

Animal Feeding and Housing Practices Adopted by Dairy Farmers in Rural Punjab

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Abstract— Exploring about the feeding and housing practices adopted by the dairy farmers in rural Punjab, the study has found that a large number of the dairy farmers have the facility of shed for housing their dairy animals in rural Punjab. Most of the dairy farmers have kept slanted shed roof, are using asbestos sheet as roofing material of the shed, keep their dairy animals on concreted floor and in single row system. All dairy farmers prefer stall feeding over grazing. A majority of the dairy farmers are following feeding practice of mixture of green fodder, dry fodder and concentrates, and are themselves cultivating green and dry fodder for animals at their own farms.

Keywords— Concentrates, Feeding, Housing, Shed, Stall feeding.

I. INTRODUCTION

Dairying is considered as backbone of the Indian economy. Dairy farming is seen as a way to fulfill the social justice objective of planning commission because it is more suitable for marginal and small farmers. It has helped in stabilising Indian economy by ensuring the diversification from agriculture to dairying (Kaur and Toor, 2021). The adoption of better dairy management practices by the dairy farmers can enhance milk productivity of the dairy animals. It is important to provide clean and comfortable housing facilities to the dairy animals. This, in turn, ensures their proper growth and optimum productivity. A balanced animal feed is a proper combination of proteins, carbohydrates, fats, minerals and vitamins. Under-nutrition of dairy animals leads to lower milk production. The quantity and quality of animal feed has significantly affected the milk production. There are also variations in allocation of feed among animals as buffaloes receive higher proportion of animal feed (Nair, 1985). In this context, the present study aims to explore about feeding and housing practices adopted by dairy farmers in rural Punjab.

II. METHODOLOGY

The present study is based on primary data, collected through a detailed schedule from 420 dairy farmers belonging to different farm size categories from 21 villages situated in three different agro-climatic zones (Shivalik-Foothills, Central Plains and South-West Dry zones) of Punjabstate. A multi-stage sampling technique has been used to select the villages and dairy farmers in the study area. Descriptive statistics is used for the purpose of analysis.

III. RESULTS AND DISUSSION

The milch animals should be protected from the extreme weather conditions. Dairy animals are being kept either in shed

or under trees in the study area. The shed is a structure or building to house dairy animals. Table 1 exhibits the distribution of the dairy farmers on the basis of housing of dairy animals. A majority, i.e. 391 (93.10 per cent), of the dairy farmers keep their dairy animals under shed to ensure their comfort. The dairy animals of remaining 29 (6.90 per cent) dairy farmers are kept under trees due to lack of finance to construct concrete shed in rural areas of Punjab. The findings are in the line with the results of Prasad et al. (2017) as they have shown that more than three-fourth of the dairy farmers provide *pucca* animal house.

TABLE 1: Dairy Animal Housing

Category	Housing of Dairy Animals				Total
	Shed		Under trees		
	No.	%	No.	%	
Large farm Hhs	84	100.00	0	0.00	84
Medium farm Hhs	80	95.24	4	4.76	84
Small farm Hhs	82	97.62	2	2.38	84
Marginal farm Hhs	76	90.48	8	9.52	84
Landless Hhs	69	82.14	15	17.86	84
Sampled	391	93.10	29	6.90	420

Source: Field Survey, 2019

Dairy animals of the large farm size category are housed in the shed. Across the medium farm size category households, 80 (95.24 per cent) and 4 (4.76 per cent) of the dairy farmers keep their dairy animals in shed and under trees respectively. Dairy animals of as much as 82 (97.62 per cent) of the dairy farmers of the small farm size category have the facility of shed for housing and only 2 (2.38 per cent) dairy farmers keep their dairy animals in open under trees. In case of the marginal farm size category, dairy animals of 76 (90.48 per cent) and 8 (9.52 per cent) dairy farmers are housed in shed and under trees respectively. The dairy animals of 69 (82.14 per cent) dairy farmers from the landless households are kept in shed and remaining 15 (17.86 per cent) keep their dairy animals under trees. The maximum number (84) of the dairy farmers having shed for housing their dairy animals are from the large farm size category and minimum (69) of the same belongs to the landless household category. The highest number (15) of the dairy farmers keeping their dairy animals under trees belongs to the landless household category and none from the large farm size category does the same. Due to their poor economic position, landless dairy farmers are unable to provide shed facility to the dairy animals.

