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Productive and reproductive performance of cattle and buffaloes reared under farmers' management in differential dairy progressive states in India

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ABSTRACT

The productive and reproductive performances of dairy animals have direct effect to milk production and profitability of dairy enterprise. The present study was carried out to analyse the productive and reproductive performance of cattle and buffaloes reared under farmers' management in three states of differential dairy progress in India. Haryana, Maharashtra and Odisha states were purposively selected from highly, moderately and least dairy progressive states, respectively. The total sample size was 900 containing 300 dairy farmers from each state. The finding shows that the productive and reproductive performances of buffalos in Haryana are better than Maharashtra and Odisha. The productive and reproductive performances of Crossbred were found better in Haryana as well as Maharashtra than Odisha. In Haryana, very few farmers reared Indigenous cattle but the performances were better than Maharashtra and Odisha. The better performance of Haryana may be due to being home track of elite Murrah buffalo, Tharparker and Sahiwal breeds of Indigenous cattle, agro-climatic situations, veterinary services and managerial skills of dairy farmers. To improve the productive and reproductive performance of dairy animals in the moderately progressive (Maharashtra) and least progressive (Odisha) states efforts should be focused on breed improvement, better veterinary infrastructure and enhance the managerial skills of the farmers.

Key words: Buffalos, Cattle, Haryana, Maharashtra, Odisha, Productive parameters, Reproductive parameters.

INTRODUCTION

In India, agriculture is primarily Crop-Livestock mixed production system where the animal husbandry is a vital and integral part. Animal husbandry plays a crucial role in the Indian economy by supplementing the family income, strengthening household nutritional security and generating gainful employment for 22.45 million people (Srivastava, 2016). India possess wealth of huge bovine population (299.6 Million) which is the main source of milk production (Livestock Census, 2012), however, the average milk productivity of the dairy animals in India is very low as compare to other developed country. There is large disparity in state wise as well as regional milk production in India (Kale *et al.*, 2016). The milk production is mainly depends on the productive and reproductive performance of cattle and buffaloes reared by the farmers. The previous studies on the productive and reproductive performance of dairy animals were customarily studied in a localized manner and for a specific species for instance, Bohra et al. (2007) in Almora district of Uttarakhand; Kumaresan *et al.,* (2009) in the eastern Himalayas; Kumar *et al.,* (2013) in Rajasthan; Jadoun *et al.,* (2015) in Haryana state; Meena *et al.,* (2015) in Faizabad district of Uttar Pradesh; Sachan *et al.,* (2015) in Unnao district of Uttar Pradesh. Therefore, keeping in view the need of the comprehensive study which covers the large area, consideration of dairy development in the state as well as all the major species i.e. Cattle (including *Desi* and Crossbred) and buffalos, the present study was undertaken.

MATERIALS AND METHODS

The study was conducted in three states of India representing highly, moderately and least progressive dairy states. A composite dairy progressiveness index of 16 states based on 20 selected indicators (Kale *et al.,* 2016) was developed and the states were classified into highly, moderately and least progressive dairy states. The detailed classification of states is given in Table.1. In the present study stratified random sampling method was adopted to select the respondents. In the first stratum three states Haryana, Maharashtra and Odisha representing the highly, moderately and least progressive dairy states, respectively were selected. All the districts from each of the three states were categorized into high, medium and low level of milk yield districts based on the milk yield per bovine in-milk animal per day. One district from each of these categories was selected randomly. A total of nine districts form three selected states were selected. Subsequently, one block from each district was selected randomly. From each of the nine selected blocks a list of villages having dairy animals was prepared in consultation with block level veterinary officer. A total of

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Table 1: Categorization of states based on dairy progressiveness.

Highly Dairy Progressive States	Moderately Dairy Progressive States	Least Dairy Progressive States
Punjab	Tamil Nadu	West Bengal
Haryana	Rajasthan	Himachal Pradesh
Kerala	Maharashtra	Bihar
Goa	Andhra Pradesh	Madhya Pradesh
Gujarat	Karnataka	Odisha
	Uttar Pradesh	

Source: Kale *et al.,* (2016)

18 villages were selected randomly for the study by selecting two villages from each block. From each village, 50 dairy farmers having at least one milch animal were selected randomly. Thus, a total sample size for the present study was 900 farmers. The data were collected from the respondents with the help of a structured interview schedule developed for the study. Data were analyzed by descriptive statistics using mean and standard deviation.

