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Dairy Herd Parameters and Productivity Comparisons in Karnal District Across Beneficiary and Non-Beneficiary Farmers of Farmers Farm School

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

The present study was conducted in Karnal district of Haryana, to compare the dairy herd parameters and the productivity of cattle possessed by the beneficiary farmers of farmers farm school and non- beneficiaries. Crossbred cows and buffaloes were more in number both with beneficiaries and non-beneficiaries. Average daily milk yield was significantly (<0.01) higher in the animals possessed by beneficiary farmers than non-beneficiary farmers. Almost all the beneficiaries found to provide mineral mixture to their dairy animals on an average of 48.80 gm/animal/day whereas only five members of non-beneficiaries were giving mineral mixture of the quantity 45.50 gm/animal/day. The percentage of animals affected were significantly (<0.01) higher in non-beneficiary group while comparing with beneficiaries. The overall morbidity status of the locale was that, 18 per cent had the ecto- parasite infestation followed by repeat breeding (9%).

Keywords: Beneficiary farmers; dairy herd parameters; farmers farm school; non- beneficiary farmers.

1. INTRODUCTION

Livestock is a source of subsidiary income for many families in India especially the resource poor who maintain few heads of animals. Cows and buffaloes if in milk will provide regular income to the livestock farmers through sale of milk. In livestock sector, India is the world's single largest milk producing country with 187.96 million tonnes against world milk production of 843.04 million tones with a share of about 22.29 per cent (FAOSTAT, 6th November, 2020). Also India, the current leader in dairy world, rank 1st in milk production with contribution of livestock to agricultural GDP is 28.63 per cent (Economic survey 2020-21). Cattle, Buffalo and goat forms the major part of dairy animals of the country.

As per the twentieth livestock census data, the total cattle, buffalo and goat population in the country is 192.4 million, 109.85 million and 148 million respectively. Out of the total cattle population, 145.11 million were female and 74.17 million constituted the milch population. The population of cattle in milk was found to be only 43.9 million. Out of the total buffalo population, 100 million were females out of which 51.16 million found to be milch animals and 38.16 million were in milk. The total demographic details shows that largest contribution in the milk production of the nation is of buffalo with 49.00 per cent, followed by cow (48.00%) and goats (3.00%). Crossbred/ exotic cattle had an average milk production of 7.95 l/animal/day whereas the same for indigenous/ non-descript cattle is 3.01 l/animal/day. The contribution of livestock sector to total GVA is showing an increasing trend and thus dairying in India can be seen as an instrument for social change (Government of India, 2019).

Being the home tract of Haryana breed of cow and Murrah breed of buffalo Haryana has the distinction from other states. According to the twentieth livestock census data, total livestock population of the state is 71.26 lakhs, of which dairy animals is 66.44 lakhs. Buffalo population of the state is 43.76 lakhs which accounts for 61.40 per cent of the total livestock. 69.37 percent of the total bovine (63.08 lakhs) is comprised of buffaloes. Cattle comprises 30.62 percent of the total bovine population and 27.11 percent of the total livestock population. The milk production of 19.50 lakh tonnes during the period of 1979-80 had increased to 107.26 lakhs in the period of 2018-19 and the estimated production for the year 2019-20 was 117 lakh tonnes. The contribution of exotic, crossbred and indigenous in the total milk production was 1.85 lakh tonnes, 13.5 lakh tonnes and 3.3 lakh tonnes. Regarding the productivity, 11.09, 8.69, 6.15 and 5.30 kg/animal/day has been found for exotic, crossbred, indigenous and non-descript cattle. As per the buffaloes are concerned, the contribution of the state in milk production was 75.23 lakh tonnes and 11.59 lakh tonnes by the indigenous buffalo and non-descript buffalo respectively. Haryana has third position in the annual growth rate of milk production, which is 9.3 per cent. The contribution of Haryana towards the total milk production of the country is 5.7 per cent. The per capita availability of milk per day has increased from 440 gm in 1979 - 80 to 1087 g during 2018-19. As per the recommendation given by Indian Council of Medical Research (ICMR), the per capita requirement of milk should be 300 g per day. The state has the second highest per capita milk

availability in the country (Government of Haryana, 2020).

