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Assessing the demographic profile of dairy farmers and the impact of herd size on calf diseases in Punjab

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Abstract

The study helps to gauge the demographic profile of dairy farmers and the effect of herd size on diseases of calf. This study was done in six different parts of Punjab. Respondents (n=420, 70 from each part) were selected and were interviewed personally with the help of a research instrument called as interview schedule. It was found that most of the farmers were middle aged. The education status of most of the dairy farmers in different parts of Punjab was beyond high school. Majority (51.43%) of the dairy farmers reared both buffalo and cows together. Murrah was common breed to be reared among buffaloes and H.F among cows. Majority of the dairy farmers were small dairy farmers having dairy animals <10. Most of dairy farmers (35.00%) had 2-5 acres of land, hence falling in semi-medium category. Herd Size had highly significant difference (P<0.01) on diseases like calf diarrhoea and respiratory infections/pneumonia.

Keywords: Demography, dairy farmers, herd size, diseases

Introduction

Dairy sector is an important aspect of the economy of the nation. Besides producing livestock products and by-products they also help to provide additional inputs for crops in agriculture (Manohar, 2012) [8]. Rearing of dairy animals is a constant source of income generation for the dairy farmers which helps to define their social and economic status (Anonymous, 2006) [2]. These dairy animals that a dairy farmer owns play an important role not only in sustainability of rural and urban sector but of entire nation. Scientific calf rearing is an important aspect of the dairy herds. They need to be properly managed for prevention of the diseases among them. So, present study was planned to know about the demographic profile of dairy farmers and to assess the effect of herd size on occurrence of calf diseases.

Materials and Methods

The present study was conducted on dairy farmers (n=420) from six different parts of Punjab. Dairy farmers were initially subjected to pre-testing and were further personally contacted and interviewed. The demographic profile parameters of dairy farmers such as age, education, herd size, animals kept, land holding were also noted. Effect of herd size on incidence of calf diseases was also observed. A total of seventy farmers were selected from each part of Punjab (From six ACZ). From each ACZ about two districts were selected purposively based on their livestock population. Selection of dairy farmers from villages was done randomly and socio-economic profile of dairy farmers was also compared in different regions of Punjab. The tabulation and analysis of data was done with the help of SPSS 20.0.

Results and Discussion

1. Demographic Profile of Dairy Farmers

It is related to the information regarding socio-personal and socio-economic characteristics of the dairy farmers such as age, education, animals kept, breed, herd size, land holding. These parameters were tabulated and subjected to frequency and percentage analysis. The information pertaining to the demographic profile of dairy farmers is given in Table 1. These demographic parameters were also compared in different parts of Punjab (ACZ- Agro-climatic Zones)

1.1 Age

It is referred to the chronological age of the dairy farmers in terms of completed years and characterised by using Mean ± Standard Deviation method (young aged up to 35 years, middle aged 36-50 years, old aged >50 years). Table 1 indicates that out of 420 dairy farmers 47.14% dairy farmers belonged to middle age group, 28.57% belonged to young age group and 24.29% belonged to old age group. Dairy farmers in their middle years tended to be more motivated to learn, to have five years or more of dairy experience, to be risk-takers, and to have had active lives for at least a decade. Rajput *et al*., (2012) [10] also reported that majority of dairy farmers belonged to middle age group followed by young and old age groups.

However, in agro climatic zone comparison (Table 1) only agro climatic zone-3 differed from rest of the agro climatic zones in age wise distribution of dairy farmers. ACZ-3 had more (37.14%) young aged farmers followed by middle aged (35.71%) and old aged (27.14%) dairy farmers.

Rest of the agro climatic zones had maximum number of farmers belonging to middle age. ACZ- 6 had 47.14%, ACZ-4 (44.28%), ACZ- 2 (44.29%) and ACZ-1 (51.42%) respectively. ACZ-5 had majority of middle aged farmers (60.00%). The results were in line with findings of Yadav *et al*. (2017) [15] & Singh *et al*. (2020) [12]. This also shows that older aged farmers and younger aged farmers were not very much interested in performing dairy farming activities and middle aged farmers were taking care of the dairy farms owned by them. While youngsters were not much motivated to start new enterprise keeping in view the low profitability, more time consuming and heavy investment required in establishing a new dairy farm (Sharma,2016) [11].

