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Impact assessment of multipurpose artificial insemination technicians in rural India training for rural youth pathway for self-employment

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ABSTRACT

The present study was carried out on 146 Multipurpose Artificial Insemination Technician in Rural India (MAITRI) trainees at the College of Veterinary and Animal Sciences, Sardar Vallabhbhai Patel University of Agriculture and Technology, Meerut, during 2021–2024. The respondents represented Western, Eastern, and Central regions of Uttar Pradesh. The findings revealed that the majority of respondents were Hindu (91.10%), belonged to the OBC category (54.10%), were relatively young (53.42%), and had limited professional experience (84.93%) in artificial insemination (A.I.). Despite facing several challenges–such as economic constraints, logistical issues, and lack of advanced technologies–most respondents reported that A.I. services and semen quality were adequate to achieve conception rates within the expected level (30–40%). The majority of respondents (72.60%) performed a relatively low number of inseminations (0–6 animals) per day, usually alongside their primary treatment activities, which contributed to lower daily income from this profession in their area. The chi–square test analysis showed a highly significant association between the three regions of Uttar Pradesh (Western, Eastern, and Central) and several parameters, including number of A.I. performed per day, average daily income, number of inseminations using sex–sorted semen per week, income from other sources, distance covered per day, and utilization of liquid nitrogen. A significant association ($P \leq 0.05$) was also observed with average daily expenditure. However, parameters such as landholding capacity and work experience were found to be non–significant.

Keywords: Artificial insemination (A.I.), Constraint, MAITRI, Self–employment, UPLDB

Animal husbandry is the backbone of the economy of rural India. Animal husbandry provides a livelihood in many ways, as poor people are involved in animal rearing as marginal farmers or milk vendors. India has 193.46 million cattle and 109.85 million buffalo (20th Livestock Census 2019) population, but milk production is only 221.06 million tonnes (annual report 2022–23). The reason behind this is the presence of a large part of the non–descript breed in the breedable population. However, there are several schemes launched by the government to grade up non–descript breeds and A.I. coverage. In spite of this, the national coverage of A.I. in India is only 30%, and even in UP, it is 28% (annual report 2021–22). The Animal Husbandry Department of the State Government can provide limited A.I. coverage because of many circumstances, like the lesser number of veterinary hospitals and Pasu Seva Kendras. So, with the aim of covering A.I. 100% of the breedable population to hike milk production against increasing milk demand for food security, preserve the indigenous germplasm of elite breeds of India, and provide self-employment to rural youths, the Central Government has launched the Multipurpose Artificial Insemination Technician in Rural India (MAITRI) scheme. The trust of trainees towards attending the training programme and becoming an artificial insemination technician was key for the efficiency of the trainees (Sasikala *et al.* 2022). The MAITRI's work is not limited to A.I. only; they are assisting government veterinary hospitals with various tasks such as vaccination, castration, primary treatment, animal insurance, animal surveys and animal tagging. MAITRI works as a tool to generate self-employment opportunities for rural literate youths and give them opportunities to disseminate scientific information to livestock farmers at their doorstep with nominal charges. So, the assessments of these MAITRI's workers for their expectations, working conditions and income generation was required. The above study has been conducted to assess the impact of MAITRI training in terms of MAITRI's work performance, income generation for their livelihood, and the constraints perceived in the working area.

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MATERIALS AND METHODS

The present study was conducted in the Department of Veterinary Gynaecology & Obstetrics, College of

Veterinary and Animal Sciences, Sardar Vallabhbhai Patel University of Agriculture and Technology Meerut. The MAITRI trainings were sponsored by the Uttar Pradesh Livestock Development Board (UPLDB), Lucknow. This study was conducted with the help of a structured interview schedule, and data was collected with the help of a Google Forms tool. The interview schedule was pretested with 42 MAITRI's trainees of different districts of UP, which belong to non-sample participants. The suggestions obtained from the pretested interview schedule were incorporated into the real interview schedule, and a Google Form was prepared and administered to MAITRI's trainees. In the present study, non probability purposive sampling technique was used in which 146 MAITRI's trainees were selected who underwent MAITRI training from the College of Veterinary and Animal Sciences, Sardar Vallabhbhai Patel University of Agriculture and Technology, Meerut. These trainees were selected by the animal husbandry department of UP during March 2021 to January 2024, and belonged to 18 districts of Uttar Pradesh. These MAITRI's participants were trained in five groups dated from March 2021 to January 2024. The participants belonged to western Uttar Pradesh (112), central Uttar Pradesh (16), eastern Uttar Pradesh (18). These trainees were trained for one-month at the college in various departments of veterinary sciences concern to them and also got field exposure of 55 days. After this training and field exposure of five days rigorous evaluation of trainees done at college in the presence of an external expert. After satisfactory evaluation, they were certified to work in respective blocks under the vigilance of a veterinary medical officer. The Google Form had questions based on knowledge testing, social profile, and constraints (economic, social, and technical).

