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Performance, proficiency, and training need of para-vets in the four states of India

VIKASH KUMAR[1]✉, H R MEENA[1], K S KADIAN[1], GOPAL SANKHALA[1], T K MOHANTY[1], S S LATHWAL[1] and PRIYAJOY KAR[2]

ICAR-National Dairy Research Institute, Karnal, Haryana 132 001 India

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ABSTRACT

In constrained availability of veterinarians and paramount study on the effectiveness of para-veterinary services, assessing the ability of these personnel *vis-à-vis* role proficiency and performance from stakeholder's perspective could act as impetus in reforming the animal healthcare and animal husbandry extension delivery system in India. The present study was conducted in four districts of Haryana, Uttar Pradesh, Maharashtra, and Rajasthan respectively. A total of 380 respondents were surveyed, comprising of 160 dairy farmers, 160 para-vets, and 60 veterinarians. Two indices namely, Role Performance Index and Role Proficiency Index were exclusively designed. Based upon the responses, the training need of para-vets were analyzed from the perspective of veterinarians. Accountability for reporting for vaccine failure to higher authority, on-spot health hazard reduction by consulting vets in the uncommon situation and, dissemination of new tools and techniques to farmers (eg. CMT toolkit) were found low by 93.12, 86.62, 91.25% para-vets respectively. Nearly half of para-vets rated their proficiency in the medium category on the role proficiency index, followed by 36.25% in the low category towards the assessed roles. Veterinarians perceived high training needs for quarantine measures (93.33%), fodder production and silage making (88.34%), latest trends in animal breeding, feeding and reproductive management (91.67%), awareness about principles of animal management and disease control (83.34%), sufficient information about rapid test kits (73.33%), and knowledge about new technologies in Animal Husbandry evolved by research institutions (86.67%). Para-veterinary services were most skillful in Hisar district, followed by Jaipur and Ahmadnagar district, and least proficient in Mathura district.

Keywords: Para-vets, Role performance index, Role proficiency index, Services, Training need

There existed varying competencies of para-vets in different states due to different provisions and criteria of minor health service definition as notified by the state (Ahuja *et al.* 2008). Initial qualification for getting inducted in para-veterinary training varied from 10th standard to 12th, for same job specification under minor veterinary services (Singh 2019). Addressing the low level of competency among para-vets in the dimension of animal welfare, risk analysis, programme planning, information and technology, professional and leadership, organizational, and management has become imperative for efficient delivery of minor-veterinary services (Shubeena *et al.* 2019). There exists a lack of clarity on the roles of different categories of para-vets trained, receiving training of different duration. It leads to differing role perception and performance among vets and farmers (Barbaruah and Samad 2014). Para-veterinarians have inadequate skills and knowledge; they need to learn according to emerging roles in line with the perception of stakeholders (Channappagouda and Sasidhar 2018). They often go beyond their boundary of performing minor- veterinary services and perform those services for which they are not equipped or trained. To increase the number of para-vets, unemployed youth should be trained for door-to-door AI and vaccination services due to the shortage of veterinarians. There should be proper communication and information flow among suppliers of animal health services (Kiara *et al.* 2017).

A study conducted by Naik *et al.* (2016) in Telangana state revealed that there exists a communication gap between veterinarians and para-vets due to the absence of the proper channel of reporting information to higher departments from para-vets working in far ûung areas. The regular meetings at the district level were conducted only for veterinarians, not for para-vets. Himachal Pradesh under the para- Veterinary Council Act, 2010, has formed a para-vet council for the employment of para-vets in state government services according to experience and seniority. These employed para-vets get the salary of ₹5,000 per month for performing AI, vaccination, deworming, and other minor veterinary services on a payment basis under the supervision of a veterinarian (NAVS 2018). This model

Present address: [1]ICAR-National Dairy Research Institute, Karnal, Haryana. [2]ICAR-Indian Institute of Maize Research, Ludhiana, Punjab. ✉Corresponding author email: vkshkmr70@gmail.com

could be implemented on a large basis to boost the morale and income security of para-vets. Developing the competencies (skills, knowledge, and attitudes) could enable them to deliver prompt and efficient services at the farmer's doorstep. To be effective at the ground level, such strategies should be based on broad-based participation and integration of activities at various levels to address complex problems (Banda and Kazembe 2008). Horizontal career progression for para-vets, coordination framework between ASCI and VCI, periodic evaluation and dissemination of skill council standards, and recruitment of para-vets by panchayat for bio-security control could be highly prospective in increasing the competency of para-vets from the perspective of sustainability in their profession (Barbaruah 2019).

