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Vikas Tiwari

BAIF Development Research
Foundation, Prayagraj, Uttar
Pradesh, India

Santosh Bansal

BAIF Development Research
Foundation, Prayagraj, Uttar
Pradesh, India

Ankita

BAIF Development Research
Foundation, Prayagraj, Uttar
Pradesh, India

Vinay Mishra

BAIF Development Research
Foundation, Prayagraj, Uttar
Pradesh, India

Vinod Potdar

BAIF Development Research
Foundation, Prayagraj, Uttar
Pradesh, India

Corresponding Author:

Vikas Tiwari

BAIF Development Research
Foundation, Prayagraj, Uttar
Pradesh, India

Genetic improvement of dairy farmer herds through sex-sorted semen technology in Bundelkhand area of Uttar Pradesh

Vikas Tiwari, Santosh Bansal, Ankita, Vinay Mishra and Vinod Potdar

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Abstract

The Bundelkhand region of Uttar Pradesh faces significant challenges in dairy farming, including unproductive breeds, reproductive disorders, and a high population of surplus male calves. These issues lead to economic losses and threaten the livelihoods of local communities dependent on livestock for income. The introduction of sex-sorted semen technology aims to address these challenges by improving the genetic quality of dairy herds and increasing the birth rate of female calves, which are more valuable for milk production.

The primary objective of this study is to enhance the productivity of dairy herds in the Bundelkhand area by implementing sex-sorted semen technology. This initiative aims to increase the conception rate of female calves, thereby improving the overall income and sustainability of dairy farming for marginalized communities.

The project involved the use of sex-sorted semen for artificial insemination, with a focus on robust data collection and monitoring systems to track the success of inseminations. Over the course of the project, more than 7.50 lakh artificial inseminations were performed, resulting in a significant number of successful conceptions and births. The project also included training for local farmers and AI technicians to ensure effective implementation of the technology.

The results of the project have been promising, with a reported conception rate of over 93% for female calves using the sorted semen technique. This has led to a substantial increase in the population of female cattle, which is expected to enhance milk production and improve the livelihoods of approximately 4.20 lakh families involved in the project. Additionally, the project has contributed to better breeding practices and increased access to scientific services for farmers in the region. Overall, the integration of sex-sorted semen technology has shown potential for transforming dairy farming practices in Bundelkhand, promoting both economic and ecological sustainability.

Keywords: Sorted semen, conception rate, milk yield, artificial insemination

Introduction

Bundelkhand Region in Uttar Pradesh, comprising seven districts of Uttar Pradesh is one of the most disadvantaged regions in India due to agro-climatic situation. The gross value added from the livestock sector across Uttar Pradesh amounted to over 916 billion Indian rupees in the fiscal year 2019. The northern state contributed over 12 percent to the economic value of India from this sector. Livestock products contributed over seven trillion rupees that year to the country's economy.

UP is generally divided into 4 zones or regions-Western, Central, Eastern, and Bundelkhand. While Bundelkhand is drought-prone, it implies that the contribution from agriculture from the Bundelkhand region is low, thus a large percentage of people are directly dependent on livestock and dairy production for their livelihood. Thus, livestock indicates a very viable diversification from traditional agriculture when it comes to drought-prone regions like Bundelkhand. At the same time, the lack of abundance of fodder resources can also be an issue when it comes to raising livestock, and drought-prone areas often do not have the biotic potential and the carrying capacity to accommodate more than a limited population of livestock.

It is important to ensure that the increase in productivity can be attributed to technological advancements and innovative methodologies of efficient cattle management, in order to extract

an effective amount of productivity that can contribute to rural livelihoods while ensuring sustainability. This would require addressing challenges such as unproductive breeds, large populations of unproductive animals (surplus male calves), reproductive disorders, shortages of quality feed, and the occurrence of diseases. All of these challenges have the potential to lead to high economic losses in turn posing a serious threat to the lives and livelihoods of these communities. Thus, our approach is to add value to livestock producers to enhance income and profitability while ensuring ecological sustainability of the stabilized livestock numbers in order to address the aforementioned challenges.