RESULTS AND DISCUSSION

The data analysis of respondents from Uttar Pradesh (UP) reveals the following findings across demographic, professional, and socioeconomic parameters. Western UP accounts for the majority (76.07%) of respondents, with smaller representations from Central UP (12.33%) and Eastern UP (10.96%). The respondents are predominantly Hindu (91.10%), with minorities of Muslims (6.85%) and Sikhs (2.05%). Most the respondents belong to the OBC category (54.10%), followed by General (23.9%) and SC (21.9%). The majority of respondents were belonged to young age group which ranges from 19–28 years (53.42%), with a mean age of 28.55 years. Nearly half of the respondents have completed intermediate education (47.94%), and a significant portion were graduates (41.78%). The respondents, educational background, with a significant fraction having completed at least intermediate education, suggests that the profession requires a certain level of academic proficiency, which is likely to be beneficial for the effective implementation of A.I. services in the whole state. The data suggested that the MAITRI workforce in UP is primarily composed of young, educated individuals, predominantly from Western UP. A majority of respondents were trained in 2023 (54.79%). The distribution of respondents according to their work experience revealed that the majority (84.93%) fall into the low experience category (0–6 years), indicating that the workforce was predominantly composed of relatively new entrants to the profession, which could reflect recent recruitment drives, training program expansions, or increasing opportunities in the sector. The medium experience group (7–12 years) constituted 10.95% of the respondents, suggesting a smaller proportion of moderately experienced workers who may serve as a bridge between fresh entrants and seasoned professionals. The high experience group (13 years and above) represented only 4.1% of the respondents, indicating a limited presence of long-term, highly experienced personnel. The distribution of respondents according to the work performed in their area indicated that the majority (72.60%) were engaged in both Artificial Insemination (A.I.) and primary treatment services (such as deworming, vaccination, castration of male and dressing of wounds). This highlighted the multifunctional role of these workers, reflecting their versatility and the integrated nature of livestock healthcare and breeding services at the grassroot level. This distribution suggested that in rural livestock service delivery systems, multi–tasking is the norm rather than specialization. The data show that the majority of respondents performed a low number of A.I. services per day (0–6.67), indicating relatively modest daily workloads, which might be influenced by factors such as seasonal breeding patterns, animal availability, and farmers' demand. About 21.92% fall into the medium range (6.68–13.33), while only 2.74% perform high numbers of A.I. (13.34 and above)**,** suggesting that intensive A.I. activity is rare and likely concentrated in areas with higher livestock density or greater demand for breeding services. The majority of respondents (88.35%) fall in the low–income category (Rs. 0–833 per day), indicating limited earning potential from their work. Only 10.27% earn a medium income (Rs. 834–1667), while a mere 1.36% achieve a high daily income (Rs. 1668–2500). This skewed income distribution reflected economic upon the challenges in the profession, which might affect job satisfaction, motivation, and long–term retention. The majority of respondents (84.24%) reported low daily expenditure (Rs. 80–386)**,** suggesting modest spending patterns that may be linked to their limited income levels. A smaller proportion (13.69%) fell within the medium expenditure range (Rs. 387–792), while only 2.05% incur high daily expenditure (Rs. 793–1000). This trend reflected upon a a generally restrained financial outflow among respondents, possibly due to economic constraints and a focus on meeting only essential needs. Most of the respondents (78.76%) travelled a shorter distance per day (4–69.33 km), indicating that their service areas were relatively localized within compact geographical zones, potentially allowing for more focused service delivery. The majority of respondents performed a low number of A.I. procedures with sex-sorted semen per week (0–3),