In India, it is obvious that government cannot provide all quality and diversified services on a sustainable basis. So, selective privatization of the services could be a better alternative. The various states like Kerala, Andhra Pradesh, Rajasthan, and Gujarat, governments are already experimenting with privatization. But so far, the privatization of veterinary services has provided mixed results and many experiences have also emphasized the need of the public sector to safeguard the interests of the small and marginal farmers (Sikhakolanu 2007). There exists a strong need to have a statutory body to evaluate the working performance of para vet's needs periodically at the state level. Their technical knowledge needs to be upgraded to high expertise. More than 100 countries of the world are in process of developing a national qualification framework for para-vets. European Qualification Framework, ASEAN Qualification Reference Framework, and Southern African Development Community are few examples of it (Barbaruah 2019). Improving the linkage of Para-vets with institutions and stakeholders could overcome the hindrance in the execution of door-step delivery of animal health services, and thus affect the performance of Para-vets in a positive manner (Rashmi and Singh 2020).

MATERIALS AND METHODS

The present study was conducted in. four states namely, Maharashtra, Rajasthan, Haryana, and Uttar Pradesh for which both descriptive and exploratory research designs were used. The states were selected based on the highest number of paravet schools, livestock population, and rank in milk production. From each state, one district was selected based on the presence of the highest number of paravet schools. Based on random sampling, stakeholders such as 160 para-vets, 60 veterinarians as trainers of paravet schools, and 160 dairy farmers were covered under the survey method of investigation, constituting a total of 380 respondents for the study. Selection criteria for para-vets were that they should have undergone at least 1-month of training for minor veterinary services rather than only for AI, practicing minor veterinary services for at least 2 years under the guidance of vets. They should be practicing in private and door to door and not working under the umbrella of any NGO. The selection criteria for veterinarians were that they should be having at least more than one year of experience in that paravet school at the time of the investigation. While farmers should be having at least 2 milch animals and availing services of para-vet for at least last 2 years.

Role performance of para-vets was operationalized as the degree to which they accomplish the task and role assigned to them in terms of efficiency and coverage. Role performance was assessed using an exclusively designed index for, which productive, preventive, curative and diagnostic, and miscellaneous services were dimensions undertaken in the study. Role proficiency was assessed in four areas of technical expertise namely, knowledge and strategies for application, accountability, persuading fellows to ensure holistic participation, and work efficiency for assigned roles *vis-à-vis* institutional arrangement. Geometric mean scores were used to compare the responses of stakeholders on various parameters among different districts. Proficiency of para-vets in various dimensions as qualitative indicator was an indirect measure of competency to perform of a various quality attribute of the minor-veterinary services rendered at farmer's doorstep. For which, role proficiency index. The Guilford method was used for the construction of both indices. Normalized Rank Order Method suggested by Guilford (1954) was used for determining the scale values of these dimensions (Niketha *et al.* 2017). The indicators having Relevancy Weightage (RW) > 0.70 and Mean Relevancy Score (MRS) > 2.25 were considered for inclusion in the role proficiency index. Each indicator of the Index consists of the number of statements and hence, each dimension was converted into a unit score using simple range and variance as in normalization technique.

Training need for increasing the competency of para-vets for prompt and efficient delivery of animal husbandry services was assessed using a structured schedule on five categories, namely, very high, high, moderate, low, and very low.

RESULTS AND DISCUSSION

Role performance of para-vets in Mathura district of Uttar Pradesh: As per reports of FAO (2004), the livestock sector contributes to nearly 6% of GDP, in return to which this sector get support from the government in the promotion of animal health, production, marketing, and extension related activities. There exists a lack of clarity on the roles of different categories of para-vets trained for a different duration. It leads to differing role perception and performance among vets and farmers (Barbaruah 2014). Role performances of para-vets have been assessed for productive, preventive, curative and diagnostic, and miscellaneous roles. Regarding the role of para-vets in the distribution of fodder seeds and various fodders available with the department, 95% of farmers rated the performance of para-vets as poor. It was found that 57.50% of farmers rated the role performance of para-vets into the poor

category for the advice given to them to control and reduce disease incidence by overcoming nutrition deficiency and feeding of animals. For pregnancy diagnosis, 50% of farmers rated the performance of para-vets as average, followed by 25% as above average. For doorstep insemination of cattle and buffalo, 37.50% of farmers rated it as average, followed by 27.50% as above average (Table 1).