Table 1: Frequency distribution of Age in different Agro-climatic Zones (n=420)

Attribute	Parameter	ACZ-1 (n=70)	ACZ- 2 (n=70)	ACZ -3 (n=70)	ACZ-4 (n=70)	ACZ-5 (n=70)	ACZ-6 (n=70)	Total (n=420)
Age (years)	Young (≤35 yrs.)	15 (21.42%)	21 (30.00%)	26 (37.14%)	20 (28.57%)	17 (24.28%)	21 (30.00%)	120 (28.57%)
	Middle (36-50 yrs.)	36 (51.42%)	31 (44.29%)	25 (35.71%)	31 (44.28%)	42 (60.00%)	33 (47.14%)	198 (47.14%)
	Old (≥50 yrs.)	19 (27.14%)	18 (25.71%)	19 (27.14%)	19 (27.14%)	11 (15.71%)	16 (22.85%)	102 (24.29%)

1.2 Education

Farmers were divided into six categories based on their education level (Table 2). Education level was found to be low in totality and also zone wise. Only 17.62% dairy farmers (from n=420) were graduate and above, 28.57% were having education level up to high school followed by higher secondary 24.52%. It was also observed that 6.43% of dairy farmers had education up to primary level and 10.48% were illiterate also. These findings were similar to Thakur (2018) [14]. This also enlightens the fact that still a lot of efforts are required to break the stereotypes of literacy in rural areas.

However, in zone wise comparison (Table 2); 22.86% farmers were educated up to high school and higher secondary, 18.57% were having education up to middle school, 5.71% studied till primary, 15.71% were graduate and above, and 14.29% were illiterate (in ACZ-6). While in ACZ-5 35.71% farmers were having education up to high school, followed by 28.57% up to higher secondary, 10.00% were graduate and above, also 10.00% had education up to primary, while 11.43% were illiterate. ACZ-4 had 25.71% farmers having education up to higher secondary, 22.86% studied up to high school, 17.14% farmers were graduate and above, 15.71% were illiterate, 12.86% studied up to middle school and 5.71% had education up to primary level. ACZ-3 had their 24.29% farmers educated up to higher secondary, 22.86% each high school and graduate and postgraduate, 14.29% were illiterate, 8.57% studied up to middle school and 7.14% up to primary level. In ACZ-2, 32.86% dairy farmers studied up to high school followed by 25.71% up to higher secondary, 21.43% were graduate and post graduate, 7.14% studied up to primary level and only 1.43% were illiterate. ACZ-2 had 34.29% dairy farmers with education level up to higher school followed by higher secondary (20.00%), 18.57% each graduate and post graduate, middle school, 5.71% illiterate and 2.86% farmers up to primary level. In ACZ-1, 28.57% dairy farmers studied up to high school, followed by 24.57% up to higher secondary, 17.62% were graduate and above, 12.38% up to middle school, 10.48% were illiterate, and 6.43% had qualification up to primary level. Hence, we can find that illiteracy was found to be less in ACZ-2 with dairy farmers' percentage to be very less (1.43%) followed by ACZ-1 (5.71%). However, Graduates and post graduates were found to be more in ACZ-3 (22.86%) followed by ACZ-2 (21.43%). These present study findings are similar to findings of Kasrija (2016) [5] & Kaur (2021) [6].

This indicates that education is very important for the dairy farmers as the education levels of dairy farmers can be utilized in execution of several scientific management and feeding practices of calf.