Farmers Farm School initiatives aim to improve the skills and knowledge of dairy farmers to improve the herd management practices and overall productivity. However, the effectiveness of such programmes in influencing key dairy parameters such as herd size, milk production, milk sales, milk consumption, incidences of morbidity, mortality and feeding schedules remain unclear. In Karnal district, both beneficiary and non-beneficiary farmers co-exist, providing opportunity to evaluate the effectiveness of farmers farm school. While beneficiary farmers receive targeted classes and training, non-beneficiaries continue their traditional farming practices, forming a natural comparison group.

A number of problems or difficulties are faced by dairy farmers while adopting day-to-day animal husbandry practices in their dairy enterprise. Thus, alleviating the constraints in scientific management can definitely enhance the profits (Manohar *et al,* 2015). The socio-personal profile and problem identification will help the planners and administrators in identifying the problems so that the loopholes, if any can be plugged (Manjusha *et al*, 2015) Studies have shown that a clear strengthening of extension services through targeted training programs to improve the knowledge of key practices among the farming community is need of the hour. Another low awareness is about schemes by the government on support to farmers in terms of finances and technical means. This can be improved through better communication channels by working with local cooperatives, NGOs and other extension approaches (Singh *et al*, 2024). Studies have suggested that trainings and awareness programs may be formulated frequently to the dairy farmers in Haryana with which the dairy farmers of the area are more concerned (Loura *et al*, 2021). Objective of this study is to address the gap in understanding whether training and classes provided through the farmers farm school have led to measurable improvements in dairy herd parameters and productivity among the beneficiaries. By comparing these parameters between beneficiaries and non-beneficiaries, this research is an attempt to identify areas of success, challenges and potential strategies to further enhance the effectiveness of dairy development programs. Thus, study entitled “Dairy Herd Parameters and Productivity Comparisons in Karnal District Across Beneficiary and Non-Beneficiary Farmers of Farmers Farm School” was conducted.

2. METHODOLOGY

The present study was conducted in Karnal district of Haryana. Karnal district was selected purposively as five batches of farmers farm school were successfully organized and sixth is in progress. The responses were collected from the registered/ beneficiary farmers of five batches. 60 beneficiaries and 60 non-beneficiaries were selected from same villages under the study following simple random sampling and thus forming a total sample size of 120. The selection criteria for non-beneficiaries were those who have at least two dairy animals in milk and five years of experience in dairying. Structured schedules were prepared for collection of data for each parameter under study. Data thus collected was analysed using frequency, percentage, mean and standard error.

3. RESULTS AND DISCUSSION

3.1 Herd Size

Herd size is defined as the total number of dairy animals possessed by the respondents at the time of inquiry. It was found that crossbred cows and buffaloes were more in number both with beneficiaries and non-beneficiaries. Table 1 shows that total number of indigenous, crossbred and buffaloes were 87, 213 and 215 with the beneficiaries whereas 80, 182 and 180 with the non-beneficiaries. The table also represents herd size in Standard animal unit (SAU). Representing the data obtained in SAU, on an average, indigenous cow, crossbred and buffalo were 2.21, 3.04 and 3.20 forming a total of 7.30 herd size with the beneficiaries. While, 2.02, 2.62 and 2.69 were the SAU of indigenous cow, crossbred cow and buffaloes with the non-beneficiaries constituting a total herd size of 6.29. The Fig. 1 shows the total composition of herd, for the pooled sample (n = 120) as in milk, dry, heifer and young stock. Most (34.00%) of the dairy animals were in milk, followed by 28.00 per cent young stock, 22.00 per cent in dry and 16.00 per cent heifer. While looking into the pooled data, it was observed that crossbred and buffaloes comprised 41.00 per cent of the total herd composition and indigenous cows were only 18 per cent. It could be because the farmers were selecting the highly available breeds with high milk production.

