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Brajesh Kumar
M.V.Sc Scholar, LPM, BVC, Patna, Bihar, India

RRK Sinha
Associate Professor, LPM, BVC, Patna, Bihar, India

RK Nirala
Assistant Professor, LPM, BVC, Patna, Bihar, India

Sanjay Kumar
Associate Professor, LPM, BVC, Patna, Bihar, India

Amrendra Kishor
Assistant Professor, LPM, BVC, Patna, Bihar, India

SP Sahu
Professor and Head, LPM, BVC, Patna Bihar, India

Arjun Kumar Mandal
M.V.Sc Scholar, LPM, BVC, Patna, Bihar, India

Vinita Yashveer
Ph.D. Researcher, AGB, BVC, Patna, Bihar, India

Corresponding Author:
RK Nirala
Assistant Professor, LPM, BVC, Patna, Bihar, India

Study on utilization pattern of manpower in the management of livestock farm operations

Brajesh Kumar, RRK Sinha, RK Nirala, Sanjay Kumar, Amrendra Kishor, SP Sahu, Arjun Kumar Mandal and Vinita Yashveer

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Abstract
The dairy sector plays an important role in India's economy and boosts the income of farmers. The present research was planned to evaluate the efficiency of manpower in the management of different categories of cattle in the dairy unit of the livestock complex, BASU (Patna). The investigations were done for 120 days. During the study, it was found that the work-efficiency of manpower during the morning time is better than the evening time. The average time spent in activities such as milking operations, feeding, watering, calf management, and miscellaneous activities were studied. The average time spent on milking, feeding, and watering activities for milch buffaloes took the most time compared to other categories of animals. The average time spent in the actual milking of cows and buffaloes were 324.52±13.90 and 329.77±8.52 seconds respectively. The average milk yield per day of cows and buffaloes were 2.98±0.18 and 4.31±0.09 kg, respectively. The time taken in rectal palpation and artificial insemination per animal was noted to be 1.37±0.04 and 7.50±0.16 minutes respectively. The training of workers may help to overcome the scarcity of manpower in adverse conditions.

Keywords: Manpower, milking, feeding, calf management

Introduction
The livestock sector plays an important role in the Indian economy, serving as a key player in the socio-economic development of rural households and providing supplementary income to a large number of families. At present, the total livestock population in India is 535.78 million and the bovine population is 302.79 million, showing an increase of 4.6% and 1%, respectively, over the previous livestock census of 2012 (20th Livestock Census). In this regard, dairy farming has played a prominent role and proved instrumental in the context of the Indian economy. The dairy sector contributes significantly to poverty reduction and income generation (Dayanandan, 2011) [2] in rural areas, as income from milk comprises as much as 75-80 % of the total income and the underprivileged are heavily dependent on dairy subsistence. Success in dairy farming requires judicious management of resources, i.e., land, labour, and capital. The availability of labour is critical to carrying out day-to-day dairy farm operations. Labour management practises in the agriculture and allied sectors are very less addressed in agriculture economics (Mugera and Bitsch, 2005) [7]. The easy availability of workers are the most common pre-expansion manpower management challenge for a dairy farm supervisor. Scientific norms for the requirements of workers for different activities in dairy farms are available, but their application as per the conditions is vital. Previous analyses by Rawat *et al.* (1973) [9], Singh and Dave (1985) [11] and Devarajulu and Naidu (1989) [3] on dairy farm activities may not fit into the present context because of hikes in labour wages, amendments to the labour laws, and also due to variability in their availability. At the same time, information on worker requirements for carrying out daily routine farm activities, *viz.* feeding, milking operations, feeding activities, cleaning of different sheds, management of calves, harvesting of green fodder, *etc.*, and their impact on dairy farm profitability is scanty (Grewal and Rangi, 1980) [5]. Therefore, it is important to know the working efficiency of manpower, their efficient utilisation, and the constraints faced during their positioning in various activities at the dairy farm.