Among various preventive roles, it was found that the role performance of para-vets in reducing animal health-related threats, following hygiene and vaccine handling protocols were poor as perceived by 87.50% of farmers, followed by 12.50% of farmers who found it below average. None of the farmers perceived their role performance as average or above average for this role. More than 40% of farmers perceived the average role performance of para-vets in identifying animal disease on basis of common clinical signs leading to early diagnosis and help in the control of disease from spreading (Table 1). It was found that 32.50% of farmers perceived the performance of para-vets as average, followed by 30% as above average for first aid and minor surgical treatment. Those roles come into the purview of minor veterinary services, which could be learned by seeing and practicing. That's why, for gynaecological and obstetrical treatment, 47.50% of farmers perceived the performance of para-vets as average, followed by 20% as an above-average response because it needs a certain level of practice and experience to have good skill in it. Veterinarians have a major role in animal welfare aspects; however, these aspects include the humane handling of animals. It was found that 77.50% of farmers perceived the role performance of para-vets in animal welfare aspects at field level and judicious use of drugs and antibiotics in the poor category. This finding aligned with the study of Naik *et al.* (2016) in which they perceived that course content and curriculum should be emphasized

Table 1. Distribution of respondents based on role performance of para-vets in Mathura district of Uttar Pradesh (as perceived by dairy farmers) (n=40)

Type of role	Excellent	Above average	Average	Below average	Poor
I Productive roles					
Distribution of nutrient products such as mineral mixture packets and/ concentrate feed obtained from market.	05.00	05.00	10.00	55.00	25.00
Distribution of fodder seeds and various fodders available with the department.	00.00	00.00	00.00	05.00	95.00
Pregnancy diagnosis.	10.00	25.00	50.00	10.00	05.00
Doorstep insemination of cattle and buffalo.	20.00	27.50	37.50	10.00	05.00
Advice farmers to control and reduce disease incidence by overcoming nutrition deficiency and feeding of animals.	00.00	02.50	10.00	30.00	57.50
II Preventive roles					
Identify animal disease on basis of common clinical signs leading to early diagnosis and help in the control of disease from spreading.	10.00	25.00	42.50	17.50	05.00
Check animal health-related threats; follow hygiene and vaccine handling protocols.	00.00	00.00	00.00	12.50	87.50
Use animal health apps for assistance and further precautious roles.	00.00	00.00	00.00	05.00	95.00
Vaccination against diseases such as HS, BQ, FMD, etc.	17.50	30.00	40.00	12.50	00.00
Deworming of animals.	15.00	27.50	42.50	15.00	00.00
III Curative and diagnostic roles					
Infertility check-ups of cattle and buffalo under the supervision of concerned vets.	05.00	12.50	17.50	52.50	12.50
First aid and minor surgical treatment.	17.50	30.00	32.50	15.00	05.00
General dispensation of common medicines.	20.00	27.50	35.00	15.00	02.50
Gynaecological and obstetrical treatment.	12.50	20.00	47.50	12.50	07.50
Consider animal welfare aspects at field level and judicious use of drug and antibiotics.	00.00	05.00	07.50	10.00	77.50
IV Miscellaneous roles					
Milk recording and herd registration.	05.00	07.50	20.00	50.00	17.50
Extension role and dissemination of novel technologies to farm front.	05.00	10.00	47.50	32.50	05.00
Assistance in extension activities in camps/ mela and distribute pamphlets/ leaflets and information to farmers about livestock issues.	10.00	17.50	32.50	30.00	10.00
Communication with peer para-vets and vets and ensure multi-stakeholder participation.	07.50	10.00	22.50	42.50	17.50
Maintaining a proper record of diagnosis in registers for further surveillance.	12.50	37.50	35.00	10.00	05.00

