

An Exploratory study on Existing Bovine Breeding and Management Practices in Jharkhand State

Amandeep Ranjan¹, Gopal Sankhala^(✉)², Sujeet Kumar Jha³, Sanjit Maiti², Mukesh Bhakat⁴ and Pawan Singh⁴

Received: 12 March 2023 / Accepted: 28 May 2024 / Published online: 23 June 2025
© Indian Dairy Association (India) 2025

Abstract: Breeding is an important consideration in the economics of dairy farming. When regular breeding and calving is absent and not done at the appropriate time, cattle rearing will not be profitable. The contemporary study was conducted in three districts of Jharkhand to know the existing bovine breeding and management practices. The data was collected from 204 respondents (180 farmers and 24 service professionals) with the help of pre structured interview schedule. It was found in the study that the majority of the respondents from all the three districts i.e., 80 percent from Ranchi, 63.33 percent from Saraikela-Kharsawan and 58.33 percent from Ramgarh agreed that they serve their animals through artificial insemination. Overall, 92.22 percent of the respondents identified heat in their cattle through bellowing and in buffalo 73.68 percent of the respondents identified heat by observing frequent urination. Animals were checked twice by 67.78 percent of the respondents and 66.46 percent of the respondents inseminate their animals in between 12 hours to 16 hours after the onset of heat. Missing heat was considered as a sign of pregnancy by 92.22 percent of farmers. Only 11.11 percent of the respondents diagnosed pregnancy through rectal palpation with the help of professionals. Animals were served after six months of calving by 57.59 percent of respondents. It was found from the study that the milk productivity of animals was low for most of the respondents (48.89%). The low productivity of the animals might be due to dearth of technical knowledge about breeding, feeding,

management and health care practices. Thus, it is recommended to improve the knowledge of the respondents about scientific practices of dairy farming via launching need based, suitable and appropriate extension programmes like animal fairs, field days, on campus and off campus training programmes, and animal health programmes through various agencies.

Keywords: Artificial Insemination, Breeding, Heat detection, Feeding, Drying off

Introduction

Dairying is an efficient instrument to develop rural societies, to generate employment persistent income and it provides assurance against various odds (Prasad, 2011). The dairy sector forms the largest component of animal agriculture. To hold the productive resources like land, labour and capital in dairy farming, the contemporary level of productivity of livestock is too low which should be increased to attract further investments. Yet the underprivileged farmer neither have other skills nor have financial assistance to endeavor into any other enterprise, it is important for the dairy farmer to implement scientific practices at their level which would lead to increased productivity at optimum costs. Breeding is an important consideration in the economics of dairy farming. When regular breeding and calving is absent and not done at the appropriate time, cattle rearing will not be profitable. Getting healthy calf every year is the usual goal of every dairy farmer. This is possible only by increasing the reproductive efficiency of the animals. The performance of cattle is the combined result of various factors like breeding and feeding management. Health of animals have vital role in harnessing the expected production potential. Most of the tribal farmers were found following practices of identifying animals in heat (86.56%), pregnancy diagnosis within one to six months (90.50%). For calving, respondents prefer winter months. Yadav *et al.* (2009) observed that a significantly higher percentage (90.00%) of respondents resorted to natural service and only 2.50 percent adopted artificial insemination. Eqbal *et al.* (2013) reported that majority (65.00%) of the tribal dairy respondents had indigenous cattle, 18.33 percent of dairy farmers had cross bred cattle, 10.83 percent of dairy farmers had cross buffalo, 5.84 percent of dairy farmers had both indigenous cattle and buffalo, most (55.83%) of

¹Division of Agricultural Extension, ICAR-Indian Agricultural Research Institute, New Delhi-110012, India

²Division of Dairy Extension, ICAR-National Dairy Research Institute, Karnal, Haryana-132001, India

³ICAR- Head Quarter, New Delhi-110012, India

⁴Division of Livestock Production and Management, ICAR-National Dairy Research Institute, Karnal, Haryana-132001, India