Table 1. Distribution of herd size possessed by the respondents

Categories	Beneficiaries (n = 60) Count (%)			SAU (Mean ± SD)	Non-beneficiaries (n = 60) Count (%)			SAU (Mean ± SD)
	Indigenous cows (n = 29)	CB cows (n = 60)	Buffalo (n = 60)		Indigenous cows (n = 27)	CB cows (n = 60)	Buffalos (n = 60)	
In milk	29 (33.33)	72 (33.80)	70 (32.56)	3.38 ± 0.97	27 (33.75)	62 (34.07)	60 (33.33)	2.94 ± 0.51
Dry	19 (21.84)	48 (22.54)	48 (22.33)	1.74 ± 0.59	16 (20.00)	41 (22.53)	40 (22.22)	1.47 ± 0.73
Heifer	17 (19.54)	30 (14.08)	35 (16.28)	1.15 ± 0.54	18 (22.50)	28 (15.38)	28 (15.56)	1.17 ± 0.65
Young stock	22 (25.29)	63 (28.58)	62 (28.83)	1.17 ± 0.31	19(23.75)	51 (28.02)	52 (28.89)	0.97 ± 0.32
Total	87 (100)	213 (100)	215 (100)	7.30 ± 1.73	80 (100)	182 (100)	180 (100)	6.29 ± 1.28
SAU (Mean ± SD)	2.21 ± 0.44	3.04 ± 0.77	3.20 ± 0.75		2.02 ± 0.49	2.62 ± 0.54	2.69 ± 0.44	

(Values in the parenthesis indicate percentage)

Table 2. Average milk yield in litres/day and its comparison between beneficiaries and non-beneficiaries

Sr. No.	Categories	Beneficiaries (n = 60)	Non-beneficiaries (n = 60)
1	Indigenous cows	4.69 ± 0.11	3.44 ± 0.08
2	Crossbred cows	10.63 ± 0.18	8.70 ± 0.32
3	Buffaloes	7.73 ± 0.09	6.37 ± 0.18
Total		20.63 ± 0.41	16.62 ± 0.44
U statistics		712.000	
Z value		-5.729	
p value		0.000	

(Mean ± SE)

3.2 Milk Production

Milk production is defined as the total quantity of milk produced by the dairy animals one day prior to investigation. The results displayed in the Table 2 shows that among beneficiary farmers average daily milk yield of crossbred cows were more with a yield of 10.63 l/animal/day followed by buffaloes (7.73 l/animal/day) and least was found in case of indigenous cows (4.69 l/animal/day). The same trend was observed in the milk production of animals reared by non-beneficiaries whereas a significant (< 0.01) difference in the milk yield was observed in animals reared by beneficiaries and non-beneficiaries. The average daily milk yield of 8.70, 6.37 and 3.44 l/animal/day was observed for crossbred, buffaloes and indigenous cows possessed by non-beneficiaries respectively, and it was significantly lesser than the same obtained by beneficiary farmers. The results obtained were similar to the study conducted by Meena *et al.* (2017) on impact of dairy production technologies on productive performance of dairy animals in Haryana. While looking into the total milk production per household from the Table 3, there was a clear-cut difference between beneficiaries and non-beneficiaries. The total milk production per household was 23.97 l/day with beneficiaries whereas it was only 17 l/day with non-beneficiaries. The difference in milk production could be because of the difference in the quality of and quantity of green and dry fodder, mineral mixture and concentrates. It could also be attributed to difference in the breed and genetic potential of the animals.

3.3 Milk Consumption

It is defined as the total quantity of milk consumed in litres by the members of family. The Table 3 depicts that more of crossbred milk was consumed by the members followed by buffalo milk. The quantity of milk consumed by beneficiaries (7.52 l/household) was found to be higher than the non-beneficiaries (5.55 l/household).

3.4 Milk Sale

Milk sale is defined as the total quantity of milk sold by the household. The Table 3 clearly shows that quantity of milk sold by beneficiaries (16.52 l/household/day) were higher than that of non- beneficiaries (11.18 l/household/day). It was because the milk production was higher in those dairy animals possessed by beneficiaries and thus the milk sale.

3.5 Feeding Schedule of Milch Dairy Animals

The Table 4 clearly depicts that, both beneficiaries and non-beneficiaries were providing feed and water to their dairy animals three times a day. Beneficiaries were giving green fodder a quantity of 19.50 kg/day/animal whereas the same provided by non-beneficiaries was 15.00 kg/animal/day. Dry fodder was provided by beneficiaries and non-beneficiaries in almost same quantity, 5.70 and 6.40 kg/animal/day. Grains and cake provided by beneficiaries were more (3.50 and 1.50 kg/animal/day) in comparison to the non-beneficiaries (1.50 and 0.68 kg/animal/day). Common salt provided by both the groups were almost same (22.50 and 20.50 gm/animal/day). A major difference was seen in providing mineral mixture to their dairy animals. Almost all the beneficiaries found to provide mineral mixture to their dairy animals on an average of 48.80 gm/animal/day whereas only five members of non-beneficiaries were giving mineral mixture of the quantity 45.50 gm/animal/day. This difference could be because beneficiary farmers were having proper knowledge regarding the type and quantity of feed and fodder after undergoing Farmers Farm School classes.