RESULTS AND DISCUSSION

In Haryana state out of 300 respondents, 255 dairy farmers possessed 620 milch buffalos, 94 dairy farmers possessed 280 milch crossbred cattle and only 33 dairy farmers possessed 57 milch indigenous cattle. In case of Maharashtra, out of 300 respondents, 40 dairy farmers possessed 290 milch Buffalos, 141 dairy farmers possessed 587 milch crossbred cattle, 153 dairy farmers possessed 440 milch indigenous cattle. In Odisha, out of 300 selected respondents, 4 dairy farmers possessed 30 milch buffalos, 109 dairy farmers possessed 304 milch crossbred cattle, 217 dairy farmers possessed 508 milch indigenous cattle. Dairy farming in Haryana is buffalo based. In Maharashtra, dairy farming is mixed of indigenous and crossbred cattle, while in Odisha it is indigenous cattle dominated.

Productive performances of dairy animals: Comparative analysis of productive performances of dairy animals in Haryana, Maharashtra and Odisha states is presented in Table 2. The productive performance of buffalo, indigenous and crossbred cow was assessed on the parameters such as average daily milk yield, lactation length, dry period, average lactation milk yield, peak yield.

Average daily milk yield (in liters): Milk yield of the milch animals is imperative in viewing the performances of the animals. It is revealed from the Table 2 that the average daily milk yield of buffalos was 7.98±1.73, 4.34±0.51and 3.90±0.30 in Haryana, Maharashtra and Odisha states, respectively. The average daily milk of crossbred cattle was 10.43±1.21, 9.76±1.69 and 5.85±0.98 in Haryana, Maharashtra and Odisha states, respectively. While the average daily milk of indigenous cattle was 4.09±1.17, 1.99±0.36.69 and 1.98±0.36 in Haryana, Maharashtra and Odisha states, respectively. The proportion of indigenous cattle in cattle population is more in Odisha and Maharashtra and productivity of the indigenous cattle is very low in these two states. The results of Raja *et al.,* (2012) is comparable to the least progressive dairy states as in their study it was observed that the daily milk yield was 6.69±0.99 and1.07±0.10 liters in crossbreed and indigenous cow respectively.

Lactation length (in days): Optimal lactation length is one of the important indicators for the performances of the milch animals. It is depicted from Table 2 that the average lactation length of Buffalo was 280.24±16.97, 264.38±13.39 and 261.03±12.55 (days) in Haryana, Maharashtra and Odisha states, respectively. The average lactation length of Crossbred was 281.91±11.21, 278.21±10 and 273.59±9.65 (days) in Haryana, Maharashtra and Odisha states, respectively. While, the average lactation length of Indigenous cattle was 265.00±13.83, 265.56±11.53 and 264.16±11.96 (days) in Haryana, Maharashtra and Odisha states, respectively. The lactation lengths of 305 days pertained to be optimal (Cole *et al.,* 2011). Among the species the lactation length was found high in crossbred animals followed by Buffalo and Indigenous cattle in all the states. Raja et al., (2012) found that the average lactation was much below as it was 224.88±6.72 and 232.00±2.00 for indigenous and crossbreed cow respectively in Sunderban, West Bengal.

Dry period (Days): Longer dry period causes economic losses to the farmers. A glance of the Table 2 revealed that the average dry period of buffalos was 156.35±30.04, 184.06±16.56 and 183.38±16.95 in Haryana, Maharashtra and Odisha states, respectively. The average dry period of Crossbred cattle was 108.07±20.35, 113.07±20.22 and 124.95±16.50 in Haryana, Maharashtra and Odisha states, respectively. While the average dry period of Indigenous cattle was 125.56±10.86, 130.50±14.66, and 131.09±14.40 in days respectively in Haryana, Maharashtra and Odisha states. Lower the dry period better the conception rate of the animals and vice-versa. Jadoun *et al.,* (2015) found that the average dry period of Integrated Murrah Development Schemes (IMDS) beneficiaries was 102.02 days and for beneficiaries it was 111.49 days in Haryana. The longer dry period in the present study could be attributed to the wide variation of breeds and management practices in the different states.