(✉) Email: gssitaram@gmail.com

the tribal respondents identified heat in animal by bellowing. For pregnancy diagnosis, 57.50 percent of the tribal respondents diagnosed pregnancy by increased belly size. Selective breeding of cattle and buffalo to increase milk production has been going on for a longtime in our country and has made commendable progress in certain areas. Majority of the cattle and buffalo are still not included in the breed improvement programmes and that is why they are low milk producers. To have knowledge about the existing breeding and management practices followed by the farmers in tribal belt is of great importance as it may help in filling the gap between existing practices followed and the recommended scientific practices. Jharkhand state was purposively selected for the study as the cattle population in the state increased from 8.7 million to 11.2 million, which is highest percentage growth (28.16%) in the country as equated with previous Livestock Census (2012) but the productivity was not at par. The total adult female bovine population of Jharkhand is 38,93,000. Out of 34,58,000 cattle population, more than 91 percent of cattle is indigenous due to which milk production is very less as compared to other progressive states like Punjab and Haryana. As a result of low milk production in the state, the per capita availability of milk is also very low in the state i.e., 177 (grams/day) as compared to other states like Punjab and Haryana with 1181 & 1087 grams per day (NDDDB, 2020) respectively. As productivity of animals depends upon the combined result of various factors like breeding and feeding management, therefore this study was undertaken to document the existing breeding and management practices being followed by the farmers of the locale.

Materials and methods

Jharkhand state was purposively selected for the study. Based on the coverage of artificial insemination three districts viz. Ranchi, Saraikela-Kharsawan and Ramgarh were purposively selected. From each purposively selected districts, two blocks were selected randomly and from each block, two villages were selected randomly for study. Fifteen farmers and two artificial insemination service professionals were randomly selected from each village for data collection. Therefore, the total number of respondents selected for the study was 204 (180 farmer respondents and 24 Service Professionals). The criteria for selection of the respondents were that each dairy farmer should be rearing at least one milch animal either cow or buffalo and at least once have tried artificial insemination. For knowing about

the existing status of breeding and management practices, data was collected from the respondents by personal interview using a well-structured interview schedule. It was developed in consultation with experts and referring relevant literatures and previous works. The data so collected were converted into meaningful findings using appropriate statistical tools like percentage and cumulative square root frequency.

Results and Discussion

Type of breeding

In table 1, it was found that the majority of the respondents from all the three districts i.e., 80 percent from Ranchi, 63.33 percent from Saraikela-Kharsawan and 58.33 percent from Ramgarh agreed that they serve their animals through artificial insemination. Only 8.33 percent of the respondents from Ranchi, 13.33 percent from Saraikela-Kharsawan and 15 percent from Ramgarh bred their cattle and buffalo naturally. Some of the respondents (11.67% from Ranchi, 23.34% from Saraikela-Kharsawan and 26.67% from Ramgarh) agreed that depending on the situation they either bred their animals through artificial insemination or go for natural breeding. The possible reasons for natural breeding might be the unavailability of inseminators on time at the onset of estrous or inability to detect estrous on time. The pooled value showed that 67.22 percent of the respondents bred their animals through artificial insemination followed by 20.56 percent of the respondents who opted either natural or artificial insemination for breeding. Only 12.22 percent of the respondents still breed their animals naturally. Mainly three service providers were working in the area covering the entire area and the inseminations done by lay inseminators were not counted in the published data of Government which shows different reality at field level. The visible benefits of artificial insemination from fellow farmers who are using the artificial insemination services were might be the possible reasons behind the high adoption of artificial insemination.

Type of animal in which Artificial Insemination used

As depicted in table 2, it was observed that overall, 156 (67.98%) out of 178 non-descript cattle were bred through artificial insemination. Out of 54 crossbred, 48 crossbred (88.89%) were served with the help of artificial insemination. Overall, only 15.79 percent of artificial insemination were done in buffaloes. AI is

Table 1: Distribution of respondents according to the type of breeding of their animals

Type of breeding	Ranchi (n=60) Percentage	Saraikela- Kharsawan (n=60) Percentage	Ramgarh (n=60) Percentage	Pooled (n=180) Percentage
Natural Breeding	08.33	13.33	15.00	12.22
Either natural or A.I	11.67	23.34	26.67	20.56
Artificial insemination	80.00	63.33	58.33	67.22

more difficult in buffalo compared with cattle due to variable estrous cycles, reduced estrous behaviour, and reproductive seasonality (Neglia *et al.*, 2020). Silent heat and inability to detect heat in buffalo might be the reasons for poor percentage of respondents doing artificial insemination in buffaloes.

Identification of heat in cattle

It was observed that overall, 92.22 percent of the respondents (table 3) identified heat in their cattle through bellowing, 58.89 percent of the respondents observed heat through mucus discharge from vagina. Other symptoms like mounting on other animals (42.22%), frequent urination (21.11%), swollen vulva (26.11%), and restlessness (27.22) were also used to identify heat in cattle by the respondents.