Table 3. Milk production, consumption and sale

Sr. No.	Categories	Beneficiaries (n = 60)			Non-beneficiaries (n = 60)		
		Milk production (l/day)	Milk consumption (l/day)	Milk sale (l/day)	Milk production (l/day)	Milk consumption (l/day)	Milk sale (l/day)
1	Indigenous cow	4.69 ± 0.11	1.64 ± 0.14	3.10 ± 0.14	3.44 ± 0.08	1.36 ± 0.10	2.19 ± 0.19
2	Crossbred cow	12.72 ± 0.57	3.68 ± 0.08	9.10 ± 0.56	9.08 ± 0.48	2.93 ± 0.10	6.35 ± 0.48
3	Buffaloes	8.98 ± 0.37	3.07 ± 0.08	5.92 ± 0.36	6.37 ± 0.18	2.05 ± 0.08	4.32 ± 0.19
4	Total	23.97 ± 0.85	7.52 ± 0.17	16.52 ± 0.78	17.00 ± 0.54	5.55 ± 0.15	11.18 ± 0.41

(Mean ± SE)

Table 4. Feeding schedule of dairy animals

Sr. No.	Categories	Beneficiaries (n=60)	Non-beneficiaries (n=60)
1	No. of times providing drinking water/day	3	3
2	No. of feeding per day	3	3
3	Green fodder (kg/day)	19.50	15.00
4	Dry fodder (kg/day)	5.70	6.40
5	Grain (kg/day)	3.50	1.50
6	Cake (kg/day)	1.30	0.68
7	Mineral mixture (g/day)	48.80	45.50 (n = 5)
8	Common salt (g/day)	22.50	20.50

(Values in the parenthesis indicate percentage)