Average lactation milk yield (in liters): The average lactation milk yield has affirmative correlation with the overall productive performances of the milch animals. The average lactation milk yield of Buffalo was 2253.51±572.12, 1149.92±157.95 and 1018.00±140.49 (in liters) in Haryana, Maharashtra and Odisha states, respectively. The average lactation milk yield of Crossbred cattle was 2947.04±420.63, 2727.21±539.01 and 1599.22±9.45 (in liters) in Haryana, Maharashtra and Odisha states, respectively. While the average lactation milk yield of Indigenous cattle was 1079.42±304.11, 527.97±98.12, and 522.33±99.20 (in liters), respectively in Haryana, Maharashtra and Odisha

states. The average lactation yield of all the species is very high compared to Maharashtra and Odisha because of availability of good germ-plasm such as Murrah Buffalo, indigenous cattle breeds like Sahiwal and Tharparkar. In Maharashtra performance of crossbred cattle was found good but buffalo and indigenous cattle was poor. It might be due to local breeds of indigenous cattle were mainly draft purpose such as Gaulao, Khillar.

Peak yield (in liters/day): A perusal of the Table-1 revealed that the average peak milk yield of buffalo, and cow, were 13.55±3.22, 8.91±0.60 and 8.25±0.87; (in liters/day) respectively in Haryana, Maharashtra and Odisha states. The average peak milk yield of crossbred cattle was 15.55±3.50, 14.68±3.34 and 9.37±1.87 (in liters/day) respectively in Haryana, Maharashtra and Odisha states. The average peak milk yield of Indigenous cattle was 7.061±1.82, 3.48±0.34 and 3.47±0.34 (in liters/day) respectively in Haryana, Maharashtra and Odisha states. Peak yield is important indicator of good quality animal. Peak yield is the defining criteria for trade of animals. More the peak yield of milch animal higher is the price in the marketplace.

Reproductive performances of dairy animals: Reproductive performances of dairy animals in Haryana, Maharashtra and Odisha states were analysed and presented in Table 3. The reproductive performance of buffalo, Indigenous and crossbred cow was assessed on the parameters such as age at first calving, services per conception, service period, calving interval.

Age at first calving (in months): This is one of the most important parameter in the reproductive performances of dairy animals. Lower the age at first calving better the reproductive performance of milch animals and vice-versa. The data from the Table 3 revealed that the average age at first calving of buffalos was, 45.05±4.26, 48.06±4.89 and 48.60±4.71 (in months) respectively in Haryana, Maharashtra and Odisha states. The average age at first calving of crossbred cattle was 37.11±2.32, 39.02±3.66 and 40.49±3.18 in months respectively in Haryana, Maharashtra and Odisha states. The average age at first calving of Indigenous cattle was 45.39±3.35, 41.84±3.40 and 42.01±3.43 in months respectively in Haryana, Maharashtra and Odisha states. The findings of Bohra *et al.* (2007) divulged that the age at first caving in buffalo and cow was 4.6 (4.0-5.5) and 4 (3.6-4.5) years respectively. Lower the age at first calving reflected the better maintenance of heifers by the farmers.

Services per conception (In Nos.): This is one of the vital factors in the reproductive performances of dairy animals. Lesser number of services per conception, better the reproductive performance of milch animals and vice-versa. Table 3 revealed that the average services per conception of buffalo were 2.24±0.78, 2.66±0.83 and 2.80±0.69 (in numbers) in Haryana, Maharashtra and Odisha states,

Table 2: Species wise productive performance of dairy animals.