on field level inefficiency of para-vets for general dispensation of medicines as a solution to the above issues. Overdose of drugs for control of parasites, especially injection of Ivermectin, more than recommended dose limit of 60 mg/kg of body weight by twice or thrice was also found. Para-vets overuse diclofenac for pain relief. They gave an overdose of calcium supplementation (starting from 21 days before the parturition, rather than recommended ± 4 days of parturition). The use of pregnancy kits to obtain milk from non- calved animals (RBSH+ Corticosteroid + Hormone therapy) was also found at field level, but very rarely. Veterinarians revealed that non-technical fraction in case of dystocia was practiced by para-vets, whereby improper placement of hooks to take out the calf. In case of non-curable disease leading to non-productivity of animals (eg. prolapse), para-vets go for non- humane killing of animals to avail the insurance money to farmers for the death of the animal as provided by the state government.

It was found that 50% of farmers perceived above average the excellent performance of para-vets in maintaining the record of diagnosis in registers (Table 1). Para-vets tried to maintain records so that they could show them to authorities when asked for. However, 60.00% of them were perceived as average to poor performers for one-to-one communication with peer para-vets and vets to ensure multi-stakeholder participation. Most para-vets work independently to deliver services, few of them consult veterinarians regularly, but they put the least effort to work with stakeholders. They perceived farmers as end-users of service and veterinarians as their mentors in a complex situation. Para-veterinarians have inadequate skills and knowledge, they need to learn according to emerging roles in line with the perception of stakeholders (Channappagouda and Sasidhar 2018). It was found that 80.00% of farmers perceived that para-vets were average to below average in performing extension roles for dissemination of novel technologies to the farm front. Farmers revealed that para-vets were not paid well for extension roles, so they assigned the least importance to it. Similarly, 70% of respondents were found the average to below-average performers in milk recording and herd registration. Although para-vets have the major responsibility to assist in extension and outreach roles due to their geographical and cultural proximity with farmers, 62.50% of farmers perceived them average to below average for assisting in extension activities in camps/ mela, distribution of pamphlets/ leaflets, and information to farmers about livestock issues.

In the survey, it was found that excessive and injudicious abuse of antibiotics by para-vets, mainly oxytetracycline and 4th generation antibiotics of mainly fluoroquinolones group was prevalent in the study area. They delineated that para-vets bring those cases to them which were of severe and critical condition. When para-vets fail to treat the animals, they seek help from veterinarians. Irregular supply of generic drugs and drug shortage was perceived as a major problem by them. Privately working para-vets working in the Mathura district received training of different duration, from 28 days to 2 months. After training, they received equipment free of cost from the state government.

Role performance of para-vets in Hisar district of Haryana: Minor veterinary services differ from state to state as each state has different provisions of roles to perform for para-vets in their notifications. It was found that for the distribution of fodder seeds and various fodders available with the department, all the respondents rated the performance of para-vets as poor. It was found that 57.50% of farmers rated role performance into the poor category for advice given to farmers to control and reduce the incidence of disease by overcoming nutrition deficiency and feeding of animals (Table 2). For pregnancy diagnosis, 52.50% of farmers rated the performance of para-vets as average, followed by 17.50% as above average. For doorstep insemination of cattle and buffalo, 30% of farmers rated it as average, followed by 25% as above average. Cent % of para-vets was not involved in the distribution of fodder seeds, thus were ranked as poor by farmers in the distribution of fodder seeds and various fodders available with the department. Among various preventive roles, it was found that the role performance of para-vets in reducing animal health-related threats; following hygiene and vaccine handling protocols were poor as perceived by 70% farmers, followed by 10% farmers who rated it below average. None of the respondents perceived their role performance as average or above average for this role. Uses of android apps were not prevalent among para-vets, so 87.50% of farmers perceived para-vets as poor performers for precautious roles by use of animal health apps for help and assistance at field level.