Materials and Methods

The present investigation was carried out at the Dairy Unit of the Livestock Farm Complex, Bihar Animal Sciences University, Patna. During the study, 41 milch animals, 32 dry animals, 44 calves, 53 heifers, and 6 bulls were selected. The livestock farm adopted a loose housing system, while individual paddocks were either brick pavers or cement concrete floors. Milking was performed in milking byres following the tail-to-tail system, and milking was done manually by hand. The time spent during various farm operations were studied and noted for record. The recoded data during the study were analysed as per the procedure laid down by Snedecor and Cochran (1994) [12].

Results and Discussion

The time taken in the milking operations of cows and buffaloes is represented in Table 1 and Table 2 respectively. The time spent by manpower in milking operations during the evening time is higher than the morning time, except for suckling the milk by calves this might be due to workers may get exhausted during the evening. The average time spent on animal tying in case of cows were 13.10±0.28 sec. in morning time and 13.30±0.25 sec. in evening time, whereas, Bara and Shah (2012) [1] in their study reported the average time taken for animal tying ranged from 10.49±0.09 to 12.90±0.14 seconds. The data observed in present finding was slightly higher; this might be due to the behaviour of animals and the construction of the milking parlour. In present study, average time spent on washing of udder in cattle (12.77±0.20 seconds) is less than Sreedhar's (1999) [13] observation because wiping by clothes were not done after washing of udder at Livestock farm complex, Patna. The average time spent for actual milking in cows and buffaloes were 324.52±13.90 and 329.77±8.52 seconds, respectively. The difference in actual milking time between cows and buffaloes may be due to the fact that the teats of buffaloes may be harder than cows teats (Hubenov and Doikov, 1965) [6]. After comparison of the coefficient of variation (Table 5.), it was found that the Coefficient of variation (C.V.) was highest in the case of feeding dry animals and watering milch buffaloes. The C.V. was lower in the feeding and watering of calves.

Table 1: Shows the average time spent on Sahiwal cow milking operations (seconds per day/animal)

S. No.	Activities	Morning	Evening	Mean ± S.E	t-value
1.	Animal tying	13.10±0.28	13.30±0.25	13.20±0.19	-0.5305
2.	Concentrate feeding	18.40±0.34	18.70±0.37	18.55±0.25	-0.5878
3.	Carrying empty bucket	51.20±1.70	51.55±1.67	51.37±1.17	-0.1467
4.	Bringing calf to dam	42.35±2.11	43.50±2.07	42.92±1.46	-0.3880
5.	Calf suckling	24.15±0.65	23.40±0.53	23.77±0.42	0.8875
6.	Tying of legs	14.85±0.38	15.35±0.31	15.10±0.25	0.9995
7.	Washing of udder	12.70±0.18	12.85±0.37	12.77±0.20	-0.3634
8.	Actual milking	330.95±19.34	318.10±20.36	324.52±13.90	0.4576

Note: * is significant at 10 %, ** is significant at 5 % and *** is significant at 1%

Table 2: Average time spent in milking operations on Murrah buffaloes (Seconds/day/animal)

S. No.	Activities	Morning	Evening	Mean ± S.E	t-value
1.	Animal tying	15.30±0.32	15.95±0.27	15.62±0.21	1.5237*
2.	Concentrate feeding	19.15±0.59	19.25±0.57	19.20±0.40	-0.1218
3.	Carrying empty bucket	53.05±1.40	53.20±1.37	53.12±0.96	-0.0765
4.	Bringing calf to dam	42.55±2.05	43.90±2.07	43.22±1.44	-0.4620
5.	Calf suckling	26.10±0.52	24.40±0.35	25.25±0.34	2.6826***
6.	Tying of legs	15.85±0.37	16.25±0.40	16.05±0.27	-0.7293
7.	Washing of udder	13.85±0.38	14.50±0.44	14.17±0.29	-1.1047
8.	Actual milking	335.30±11.43	324.25±12.82	329.77±8.52	0.6432