This region specifically faces various issues when it comes to the raising and rearing of livestock. Constraints low yielding non-descript cattle, low milk yield, low breedable population, dependency on grazing and crop residues utilization, lack of veterinary services, the dominance of middlemen in marketing channels, lack of scientific and technical know-how, etc. the. It is predominantly an agrarian economy where 80% of the population is dependent on agriculture and livestock, generating 96% of the farmers' income, indicating the magnitude of dependency on these sectors in the region. In the Bundelkhand region, only 4.22 % crossbred female animals and 95.78 % Indigenous/Non-descriptive female animals. The total cow and buffalo female population is also low contributing to 31.76 Lacs and 17.25 lacs goat population.

Background

The region is characterized by the prevalence of 'Anna Pratha' practice wherein animals are let loose during the Kharif season. This practice had led to a huge annual loss, BAIF initiated cross-breeding activities in local non-descript cows using frozen semen technology with artificial

insemination technique. After a critical analysis and evaluation of the programme by the Department of Animal Husbandry, Uttar Pradesh.

The government of UP was expanded to 62 livestock development centers in 10 districts to explore wider replication of the programme. Later on, looking at the success of the programme, the Government of India recognized BAIF as a reliable rural development agency and provided support to its rural development programmes through its IRDP Scheme which was later merged with its new SGSY scheme. It was expanded to 311 centers in 42 districts with the help of DRDAs.

The Government, in the year 2012 developed a model to open Cattle Development Centers in collaboration with BAIF in all seven districts of the state. The primary objective of this was the further development of Animal Husbandry, focused on increasing the dairy production in the area and enhancing the income of farmers in this region. This was done to upgrade the breed of cows and buffaloes of the farmers so that the productivity of dairy from their livestock would increase with the introduction of better breeds of animals. This would then eventually lead to a significant increase in their income whilst providing nutritional support to households through the consumption of quality dairy products.

Status of the BAIF Cattle Development Programme:

Initially, the Cattle Development Programme in the Bundelkhand region was started by BAIF under the financial assistance of Department of Animal Husbandry, Uttar Pradesh in the year '2012 through the establishment and operation of 120 Livestock development centers in all the 7 districts (Jhansi, Lalitpur, Jalaun, Hamirpur, Mahoba, Banda, and Chitrakoot) of the region.

