujon; B = Batu; KP = Karang Ploso.
Figures in parentheses are standard deviations.

The type of housing in most cases influences practical farm management of dairy cattle as most activities of husbandry are done in the animal houses and surroundings. In these areas, most of the farmers activities such as milking, feeding, cleaning the floor and the animal, artificial insemination of the cows, assisting cows during calving, disease control and parasitic treatment are concentrated in the animal house.

Environmental conditions inside the stable

The mean ambient temperature and relative humidity inside the stable ranged from 17 to 26℃ and 62 to 73%, respectively. The environmental conditions in the district of Karang Ploso was less favourable to Holstein Friesian cattle as compared to the districts of Pujon and Batu. Under these conditions the imported Holstein Friesian dairy cattle may suffer heat stress.

Holstein Friesian originated from the northern part of the Netherlands (Friesland), with an average annual temperature of 12℃ and a maximum temperature of 22℃ with less than 30 days per year when maximum temperature exceeds 27℃ (McDowell, 1989). Therefore, farmers should manipulate the local environmental condition to suit original conditions as required by the animals via improved housing and practical farm management. The influence of the surrounding environment inside or outside of the stall to the animal is high, which could affect their production performance.

Floor size

The type of animal house in the areas studied was the one row stall, varying in size from 1.8 to 2.3 m length and 0.9 to 1.9 m wide and a floor with a 1 to 3% slope. The floor area per animal differed from the standards discussed by Foley et al. (1972) and Muijs (1984). Most farmers did not match the size with the number of animals placed in such stall. The space per animal in the stall is mostly too wide compared to Moton et al. (1985) and Belgian standards for black and white cattle (Anon, 1974). Also, farmers do not use partitions between two animals, thus making it more difficult to maintain the cleanliness of the floor. The manure and urine do not fall in the right place (gutter) but are dropped on the platform of the neighbouring animals.

Roof type

The type of the roofs in Pujon was 75% gable and 25% shed, while in Batu and Karang Ploso 66% was gable and 34% shed. Sainsbury & Sainsbury (1988) categorized the roofs of the animal house into 2 types i.e., gable and mono-pitch or lean-to-roof which can be made from slats, cedar shingles, thatch, galvanized or protected steel, aluminum, tiles or even fibre cement. In Indonesia, the type of roof varies according to location, material availability and also the price.

Roof height

The height of the roof in the areas studied varied from 2-3 m (measurement done at the centre of the lowest part of the roof frame), with an average 2.16 m in Pujon, 2.32 m in Batu and 2.35 m in Karang Plose. This indicated that the farmers tend to increase the level of the roof height as the altitude of the location decreases. In other words, at higher environmental temperature, the farmers tend to increase the roof level in order to keep the stall temperature down. In fact, the ambient temperature was slightly on the high side (17-26℃) for optimum milk production as recommended by Sainsbury & Sainsbury (1988). Therefore, increasing the height of the roof (3 m), widening the roof, planting of trees for shelter around the west part of the barn and also increasing the ventilation level may be able to reduce the temperature under the roof.

Building materials (walls and floor)

Materials used for the buildings varied from soil, bamboo, wood and brick or stone covered with cement, sand, with or without baked lime stone. These conditions have special influence on the variation in strength, durability, cleanliness of the floor and animals. Materials used in the construction of the roof in animal houses were from soil tiles except the one in Pujon which was made from metal (corrugated iron). These materials were supported by roof frames made from bamboo with or without wood and nails. These materials could keep the shed temperature below 29℃ from noon to 15:00 h when the outdoor temperatures were around 34℃, partly due to the insulation capacity of the roof and air circulation between tiles and ventilation (wall made from split plated bamboo or even without wall).

Wood is very popular and has been used by most farmers except 5 respondents preferring bamboo and one using concrete pillars for the animal house. The farmers are very concerned with the price and the availability of the materials, and the easiness of handling during transportation and construction.

In Bocek (Karang Ploso), for example, over 60% of the floor was made from wood or bamboo and some 30% respondents had 1/3 of the floor part (front part) from compressed earth without a feed trough. In this case the respondents (farmers) claimed that this system reduces front leg problems of their animals (injury, difficulty in getting up from lying down position). This system seems promising for the female animals as long as the farmer could maintain the floor in dry condition, however, for the male animal the front part of the floor can be very wet and feed refusal may be higher (as the feed gets contaminated with urine).