indicating limited adoption of this advanced reproductive technology. Although sex–sorted semen is being utilized, its overall use remains relatively low, possibly due to higher costs. Moreover, A.I. workers indicated that 45.21% of livestock owners expressed a clear interest in adopting sex-sorted semen, indicating growing awareness of its benefits. The majority of respondents (84.25%) provide regular advice to livestock owners, highlighting their active role in farmer education and extension services. A smaller proportion (8.90%) offered occasional advice, possibly due to time constraints or limited interaction opportunities, while only 6.85% did not provide any advisory services at all. This indicates that advisory support was a common and integral part of respondents' work, contributing to improved livestock management practices at the grassroot level. Half of the respondents report no income from other sources, indicating complete dependence on their primary occupation for earnings. This pattern suggested that alternative income opportunities were limited for most respondents, which might increase their economic vulnerability and reliance on livestock-related work. The majority of the respondents reported procuring sexed sorted semen through the State Animal Husbandry Department, whereas only 19.86% obtained it from other sources such as private suppliers, NGOs, or cooperatives. This trend indicated that the State Animal Husbandry Department played a dominant role in ensuring accessibility and distribution of sex-sorted semen to livestock farmers, possibly due to government-supported schemes, subsidized rates, and wider coverage in rural areas. The majority of respondents reported that livestock owner showed their willingness and ability to bear the cost of sex-sorted semen, reflecting a positive attitude towards investing in advanced breeding technology for improving herd productivity. However, a considerable proportion (39.73%) reported inability to afford the cost, which might be due to financial constraints, low profit margins in livestock farming, or lack of assured returns on investment. This highlights the need for targeted subsidies, credit support, or cost-sharing schemes to enhance the adoption of sex-sorted semen among economically weaker farmers. Half of the respondents reported low monthly utilization of liquid nitrogen (2–16 L), closely followed by with medium utilization (17–32 L). Only a small proportion used high volumes (33–50 L) per month. This pattern suggested that most respondents operated at a moderate scale of artificial insemination and semen storage activities, while large-scale operations requiring higher LN_2 volumes are relatively rare, possibly due to lower service demand or limited infrastructure in the study area. Just over half of the respondents procured liquid nitrogen from the State Animal Husbandry Department, while a comparable proportion relied on other sources such as private suppliers, cooperatives, or institutional arrangements. This near-equal distribution suggested that both public and private channels play an important role in meeting LN_2 requirements, with the choice of source likely influenced by factors such as accessibility, pricing, reliability of supply, and existing institutional linkages. The majority of respondents consistently used a thermometer to measure water temperature during thawing, reflecting satisfactory adherence to standard A.I. protocols for maintaining semen viability. However, very few reported only occasional use, which may increase the risk of reduced conception rates due to improper thawing temperatures. This indicated an overall awareness of its importance, though regular training and monitoring could ensure more uniform best practices. The majority of respondents reported that animal owners were able to correctly identify estrus in their animals, reflecting satisfactory awareness and observational skills regarding reproductive signs. Only 41.10% of respondents regularly received calls from animal owners for providing primary treatment. This indicates that although primary treatment services are in demand, many owners approach service providers on an as–need basis rather than consistently, possibly due to varying disease incidence, reliance on alternative sources, or distance and accessibility factors. The majority of respondents consistently received information about estrus from animal owners before performing artificial insemination. This reflected good communication and coordination between animal owners and service providers, which is essential for timely A.I. and improved conception rates. The majority respondents conducted A.I. strictly based on the estrus information provided by owners. This suggested that as most A.I. practices are guided by owner inputs, variability in accuracy or trust in such information may influence insemination decisions. The majority of respondents regularly confirmed estrus through per rectal examination. This indicates that most respondents followed a reliable diagnostic approach to ensure accurate timing of AI, thereby enhancing conception rates. About 28.08% of respondents consistently performed repeat A.I. after 12 h, while the majority did only occasionally. This suggested variability in adherence to the recommended timing for repeat insemination, which may be due to constraints such as time, resources, owner willingness, or differing perceptions of its necessity. The data also reflected that double dose insemination was not a routine practice by most of the respondents possibly due to cost, time constraints, or varying opinions on its effectiveness in improving conception rates. The data indicated that most of the respondents were fully satisfied with their profession as MAITRI workers. This suggests that the majority considered their work fulfilling, though a considerable minority experience partial or low satisfaction, possibly due to challenges such as income levels, workload, or resource limitations. Yet, most of the MAITRI workers felt that income was not sufficient to fulfil family needs. This disparity between satisfaction level and money earned from MAITRI might be due to high expectations from this profession. The majority of respondents were landless, and dependent only on the MAITRI profession for income, which might influence their economic dependence on livestock-related activities for livelihood. The majority of