Productive parameters	**Buffalo**			**Crossbred**			**Indigenous**		
	Haryana	**Maharashtra**	**Odisha**	**Haryana**	**Maharashtra**	**Odisha**	**Haryana**	**Maharashtra**	**Odisha**
Farmers	255	40	4	94	141	109	33	153	217
Animals	620	290	30	280	587	304	57	440	508
	Mean ± SD	**Mean ± SD**	**Mean ± SD**	**Mean ± SD**	**Mean ± SD**	**Mean ± SD**	**Mean ± SD**	**Mean ± SD**	**Mean ± SD**
Average daily milk yield (In liters)	7.98±1.73	4.34±0.51	3.90±0.30	10.43±1.21	9.76±1.69	5.85±0.98	4.09±1.17	1.99±0.36	1.98±0.36
Lactation length (In days)	280.24±16.97	264.38±13.39	261.03±12.55	281.91±11.21	278.21±10.96	273.59±9.65	265.00±13.83	265.56±11.53	264.16±11.96
Dry period (In days)	156.35±30.04	184.06±16.56	183.38±16.95	108.07±20.35	113.07±20.22	124.95±16.50	125.56±10.86	130.50±14.66	131.09±14.40
Average lactation milk yield (In liters)	2253.51±572.12	1149.92±157.95	1018.00±140.49	2947.04±420.63	2727.21±539.01	1599.22±9.45	1079.42±304.11	527.97±98.12	522.33±99.20
Peak yield (In liters)	13.55±3.22	8.91±0.60	8.25±0.87	15.55±3.50	14.68±3.34	9.37±1.87	7.061±1.82	3.48±0.34	3.47±0.34

Table 3: Species wise reproductive performance of dairy animals.

Reproductive parameters	Buffalo			Crossbred			Indigenous		
	Haryana	Maharashtra	Odisha	Haryana	Maharashtra	Odisha	Haryana	Maharashtra	Odisha
Age at first calving (In months)	45.05±4.26	48.06±4.89	48.60±4.71	37.11±2.32	39.02±3.66	40.49±3.18	45.39±3.35	41.84±3.40	42.01±3.43
Services per conception (In Nos.)	2.24±0.78	2.66±0.83	2.80±0.69	2.34±0.77	2.38±0.75	2.45±0.73	2.05±0.79	2.27±0.56	2.41±0.62
Service period(In days)	133.68±19.56	148.39±17.78	147.63±18.05	105.71±11.10	106.78±11.43	106.09±13.12	119.12±17.63	99.52±15.50	101.62±16.93
Calving interval (In days)	436.59±18.99	448.44±17.59	444.40±18.70	389.98±21.36	391.28±19.18	398.54±26.15	390.56±19.82	396.04±15.57	395.25±26.35

respectively. The average services per conception of crossbred cattle were 2.34±0.77, 2.38±0.75 and 2.45±0.73 (in numbers) in Haryana, Maharashtra and Odisha states, respectively. The average services per conception of Indigenous cattle were 2.05±0.79, 2.27±0.56 and 2.41±0.62 (in numbers) in Haryana, Maharashtra and Odisha states, respectively. Timely availability of veterinary services and availability of good quality semen, skill of the AI practitioner also affect on the number of services per conception.

Service period (In days): The data in the Table 3 shows that the average service period of buffalos was 133.68±19.56, 148.39±17.78 and 147.63±18.05, (in days) in Haryana, Maharashtra and Odisha states, respectively. The average service period of crossbred was 105.71±11.10, 106.78±11.43, and 106.09±13.12 (in days) in Haryana, Maharashtra and Odisha states, respectively. The average service period of indigenous was 119.12±17.63, 99.52±15.50 and 101.62±16.93 (in days) in Haryana, Maharashtra and Odisha states, respectively. Optimal services period of dairy animal should 60-90 days (TNAU agritech portal, 2016) but in the study area it was much skewed towards higher side. The lengthier service period might be attributed to poor identification of heat symptoms in milch animals or due to non-availability of insemination facilities in vicinity.

Calving interval (In days): Shorter calving interval is the key for the profitable dairy enterprise. The date from Table 3 shows that the calving interval of buffalo was 436.59±18.99, 448.44±17.59 and 444.40±18.70 days in Haryana, Maharashtra and Odisha states, respectively. The calving interval of Crossbred cattle was 389.98±21.36, 391.28±19.18 and 398.54±26.15 days in Haryana, Maharashtra and Odisha states, respectively. The calving interval of indigenous cattle was 390.56±19.82, 396.04±15.57 and 395.25±26.35 days in Haryana, Maharashtra and Odisha states, respectively. Enhanced calving interval indicates that the farmers received less milk from milch animal. The breeding, feeding and health management of dairy animal by the farmers affect the calving interval.