Table 2: Frequency distribution of Education in different Agro-climatic Zones (n=420)

Attribute	Parameter	ACZ-1 (n=70)	ACZ- 2 (n=70)	ACZ -3 (n=70)	ACZ-4 (n=70)	ACZ-5 (n=70)	ACZ-6 (n=70)	Total (n=420)
Education	Illiterate	4 (5.71%)	1 (1.43%)	10 (14.29%)	11 (15.71%)	8 (11.43%)	10 (14.29%)	44 (10.48%)
	Primary	2 (2.86%)	5 (7.14%)	5 (7.14%)	4 (5.71%)	7 (10.00%)	4 (5.71%)	27 (6.43%)
	Primary	2 (2.86%)	5 (7.14%)	5 (7.14%)	4 (5.71%)	7 (10.00%)	4 (5.71%)	27 (6.43%)
	Middle	13 (18.57%)	8 (11.43%)	6 (8.57%)	9 (12.86%)	3 (4.29%)	13 (18.57%)	52 (12.38%)
	High School	24 (34.29%)	23 (32.86%)	16 (22.86%)	16 (22.86%)	25 (35.71%)	16 (22.86%)	120 (28.57%)
	High Secondary	14 (20.00%)	18 (25.71%)	17 (24.29%)	18 (25.71%)	20 (28.57%)	16 (22.86%)	103 (24.52%)
	Graduate and Post Graduate	13 (18.57%)	15 (21.43%)	16 (22.86%)	12 (17.14%)	7 (10.00%)	11 (15.71%)	74 (17.62%)

1.3 Animals Kept

About 51.43% dairy farmers were keeping both buffaloes and cows. Only buffaloes were reared by 32.86% dairy farmers while, 15.71% farmers were rearing cows only (Table 3). In zone wise comparison; ACZ-6 had more farmers (48.57%) who were rearing buffaloes followed by both animals' i.e. cows and buffaloes together (42.86%) and only 8.57% dairy farmers were rearing cows solely. However, ACZ-5 (52.86%), ACZ- 4 (61.43%), ACZ-3(52.86%), ACZ-2 (50.00%), ACZ-1 (48.57%) had majority of dairy farmers rearing cows and buffaloes together. However, Patil *et al*. (2004) [9] noted that rearing of both cows and buffaloes is done by dairy farmers of Punjab in order to produce more milk on a regular basis, which is a

considerable source of income.

Today, the government is promoting specific separate housing plans for cows and buffaloes due to the commercialization of dairy production. Due of their distinct management and dietary needs, these two species will require more independent raising in the future. Farmers have begun raising buffalo alongside cows due to the low market for spent cows. The residents of the state enjoy buffalo milk, which is high in energy and fat.

1.4 Breeds (Cows)

The breed of cows that dairy farmers (n=420) were maintaining in their dairy farms were classified into nine categories (Table 3) mainly H.F, Jersey, Desi, Sahiwal, Crossbred, H.F+Jersey, HF/Jersey/Sahiwal+CB, Sahiwal + Jersey and Sahiwal + H.F. It was observed that among the dairy farmers (n=420) the most common breed among cows was H.F which was reared by 31.67% dairy farmers followed by Jersey (11.43%). Dua (2003) [4] also reported the similar findings. About 7.62% farmers reared H.F/Jersey/ Sahiwal with the crossbred cows. However, 4.52% reared H.F and Jersey together, while only 3.33% reared Sahiwal and 2.38% reared Desi cows solely. Rearing of Sahiwal with H.F and Sahiwal with Jersey was done by only 1.90% and 0.48% farmers respectively, which was found to be very low.

In Zone wise comparison (Table 3), H.F was found to be the most common breed reared in all the agro-climatic zones with percentage of 20.00%, 34.29%, 37.14%, 25.71%, 32.86% and 40.00% in ACZ-6, 5, 4, 3, 2 and 1 respectively. These findings were in contrast to findings of Thakur, 2018 [14].

However, ACZ-1 had highest percentage of farmers among all agro-climatic zones in rearing of H.F followed by ACZ-4. In ACZ-6 (12.86%) and ACZ-1 (11.43%), after H.F the most common breed reared was cross bred along with H.F/Jersey/Sahiwal. However, in ACZ-5 (11.43%), ACZ-4 (20.00%), ACZ- 3 (15.71%) and ACZ-2 (11.43%) the most preferred breed for rearing by dairy farmers after H.F was Jersey.