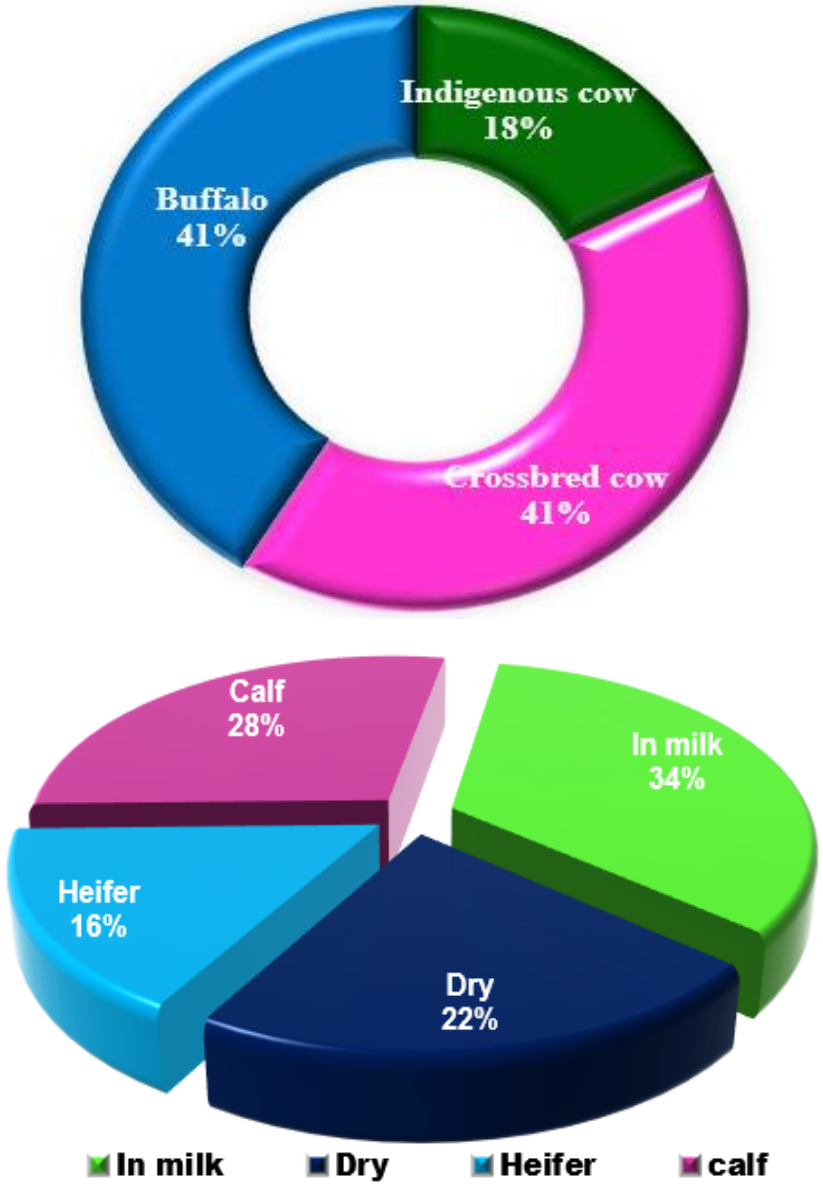

Fig. 1. Composition of herd possessed by the respondents

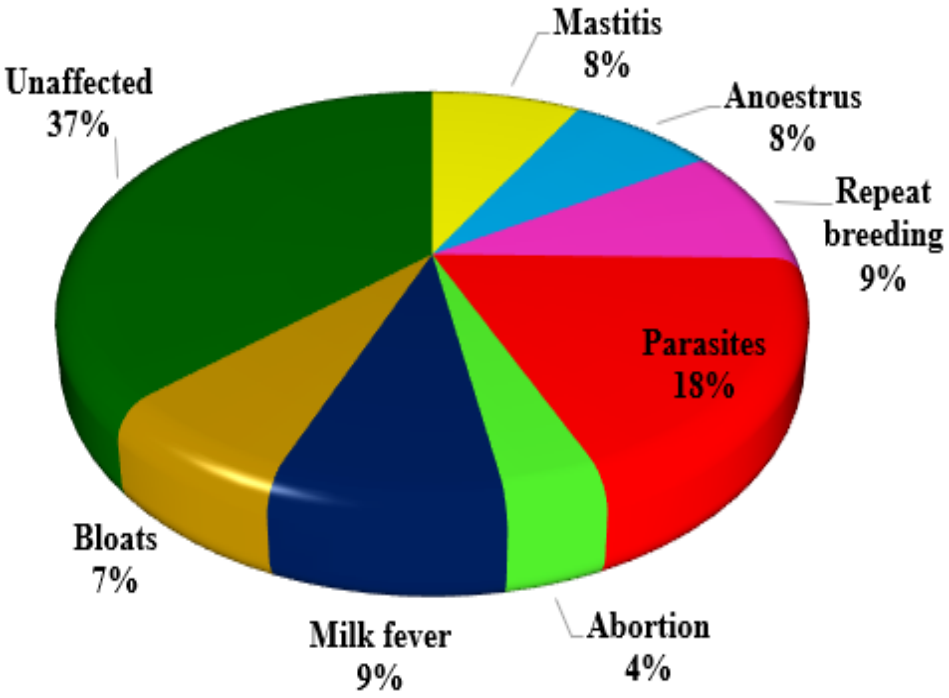

Fig. 2. Extent of morbidity in dairy animals

3.6 Incidence of Morbidity

The Table 5 displays the list of diseases observed in the dairy animals in the study area and number of animals affected with percentage of animals affected. Table 5 indicates that the disease incidence was more in case of crossbred animals both in beneficiary and non-beneficiary group and less in indigenous cows. The percentage of animals affected were much more in non-beneficiary group while comparing with beneficiaries. The table express that 27.15 per cent of animals were affected with ecto-parasites (ticks) in the non- beneficiary group followed by repeat breeding issues (20.31%) and milk fever (18.44%). While looking into the data the same morbidity status in beneficiary group was 10.68 per cent of animals were infested with ecto-parasites, 6.52 with repeat breeding and milk fever. The incidence of anoestrus and mastitis was also found to be prevalent in the non-beneficiary group (17.81% and 17.50%) whereas in beneficiary group the incidence was 5.71 percent for mastitis and 5.16 per cent for anoestrus. The Table 6 also depicts that there exists a significant difference in incidence of morbidity of the animals possessed by beneficiary and non-beneficiary group. The Fig. 2 represents the overall morbidity status in the villages selected and is the combined results of beneficiaries and non-beneficiaries. It represents 18 per cent had the ecto- parasite infestation followed by repeat breeding (9.00%), milk fever (9.00%), mastitis (8.00%), anoestrus (8.00%) and bloats (7.00%), respectively. The more incidence of morbidity among the dairy animals possessed by non- beneficiaries could be because of the poor management practices followed by them, negligence, failure in taking timely preventive measures and failure in early detection of the diseases and liability in assuring appropriate health care treatments.

3.7 Incidence of Calf Mortality