respondents expressed interest in animal rearing, mainly cattle and buffalo. Large ruminants (cattle and buffalo) were the most common livestock choice, reflecting their higher economic and utility value in the region. The majority of respondents did not sell milk produced by their own livestock. Only 17.8% of respondents were able to fulfil their family needs through this profession, while a vast majority (82.19%) could not. This indicated that earnings from the profession were insufficient for most respondents to meet household expenses, highlighting economic challenges and the need for better income opportunities or financial support. Supply chain and accessibility challenges are common, at least intermittently, and could affect the timely and efficient delivery of A.I. services. The data shows that 23.28% of respondents regularly faced problems in obtaining liquid nitrogen or semen, 48.63% experienced such issues occasionally, while 28.08% reported no problems. The majority of respondents occasionally faced problems during AI possibly due to animal behaviour, owner cooperation, or technical constraints (Problem in A.I. gun passing). The most of the respondents were satisfied with the semen quality. This indicated that semen quality is generally meeting the expectations of most respondents, though a small proportion still perceived scope for improvement, possibly due to occasional issues with handling, storage, or genetic potential. This result was totally deferred from Chandraker *et al.* (2018) as untimely supply of liquid nitrogen and semen. This difference in result might be due to difference in geographical area. The semen quality in this parameter was not assessed by MAITRI workers through laboratory analysis, but rather judged indirectly based on their field experience and the conception results observed after insemination. MAITRI workers regularly handled semen during A.I. procedures and monitored pregnancy outcomes in their service areas, which allowed them to form a practical opinion on semen quality. The results showed that the majority of respondents (41.09%) achieved a conception rate between 31–40%, followed by 16.43% with 41–50%, and smaller proportions in both lower and higher ranges. This indicated that most conception rates fall within a moderate range. During the survey, species-wise (cattle and buffalo) data was not collected. However, all MAITRI workers maintained A.I. records, as their payments from UPLDB were linked to service delivery- Rs. 50 per A.I., Rs. 100 per pregnancy diagnosis, and Rs. 200 per calving. The majority of respondents performed pregnancy diagnosis on animals inseminated by them. This reflects good follow–up practices among the majority, which are essential for monitoring reproductive performance and planning subsequent breeding management. The majority of respondents were reported that owners expressed consistent interest in sex-sorted semen. The majority of respondents perceived an improvement in their skills after MAITRI training. This highlighted the effectiveness of the training program in enhancing the technical capabilities of participants. Most of the MAITRI workers had no time for social responsibilities due to their professional duties, leaving limited scope for additional social engagement. Given the nature of their work–providing AI, pregnancy diagnosis, calving assistance, and primary treatment services–MAITRI workers often had to remain on call and available in their service areas, which restricted the time they could allocate to broader social responsibilities. Although many respondents expressed overall job satisfaction and a sense of professional fulfilment, the demanding schedule and on-call responsibilities often limited their ability to participate in family events. The apparent mismatch between income, satisfaction, and family time suggested that their job satisfaction was influenced more by the social respect, service orientation, and professional identity associated with the role, rather than solely by income or available personal time. The majority of respondents were able to make time for family emergencies. The majority of respondents perceived an increase in their social status, indicating positive influence on their social recognition and respect. Similar finding was reported by Dodiya *et al*. (2022) and found that the training help trainees either monetary motivation or they felt improvement in the job quality. The data on the hike in owner reliability was based on the self-reported perceptions of MAITRI workers, reflecting their experiences and feedback received from livestock owners during service delivery. While direct data from livestock farmers could provide an external validation, the responses from MAITRI workers still offered valuable insight, as they were in regular contact with the farmers and could gauge changes in trust and dependence through repeated interactions over time. The majority of respondents agreed on the need to improve the quality of instruments such as the artificial insemination gun, sheaths, crystoscope and castrator, which could help to improve the heat detection and A.I. practices in field conditions. The majority of respondents agreed upon the need for a fixed honorarium for MAITRI workers as a stable and regular financial compensation to support the workers' motivation and job security. Most of the respondents agree on the need for retraining of MAITRI workers because of the importance of continuous skill development to maintain and improve service quality. Further, the study revealed continuous bonding among the faculty of the training institute and MAITRI workers. Similar findings were reported by Khode *et al.* (2020) that training organizing institutes should intensively plan more trainings of long duration ensuring larger and wider participation of trainees. This underscores the importance of hands–on training to build practical skills and confidence among trainees. Yet, most of the respondents agreed on increased practice time. Most of the respondents suggested that insurance, dress code, and identity cards were essential for proper cover–up of uncertainty regarding health and also for identification in the area.