The choice of H.F preference may be attributed to high milk production of H.F, which would assist dairy farmers obtain higher prices for milk and milk by-products. While Jersey breeding is second-choice because of its superior nutritional value, including higher fat and protein contents.

1.5 Breeds (Buffaloes)

The breed of buffaloes that dairy farmers were maintaining in their dairy farms were classified into six categories (Table 3) mainly Murrah, Nili Ravi, crossbred, Murrah+ Nili Ravi, Murrah/Nili Ravi + Crossbred and Desi. Out of 420 dairy farmers, majority (59.76%) farmers were rearing Murrah buffalo, followed by rearing of Murrah along with Nili Ravi buffaloes (11.67%). Rearing of Nili Ravi buffaloes was done by 6.67% dairy farmers, followed by 2.62% dairy farmers rearing Desi buffaloes. Only 2.14% dairy farmers were rearing Murrah/Nili Ravi along with crossbred buffaloes and 1.43% dairy farmers were rearing cross bred buffaloes solely.

In Zone wise comparison (Table 3), Murrah was found to be the most common breed of buffaloes reared in all the agro-climatic zones with percentage of 74.29% (ACZ-6), 70.00% (ACZ-5), 58.57% (ACZ-4), 47.14% (ACZ-3 and ACZ-1 each), 61.43% (ACZ-2). However, percentage of Murrah rearing was highest in ACZ-6 (74.29%) followed by ACZ-5(70.00%). In all the zones, except ACZ- 5 the farmers preferred to rear Murrah+Nili Ravi as together as their second choice after Murrah. But in ACZ-5, rearing of Nili Ravi solely was done by the 10.00% dairy farmers. In ACZ-6, 4, 3, 2 and 1 about 8.57%, 12.86%, 20.00%, 8.57% and 11.43% dairy farmers were rearing Murrah along with Nili Ravi respectively. These results were similar to findings of Dua (2003) [4] & Thakur (2018) [18].

Farmers in all regions of Punjab prefer raising Murrahs over other buffaloes because of their disease resistance, high productivity (more milk produced), higher fat percentage, higher net income returns from their milk (under low maintenance conditions), high nutritional value and longevity.

Table 3: Frequency distribution of Animal kept and Breeds (Cow and Buffalo) in different Agro-climatic Zones (n=420)