Slope of roof of shed

Roof, slanted or plain-topped, is the main structure to prevent dairy animals from heavy rains, hot sun and chilling cold. Table 2 shows the data on the slope of roof of the shed. As much as 271 (69.31 per cent) dairy farmers prefer slanted roof of the shed and remaining 120 (30.69 per cent) have made flat type roof of dairy animal shed.

Across the large farm size category households, 69 (82.14 per cent) dairy farmers have made slanted roof and 15 (17.86 per cent) have made plain-top roof of the shed. Slanted roof of the shed is preferred by 61 (76.25 per cent) and plain-top roof of shed is made by 19 (23.75 per cent) dairy farmers of the medium farm size category. As much as 53 (64.63 per cent) dairy farmers of the small farm size category have kept the shed roof slanted and 29 (35.37 per cent) have kept it flat. In case of the marginal farm size category, slanted roof is preferred by 46 (60.53 per cent) dairy farmers and plain-top is preferred by 30 (39.47 per cent). A majority, i.e. 42 (60.87 per cent), of the dairy farmers from the landless households are keeping shed roof slanted and remaining 27 (39.13 per cent) keeps it flat.

The highest number (69) of the dairy farmers making slanted roof are from the large farm size category and lowest (42) of the same are from the landless households. The maximum number (30) of the dairy farmers preferring plain-top roof belongs to the marginal farm size category and minimum (15) of the same are from the large farm size category.

TABLE 2: Slope of Roof of Shed

Category	Slope of Roof of shed				Total#
	Slanted		Plain-top		
	No.	%	No.	%	
Large farm Hhs	69	82.14	15	17.86	84
Medium farm Hhs	61	76.25	19	23.75	80
Small farm Hhs	53	64.63	29	35.37	82
Marginal farm Hhs	46	60.53	30	39.47	76
Landless Hhs	42	60.87	27	39.13	69
Sampled	271	69.31	120	30.69	391

Source: Field Survey, 2019

#only those households are included who have the facility of shed for their dairy animals

Roofing material of shed

Different types of materials are used for covering the roof of the shed. Roofing material is selected carefully. The commonly used roofing materials are tiles, asbestos sheets, aluminum sheets and thatched roof. Asbestos sheets are prepared by mixing cement with vegetable fiber. Thatched roof is prepared by using hay and straw. Thatched roof is made generally to lower the construction cost of shed. The dairy farmers, who have weak financial position, prefer to prepare thatched roof of shed. Table 3 contains information regarding roofing material of the shed among the dairy farmers of Punjab. As much as 225 (57.54 per cent) of the dairy farmers use asbestos sheet as a roofing material of shed due to its durability, followed by 136 (34.78 per cent) using tiles and 30 (7.67 per cent) using thatched roof. Prasad et al. (2017) have revealed that two-third of the dairy farmers use concrete sheets as roofing material and slightly less than one-fifth of them use asbestos sheets. Hence, their results are in contrast with the present study.

Across the large farm size category households, 54 (64.29 per cent) and 30 (35.71 per cent) use asbestos sheet and tiles respectively for covering shed roof. As much as 59 (73.75 per cent) dairy farmers from the medium farm size category prefer to use asbestos sheet and remaining 21 (26.25 per cent) dairy farmers are using tiles as a roofing material of the shed. In case of the small farm size category, asbestos sheets used by 43 (52.44 per cent), tiles by 36 (43.90 per cent) and thatched roof by 3 (3.66 per cent) dairy farmers. A half of the dairy farmers (38, 50 per cent) of the marginal farm size category are using asbestos sheet, followed by 30 (39.47 per cent) using tiles and 8 (10.53 per cent) using thatched roof. Asbestos sheet, tiles and thatched roof is used by 31 (44.93 per cent) and 19 (27.54 per cent each) respectively by the dairy farmers of the landless category.