Calf mortality was found to be high in crossbred animals from the results depicted in the Table 7. Beneficiary group had the calf mortality of 7.24% in crossbred cows which was lesser when compared to the same observed in non-beneficiary group (16.13%). Mortality rate was lesser in indigenous cows and buffaloes in both beneficiaries and non-beneficiaries. Table also depicts the existence of significant (<0.05) difference between beneficiaries and non-beneficiaries in calf mortality. It was in contrast to the results reported in a comparative study on health care practices adopted by dairy farmers by Roy and Meena, 2020.

Table 5. Incidence of morbidity of dairy animals (last year, 2021)

Sr. No	Categories	Beneficiaries (n_1=60)			Non-beneficiaries (n_2=60)		
		Indigenous Cow (Adult =65 Total=87)	Crossbred cow (Adult=150 Total=213)	Buffalo (Adult=153 Total=215)	Indigenous cow (Adult=61, Total=81)	Crossbred cow (Adult=131, Total=182)	Buffalo (Adult=128 Total=180)
1	Mastitis	2 (3.08)	10 (6.67)	9 (5.88)	10 (16.39)	24 (18.32)	22 (17.19)
2	Anoestrus	2 (3.08)	9 (6.00)	8 (5.23)	8 (13.11)	28 (21.37)	21 (16.41)
3	Repeat breeding	1 (1.54)	12 (8.00)	11 (7.19)	8 (14.04)	33 (25.19)	24 (18.75)
4	Parasites (Ticks)	3 (3.45)	30 (14.08)	22 (10.23)	16 (20.00)	60 (32.97)	44 (24.44)
5	Abortion	-	5 (3.33)	4 (2.61)	2 (3.28)	15 (11.45)	10 (7.81)
6	Milk fever	2 (3.08)	12 (8.00)	10 (6.54)	7 (11.48)	29 (22.14)	23 (17.97)
7	Bloats	3 (3.45)	9 (4.23)	10 (4.57)	7 (8.75)	21(11.54)	20 (11.11)

(Values in the parenthesis indicate percentage)

Table 6. Overall status of morbidity of dairy animals (2021)

Sr. No	Categories	Beneficiaries (Adult animals=368, Total=515)	Non beneficiaries (Adult animals=320, Total=442)
1	Mastitis	21 (5.71)	56 (17.50)
2	Anoestrus	19 (5.16)	57 (17.81)
3	Repeat breeding	24 (6.52)	65 (20.31)
4	Parasites	55 (10.68)	120 (27.15)
5	Abortion	9 (2.45)	27 (8.44)
6	Milk fever	24 (6.52)	59 (18.44)
7	Bloats	22 (4.27)	48 (10.86)
U statistics		4.500	
Z value		-2.570	
p value		0.007**	

(Values in the parenthesis indicate percentage)

Table 7. Incidence of calf mortality (last year, 2021)

Sr. No	Categories	Beneficiaries (n_1=60)			Non beneficiaries(n_2=60)		
		Indigenous cow	Crossbred cow	Buffalo	Indigenous cow	Crossbred cow	Buffalo
1	Calf born	23	69	63	21	62	53
2	Calves survived	22	64	70	19	52	50
3	Calf died	1	5	3	2	10	3
4	Calf mortality	4.34	7.24	4.76	9.52	16.13	5.66
U statistics		1571.500					
Z value		-1.785					
p value		0.044					