Curative and diagnostic roles of para-vets play important role in form of first-aid, minor surgical, gynaecological treatments, and general dispensation of medicines. For gynaecological and obstetrical treatment, 40% of farmers perceived the performance of para-vets as average, followed by 17.50% as an above-average response (Table 2). It was found that 80% of farmers perceived below average to poor role performance of para-vets in animal welfare aspects at field level and judicious use of drug and antibiotics. This finding aligned with reporting of Haan *et al.* (2001) who conducted a study in Africa and revealed that high drug misuse could be a key concern regarding the quality of the services provided by para-vets. Various miscellaneous roles such as milk recording and herd registration, extension role *vis-à-vis* dissemination of novel technologies to farm front, assistance in extension activities in camps/ mela, one to one communication with peer para-vets and vets, efforts to ensure multi-stakeholder participation, and maintenance of record of diagnosis in registers for further surveillance were an important part of task assigned to para-vets under minor-veterinary services. It was found that 50% of farmers perceived above average the excellent performance of para-vets in maintaining proper record of diagnosis in registers for further surveillance. It was found that 62.50% of farmers perceived that para-vets were average to below average in

Table 2. Distribution of respondents based on role performance of para-vets in Hisar district of Haryana (as perceived by dairy farmers) (n=40)

Type of role	Excellent	Above average	Average	Below average	Poor
I Productive roles					
Distribution of nutrient products such as mineral mixture packets and/ concentrate feed obtained from market/ dispensary.	05.00	07.50	07.5	65.00	15.00
Distribution of fodder seeds and various fodders available with the department.	00.00	00.00	00.00	00.00	100.00
Pregnancy diagnosis.	12.50	17.50	52.50	12.50	05.00
Doorstep insemination of cattle and buffalo.	20.00	25.00	30.00	17.50	07.50
Advice farmers to control and reduce disease incidence by overcoming nutrition deficiency and feeding of animals.	00.00	07.50	12.50	22.50	57.50
II Preventive roles					
Identify animal disease on basis of common clinical signs leading to early diagnosis and help in the control of disease from spreading.	12.50	17.50	32.50	15.00	22.50
Check animal health-related threats, follow hygiene and vaccine handling protocols.	05.00	07.50	07.50	10.00	70.00
Use animal health apps for assistance and further precautious roles.	02.50	02.50	07.50	07.50	87.50
Vaccination against diseases such as HS, BQ, FMD, etc.	20.00	25.00	37.50	17.50	00.00
Deworming of animals.	17.50	27.50	35.00	20.00	00.00
III Curative and diagnostic roles					
Infertility check-ups of cattle and buffalo under the supervision of concerned vets.	07.50	10.00	15.00	35.00	32.50
First aid and minor surgical treatment.	10.00	17.50	42.50	17.50	12.50
General dispensation of common medicines.	22.50	30.00	27.50	12.50	07.50
Gynaecological and obstetrical treatment.	15.00	17.50	40.00	15.00	12.50
Consider animal welfare aspects at the field level and judicious use of drugs and antibiotics.	00.00	05.00	15.00	42.50	37.50
IV Miscellaneous roles					
Know how to do animal recording and herd registration.	00.00	05.00	60.00	25.00	10.00
Extension role for dissemination of novel technologies to farm front.	07.50	12.50	42.50	20.00	17.50
Assistance in extension activities in camps/ mela and distribute pamphlets/ leaflets and information to farmers about livestock issues.	07.50	20.00	27.50	30.00	15.00
Communication with peer para-vets and vets and ensure multi-stakeholder participation.	10.00	12.50	20.00	35.00	22.50
Maintaining a proper record of diagnosis in registers for further surveillance.	15.00	25.00	32.50	15.00	12.50

performing extension roles for dissemination of novel technologies to the farm front. Similarly, 85% of respondents were found average to below-average performers in milk recording and herd registration (Table 2).

Role performance of para-vets in Jaipur district of Rajasthan: Accountability to take the responsibility for efficient delivery of animal husbandry services could be built only if the role performance of para-vets could be above average to excellent as perceived by end-users. For distribution of fodder seeds and various fodders available with the department, 90% of respondents rated the performance of para-vets as poor for this aspect (Table 3). It was found that 57.50% of farmers rated the performance of para-vets into the poor category regarding advice given to farmers to control and reduce disease incidence by overcoming nutrition deficiency and feeding of animals. For pregnancy diagnosis, 42.50% of farmers rated the performance of para-vets as average, followed by 15% as above average. For doorstep insemination of cattle and buffalo, 22.50% of farmers rated it as average, followed by 25% as above average and 22.50 as excellent. Among various preventive roles, it was found that the role performance of para-vets in reducing animal health-related threats, following hygiene, and vaccine handling protocols were poor as perceived by 65% of farmers. A critical review (Table 3) highlighted that 27.50% of farmers perceived para-vets as average role performers in identifying animal disease on basis of common clinical signs leading to early diagnosis and helpful in controlling the spread of disease. For vaccination against diseases such as HS, BQ, FMD, etc., it was found that 22.50% of farmers perceived as the average performance of para-vets, followed by 25% as above average and 25% as excellent performers. Uses of android apps were not prevalent among para-vets, so 90% of farmers perceived para-vets as poor performers for precautious roles by use of animal health apps for help and assistance at field

level. This finding aligned with reporting of Pratikshya *et al*. (2018) who revealed that para-vets showed poor response *vis-à-vis* the use of android applications.