TABLE 3: Roofing Material of Shed

Category	Roofing material of shed						Total#
	Asbestos sheet		Tiles		Thatched Roof		
	No.	%	No.	%	No.	%	
Large farm Hhs	54	64.29	30	35.71	0	0.00	84
Medium farm Hhs	59	73.75	21	26.25	0	0.00	80
Small farm Hhs	43	52.44	36	43.90	3	3.66	82
Marginal farm Hhs	38	50.00	30	39.47	8	10.53	76
Landless Hhs	31	44.93	19	27.54	19	27.54	69
Sampled	225	57.54	136	34.78	30	7.67	391

Source: Field Survey, 2019

#only those households are included who have the facility of shed for their dairy animals

The highest number (59) of the dairy farmers using asbestos sheet as roofing material belongs to the medium farm size category and lowest (31) of the same belongs to the landless category. The maximum number (3) of the dairy farmers making use of tiles for roof covering are from the small farm size category and minimum (19) of the same are from the landless category. Thatched roof for shed is preferred in large numbers (19) by the landless dairy farmers. None of the dairy farmer from large and medium farm size categories prefer thatched roof as a roofing material of shed.

Floor of the animal housing

Floor is another important part of the animal building as it is frequently used by the dairy animals for resting, feeding and milking. Floor must be strong and durable. Table 4 shows the distribution of dairy farmers according to the floor of animal housing. As much as 292 (69.52 per cent) dairy farmers keep floor concrete, followed by 114 (27.14 per cent) keeping it *katcha* and 14 (3.34 per cent) keeping it matted. Similar findings are reported by Prasad et al. (2017) as they have found that a majority of the dairy farmers provide concrete floor to their dairy animals.

Across the large farm size category households, concrete floor for resting of the dairy animals is provided by 75 (89.29 per cent) dairy farmers, followed by 5 (5.95 per cent) providing *katcha* floor and 4 (4.76 per cent) providing matted floor. As

much as 63 (75 per cent) of the dairy farmers are from the medium farm size category keep floorconcreted, followed by 14 (16.67 per cent) keeping *katcha* floor and 7 (8.33 per cent) keeping matted floor. Among the small farm size category, floor is kept concreted, *katcha* and matted by 66 (78.57 per cent), 17 (20.24 per cent) and 1 (1.19 per cent) dairy farmers respectively. The floor is kept concreted by 51 (60.71 per cent) dairy farmers from the marginal farm size category and *katcha* by 33 (39.29 per cent) dairy farmers. Across the landless households, *katcha* floor for resting of dairy animals is provided by 45 (53.57 per cent) dairy farmers, concreted by 37 (44.05 per cent) and matted by 2 (2.38 per cent) dairy farmers.

TABLE 4: Floor of the Animal Housing

Category	Floor of Animal Housing						Total
	Katcha		Concreted		Matted		
	No.	%	No.	%	No.	%	
Large farm Hhs	5	5.95	75	89.29	4	4.76	84
Medium farm Hhs	14	16.67	63	75.00	7	8.33	84
Small farm Hhs	17	20.24	66	78.57	1	1.19	84
Marginal farm Hhs	33	39.29	51	60.71	0	0.00	84
Landless Hhs	45	53.57	37	44.05	2	2.38	84
Sampled	114	27.14	292	69.52	14	3.34	420

Source: Field Survey, 2019

The highest number (45) of the dairy farmers providing *katcha* floor for resting of their dairy animals are from the landless category and lowest (5) of the same are from the large farm size category. The maximum number (75) of the dairy farmers providing concrete floor belongs to the large farm size category and minimum (37) of the same are from the landless category. Matted floor is provided largely (7) by the dairy farmers of the medium farm size category.

Structure of shed

The milch animals generally have single row system and double row system. In single row system, 12-16 milch animals can be kept together. If it is greater than 16, double row system is preferable. There are two methods available in double row system, i.e., tail to tail or face-out method and head to head or face-in method. As much as 399 (95 per cent) of the dairy farmers keep their dairy animals in single row system due to small herd size (Table 5). Only 21 (5 per cent) dairy farmers have kept their animals in head to head system of double row system as their herd size is big and it is convenient to house as well as feed dairy animals in head to head method.

Across the categories, out of their respective totals, the distribution of the dairy farmers regarding the shed reveals the state pattern except large and marginal farm size category. Across the large farm size category households, 76 (90.48 per cent) dairy farmers keep dairy animals in single row system and remaining 8 (9.52 per cent) keep them in head to head system. As much as 83 (98.81 per cent) of the dairy from the marginal farm size category are using single row system for housing dairy animals and 1 (1.19 per cent) using head to head system.