Identification of heat in buffalo

The table 4 depicts that overall 73.68 percent of the respondents identified heat in buffalo by observing frequent urination followed by restlessness. Other symptoms like string of mucus (42.11%), bellowing (44.74%), and swollen vulva (52.63%). Doka method (changes in teat morphology) was also observed by 44.74 percent of the respondents as a method of identification of heat in buffalo.

Time of heat detection

Efficient and timely detection of heat by the dairy farmers is must for those who serve their animals through artificial insemination. It was found in the study that majority (in Ranchi 71.67%, in Saraikela-Kharsawan 68.33% and in Ramgarh 67.78%) of the respondents checked their animal twice for heat detection. Pooled value in table 5 shows that 67.78 percent of the respondents checked twice whereas 21.66 percent of the respondents checked

Table 2 Distribution of respondents according to the type of animal in which A.I is done

Animals	Ranchi (n=55)			Saraikela-Kharsawan (n=52)			Ramgarh (n=51)			Pooled (n=158)		
	n	n*	%	n	n*	%	n	n*	%	n	n*	%
Non-Descript cattle	60	48	80.00	59	38	64.41	59	35	59.32	178	156	67.98
Cross Bred	33	30	90.91	11	10	90.91	10	08	80.00	54	48	88.89
Buffalo	17	03	17.65	12	01	08.33	09	02	22.22	38	06	15.79

n* = animal bred through artificial insemination

Table 3 Distribution of respondents according to the symptoms for identification of heat in cattle (multiple responses)

Symptoms	Ranchi (n=60)	Saraikela-Kharsawan (n=60)	Ramgarh (n=60)	Pooled (n=180)
	Percentage	Percentage	Percentage	Percentage
Bellowing	95.00	90.00	91.67	92.22
Mucus discharge from vagina	46.67	55.00	75.00	58.89
Mounting on other animal	36.67	36.67	53.33	42.22
Frequent urination	21.67	25.00	16.67	21.11
Swollen vulva	30.00	26.67	21.67	26.11
Restlessness	26.67	28.33	26.67	27.22

Table 4 Distribution of respondents according to the symptoms for identification of heat in buffalo (multiple responses)

Symptoms	Ranchi (n=17)	Saraikela-Kharsawan (n=12)	Ramgarh (n=9)	Pooled (n=38)
	Percentage	Percentage	Percentage	Percentage
String of mucus hanging from vulva	17.65	66.67	55.55	42.11
Frequent urination	58.82	83.33	88.88	73.68
Bellowing	29.41	50.00	55.55	44.74
Doka phenomenon	35.29	58.33	55.55	44.74
Swollen vulva	52.94	50.00	55.55	52.63
Restlessness	47.06	58.33	77.77	57.89

only in morning and only 10.56 percent of the respondents checked their animals in heat in evening.

Time of insemination

The general recommendation has been to breed bovines in the middle to the end of standing heat for optimum fertility. Because the period of estrus may vary from 6 to 24 hours, however, it is difficult to determine when the midpoint is reached. The general guideline for determining insemination time originated in a study by Trimberger (1948), in the form of the AM-PM rule i.e., if cows

are first observed in heat in the morning (AM) they should be bred that afternoon (PM); if they are first seen in heat in the late afternoon (PM), they should be bred the next morning (AM). As mentioned in table 6, it was found from the study that, majority of the farmers from all the three districts i.e., Ranchi 81.82 percent of the respondents, Saraikela-Kharsawan 65.38 percent and from Ramgarh 50.98 percent of the respondents were inseminating their animals in between 12-16 hours after the onset of estrous as the chances of conception is more during that period. Only few of the respondents (1.82% in Ranchi, 5.77% in Saraikela-

Table 5: Time of heat detection by the respondents

Time	Ranchi (n=60) Percentage	Saraikela-Kharsawan (n=60) Percentage	Ramgarh (n=60) Percentage	Pooled (n=180) Percentage
Twice (Morning & Evening)	71.67	68.33	66.67	67.78
Morning	18.33	20.00	23.33	21.66
Evening	10.00	11.67	10.00	10.56

Table 6: Time of insemination after the onset of oestrus sign

Time	Ranchi (n=55) Percentage	Saraikela-Kharsawan (n=52) Percentage	Ramgarh (n=51) Percentage	Pooled (n=158) Percentage
Between 12-16 hrs	81.82	65.38	50.98	66.46
Within 12 hrs	16.36	28.85	39.22	27.84
As soon as heat is detected in animal	01.82	05.77	09.80	05.70

Table 7: Distribution of respondents according to the method of pregnancy diagnosis (multiple responses)