Chi-square test analysis of regional variations and selected parameters of respondents: The chi-square

Table 1. Distribution of MAITRI Trainees for Socio–economic, job performance and their constraints suggestions regarding MAITRI Profession

Parameter	Frequency	Percentage (%)
Socio–economic parameter		
Distribution of respondents according to regions in UP		
Western UP	112	76.07
Eastern UP	016	10.96
Central UP	018	12.33
Total	146	100.00
Distribution of respondents based on religion		
Hindu	133	91.10
Muslim	010	6.85
Sikh	003	2.05
Distribution of respondents based on according to caste		
OBC	79	54.10
SC	32	21.9
General	35	23.9
Distribution of respondents according to age wise		
Young (19–28)	78	53.42
Middle (29–38)	63	43.15
Old (39 and above)	05	3.42
Mean±SD 28.55±5.08		
Distribution of respondents according to education wise		
High School	04	2.73
Intermediate	70	47.94
Graduate	61	41.78
Post Graduate	11	7.53
Distribution of respondents based on the year of training received		
2021	22	15.06
2022	21	14.38
2023	80	54.79
2024	23	15.75
Distribution of respondents according to work experience (years)		
Low (0–6)	124	84.93
Medium (7–12)	16	10.95
High(13–Above)	06	4.1
Mean±SD 3.78±3.29		
Distribution of respondents based on the nature of work of performed in their area		
A.I.	33	22.60
Primary treatment	07	4.79
A.I. & Primary treatment	106	72.60
Distribution of respondents based on number of A.I. performed per day		
Less no of A.I. (0–6.67)	110	75.34
Medium no of A.I. (6.68–13.33)	32	21.92
High (13.34& above)	04	2.74
Mean±SD	5.32±3.14	
Distribution of respondents according to average income (Rs.) per day		
Low (0–833)	129	88.35
Medium (834–1667)	15	10.27
High (1668–2500)	02	1.36
Mean±SD	492.43±352.35	
Distribution of respondents according to average expenditure (Rs.) per day		
Low (80–386)	123	84.24
Medium (387–792)	20	13.69
High (793–1000)	03	2.05
Mean±SD	254.69±148.91	
Job performance		
Distribution of respondents according to average distance in KM covered per day		
Less (4–69.33)	115	78.76
Medium (69.34–138.68)	26	17.8
More (138.69–200)	05	3.42
Mean±SD	48.07±37.84	
Distribution of respondents according to average insemination by sex–sorted semen per week		
Low (0 –3)	112	76.71
Medium (4–7)	27	18.49
High (8 and above)	07	4.79
Mean±SD	2.30±2.51	
Distribution of respondents according to interest of livestock owners perceived by MAITRI worker towards adoption of sex sorted semen		
Yes	66	45.21
No	23	15.75
Occasionally	57	39.04
Distribution of respondents according to provide advice to livestock owners		
Yes	123	84.25
No	10	6.85
Occasionally	13	8.90
Distribution of respondents according to average income in Rs. from other sources		
NIL (0)	74	50.68
Low (1–66667)	60	41.10
Medium (66668–133334)	7	4.79
High (133335–200000)	5	3.42

Table 1 contd...

Table 1 contd...