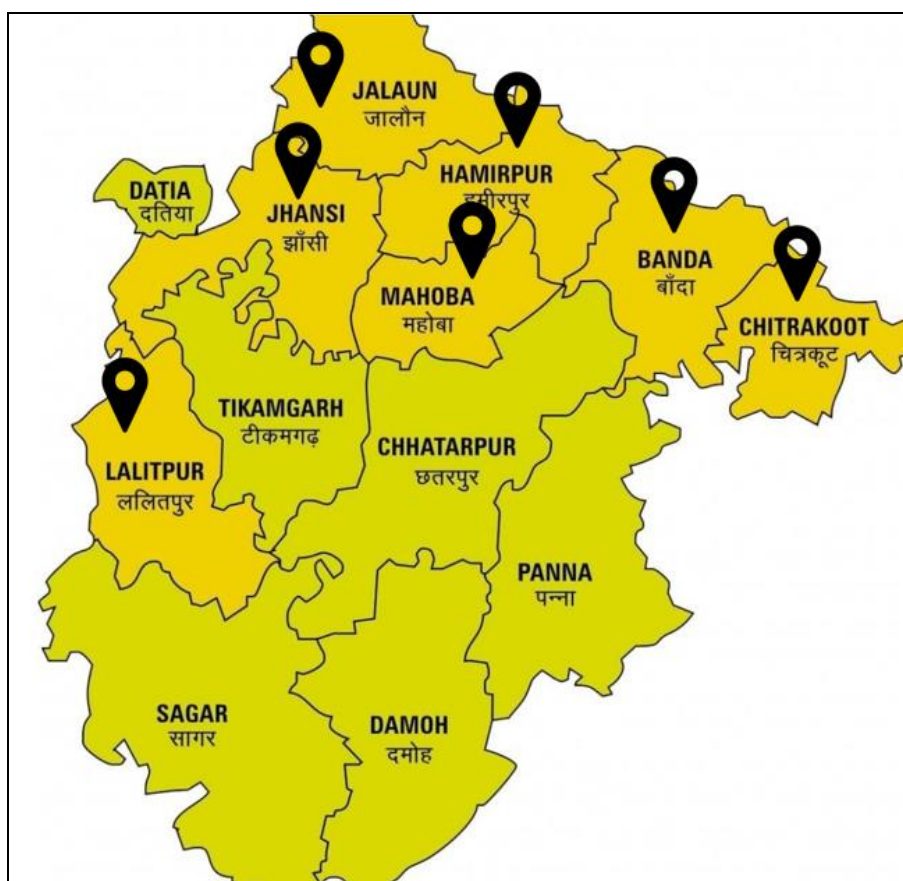


Fig 1: Map of Bundelkhand region

In a phase of five years (2012-2017), more than 2 Lakh families benefited through cattle breeding services available at the BAIF centers. Improvement of breeding systems was the major focus of this phase which consisted of cross-breeding and up-gradation of cattle to increase the productivity and quality of milk.

Observations

Many of the progenies born under this programme have already come into their first lactation phase showing a substantial increase in the yield of milk. Based on our records:

1. It is observed that milk yield will increase from 1-2 liter to 4-6 liter in cow and from 5-6 liter to 8-10-liter buffalo (fig. 2).
2. It has helped increase families' income and is serving as a good source of livelihood for families in the most

vulnerable areas of the state having large-scale migration in search of jobs.

3. It has also been observed that progenies born under our programme are not let loose in “Anna Pratha” as they have better milk production potential.

Based on very encouraging results of BAIF’s centers in the region for five years, Govt. of the U.P. decided to continue the operation of these centers for two years i.e. '19-20 & 20-21. A two-year (19-20, 20-21) MoU was signed by BAIF and the Department of Animal Husbandry of U.P which declared BAIF as the operational authority for the existing 120 centers. It also stated the establishment of 52 new centers during the year 2019 increasing the total number of centers to 172 from 120 through maximum uses of sex-sorted semen technology in Artificial Insemination. This indicated the successful results and the optimistic potential of this venture.

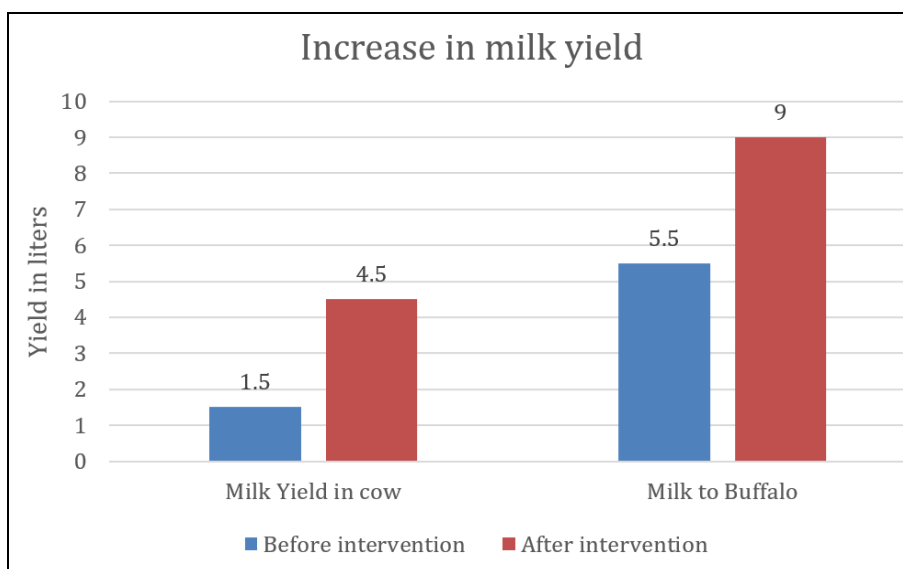


Fig 2: Increase in milk yield before and after the intervention of SSS Technolog

Table 1: Sorted Semen AI performance

Sorted Semen AI performance							
Year	AI	PD	CP	CP %	Male	Female	% Female
2019-2020	66991	35563	17575	49	0	0	
2020-2021	2158	20922	10060	48	1488	19482	93
2021-2022	14061	11440	6077	53	92	497	84
2022-2023	33015	13309	6028	45	309	255	45
Grand Total	116225	81234	39740	49	1889	22534	92

Table 2: Conventional Semen AI performance

Conventional Semen AI performance							
Year	AI	PD	CP	CP %	Male	Female	% Female
2019-2020	53986	57122	33294	58	23420	19724	46
2020-2021	122555	80388	43928	55	12585	10478	45
2021-2022	139869	106624	57933	54	21615	19130	47
2022-2023	125664	94504	50704	54	20267	17844	47
Grand Total	442074	338638	185859	55	77887	67176	46

BAIF operated these centers resulting in the following developments

1. In the Financial year 2019-2020, Renovated technology of Sorted semen was introduced with an objective to produce more number (93% female calf) female calves and control the “Anna Pratha” in order to optimize the population of cattle.