Condition of the floor

The problem of knee, hock and udder injury was higher on the rough and slippery concrete floor compared to bamboo and wooden floors. Therefore, some farmers preferred to cover the concrete floor with soft wood or even bamboo to reduce the problem. This is valid provided the farmer could maintain the platform dry and clean. With irregular floor surfaces of bamboo and wooden floors maintaining the cleanliness of the floor and avoiding the mastitis problem seems to be more difficult. This results in the extra need for labour to clean the floor and animals.

Farmers in the areas studied gave special attention to reduce the slippery condition of the floor by scratching the upper part of the floor or threshing it with a broom. Other farmers preferred using wood or bamboo floors in order to reduce the problem, however, maintaining the sanitary condition of that kind of floor is difficult.

Gutter

The use and size of the gutter varied between farms. For example 75% of the farmers in Pujon made gutters with 0.3-0.5 m depth, 0.10-0.33 m wide and 2.5% in slope, and only 25% were still using a manure pit (around 1.5 m depth and 2 m wide) right at the end of the platform. In Batu area, 40% of the farmers gave attention to the size of the gutter 0.25-0.55 m wide and 0.10-0.20 m depth and a slope of 1%, while 60 % of the farmers preferred the manure pit. More than half of the farmers (53%) in Karang Ploso made gutters 0.20-0.40 m wide and 0.10-0.40 m in depth with a slope of 1-2.5%, while the other farmers (47%) preferred manure pits. It seemed that farmers in Batu areas gave less attention to the important function of gutters in maintaining the dry condition of platforms. The use of pits for collecting manure has been done for a long time for compost production and organic fertilizer, which may explain the large percentage of manure pits in the housing system in Batu area.

Feeding management

Farmers in the Pujon and Batu areas had feed troughs made out of locally available materials, whereas 20% of farmers interviewed in the Karang Ploso area had no structures built to place the roughage, feed was placed on the ground.

Many of the farmers spent their afternoon to cut and collect grass and other roughages such as shrubs, tree leaves etc. Fresh grass is offered after afternoon milking and the balance the next day after morning milking. In the three villages studied, on an average the farmers offered 35-45 kg of roughage and 4-6 kg of concentrate. Eventhough the quantity of roughage (20-25% dry matter) offered per animal seems to be sufficient (7-10 kg dry matter), the quality of the roughage offered was highly variable. For example, in Pujon the roughage fed consisted mainly of maize stover and elephant grass, whereas in Batu it was maize stover, elephant or king grass and natural grasses. In Karang Ploso the availability of improved grasses or maize stover was low and the farmers were more dependent on natural grasses and tree leaves as sources of roughage. Similarly the concentrates used in these areas was also variable. The established/old cooperatives such as Pujon and Batu produced their own concentrate mix, and sold to their members at a subsidized price. Farmers belonging to the cooperative Karang Ploso did not have this benefit and they were mainly feeding rice bran mixed with commercial concentrates.

Eventhough water was offered only twice a day mixed with concentrates, the animals had access to about 31-39 kg of water.

Reproductive parameters

In Karang Ploso all farmers interviewed were using the AI programme, whereas one third or the farmers in Pujon preferred natural mating. In all three areas studied, both the age at first service (18 to 23 months) and at first calving (28 to 33 months) are within the accepted range for cows managed well under tropical conditions (Russell et al., 1990). In Pujon and Batu, the mean values of 47 and 46 days, respectively, recorded for first service post-partum indicate that the farmers are not allowing sufficient time between calving and mating. Under proper management the cows should be bred at the first oestrus that occurs more than 50 days after calving. (Webster, 1987). According to Webster, there is little point in inseminating cows under 50 days post-calving since conception rates are less than 50% because in some cows the uterus has not recovered to a degree where it will permit implantation. This is reflected in the higher number of services per conception recorded for Pujon (2.5) and Batu (2.4).

Hoof condition

Many farmers did not practice hoof trimming, as such the hoof length was too long and curved. This resulted in cows standing in unstable positions and moreover self injuries was a common site. This management problem could be easily overcome by training farmers on hoof trimming.

Conclusions

Housing animals in relation to the size, age and sex of the stock has not been done by the farmers. Most farmers have limited number of animals and funds. The space for the animals is mostly too wide and too long, and farmers also do not have partitions between animals which leads to low sanitation conditions. Little exercise and hoof treatment lead to bad conditions of the hooves and unstable position of the animal, pain and high risk of injury which may affect production performance of the animals. The housing condition needs therefore to be improved in order to increase the health condition of the animals as well as the production performance of the dairy cattle in Malang regency. Any improvement achieved would improve the income situation of the farmer.

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