The highest number (8) of the dairy farmers keeping their dairy animals in head to head system are from the large farm size category and lowest (1) of the same are from the marginal farm size category. The maximum number (83) of the dairy farmers using single row system belongs to the marginal farm

size category and minimum (76) of the same are from the large farm size category.

TABLE 5: Structure of Shed

Category	Structure of Shed				Total
	Head to head		Single Row		
	No.	%	No.	%	
Large farm Hhs	8	9.52	76	90.48	84
Medium farm Hhs	5	5.95	79	94.05	84
Small farm Hhs	4	4.76	80	95.24	84
Marginal farm Hhs	1	1.19	83	98.81	84
Landless Hhs	3	3.57	81	96.43	84
Sampled	21	5.00	399	95.00	420

Source: Field Survey, 2019

Feeding management practices adopted by dairy farmers

A good animal feedstuff is balanced in nutrients, clean and fresh, and free from toxins. However, there is shortage of feed and fodder in India, along with ineffective feed quality control and poor quality feed (Kumar et al., 2019).

TABLE 6: Feeding System

Category	Feeding System		Total
	Stall Feeding		
	No.	%	
Large farm Hhs	84	100	84
Medium farm Hhs	84	100	84
Small farm Hhs	84	100	84
Marginal farm Hhs	84	100	84
Landless Hhs	84	100	84
Sampled	420	100	420

Source: Field Survey, 2019

Feeding system includes stall feeding and grazing. Stall feeding is most popular these days. Moreover, the grazing lands are no longer exists in the state of Punjab. In stall feeding, dairy animals are kept in a shed and fed at a stall and are not allowed to graze in open fields. All dairy farming households (420, 100 per cent) prefer stall feeding over grazing (Table 6). This is because stall-fed animals perform better than grazing lands in form of milk production as stall feeding involves better feeding and management of dairy animals. On other hand, grazing is a time-consuming activity and needs intensive care of animals while grazing. A majority of the dairy farmers are pursuing other economic activities along with dairying. That is why they find it inconvenient to take their dairy animals in open fields for grazing. Lack of common grazing land and pastures also promotes stall feeding. This result is in line with the findings of Malsawmdawngliana et al. (2016) and Kumar et al. (2019), who have found that all almost all dairy farmers do stall feeding of their animals.

Feeding mixture of green and dry fodder

Green fodder is a rich source of nutrients for dairy animals. It is highly digestible and helps in improving the breeding performance of dairy animals. Table 7 provides information about feeding of mixture of green and dry fodder. As much as 397 (94.52 per cent) dairy farmers are feeding their dairy animals a mixture of green and dry fodder. Remaining 23 (5.48 per cent) of them are feeding one of the green or dry fodder. The study of Dhaliwal and Dhillon (2017) depicts the similar result to the present study. The dairy farmers of different farm size categories have land to cultivate green fodder. So, they

prefer to feed their dairy animals green fodder along with dry others. The dairy farmers are choosing one of these due to reason either green fodder is temporary unavailable or to reduce the fodder cost.

Across the categories also, the similar trend is seen as state pattern, with minor percentage variations here and there. As much as 74 (88.10 per cent) landless dairy farmers prefer to feed dry and green fodder to their dairy animals. Remaining 10 (11.90 per cent) dairy farmers feed either green fodder or dry fodder to reduce the cost of fodder.

TABLE 7: Feeding Mixture of Green and Dry Fodder

Category	Feeding Mixture of Green and Dry Fodder				Total
	Yes		No		
	No.	%	No.	%	
Large farm Hhs	82	97.62	2	2.38	84
Medium farm Hhs	81	96.43	3	3.57	84
Small farm Hhs	80	95.24	4	4.76	84
Marginal farm Hhs	80	95.24	4	4.76	84
Landless Hhs	74	88.10	10	11.90	84
Sampled	397	94.52	23	5.48	420

Source: Field Survey, 2019

Feeding mixture of green fodder and concentrate

Concentrates are feeds which are rich in energy and proteins. These are considered good for providing nutrients to dairy animals along with fodder.