CONCLUSION

It may be inferred from the study that there is enough scope to improve the productive and reproductive performance of buffalos, crossbred and indigenous dairy cows under farmer's managements in all the three states. Haryana possess good germ plasm of *Murrah, Tharparkhar* and *Sahiwal* milch purpose breeds. The numbers of Indigenous cattle are low and there is need for conservation and spread of indigenous pure breeds on other suitable areas. In Maharashtra and Odisha the indigenous cattle were found more in numbers however the indigenous breeds are draft purpose such as *Gaulao, Khillar* or non descript. Therefore, the milk productivity of the indigenous cattle is very low. These large number of non descript indigenous cattle have

to be improved by upgrading with suitable indigenous high milk yielding breeds such as *Tharparkhar*, *Sahiwal* and *Gir* in Maharashtra and Odisha. In Maharashtra, Murrah buffalos can be used for breed improvement. To improve the reproductive performance the veterinary facilities and farmers managerial skills must be improved in Odisha as well as Maharashtra. Improvement in productive and reproductive performance is the key for increase the milk production. There is need to increase the milk production in relatively low performing dairy sates to achieve future milk demand and make dairy farming sustainable for farmers. Therefore, in the moderately progressive (Maharashtra) and least progressive (Odisha) states efforts should be focused on breed improvement, veterinary infrastructure and farmers managerial skills to improve the productive and reproductive performance of dairy animals.

REFERENCES

Bohra, B., Sharma, R.J, Singh, S.K, Jaiswal, R.S and Singh, V. (2007). Productive and reproductive performance of dairy animals in Almora district of Uttarakhand. *Indian Journal of Animal Science* **77**(7): 633-635.

Cole, J.B., Null, D.J., De Vries, A. (2011). Short communication: best prediction of 305-day lactation yields with regional and seasonal effects. *Journal of Dairy Science* **94** (3):1601-1604.

Jadoun, Y. S., Jha, S.K., Bhadauria, P., Kale, R. B and Singh, R. (2015). Impact of "Integrated Murrah Development Scheme" (IMDS) on dairy farmers of Haryana state of India. *Indian Journal of Animal Research* **49** (3): 405-408

Kale, R.B., Ponnusamy, K., Chakravarty, A.K., Sendhil, R. and Mohammad, A., (2016). Assessing resource and infrastructure disparities to strengthen Indian dairy sector. *Indian Journal of Animal Sciences* **86**(6): 720-725

Kumar, D., Kadian, K.S., Jadoun, Y.S. and Bhadauria, P. (2013). Comparative analysis of the productive performance of milch animals of members of private dairy and dairy co-operatives. *Asian Journal of Dairy and Food Research* **32** (3): 191-194

Kumaresan, A., Prabhakaran P. P, Bujarbaruah, K. M., Pathak, K. A., Chhetri, B and Ahmed, S. K. (2009). Reproductive performance of crossbred dairy cows reared under traditional low input production system in the eastern Himalayas. *Tropical Animal Health Production* **41**:71–78.

Livestock Census, (2012). Department of Animal Husbandry, Dairying, and Fisheries, Ministry of Agriculture and Farmers Welfare, Government of India, New Delhi.

Meena, B.S., Verma, H.C., Meena, H.R., Singh, A and Meena, D.K. (2015). Field level study on productive and reproductive parameters of dairy animals in Uttar Pradesh, India. *Indian Journal of Animal Research* **49** (1): 118-122

Raja, R.A., Ghoshal., T.K, Sundaray, J.K, De, D., Biswas, G., Kumar, S., Panigrahi, A., Kumaran., M and Pradhan, J.K. (2012). Status and challenges of livestock farming community in Sunderban India. *Indian Journal of Animal Sciences*, **82** (4): 436–438

Sachan, R., Sankhala, G and Manjusha, J. (2015). Productive and reproductive performance of buffalo. *The Asian Journal of Animal Science*. **10** (1): 29-36

Srivastava, A. K. (2016). Address by Director and Vice chancellor- ICAR –NDRI Karnal during "Make in India: Dairying 2030", 44th Dairy Industry Conference, 2016 held at NDRI Karnal, during 18-20 February, 2016. *Indian Dairyman*, (Conference special Part II) May 2016: 22-24.

TNAU agritech portal. (2016). Economic character in dairy cattle http://agritech.tnau.ac.in/animal_husbandry/animhus_ economic%20character.html