Parameter	Frequency	Percentage (%)
Mean±SD	2.30±2.51	
Distribution of respondents according to source of procurement of sexed sorted semen		
State Animal Husbandry Department	117	80.14
Other source	29	19.86
Distribution of MAITRI workers' perceptions of livestock owners' ability to pay for the cost of sex-sorted semen		
Yes	88	60.27
No	58	39.73
Distribution of respondents according to for utilization of amount of LN_2 per month in litre		
Low (2–16)	72	49.32
Medium (17–32)	68	46.58
High (33–50)	6	4.11
Mean±SD	18.25±8.59	
Distribution of respondents according to procurement source of LN2		
State Animal Husbandry Department	76	52.05
Other Source	70	47.95
Distribution of respondents according to use thermometer for measuring the temperature of water during thawing		
Yes	133	91.10
No	0	00.00
Occasionally	13	8.90
Distribution of respondents according to for animal owners' ability to identify the estrus of animal		
Yes	103	70.55
No	18	12.33
Occasionally	25	17.12
Distribution of respondents according to receiving calls by animals' owner for primary treatments		
Yes	60	41.10
Occasionally	78	53.42
No	08	5.48
Distribution of respondents according to getting the information about estrus before AI.		
Yes	139	95.21
Occasionally	07	4.79
No	00	0.00
Distribution of respondents according to A.I. performed on the basis of history provided by the livestock owners		
Yes	97	66.44
Occasionally	28	19.18
No	21	14.38

Table 1 contd...

Parameter	Frequency	Percentage (%)
Distribution of respondents according to confirm the estrus of animal by per rectal examination		
Yes	133	91.10
Occasionally	06	4.11
No	07	4.79
Distribution of respondents according to for repeat A.I. after 12 h		
Yes	41	28.08
Occasionally	79	54.11
No	26	17.81
Distribution of respondents according to double dose insemination		
Yes	19	13.0
Occasionally	76	52.05
No	51	34.93
Distribution of respondents according to for their satisfaction level in profession as MAITRI's workers		
Partially satisfied	38	26.03
Fully satisfied	93	63.70
Unsatisfied	15	10.27
Distribution of respondents according to land holding in Acre		
Landless	100	68.49
Middle (0.1–2.0 Acre)	40	27.39
High (2.1 Acre & above)	6	4.1
Distribution of respondents according to their interest in animal rearing		
Yes	126	83.3
No	20	13.6
Distribution of respondents according to their type of census reared		
Nothing	20	13.6
Cattle/Buffalo	99	67.8
Cattle/Buffalo & Goat/ Sheep/Chicken	23	15.75
Only Chicken	1	0.68
Only Goat/Sheep	3	2.05
Distribution of respondents according to for their sell the milk		
Yes	58	39.72
No	88	60.2
Distribution of respondents according to them to fulfil family needs by this profession		
Yes	26	17.8
No	120	82.19
Distribution of respondents according to facing the problems in obtaining liquid nitrogen/semen		
Yes	34	23.28

Table 1 contd... *Table 1 contd...*

Table 1 contd...

Parameter	Frequency	Percentage (%)
No	41	28.08
Some Time	71	48.63
Distribution of respondents according to facing problem (A.I. Gun Passing) at the time of A.I.		
Yes	12	8.21
No	44	30.13
Some Time	90	61.64
Distribution of respondents according to their satisfaction of semen quality (based on A.I. result)		
Yes	124	84.93
No	22	15.06
Distribution of respondents according to the conception rate of animals sired with AI		
0–10	2	1.36
11–20	2	1.36
21–30	20	13.6
31–40	60	41.09
41–50	24	16.43
51–60	20	13.6
61–70	18	12.32
Distribution of respondents according to their pregnancy diagnosis of animals on which A.I. was conducted by them		
Yes	137	93.83
No	9	6.16
Distribution of respondents according to their owner interest in Sexed Sorted Semen		
Yes	77	52.73
No	14	9.58
Some Time	55	37.67
Distribution of respondents according to their improvement in skill after MAITRI training		
Yes	142	97.26
No	04	2.73
Constraints and suggestions		
Distribution of respondents according to their time for social responsibility		
Yes	63	43.15
No	83	56.84
Distribution of respondents according to their time for family function		
Yes	59	40.41
No	87	59.58
Distribution of respondents according to their time for family emergency		
Yes	108	73.97

Table 1 contd...

Table 1 contd...

