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Sexed semen technology in Gujarat: Assessing dairy farmers' awareness and adoption readiness

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Abstract

Sex-sorted semen technology has emerged as an important reproductive intervention for improving herd composition, genetic progress, and dairy farm profitability. The present study was conducted to assess the knowledge and adoption of sex-sorted semen technology among dairy farmers in Gujarat. A total of 300 dairy farmers were randomly selected from Mehsana, Sabarkantha, and Amreli districts. Data were collected through a pre-tested interview schedule and analyzed using appropriate statistical tools. The findings revealed that the majority of respondents were middle-aged (54.33%), had primary-level education (45.67%), possessed high dairy farming experience (76.00%), and maintained medium-sized herds (54.00%). Regarding reproductive performance, 70.67 per cent of dairy farmers exhibited a medium level of knowledge, with high awareness of milch animal selection (85.00%) and heat detection (72.00%). In the case of sex-sorted semen technology, 54.33 per cent and 20.67 per cent of respondents possessed medium and high knowledge levels, respectively, while 65.67 per cent exhibited a medium level of adoption. Although 60.67 per cent of farmers were aware of sex-sorted semen technology, detailed technical knowledge regarding its long-term reproductive benefits remained limited. The study concludes that dairy farmers possess adequate knowledge of conventional reproductive management practices but require greater technical exposure to advanced reproductive technologies such as sex-sorted semen. Strengthening extension services, farmer training programmes, and demonstration-based interventions may enhance awareness and adoption of the technology, thereby contributing to sustainable dairy development.

Keywords: Dairy farmers, knowledge, adoption, reproductive performance, sex-sorted semen technology, Gujarat

Introduction

The dairy industry in India has long been a cornerstone of the country's agricultural economy, providing livelihoods to millions of farmers and contributing significantly to national milk production. However, despite its impressive growth, the sector faces several challenges, including the overproduction of low-value male calves and calving complications. The advent of sex-sorted semen technology offers a transformative solution, allowing farmers to selectively breed for female offspring, optimizing herd management, and increasing milk production efficiency. Sex-sorted semen technology has emerged as a strategic reproductive intervention in dairy farming due to its potential to improve herd structure, accelerate genetic gain and enhance economic efficiency. To design and implementation of dairying related support programmes framed by the central and state government for promoting dairy farming by adoption of new technologies; sexed semen producing only female calves helps the farmers to save resources that would have been shared with unwanted

males. Use of sexed semen in dairy sector not only increase the number of superior heifers but also increase the genetic progress in a herd. It also helps in producing good male germplasm from elite bulls for future breeding. The study is to be conducted to explore the knowledge and adoption of dairy farmers towards sex semen technology and constraints faced by the dairy farmers of Sabarkantha, Mehsana and Amreli districts of Gujarat state.

Objective

1. To study the profile of dairy farmers.
2. To study knowledge of dairy farmers towards used of sexed semen technology.
3. To study adoption of dairy farmers towards use of sexed semen technology.

Materials and Methods

The study was conducted in three districts viz., Mahesana, Sabarkantha and Amreli of Gujarat state. From each district two talukas were randomly selected. From each taluka five

villages were selected randomly. From each village ten dairy farmers randomly selected. Thus, a total of 300 respondents' (dairy farmers) were randomly selected for the study.

A suitable interview schedule was developed for dairy farmers. All these selected variables were included in the schedule. The suitable indices were also developed for the measurement of variables. The interview schedules pre-tested on similar respondents in non-sample area to work out their reliability and validity. The suitable modification was made in the schedules accordingly. With the help of interview schedule, the data was collected from dairy farmers personally by the researcher at the convenient time. Some informal discussion pertaining to the study was carried out. After collection of information, the classification and tabulation of data was done keeping in view the objectives of the study. The suitable statistical analysis of data using SPSS- 16.0 software such as mean, standard deviation, frequency and percentages were applied to draw meaningful inferences.