TABLE 8: Feeding Mixture of Green Fodder and Concentrate

Category	Feeding Mixture of Green Fodder and Concentrate				Total
	Yes		No		
	No.	%	No.	%	
Large farm Hhs	72	85.71	12	14.29	84
Medium farm Hhs	68	80.95	16	19.05	84
Small farm Hhs	69	82.14	15	17.86	84
Marginal farm Hhs	68	80.95	16	19.05	84
Landless Hhs	42	50.00	42	50.00	84
Sampled	319	75.95	101	24.05	420

Source: Field Survey, 2019

Table 8 shows the feeding of green fodder as well as concentrates by the dairy farmers. Out of all, 319 (75.95 per cent) of the dairy farmers are feeding mixture of green fodder and concentrates to their dairy animals so that the milch animals can improve their genetic potential of milk production. Remaining 101 (24.05 per cent) dairy farmers are not feeding their animals with the mixture of green fodder and concentrate, and use only green fodder but not concentrates. Costly concentrate feed prevents the dairy farmers to use the ration mixture of green fodder and concentrates. This result is in line with the findings of Malsawmdawngliana et al. (2016), who have found that 95 per cent of the dairy farmers are following this feeding practice. The category-wise figures also depict the state pattern except for landless households. A half (42) of the landless dairy farmers is feeding the mixture of green fodder and concentrates, while remaining a half of them prefer to feed green fodder only because costly concentrate puts extra financial burden on them for maintaining milch animals.

Feeding mixture of green fodder, dry fodder and concentrate

The dairy animals feed is of two types: fodder and concentrates. Fodder can either be in green form or in dry form. The dairy animals should be fed in such a way that their dry matter requirement is met.

Table 9 shows the distribution of dairy farmers as per the use of ration mixture of green fodder, dry fodder and concentrates. The ration mixture of green fodder, dry fodder and concentrates is fed by 311 (74.05 per cent) dairy farmers to improve the productivity of their dairy animals by meeting the dry requirement of their dairy animals. Remaining 109 (25.95 per cent) dairy farmers are not following this feeding practice either due to lack of knowledge about potential benefits of adopting this feeding practice or due to cut down the expenses on feed and fodder of their dairy animals. The three-fourth of the dairy farmers is following feeding practice of ration mixture of green and dry fodder. It is observed that the same numbers of dairy farmers are also adopting feeding mixture of green fodder, dry fodder and concentrates. This shows that the farmers, who are using ration mixture of green fodder and concentrates, are also feeding dry fodder along with former ration mixture to their animals. This result is in contrast with the study of Malsawmdawngliana et al. (2016), in which they have revealed that a few dairy farmers are feeding ration mixture of green, dry fodder and concentrates.

TABLE 9: Feeding Mixture of Green Fodder, Dry Fodder and Concentrate

Category	Feeding Mixture of Green, Dry Fodder and Concentrate				Total
	Yes		No		
	No.	%	No.	%	
Large farm Hhs	70	83.33	14	16.67	84
Medium farm Hhs	66	78.57	18	21.43	84
Small farm Hhs	67	79.76	17	20.24	84
Marginal farm Hhs	66	78.57	18	21.43	84
Landless Hhs	42	50.00	42	50.00	84
Sampled	311	74.05	109	25.95	420

Source: Field Survey, 2019

The category-wise data reveals the similar trend as state pattern except landless households. Among landless dairy farmers, the ration mixture of green fodder, dry fodder and concentrate is fed by a half of the dairy farmers, i.e. 42, only.

Source of water for dairy animals

Water availability and its quality play an important role in milch animal's health and productivity. Water consumption by dairy animals depends upon their feed intake, weather conditions, milk production and stage of lactation.

Table 10 provides the detailed information about source of water for dairy animals. As much as 325 (77.38 per cent) use electric motor as a source of water, followed by 74 (17.62 per cent) using public water works, 18 (4.29 per cent) using hand pump and remaining 3 (0.71 per cent) using both public water works & electric motor.