2. During the first year (19-20), around 67,000 inseminations were performed with sorted semen resulting in a distinguished response from farmers who adopted this technology.
3. Till now, more than 7.50 Lakh Artificial Inseminations have been performed leading to the successful conception and birth of 2.62 Lakh calves, benefiting around 4.20 Lakh participant families in the project area.

BAIF breeding programme performance since inception using the conventional system of A.I. as well as sorted semen in the Bundelkhand region is being reflected in the tables respectively

The outcome of the Breeding Programme (Conventional v/s Sorted) was analyzed and has been displayed in the tables (Table 1 and Table 2). There is marked increase in the female production percentage in the case of utilization of Sorted Semen, 92% in comparison to Conventional Semen, 46%.

The established data demonstrates the superiority of Sorted

Semen against Conventional Semen with regards to female production. It is evident from aforesaid outcome that probability of production of female is more than 2 times in Sorted semen AI performance compared to Conventional semen AI performance. The significance of increased probability of a birth of a female progeny is paramount because this is consequential with regards to providing livelihood options to livestock farmers. This results in better time management of the livestock farmers that are extremely dependent on their livestock.

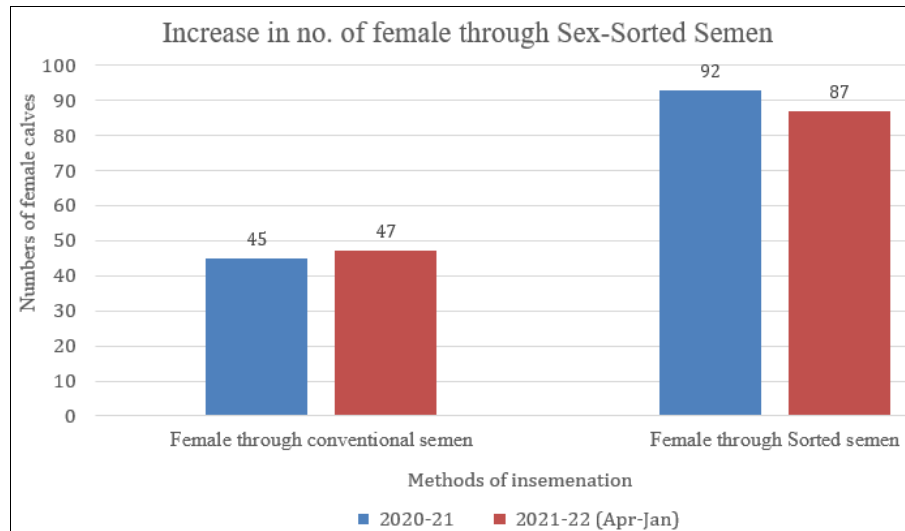


Fig 3: Chart showing the number of female calves through conventional and sex-sorted insemination methods

Qualitative Outcome

The aforementioned data is conclusive for undertaking and replicating various activities that aid the management and production of livestock and also gives rise to sustainable income to vulnerable communities that depend on livestock for the major part of their income. The following outcomes can be derived from the presented data above:

- Due to limited resources in the Bundelkhand region; it is important to note that a larger cattle population is effectively harmful for the maintenance of the ecosystem and establishment of sustainable natural resource management techniques. Thus, with the available resources and limited carrying capacity of the geographical land, the balance in the ecosystem is highly required to ensure sustainable soil, water and land management. At the same time, it is of utmost importance to provide vulnerable communities with integrated sources of income that can ensure nutrition and sustainable livelihoods for them. Thus, our most optimum result would include a high population of female cattle, with larger productivity and potential to reproduce. Male cattle are often undesired by the communities leading to neglect and starvation of animals that can't be maintained and are of no tangible use for the community. These animals then graze on grassland unregulated, degrading the availability of natural resources. These animals often lead to unsustainable practices like the Anna Pratha, that can be quite harmful for land and soil health. With our projected outcome of 93% of female offspring in the Sorted Semen AI, we can resolve this issue to a point that more female offspring are conceived by the breeding population, thus decreasing the overload of cattle population while continuing the increase in dairy production, positively affecting participant's income.