Among curative and diagnostic roles of para-vets, it was found that 40% of farmers perceived the performance of para-vets as average, followed by 22.50% as above average for first aid and minor surgical treatment. Similarly, for gynaecological and obstetrical treatment, 32.50% of farmers perceived the performance of para-vets as average, followed by 22.50% as the above-average response. It was found that 75% of farmers perceived below average to poor role performance of para-vets in animal welfare aspects at field level and judicious use of drugs and antibiotics (Table 3). Among various miscellaneous services, it was found that 65% of them were perceived as below average to poor performers for one-to-one communication with peer para-vets and vets to ensure multi-stakeholder participation. It was found that 62.50% of farmers perceived that paravets were average to below average in performing extension roles for dissemination of novel technologies to the farm front. Similarly, 85% of respondents were found the average to below-average performers in milk recording and herd registration. Although, paravets have major responsibility to assist in extension and outreach roles due to their geographical and cultural proximity with farmers, but 50% of farmers perceived them average to below average for providing assistance in extension activities in camps/ mela, distribution of pamphlets/ leaflets and information to farmers about livestock issues (Table 3).

Role performance of para-vets in Ahmadnagar district of Maharashtra: For pregnancy diagnosis, 42.50% of farmers rated the performance of para-vets as average, followed by 15% as above average (Table 4). It was found that 17.50% of farmers perceived the performance of para-vets as average and 32.50% as below average for distribution of nutrient products such as mineral mixture

Table 3. Distribution of respondents based on role performance of para-vets in Jaipur district of Rajasthan (as perceived by dairy farmers) (n=40)

Type of role	Excellent	Above average	Average	Below average	Poor
I Productive roles					
Distribution of nutrient products such as mineral mixture packets and/ concentrate feed obtained from market/ dispensary.	10.00	20.00	40.00	17.50	12.50
Distribution of fodder seeds and various fodders available with the department.	00.00	00.00	00.00	10.00	90.00
Pregnancy diagnosis.	10.00	15.00	42.50	20.00	12.50
Doorstep insemination of cattle and buffalo.	22.50	25.00	22.50	25.00	05.00
Advice farmers to control and reduce disease incidence by overcoming nutrition deficiency and feeding of animals.	00.00	07.50	12.50	22.50	57.50
II Preventive roles					
Identify animal disease on basis of common clinical signs leading to early diagnosis and help in the control of disease from spreading.	15.00	20.00	27.50	22.50	15.00
Check animal health-related threats, follow hygiene and vaccine handling protocols.	02.50	07.50	10.00	15.00	65.00
Use animal health apps for assistance and further precautious roles.	00.00	00.00	02.50	07.50	90.00
Vaccination against diseases such as HS, BQ, FMD, etc.	25.00	25.00	22.50	20.00	07.50
Deworming of animals.	20.00	22.50	27.50	20.00	10.00
III Curative and diagnostic roles					
Infertility check-ups of cattle and buffalo under the supervision of concerned vets.	10.00	15.00	22.50	32.50	20.00
First aid and minor surgical treatment.	12.50	22.50	40.00	15.00	10.00
General dispensation of common medicines.	20.00	22.50	27.50	17.50	12.50
Gynaecological and obstetrical treatment.	12.50	22.50	32.50	17.50	15.00
Consider animal welfare aspects at field level and judicious use of drug and antibiotics.	00.00	07.50	17.50	20.00	55.00
IV Miscellaneous roles					
Know how to do animal recording and herd registration	00.00	10.00	60.00	25.00	05.00
Extension role for dissemination of novel technologies to farm front	10.00	12.50	40.00	22.50	15.00
Assistance in extension activities in camps/ mela and distribute pamphlets/ leaflets and information to farmers about livestock issues.	12.50	22.50	30.00	20.00	15.00
Communication with peer para-vets and vets to ensure multi-stakeholder participation.	07.50	15.00	25.00	40.00	12.50
Maintaining a proper record of diagnosis in registers for further surveillance.	20.00	32.50	30.00	12.50	05.00