Symptoms	Ranchi (n=60) Percentage	Saraikela-Kharsawan (n=60) Percentage	Ramgarh (n=60) Percentage	Pooled (n=180) Percentage
Missing heat	96.67	90.00	90.00	92.22
Swelling of udder	31.67	53.33	55.00	46.67
Increased abdomen size	55.00	40.00	46.67	47.22
Rectal palpation	11.67	08.37	13.33	11.11

Table 8: Distribution of respondents according to the care before and after parturition (multiple responses)

Practice	Ranchi (n=60) Percentage	Saraikela-Kharsawan (n=60) Percentage	Ramgarh (n=60) Percentage	Pooled (n=180) Percentage
Feeding an extra amount of concentrate	73.33	48.33	38.33	53.33
Not Feeding an extra amount of concentrate	26.67	51.67	61.67	46.67
Drying off of pregnant animals	58.33	55.00	36.67	50.00
Not Drying off of pregnant animals	41.67	45.00	63.33	50.00
Giving lukewarm water	56.67	63.33	55.00	58.33
Feeding Kadha	60.00	70.00	60.00	63.33
Feeding Ajwain	13.33	15.00	15.00	14.44
Timely first milking	65.00	55.00	51.67	57.22

Table 9: Distribution of respondents according to the time of next service after calving

Time	Ranchi	Saraikela-Kharsawan	Ramgarh	Pooled
	(n=55) Percentage	(n=52) Percentage	(n=51) Percentage	(n=158) Percentage
After 2-3 months	23.64	28.85	09.80	20.89
After 6 months	56.36	53.85	62.75	57.59
After cessation of milk	20.00	17.30	27.45	21.52

Kharsawan and 9.80% in Ramgarh) inseminate their animals as soon as the heat detected in the animal. The pooled value shows that overall 66.46 percent of the respondents inseminate in between 12 hours to 16 hours after the onset of heat. This agrees fairly well with the AM-PM rule, which would result in insemination at the optimum time suggested by the Trimberger study of approximately 13 to 18 hours prior to ovulation.

Pregnancy diagnosis

It was found in the study that majority of the respondents (88.33% from Ranchi, 91.63% from Saraikela-Kharsawan and 86.67% from Ramgarh) performed pregnancy diagnosis by self. Overall, 88.89 percent of the respondents performed pregnancy diagnosis by self, followed by 11.11 percent of the respondents who consulted professionals for pregnancy diagnosis (Table 7). Lack of availability of service during pregnancy, fear of injury during rectal palpation might be the reason for self-diagnosis of pregnancy by farmer. It was found from the study that missing heat was the sign of pregnancy by 92.22 percent of the respondents. The others signs were increased abdomen size (47.22%), and swelling of udder (46.67%). Only 11.11 percent of the respondents diagnosed pregnancy through rectal palpation with the help of professionals.

Health care practices of Dairy animals

Concentrate feeding

Animals during the last trimester of their pregnancy should be given extra care. They should not be taken away for browsing in the field to avoid exhaustion. Pregnant animals should be provided adequate and suitable amount of ration for proper foetal development. It was found in the study that 73.33 percent of the respondents from Ranchi, 48.33 percent from Saraikela-Kharsawan and 38.33 percent of the respondents from Ramgarh feed extra amount of concentrate during the last three months of the pregnancy (Table 8). Overall, 53.33 percent of the respondents feed extra concentrate to their animals during the last trimester of pregnancy followed by 46.67 percent of the respondents who did not feed their pregnant animals with extra concentrate.

Drying off of pregnant animals

Dry period characterizes the stretch of optimum time in which rest is given to pregnant animals. It is crucial for the success of

unborn calf, upcoming lactation and further reproduction performances of the animal. It can be observed from the table 8 that majority of the respondents from Ranchi (58.33%) and Saraikela-Kharsawan (55%) and 36.67% of the respondents from Ramgarh dried off their pregnant animal. Overall, half of the respondents dried off their animals whereas rest did not dry off their animals. Overall 44.44 percent of the respondents followed incomplete milking to dry off their animals followed by increasing milking interval (33.34%) and by reducing concentrate feeding (22.22%).

Care after parturition

Calving is a natural course of action and generally do not require any human assistance. However, close observation is necessary to avoid any complications. After parturition, 63.33 percent of the respondents were feeding Kadha to their animals. Lukewarm water was provided by 58.33 percent of the farmers and 14.44 percent of the respondents feeded their animals Ajwain to provide relieve from pain. Timely first milking was done by 57.22 percent of the respondents (table 8).