Results and Discussion

The data present in table-1 indicated that majority (54.33 per cent) of dairy farmers belonged to middle age group, followed by old age and young age group. The probable reason might be that this age is considered to be an actively working age. In this group they have responsibilities of earning for their families leading majority farmers in this group. Nearly 45.67 per cent dairy farmers were study up to primary level followed by secondary level, higher secondary level, illiterate and graduate level. This clearly indicated that among the people engaged with dairy farming, majority had primary to higher level of education. Reflecting the fact that

dairy farming demands sufficient knowledge for its survival and development. It also shows a good number of the dairy farmers (76.00 per cent) were in long experience group, followed by medium experience (14.67 per cent) and only 9.33 per cent of the respondents had short experience. Table also indicate the 42.00 per cent dairy farmers were small farmers. followed by large farmer category (31.33 per cent), medium farmer category (20.67 per cent) and 5.67 per cent were landless. This is clearly reflected that most of the people engaged with dairy farmer had more than 2.0 hector land. Probable reason may be that dairy farming needs more capital and resources as well as also require risk taking ability which may not be within the capacity of land less laborers, it results in a greater number of farmers in small to big farmer's category. Around 54.00 per cent dairy farmers had medium sized herd, followed by 32.00 per cent dairy farmers had small sized herd and 14.00 per cent dairy farmers had large sized herd. Majority (61.67) per cent dairy farmers had medium annual income, followed by 21.00 per cent dairy farmers had low annual income and only 17.33 per cent dairy farmers had high annual income. The data show that majority (56.00) per cent dairy farmers had low social participation, followed by 32.33 per cent dairy farmers had medium social participation and only 11.67 per cent dairy farmers had high social participation. Nearly (45.00) per cent dairy farmers had low extension participation, followed by 29.67 per cent dairy farmers had medium extension participation and only 25.33 per cent dairy farmers had high extension participation. Nearly (60.00) per cent dairy farmers had low level of mass media exposure, followed by 24.33 per cent dairy farmers had medium mass media exposure and only 15.67 per cent dairy farmers had high level of mass media exposure.

Table 1: Distribution of respondents according to their personal and socio-economic profile (n=300)

Sr. No.	Personal Profile	Frequency (F)	Percentage (%)
Age			
1	Young age (up to 30 years)	34	11.33
2	Middle age (31 to 55 years)	163	54.33
3	Old age (above 55 years)	103	34.33
Education			
1	Illiterate	22	7.33
2	Primary level (1-7std.)	137	45.67
3	Secondary level (8-10 std.)	63	21.00
4	Higher secondary level (11-12 std.)	59	19.67
5	Graduate level	19	6.33
Dairy experience			
1	Low (below 5 years)	28	9.33
2	Medium (5 to 10 years)	44	14.67
3	High (above 10 years)	228	76.00
Land holding			
1	Landless	17	5.67
2	Small farmers (up to 2 ha)	127	42.33
3	Medium farmers (up to 4 ha)	62	20.67
4	Large farmers (more than 4 ha)	94	31.33
Herd size			
1	up to 5	99	33.00
2	up to 10	13	4.33
3	up to 15	121	40.33
4	up to 20	61	20.33
5	More than 20	6	2.00
Annual Income			
1	Low income (up to 3.00 Lakh/year)	63	21.00

2	Medium income (3.01- 6.00 Lakh/year)	185	61.67
3	High income (more than 6.00 Lakh/year)	52	17.33
Social participation			
1	Low social participation	168	56.00
2	Medium social participation	97	32.33
3	High social participation	35	11.67
Extension participation			
1	Low extension participation	135	45.00
2	Medium extension participation	89	29.67
3	High extension participation	76	25.33
Mass media exposure			
1	Low mass media exposure	180	60.00
2	Medium mass media exposure	73	24.33
3	High mass media exposure	47	15.67

Table 2: Distribution of respondents according to their knowledge / awareness regarding reproductive performance of dairy animals (n=300)

Sr.	Statement	Frequency	Percentage	Rank
1	Aware of criteria for selection of milch animal	255	85.00	I
2	Knowledge about heat detection in cows/buffaloes	216	72.00	II
3	Knowledge of timely insemination of their animals	197	65.67	III
4	Knowledge about ideal dry period	192	64.00	IV
5	Knowledge about right period of pregnancy diagnosis	188	62.67	V
6	Perform timely treatment of repeat breeding/ infertile cows and buffaloes?	170	56.67	VI
7	Knowledge about inter calving period	160	53.33	VII
8	Aware about ideal service period of cow & buffalo	158	52.67	VIII
9	Perform timely treatment of anestrous cow and buffalo?	145	48.33	IX

Table 3: Distribution of respondents according to their knowledge / awareness regarding sex sorted semen technology (n=300)