packets and/ concentrate feed obtained from market/ dispensary. It was found that 65% of farmers rated the performance of para-vets into the poor category regarding advice given to farmers to control and reduce disease incidence by overcoming nutrition deficiency and feeding of animals. Among various preventive roles, it was found that the role performance of para-vets in reducing animal health-related threats, following hygiene and vaccine handling protocols was poor as perceived by 75% of farmers, followed by 12.50% of farmers who found it below average. For the role of vaccination against diseases such as HS, BQ, FMD, etc., it was found that 22.50% of farmers perceived as the average performance of para-vets, followed by 30% as above average and 20% as excellent. A similar response was also received for deworming of animals by para-vets, where 30.00% of farmers perceived performance of para-vets as average followed by 27.50 as above average.

Among various curative and diagnostic roles of para-vets, 25% of farmers perceived the performance of para-vets as average, followed by 22.50% as above average for first aid and minor surgical treatment (Table 4). Similarly, for gynaecological and obstetrical treatment, 25.00% of farmers perceived the performance of para-vets as average, followed by 25% as the above-average response. Para-vets were actively involved in the general dispensation of common medicine, for which 27.50% of farmers perceived their role performance as average for it. Among miscellaneous roles, it was found that 80% of farmers perceived below average to poor role performance of para-vets in animal welfare aspects at field level and judicious use of drugs and antibiotics. More than 70% of para-vets were perceived as average to poor performers for one-to-one communication with peer para-vets and vets to ensure multi-stakeholder participation. Similarly, 77.50% of respondents were found the average to below-average performers in milk recording and herd registration. About 65% of farmers perceived them below average to poor in assisting in extension activities.

A comparison of role performance of para-vets in various districts of the study area: In earlier sections, an attempt

Table 4. Distribution of respondents based on role performance of para-vets in Ahmadnagar district of Maharashtra (as perceived by dairy farmers) (n=40)

Type of role	Excellent	Above average	Average	Below average	Poor
I Productive services					
Distribution of nutrient products such as mineral mixture packets and/ concentrate feed obtained from market/ dispensary.	10.00	15.00	17.50	32.50	25.00
Distribution of fodder seeds and various fodders available with the department.	00.00	00.00	00.00	05.00	100.00
Pregnancy diagnosis.	10.00	15.00	42.50	20.00	12.50
Doorstep insemination of cattle and buffalo.	17.50	30.00	32.50	15.00	05.00
Advice farmers to control and reduce disease incidence by overcoming nutrition deficiency and feeding of animals.	00.00	05.00	12.50	17.50	65.00
II Preventive services					
Identify animal disease on basis of common clinical signs leading to early diagnosis and help in the control of disease from spreading.	12.50	20.00	22.50	32.50	12.50
Check animal health-related threats, follow hygiene and vaccine handling protocols.	00.50	05.00	07.50	12.50	75.00
Use animal health apps for assistance and further precautious roles.	00.00	00.00	02.50	07.50	87.50
Vaccination against diseases such as HS, BQ, FMD, etc.	20.00	30.00	32.50	12.50	05.00
Deworming of animals.	22.50	27.50	30.00	15.00	05.00
III Curative and diagnostic services					
Infertility check-ups of cattle and buffalo under the supervision of concerned vets.	15.00	15.00	22.50	30.00	17.50
First aid and minor surgical treatment.	17.50	22.50	25.00	20.00	15.00
General dispensation of common medicines.	20.00	22.50	27.50	17.50	12.50
Gynaecological and obstetrical treatment.	15.00	25.00	25.00	20.00	15.00
Consider animal welfare aspects at field level and judicious use of drug and antibiotics.	05.00	05.00	10.00	17.50	62.50
IV Miscellaneous services					
Know how to do animal recording and herd registration.	05.00	07.50	62.50	15.00	10.00
Extension role for dissemination of novel technologies to farm front.	05.00	05.00	12.50	17.50	60.00
Assistance in extension activities in camps/ mela and distribute pamphlets/ leaflets and information to farmers about livestock issues.	07.50	10.00	17.50	37.50	27.50
Communication with paravets and vets to ensure multi- stakeholder participation.	05.00	05.00	15.00	37.50	37.50
Maintaining a proper record of diagnosis in registers for further surveillance.	12.50	15.00	22.50	27.50	22.50