TABLE 10: Source of Water for Dairy Animals

Category	Source of Water for Dairy Animals						Total
	Public Water Works		Electric Motor		Hand pump		
	No.	%	No.	%	No.	%	
Large farm Hhs	1	1.19	83	98.8	0	0.0	84
Medium farm Hhs	8	9.52	74	88.1	0	0.0	84
Small farm Hhs	10	11.90	74	88.1	0	0.0	84
Marginal farm Hhs	19	22.62	59	70.2	6	7.1	84
Landless Hhs	36	42.86	35	41.6	12	14.2	84
Sampled	74	17.62	325	77.3	18	4.2	420

Source: Field Survey, 2019

Across the categories, the highest number (36) of the dairy farmers depending upon public water works are from the landless households and lowest (1) of the same are from large farm size category. The maximum number (83) of the dairy farmers using electric motor belongs to large farm size category households and minimum (35) of the same belongs to landless category. The highest dependence (12) on the hand pump is reported by landless households.

Cultivation of green fodder

Green fodder is one of the main components of the ration mixture of the dairy animals. Table 11 shows the data on cultivation of green fodder by the dairy farmers. A majority, i.e. 344 (81.90 per cent), of the dairy farmers are cultivating green fodder themselves for meeting the nutritional requirement of their animals. Even the landless dairy farmers have taken land on-lease to cultivate green fodder as dry fodder is costly. Remaining 76 (18.10 per cent) dairy farmers do not cultivate green fodder either due to the reason that they do not own any land or have a small piece of land. These findings are in line with the result of Kumar et al. (2019), in which they have found that a majority of the dairy farmers are themselves cultivating green fodder for their animals.

Across the categories, all dairy farmers (84) from large and medium farm size category households cultivate green fodder for their dairy animals. Among landless households, just 11 dairy farmers are cultivating green fodder by taking land on-lease and 73 dairy farmers do not cultivate green fodder for their animals.

TABLE 11: Cultivation of Green Fodder

Category	Cultivation of green fodder				Total
	Yes		No		
	No.	%	No.	%	
Large farm Hhs	84	100.00	0	0.00	84
Medium farm Hhs	84	100.00	0	0.00	84
Small farm Hhs	83	98.81	1	1.19	84
Marginal farm Hhs	82	97.62	2	2.38	84
Landless Hhs	11	13.10	73	86.90	84
Sampled	344	81.90	76	18.10	420

Source: Field Survey, 2019

IV. CONCLUSION

More than nine-tenth of the dairy farmers have the facility of shed for housing their dairy animals. Less than one-tenth of the dairy farmers keep their dairy animals under trees. Slightly less than seven-tenth of the dairy farmers have kept slanted shed

roof, while marginally higher than one-tenth of them have kept plain-top roof of animal shed. Slightly less than three-fifth of the dairy farmers are using asbestos sheet as roofing material of the shed. Around one-third of the dairy farmers prefer tiles for covering shed roof as they are less expensive. Less than one-tenth of the dairy farmers make thatched roof due to their weak economic position. Around seven-tenth of the dairy farmers keep their dairy animals on concrete floor. Slightly more than one-fourth of the dairy farmers have kept *katcha* floor for resting of the dairy animals. Matted floor is provided by less than one-twentieth of the dairy farmers to protect them from teat related infections. A majority of the dairy farmers keep their dairy animals in single row system. All dairy farmers prefer stall feeding over grazing due to higher milk yield under stall feeding of dairy animals. More than nine-tenth of the dairy farmers are feeding green and dry fodder mixture to their dairy animals to meet nutritional requirement of the animals. Three-fourth of the dairy farmers are meeting dry fodder requirement of their dairy animals by feeding mixture of green fodder and concentrates. Marginally less than three-fourth of the dairy farmers is following feeding practice of mixture of green fodder, dry fodder and concentrates. More than three-fourth of the dairy farmers are using electric motor for drinking water as well as bathing needs of dairy animals. Less than one-fifth of the dairy farmers are getting water from public water works and around one-twentieth of the dairy farmers depend upon hand pump as the source of water. Around four-fifth of the dairy farmers are cultivating green fodder themselves for their animals. The milk cooperative societies, by providing subsidised concentrate feed to the dairy farmers, can play an important role in improving the feeding practices adopted by dairy farmers. The fodder production can be promoted by using the high yielding varieties of fodder seeds. The subsidised high yielding variety seeds of green fodder should be provided to the dairy farmers to enhance fodder production. Moreover, the specialised dairy training courses can develop entrepreneurship among dairy farmers in rural areas of Punjab.

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