Parameter	Frequency	Percentage (%)
No	38	26.02
Distribution of respondents according to their hike in social status		
Yes	105	71.91
No	41	28.08
Distribution of respondents according to their hike in owner reliability on him (On the basis of repeat consultancy for AI)		
Yes	136	93.15
No	10	6.84
Distribution of respondents according to their suggestion of increase in quality of instruments (artificial insemination gun, sheaths, castrator and crystoscope)		
Agree	111	76.02
Disagree	14	9.58
Cannot say	21	14.38
Distribution of respondents according to their suggestion of fixed honorarium of MAITRI's workers		
Agree	132	90.4
Disagree	8	5.47
Cannot say	6	4.10
Distribution of respondents according to their suggestion of need of re–training of MAITRI's workers		
Agree	88	60.27
Disagree	38	26.02
Cannot say	20	13.69
Distribution of respondents according to their suggestion facility of conversation with faculty		
Agree	132	90.4
Disagree	6	4.1
Cannot say	8	5.47
Distribution of respondents according to their suggestion sufficient practice time in MAITRI training		
Agree	140	95.89
Disagree	04	2.73
Cannot say	02	1.36
Distribution of respondents according to their suggestion of increase practice time in MAITRI training		
Agree	126	86.3
Disagree	08	5.47
Cannot say	12	8.21
Distribution of respondents according to their suggestion of change in theory/practice time in MAITRI training		
Agree	108	73.97
Disagree	22	15.06
Cannot say	16	10.95

Table 1 contd... *Table 1 contd...*

Table 1 concluded

Parameter	Frequency	Percentage (%)
Distribution of respondents according to their suggestion of provide dress with identity card to MAITRI's workers		
Agree	125	85.61
Disagree	19	13.01
Cannot say	2	1.36
Distribution of respondents according to their suggestion of provide insurance of MAITRI's workers		
Agree	139	95.20
Disagree	07	4.79
Cannot say	00	00

analysis was employed to assess the statistical significance of associations between various parameters and the regions (Western, Eastern, and Central Uttar Pradesh). The results indicated varied levels of significance across the parameters analysed. First, no significant association was observed between respondents' experience levels and their respective regions (χ^2= 4.373, p= 0.358). In contrast, a highly significant association was found between the number of artificial inseminations (A.I.) performed per day and the regions (χ^2= 152.681, p= 0.000). The results indicated marked regional differences, with western UP (Region 1) exhibiting the highest levels of A.I. activity, while region 2 (eastern UP) and 3 (central UP) showed minimal A.I. usage. Similarly, a strong correlation was observed between

Table 2. Distribution of MAITRI trainees

	Western UP	Eastern UP	Central UP	Total	Chi square
Distribution of respondents according to experience of work (Years)					
Low (0–6)	98 (79.7/87.5)	12(9.8/75.0)	13(10.6/72.2)	123	
Medium (7–12)	10(62.5/8.9)	3(18.8/18.8)	3(18.8/16.7)	16	4.373
High (13 and above)	4(57.1/3.6)	1(14.3/6.3)	2(28.6/11.1)	7	
Distribution of respondents according to A.I. performed per day					
Low	110(100/98.2)	0(0/0)	0(0/0)	110	
Medium	2(6.3/1.8)	16(50/100)	14(43.8/77.8)	32	152.681**
High	0(0/00)	0(0/0)	4(100/22.2)	4	
Distribution of respondents according to average income per day					
Low	112(86.8/100)	16(12.4/100)	1(0.8/5.6	129	
Medium	0(0/0)	0(0/0)	15(100/83.3)	15	136.820**
High	0(0/0)	0(0/0)	2(100/11.1)	02	
Distribution of respondents according to average expenditure per day					
Low	100(81.3/89.3)	12(9.8/75.0)	11(8.9/61.1)	123	
Medium	11(55/9.8)	3(15.06/18.8)	6(30.0/33.3)	20	11.416*
High	1(33.3/0.9)	1(33.3/6.3)	1(33.3/5.6)	3	
Distribution of respondents according to average distance in KM covered per day					
Low	112(97.4/100)	3(2.6/18.8)	0(0/0)	115	
Medium	0(0/0)	13(50/81.3)	13(50/72.2)	26	149.496**
High	0(0/0)	0(0/0)	5(100/27.8)	5	
Distribution of respondents according to average insemination by sex–sorted semen per week					
Low	112(100/100)	0(0/0)	0(0/0)	112	
Medium	0(0/0)	16(59.3/100)	11(40.7/61.1)	27	179.646**
High	0(0/0)	0(0/0)	7(100/38.9)	7	
Distribution of respondents' average income in Rs. from other sources					
Low	74(100/66.1)	0(0/0)	0(0/0)	74	
Medium	38(63.3/33.9)	16(26.7/100)	6(10/33.3)	60	122.97**
High	0(0/0)	0(0/0)	12(100/66.7)	12	
Distribution of respondents for utilization of amount of LN2 per month in litre					
Low	72(100/64.3)	0(0/0)	0(0/0)	72	
Medium	40(58.8/35.7)	16(23.5/100)	12(17.6/66.7)	68	78.725**
High	0(0/0)	0(0/0)	6(100/33.3)	6	
Distribution of respondents' land holding in acre					
Land less	81(81.0/72.3)	9(9/56.30)	10(10/55.60)	100	
Small	26(65.0/23.2)	6(15/37.5)	8(20.0/44.4)	40	5.203
Medium	5(83.3/4.5)	1(16.7/6.3)	0(00/00)	6	