4. CONCLUSION

A large proportion of Haryana farmers are involved in dairy farming and majority of them are comprised of small and marginal farmers. Crossbred cows and buffaloes were more in number both with beneficiaries and non-beneficiaries. Most (34%) of the dairy animals were in milk, followed by 28 per cent young stock, 22 per cent in dry and 16 per cent heifer, in the locality where study was conducted. Crossbred and buffaloes comprised 41 per cent of the total herd composition and indigenous cows were only 18 per cent in the locale. Among beneficiary farmers average daily milk yield of crossbred cows were more with a yield of 10.63 l/animal/day followed by buffaloes (7.73 l/animal/day) and least was found in case of indigenous cows (4.69 l/animal/day) while the average daily milk yield of 8.70, 6.37 and 3.44 l/animal/day was observed for crossbred, buffaloes and indigenous cows possessed by non-beneficiaries. Average daily milk yield was significantly (<0.01) higher in the animals possessed by beneficiary farmers than non-beneficiary farmers. The total milk production per household was 23.97 l/day with beneficiaries, which was significantly (<0.01) higher 17 l/day attained by non-beneficiaries. There was a significant (<0.01) difference in the quantity of milk consumed by beneficiaries (7.52 l/household) and non-beneficiaries (5.55 l/household). The quantity of milk sold by beneficiaries (16.52 l/household/day) were significantly higher than the non-beneficiaries (11.18l/household/day). Beneficiaries were giving green fodder a quantity of 19.50 kg/day/animal whereas the same provided by non-beneficiaries was 15.00 kg/animal/day. Almost all the beneficiaries found to provide mineral mixture to their dairy animals on an average of 48.80 gm/animal/day whereas only five members of non-beneficiaries were giving mineral mixture of the quantity 45.50 gm/animal/day. The percentage of animals affected were significantly (<0.01) higher in non-beneficiary group while comparing with beneficiaries. The overall morbidity status of the locale was that, 18 per

cent had the ecto- parasite infestation followed by repeat breeding (9%), milk fever (9%), mastitis (8%), anoestrus (8%) and bloats (7%), respectively. Calf mortality percentage was significantly (<0.05) lesser in beneficiary group than non-beneficiaries.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

FAOSTAT. (2020). *FAOSTAT Agriculture data*. Available at http://faostat.fao.org. Accessed November 6, 2020.

Government of Haryana. (2020). *Handbook on 20th Livestock Census*. Animal Husbandry & Dairying Department.

Government of India. (2019). *Department of Animal Husbandry and Dairying*. Ministry of Fisheries, Animal Husbandry and Dairying.

Loura, M., Ghalawat, S., Malik, J., Mehla, S., Yadav, E., & Kumar, M. (2021). Constraints faced by dairy farmers in Haryana. *Constraints, 51*(3), 1697-1709.

Manjusha, J., Gupta, J., Kumar, V., Sachan, R., Verma, A. K., & Singh, P. K. (2015). Sociopersonal profile and constraints experienced by dairy farmers in adoption of recommended dairy farming practices in Karnal district of Haryana. *Progressive Research–An International Journal, 10*(1), 50-53.

Manohar, D. C., Manohar, M. S., Choudhary, D., & Rathore, V. S. (2015). Constraints perceived in adoption of recommended management practices by buffalo owners in the Jaipur district of Rajasthan. *Journal of Dairy, Veterinary & Animal Research, 2*(1), 13-14.

Meena, B. S., Sankhala, G., Meena, H. R., & Maji, S. (2017). Impact of dairy production technologies on productive and reproductive performance of dairy animals in Haryana. *Indian Journal of Animal Sciences, 87*(2), 234-237.

Ministry of Finance, Government of India. (2017). *Economic Survey 2020-21*.

Roy, S. K., & Meena, B. S. (2020). A comparative study of healthcare practices adopted by dairy farmers in Karnal district of Haryana. *Indian Journal of Extension Education, 56*(2),101 -105.

Singh, A. K., Shelar, R., Naik, B. M., & Singh, A. K. (2024). Assessment of dairy farmers' knowledge regarding good dairy farming practices in Uttar Pradesh, India. *Journal of Scientific Research and Reports, 30*(11), 1009-1022.

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