Attributes	Parameter	ACZ-1 (n=70)	ACZ- 2 (n=70)	ACZ -3 (n=70)	ACZ-4 (n=70)	ACZ-5 (n=70)	ACZ-6 (n=70)	Total (n=420)
Animals Kept	Cows	19 (27.14%)	14 (20.00%)	10 (14.29%)	9 (12.86%)	8 (11.43%)	6 (8.57%)	66 (15.71%)
	Buffaloes	17 (24.29%)	21 (30.00%)	23 (32.86%)	18 (25.71%)	25 (35.71%)	34 (48.57%)	138 (32.86%)
	Both	34 (48.57%)	35 (50.00%)	37 (52.86%)	43 (61.43%)	37 (52.86%)	30 (42.86%)	216 (51.43%)
Breeds (Cow)	Desi	4 (5.71%)	1 (1.43%)	3 (4.29%)	0 (0.00%)	1 (1.43%)	1 (1.43%)	10 (2.38%)
	Jersey	3 (4.29%)	8 (11.43%)	11 (15.71%)	14 (20.00%)	8 (11.43%)	4 (5.71%)	48 (11.43%)
	HF	28 (40.00%)	23 (32.86%)	18 (25.71%)	26 (37.14%)	24 (34.29%)	14 (20.00%)	133 (31.67%)
	Crossbred	1 (1.43%)	0 (0.00%)	4 (5.71%)	1 (1.43%)	1 (1.43%)	3 (4.29%)	10 (2.38%)
	HF + Jersey	4 (5.71%)	6 (8.57%)	3 (4.29%)	4 (5.71%)	2 (2.86%)	0 (0.00%)	19 (4.52%)
	HF/Jersey/Sahiwal + Crossbred	8 (11.43%)	3 (4.29%)	2 (2.86%)	5 (7.14%)	5 (7.14%)	9 (12.86%)	32 (7.62%)
	Sahiwal	5 (7.14%)	2 (2.86%)	5 (7.14%)	0 (0.00%)	0 (0.00%)	2 (2.86%)	14 (3.33%)
	Sahiwal + Jersey	0 (0.00%)	0 (0.00%)	1 (1.43%)	0 (0.00%)	1 (1.43%)	0 (0.00%)	2 (0.48%)
	Sahiwal + HF	0 (0.00%)	6 (8.57%)	1 (1.43%)	0 (0.00%)	0 (0.00%)	1 (1.43%)	8 (1.90%)
Breeds (Buff)	Murrah	33 (47.14%)	43 (61.43%)	33 (47.14%)	41 (58.57%)	49 (70.00%)	52 (74.29%)	251 (59.76%)
	Nilli Ravi	6 (8.57%)	2 (2.86%)	6 (8.57%)	4 (5.71%)	7 (10.00%)	3 (4.29%)	28 (6.67%)
	Crossbred	2 (2.86%)	1 (1.43%)	0 (0.00%)	1 (1.43%)	0 (0.00%)	2 (2.86%)	6 (1.43%)
	Murrah + Nilli Ravi	8 (11.43%)	6 (8.57%)	14 (20.00%)	9 (12.86%)	6 (8.57%)	6 (8.57%)	49 (11.67%)
	Nilli Ravi/ Murrah+Crossbred	1 (1.43%)	0 (0.00%)	3 (4.29%)	2 (2.86%)	1 (1.43%)	2 (2.86%)	9 (2.14%)
	Desi	2 (2.86%)	4 (5.71%)	2 (2.86%)	3 (4.29%)	0 (0.00%)	0 (0.00%)	11 (2.62%)

1.6 Herd Size

The distribution of farmers on the basis of their herd size is given in Table 4. It was observed that there were 58.81% small, 33.57% medium, 3.81% each large dairy and very large dairy farmers respectively in the sampled study. Kaur (2021) [6] found that, in contrast, 45.5% of farmers owned small herds of between 4 and 10. It indicates that cattle are still in the developmental stage and that as time goes on, farmers will need to strengthen their dairy farms. The only remaining option will be to increase the size of the farm; while per unit income won't increase.

In zone wise comparison (Table 4), only ACZ- 1 had more percentage of farmers (44.29%) having herd size of 10-30 animals i.e. having medium herd size. In rest of the zones majority of the dairy farmers had small herd size consisting of less than 10 animals. ACZ-6 had 78.57%, ACZ-5 (64.29%), ACZ-4 (60.00%), ACZ-3 (51.43%), ACZ-2 (58.57%) and ACZ-1 had 40.00% dairy farmers having small herd size. The aforementioned research's findings are in line with Chand (2011) [3] and Tak (2010) [13] observations, which suggested that the majority of dairy farmers were keeping small herd sizes.

The dairy farmers' ability to commercialise and profit from the rising demand for livestock and livestock by-products is limited by the modest size of their animal herd.

1.7 Land Holdings

The data in the Table 4 revealed categorization of dairy farmers on the basis of land owned by them. Out of 420 dairy farmers, it was found that 35.00% dairy farmers belonged to semi-medium category having 2-5 acres of land followed by 25.71% farmers having 1-2 acres of land (small category), 18.33% owning 5-10 acres land (medium category), 10.00% having >10 acres of land (large category). Only 3.33% farmers were landless and 7.38% farmers were marginal. The results were in line with those of Patel (2005).

In zone wise comparison (Table 4) also, dairy farmers had more percentage of farmers with semi-medium land except for ACZ- 4 having more farmers (37.14%) with small land holding comprising of 1-2 acres. ACZ-6 has 38.57%, ACZ-5 (30.00%), ACZ-3 (38.57%), ACZ-2 and ACZ-1 having 37.14% farmers consisting of land holding of 2-5 acres respectively. While, ACZ-4 had 28.57% farmers falling in both semi-medium and medium categories respectively.