Sr.	Statement	Frequency	Percentage	Rank
1	Is owner aware about sexed semen technology?	182	60.67	I
2	If aware, he knows the benefits & accuracy of sex semen technology?	146	48.67	III
3	He knows the effect of this technology on milk production?	134	44.67	IV
4	He is aware about breed improvement through sex semen technology?	118	39.33	V
5	Aware about sex semen technology in enhancement of farm animal productivity?	98	32.67	VI
6	Aware about ratio of male & female calf through sex semen technology?	148	49.33	II
7	Aware about reproductive performance of female calf born through sex semen technology?	83	27.67	VII

Table 4: Distribution of respondents according to their knowledge regarding reproductive performance of dairy animals (n=300)

Sr.	Knowledge level	Frequency	Percentage
1	Low level of knowledge	33	11.00
2	Medium level of knowledge	212	70.67
3	High level of knowledge	55	18.33
Mean = 14.60		SD = 1.80	

Table 5: Distribution of respondents according to their knowledge regarding sex sorted semen technology (n=300)

Sr.	Knowledge level	Frequency	Percentage
1	Low level of knowledge	75	25.00
2	Medium level of knowledge	163	54.33
3	High level of knowledge	62	20.67
Mean = 10.00		SD = 1.89	

Table 6: Distribution of respondents according to overall level of adoption regarding sex sorted semen technology (n=300)

Sr.	Adoption level	Frequency	Percentage
1	Low level of adoption	50	16.67
2	Medium level of adoption	197	65.67
3	High level of adoption	53	17.67
Mean = 10.42		SD = 1.91	

The study reveals that while dairy farmers possess a solid foundational understanding of traditional reproductive management, a significant knowledge gap persists regarding advanced biotechnological interventions. Most respondents demonstrate high proficiency in basic practices, particularly in the selection criteria for milch animals (85.00%), heat detection (72.00%), and timely insemination (65.67%). However, this understanding diminishes when managing specific clinical conditions, as evidenced by lower awareness levels regarding ideal service periods (52.67%) and the timely treatment of anestrous animals (48.33%). Overall, the baseline reproductive knowledge remains predominantly moderate, with 70.67% of farmers falling into the medium-knowledge category. In contrast, awareness regarding sex-sorted semen technology is comparatively superficial and polarized. Although a majority of owners are aware of the technology's existence (60.67%), deep technical comprehension is limited; only 27.67% understand the long-term reproductive performance of female calves born through this method, and a substantial 25.00% of the population exhibits a low overall knowledge level regarding this technology. The present study revealed that 70.67 per cent of dairy farmers possessed a medium level of knowledge regarding reproductive performance of dairy animals, while 75.00 per cent exhibited medium to

high knowledge regarding sex-sorted semen technology. These findings indicate a moderate level of awareness and understanding of advanced reproductive technologies among dairy farmers. The present findings are in agreement with those reported previously, where 69.56 per cent of dairy farmers exhibited a medium level of favorable perception towards sex-sorted semen technology¹. And also observed that the majority of adopters possessed medium knowledge and innovativeness regarding the technology. The findings are further supported by previous research, which reported a 39.92 per cent conception rate and a 90.90 per cent female calf ratio using sex-sorted semen under Indian field conditions, demonstrating its practical utility in dairy farming². The present findings also corroborate previous reports, which indicated positive stakeholder perceptions towards sex-sorted semen technology, although higher cost and lower conception rates were identified as major constraints³. Likewise, previous research emphasized that farmers' awareness and accessibility to quality breeding services significantly influence the adoption of reproductive technologies⁴. Therefore, the medium level of knowledge observed in the present study may be attributed to increasing extension efforts and the gradual dissemination of information regarding sex-sorted semen technology among dairy farmers.

Conclusion

Dairy farmers possess excellent foundational knowledge, with successfully identifying proper criteria for selecting milch animals. Most respondents understand critical breeding timelines, specifically heat detection and timely insemination. The study reveals that while dairy farmers understand routine, traditional reproductive practices well, they face a distinct knowledge deficit regarding modern biotech interventions like sex-sorted semen. Farmers possess strong traditional breeding literacy but face critical technical gaps regarding modern biotechnological advancements.

Recommendation/Policy Implement

Extension agencies must transition from generalized training to specialized, demonstration-based capacity programs to mitigate technology skepticism and accelerate the adoption of herd-improvement innovations.

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Conflict of Interest

All authors declare that they have no conflict of interest.

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