- Interventions with sorted semen technique can have a widespread impact, in not only improving income of dependent communities, but also can have an overall positive effect socially and environmentally, making this an optimized and desired scientific integration. This can contribute to the regulation of the 'Anna Pratha' which can be quite problematic in case of resource poor landscapes as well as help the utilization of natural resources in a more sustainable, need based and holistic manner.

General Discussion

The programme intervention has been increasingly successful due to the proper management of project segments such as infrastructural development, skill development along with integrated scientific management. This has resulted in the implementation of good breeding practices among farmers consequently contributing to a population of animals with superior genetics best serving the farmer's interests. The most integral efforts leading to successful implementation can be attributed to:

- Development of genetically superior germplasm for contributing toward better productivity
- Scientific and social awareness among the farmers who are heavily dependent on livestock and its productivity to sustain their livelihoods Geo-Biological capacity building among farmers, to detect climate variability, breeding cycles, insemination regularities, etc.
- Regular and periodic delivery of services at farmers' doorsteps.
- Robust research with compact record keeping, data collection, and analysis
- Monitoring system development for following up if artificially inseminated animals.

- Guiding and supporting all AI technicians under rural conditions with proper channels of communication.

Results

The impact of this project has also shown an overall increase in the accessibility of various scientific services like dairy extension and breed development targeted to reach the maximum number of marginal and small-scale farmers.

We can clearly observe that the project has been able to contribute to improving the ratio of female calves, increasing its rate to over 93% female conception in case of sorted semen technique of artificial insemination. This has led to the rate of conception remaining stabilized while significantly increasing the conception of female calves. This really is integral to the farmers of this region, who can achieve the maximum benefit, to have productive cattle, leading to more sustainable use of natural resources contributing to an enhanced income.

This also leads to social implications, where practices like 'Anna Pratha' can be minimized, as these can be severely resource depleting practices, especially for communities having limited resources in drought-prone areas that are experiencing the impacts of climate variability over a stretched period of time.

Conclusion

This report attempts to capture the impact of the project along with understanding its need and potential. The resultant output and outcome of this data can be concluded to be positively progressive, which can be extrapolated to larger models with its adaptive approach intact. BAIF's new and improved integration of technology has led to multiple developments in providing quality breeding services at farmer's doorsteps, along with holistic skill development programmes for local youth and farmers to enhance scientific awareness and confidence among the communities to voluntarily partake in the sorted semen programme. The broader objective of this programme remains intact which is to cater to marginalized and vulnerable communities for sustainable use of natural resources, enhanced income, and increase in the dairy productivity of cattle.

References

1. Sharma R, Kumar P, Singh A, Gupta N, Verma S. Genetic improvement of dairy farmer herds through sex-sorted semen technology in Bundelkhand area of Uttar Pradesh. *Indian J Anim Sci.* 2024;94(3):315-320.
2. Mishra VK, Tiwari A, Yadav R, Singh M, Patel D. Genetic improvement of dairy farmer herds through sex-sorted semen technology in Bundelkhand area of Uttar Pradesh. *J Dairy Vet Anim Res.* 2024;6(4):210-215.
3. Singh P, Chaudhary K, Gupta R, Chaturvedi S. Genetic improvement of dairy farmer herds through sex-sorted semen technology in Bundelkhand area of Uttar Pradesh. *Asian J Agric Res.* 2024;9(1):50-56.
4. Verma AK, Sharma M, Yadav P. Genetic improvement of dairy farmer herds through sex-sorted semen technology in Bundelkhand area of Uttar Pradesh. *Livest Sci.* 2024;18(7):119-124.
5. Kumar S, Mishra J, Patel K. Genetic improvement of dairy farmer herds through sex-sorted semen technology in Bundelkhand area of Uttar Pradesh. *J Appl. Anim. Res.* 2024;10(5):230-238.

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