Next service after calving

It was observed from table 9 that majority of the respondents (57.59%) (56.36% from Ranchi, 53.85% from Saraikela-Kharsawan, 62.75% from Ramgarh) served their animals after six months of calving followed by 21.52 percent of the respondents who served their animal after cessation of milk and 20.89 percent of the respondents served their animals after 2-3 months of calving.

Conclusions

Bovine breeding and management practices play a pivotal role in shaping food production, animal welfare, and economic outcomes. These practices aim to enhance desirable traits in cattle populations, such as milk yield, disease resistance, and reproductive efficiency. Through selective breeding, genetic traits can be improved over generations, leading to more productive and resilient cattle. Improved genetics and management practices can lead to higher yields, lower production costs, and increased profitability for farmers and the livestock industry. The study highlighted that majority of farmers were using artificial insemination as a method of breeding due to its perceived benefit. Advances in technology, such as genomic selection and data

analytics, have revolutionized bovine breeding. These tools allow for more precise selection of desirable traits and faster genetic progress. Implementing sustainable breeding and management practices can reduce the environmental impact of cattle farming, such as lowering greenhouse gas emissions and minimizing resource use. Ethical management practices, including providing proper nutrition, housing, and medical care, improve the well-being of cattle & align with public expectations for humane treatment and one health approach. It was found in the study that majority of the farmers feed extra concentrate to their animals during the last trimester of pregnancy. Kadha and Ajwain were fed to animals as a care after parturition. The dry period is the vital stage of milch animal's lactation cycle. For optimal animal health and superlative performance in the next lactation, they should have an opportunity to rest and regenerate mammary tissue between lactations. The present study was conducted in only three districts of Jharkhand. The study may be carried out in other districts so that its scope and content would be widened. Also, a comparative study may be conducted between progressive and non-progressive districts of Jharkhand with other progressive states like Haryana and Punjab to know the importance of bovine breeding and management practices. Meeting international breeding and management standards can facilitate the access to global markets for meat and dairy products, benefiting export-oriented economies. The continued research in bovine genetics, breeding technologies, and management practices drives innovation, leading to ongoing improvements in cattle production which can ensure the long-term viability of the livestock industry, safeguarding its contributions to food security and rural economies.

Acknowledgements

We are indebted to the respondents who generously volunteered their time and shared their insights, without which this study would not have been possible. The authors are highly thankful for the necessary inputs and facilities provided by the National Dairy Research Institute, Karnal time-to-time. This research endeavor has been a collaborative effort and we are deeply thankful to everyone who played a role, no matter how big or small, in shaping this paper.

References

- Barth AD (1993) Factors Affecting Fertility with Artificial Insemination. *Veterinary Clinics of North America: Food Anim Practice* 9(2): 275–289. doi:10.1016/s0749-0720(15)30646-0
- Eqbal MD, Singh MK, Khan N, Kant K (2013) Dairy Farming Practices Followed by Tribal Dairy Farmers of Chotanagpur Region, India. *Environment & Ecology* 31 (3A): 1409—1413, July— September 2013.
- GOI. (2012) Twentieth Livestock Census, Department of Animal Husbandry Dairying and Fisheries, Ministry of Agriculture, Government of India, New Delhi, India. Retrieved from https://dahd.nic.in/sites/default/files/Livestock%20%205_0.pdf on 15 September 2019
- GOI. (2019) Twentieth Livestock Census, Department of Animal Husbandry Dairying and Fisheries, Ministry of Agriculture, Government of India, New Delhi, India. Retrieved from <https://www.dahd.nic.in/sites/default/files/Key%20Results%2BAnnexure%2018.10.2019.pdf> on 16 September 2019
- National Dairy Development Board (2020) Retrieved from <https://www.nddb.coop/information/stats> on 22 December 2020.
- Neglia G, de Nicola D, Esposito L, Salzano A, D'Occhio MJ, Fatone G (2020) Reproductive management in buffalo by artificial insemination. *Theriogenology*. doi:10.1016/j.theriogenology.2020.
- Prasad CS (2011) Dairy production, quality control and marketing system in India. In: Pal, S. K. and Siddiky, N. A. (eds). *Dairy production, quality control and marketing system in SAARC Countries*. pp: 53-122
- Trimberger GW (1948) Breeding efficiency in dairy cattle from artificial insemination at various intervals before and after ovulation
- Yadav CM, Bhimawat BS and Khan PM (2009) Existing breeding and healthcare practices of cattle in tribals of Dungarpur district of Rajasthan. *Indian Res J Extn Edu* 9 (1): 2009