These research findings were somewhat similar to research findings of Khin Mar O.O (2005) [7].

The force of urbanisation has grown and is now infiltrating villages. Because of this, agriculturally productive land that could be utilised to build dairy farms, practise agriculture, etc. is lost every year, leaving farmers with less land holdings. However, a tiny land holding or semi-medium category of land is also sufficient to establish a small dairy farm, which provides farmers with higher returns than conventional agriculture on small land holdings.

Table 4: Frequency distribution of Herd Size Land Holding (acres) in different Agro-climatic Zones (n=420)

Attributes	Parameter	ACZ-1 (n=70)	ACZ- 2 (n=70)	ACZ -3 (n=70)	ACZ-4 (n=70)	ACZ-5 (n=70)	ACZ-6 (n=70)	Total (n=420)
Herd Size	<10 (small)	55 (78.57%)	45 (64.29%)	42 (60.00%)	36 (51.43%)	41 (58.57%)	28 (40.00%)	247 (58.81%)
	10-30 (medium)	13 (18.57%)	24 (34.29%)	24 (34.29%)	24 (34.29%)	25 (35.71%)	31 (44.29%)	141 (33.57%)
	30-50 (large)	1 (1.43%)	1 (1.43%)	3 (4.29%)	1 (1.43%)	3 (4.29%)	7 (10.00%)	16 (3.81%)
	>50 (very large)	1 (1.43%)	0 (0.00%)	1 (1.43%)	9 (12.86%)	1 (1.43%)	4 (5.71%)	16 (3.81%)
Land Holding (acres)	<1 (marginal)	6 (8.57%)	7 (10.00%)	3 (4.29%)	4 (5.71%)	5 (7.14%)	6 (8.57%)	31 (7.38%)
	1-2 (small)	13 (18.57%)	26 (37.14%)	14 (20.00%)	15 (21.43%)	17 (24.29%)	23 (32.86%)	108 (25.71%)
	2-5 (semi-medium)	27 (38.57%)	21 (30.00%)	20 (28.57%)	27 (38.57%)	26 (37.14%)	26 (37.14%)	147 (35.00%)
	5-10 (medium)	10 (14.29%)	7 (10.00%)	20 (28.57%)	12 (17.14%)	16 (22.86%)	12 (17.14%)	77 (18.33%)
	>10 (large)	11 (15.71%)	5 (7.14%)	11 (15.71%)	8 (11.43%)	4 (5.71%)	3 (4.29%)	42 (10.00%)
	Landless	3 (4.29%)	4 (5.71%)	2 (2.86%)	4 (5.71%)	1 (1.43%)	0 (0.00%)	14 (3.33%)

Correlation of herd size with occurrence of diseases in calves

Effect of herd size on occurrence of various calf diseases was analysed with the help of correlation (Table 5). Herd size had positive correlation with various diseases such as calf scours, pneumonia and parasitic infestation. It means presence of diseases such as calf scours and pneumonia were highly significant ($P<0.01$) with large herd size. However, incidence of parasitic infestation was also significant ($P<0.1$) with larger herds.

It means that as the herd size increases management practices get ignored and overcrowding tends to occur more which predisposes the calves' susceptibility to various infections and diseases. Alvasen *et al*., (2012) [1] also reported mortality to be high in large herds.

Table 5: Correlation of herd size with occurrence of diseases in calves (n=420)

Parameters	Disease	Correlation Coefficient
Herd size	Calf diarrhea (scours)	0.16***
	Pneumonia/Respiratory infection	0.21***
	External and internal parasitic infestation	0.09*

*** Significant (P<0.01), *Significant (P<0.1)

Conclusion

As we can see from the study that majority of the dairy farmers were middle aged. Hence, more young farmers need to join the dairy sector for upliftment of the dairy sector. Majority of the farmers were uneducated. Hence, the rural areas must be equipped with providing education facilities to the dairy farmers at least up to basic level. Proper management of the calves in the herds' especially larger herds is the need of an hour to prevent losses of calves from the diseases.

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