Note: * is significant at 10 %, ** is significant at 5 % and *** is significant at 1%

Perusal of the table 3, indicates that the average time spent per day in washing of udder after milking, untying the legs, carrying the milk bucket to the recording room, unloading the milk pail, and weighing were 4.65±0.10, 4.67±0.15, 56.65±1.38 and 16.27±0.23 seconds respectively. Sachan *et al.* (2018) [10] reported that untying of legs took on an average 5.43±0.47 seconds which is slightly higher than this study. The average time taken for feeding colostrum to the calf, change the bedding, watering of the calf and washing the utensil were 3.25±0.22, 4.80±0.10, 1.59±0.09 and 2.69±0.09 minutes respectively (Table 4). Naik and Lathwal (2016) [8] observed that feeding of colostrum consumed by calf took maximum time (more than 50% of the total time). Concentrate feed poured with water in water tub then distributed to animals. The average time spent in feeding and watering on milch cows, milch buffaloes, dry animls, calves and heifers are presented in Table 5. The average time spent in feeding of 100 milch animals and 30 heifers were 842.16±11.51 minutes and 116.60±5.00 minutes (Devarajulu and Naidu, 1989) [3].

Table 3: Time spent by manpower (in seconds) for post milking operations

Activities	Morning	Evening	Mean ± S.E	t-value
Washing of udder	4.60±0.15	4.70±0.14	4.65±0.10	-0.4728
Untying legs	4.60±0.18	4.75±0.25	4.67±0.15	-0.4837
Carrying milk bucket	56.45±1.98	56.85±1.98	56.65±1.38	-0.1427
Unloading milk pail and weighing time	16.20±0.35	16.35±0.31	16.27±0.23	-0.3195

Table 4: Time spent (in minutes) in the management of calves from 0 to 6 days of age

Activities	Morning	Evening	Mean ± S.E	t-value
Feeding of colostrum	3.62±0.18	2.87±0.36	3.25±0.22	0.1073**
Change the bedding	4.81±0.16	4.79±0.15	4.80±0.10	0.1073
Watering of calf	1.62±0.14	1.57±0.12	1.59±0.09	0.2877
Washing the utensil	2.78±0.13	2.61±0.14	2.69±0.09	0.8949

Table 5: Average time spent in feeding and watering on different categories animals (minutes/day/animal)

S. No.	Categories	Feeding		Watering	
		Mean ± S.E	CV%	Mean ± S.E	CV%
1.	Milch cows	9.15±0.16	7.89	2.32±0.08	14.96
2.	Milch buffaloes	9.45±0.14	6.86	2.66±0.13	23.08
3.	Dry animals	4.38±0.16	16.59	2.18±0.06	13.00
4.	Calves	3.25±0.02	3.06	1.42±0.02	6.04
5.	Heifers	4.61±0.12	11.68	2.16±0.07	14.65

S.E: Standard Error CV%: Coefficient of variation

Table 6: Time spent by manpower (in minutes) in miscellaneous activities of dairy farm

S. No.	Activity	Average time
1	Veterinary aid (man-min./animals)	12.63±0.73
2	Rectal palpation (man-min./animals)	1.37±0.04
3	Artificial insemination (man-min./animals)	7.50±0.16
4	Weighing of calves (man-min./animals)	4.97±0.19

Weighing of the calves was done on the mechanical bridge fortnightly (Table 6). Time taken in weighing of each calf was 4.97±0.19 minutes. Time taken in rectal palpation and artificial insemination per animal were noted to be 1.37±0.04 minutes and 7.50±0.16 respectively. Wadhawani *et al.* (2015) [14] investigated that time utilized in veterinary aid and A.I. service was 8.90±0.10 man minutes/cow.

Conclusions

Scientific construction of dairy farm and good management help in better utilization of manpower. Close observation is very essential for judicious deployment of the manpower and trained the every worker to overcome the scarcity of manpower.

Conflict interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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