**Highly significant at $p \leq 0.01$, *Significant at $p \leq 0.05$

average daily income and the regions (χ^2= 136.820, p= 0.000). The data revealed that respondents with higher incomes were predominantly located in Central UP (Region 3), while those with lower incomes are concentrated in Western UP (Region 1). A significant association between average daily expenditure and regions was also identified (χ^2= 11.41, p= 0.02), with region 1 (western UP) having the largest proportion of respondents with low daily expenditures. Additionally, the average distance covered per day by respondents showed a highly significant regional correlation (χ^2= 149.496, p= 0.000). These finding were in agreement with results reported by Bardhan (2010) regarding the distance covered for veterinary services by livestock owners. The use of sex–sorted semen per week exhibited a highly significant association with regions (χ^2 = 179.616, P = 0.000). Respondents from Region 1 (western UP) primarily fell into the low insemination category, whereas regions 2 (eastern UP) and 3 (central UP) showed higher averages of inseminations using sex–sorted semen. A strong association was also found between supplementary income levels and regions (χ^2= 122.97, p= 0.000). In western UP (Region 1), no respondents reported medium or high supplementary income, while such income levels were more prevalent in regions 2 and 3. The utilization of liquid nitrogen (LN_2) across regions was another parameter with a highly significant correlation (χ^2 = 78.725, p= 0.000). Conversely, no significant association was found between landholding size and region (χ^2= 5.203, p= 0.267), indicating that land ownership patterns did not differ substantially across the regions. Overall, most parameters, including A.I. performed per day, average income, and expenditure, showed strong and statistically significant associations with the regions. This suggested that regional characteristics played a critical role in shaping the distribution of these variables, highlighting the need for region-specific strategies to address challenges in the artificial insemination profession.

The study revealed that the MAITRI workforce in Uttar Pradesh is largely composed of young and educated people. Most respondents belonged to the OBC category and were predominantly Hindu. Professionally, the majority had low work experience and were engaged in multi–functional roles, providing both A.I. and primary treatment services, reflecting their importance in grassroots livestock healthcare and breeding. The daily workload of most respondents was modest, while their income remained low, insufficient to fulfil family needs despite overall job satisfaction. The majority were landless and dependent solely on this profession. The adoption of advanced technologies, such as sex–sorted semen, was limited; however, livestock owners showed a willingness to bear the associated costs. Nearly half of MAITRI workers had no income from other sources, indicating high economic vulnerability. In terms of practice, most respondents followed correct protocols, such as using thermometers during thawing and confirming estrus by rectal examination, achieving conception rates up to par. Challenges included irregular supply of LN_2/semen and limited family/social participation due to professional demands. Despite this, the majority reported improved skills, higher social status, and increased owner reliability after training. Policy and extension implications include ensuring a fixed honorarium and insurance cover to improve financial security; subsidy or credit support for sex–sorted semen adoption; strengthening LN_2/semen supply chains; improving instrument quality; and increasing hands–on training and retraining programs. Supporting MAITRI workers with structured incentives and continuous skill development will enhance their effectiveness in livestock service delivery, farmer trust, and overall rural livestock productivity in Uttar Pradesh.

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