was done to express the level of role performance of para-vets as perceived by farmers on 5-point continuum (excellent, above average, average, below average and poor) for all the four districts of the study area. Summarizing the level of role performance into the geometric mean score and comparing these scores delineate the relative role performance in all four districts. For most of the roles under productive services, the level of role performance was highest in Hisar followed by Jaipur. Ahmednagar district ranked third and Mathura district was least in terms of role performance for para-veterinary services (Table 5). A similar trend continued for preventive services, but there was a very low difference in the performance of para-vets as weighted mean scores were near about consistent. Performance of curative services was found relatively good in Jaipur followed by Hisar district. In comparison to other services (curative, productive, and preventive), the performance of para-vets in curative and productive services was comparatively good in Mathura district as the overall role performance of para-veterinary services was not very recognizable. Role performance of para-vets regarding curative and diagnostic services was found average in Ahmadnagar. For miscellaneous services also performances of para-vets were comparatively good in Hisar, followed by Jaipur and Ahmadnagar, and least in Mathura district. Thus, we can say that para-veterinary services need a lot of improvement in Mathura followed by Ahmadnagar district by overcoming the manpower shortage as well as increasing the competency of para-vets.

Technical expertise and proficiency in various dimensions of roles and responsibilities for capacity building (in perspective para-vets)

Responses of para-vets towards efficient delivery of animal health services and capacity building were obtained for four dimensions, i.e. knowledge and strategies for application, accountability, leadership, and work efficiency for assigned roles vis-à-vis institutional arrangement. Under the attribute, "knowledge and strategies for application",

Table 5. Comparison of weighted mean scores for the performance of para-vets (in perspective of farmers of different districts)

	Weighted mean scores for role performance			
Type of role	Mathura	Hisar	Jaipur	Ahmadnagar
I Productive services				
Distribution of nutrient products such as mineral mixture packets and/ concentrate feed obtained from market/ dispensary.	5.60	7.93	7.00	6.73
Distribution of fodder seeds and various fodders available with the department.	2.67	2.80	2.73	2.67
Pregnancy diagnosis.	8.67	8.53	7.73	7.93
Doorstep insemination of cattle and buffalo.	9.27	8.87	8.93	9.07
Advice farmers to control and reduce disease incidence by overcoming nutrition deficiency and feeding of animals.	4.20	4.53	5.27	4.20
II Preventive services				
Identify animal disease on basis of common clinical signs leading to early diagnosis and help in the control of disease from spreading.	8.47	7.53	7.93	7.67
Check animal health-related threat, hygiene, and vaccine handling protocols.	3.00	4.47	4.47	3.80
Use animal health apps for assistance and further precautious roles.	2.80	3.13	3.00	3.13
Vaccination against diseases such as HS, BQ, FMD, etc.	9.40	9.27	9.07	9.27
Deworming of animals.	9.13	9.13	8.60	9.27
III Curative and diagnostic services				
Infertility check-ups of cattle and buffalo under the supervision of concerned vets.	6.53	6.00	7.47	7.00
First aid and minor surgical treatment	9.07	7.87	8.33	8.20
General dispensation of common medicines	9.27	9.27	8.53	8.33
Gynaecological and obstetrical treatment	8.47	8.20	8.00	8.13
Consider animal welfare aspects at field level and judicious use of antibiotics.	3.73	5.00	4.73	4.60
IV Miscellaneous services				
Know how to do animal recording and herd registration	6.20	6.93	7.33	7.53
Extension role for dissemination of novel technologies to farm front	7.40	7.27	7.47	4.73
Assistance in extension activities in camps/ mela and distribute pamphlets/ leaflets and information to farmers about livestock issues.	7.67	7.33	7.93	6.20
One to one communication with peer para-vets, vets and ensure multi-stakeholder participation.	6.60	6.73	7.07	5.40
Maintaining a proper record of diagnosis in registers for further surveillance.	7.13	9.33	9.13	8.40

the technical expertise was comparatively high for access to basic inputs for door-step delivery (20.67%) and the ability to learn, understand and utilize technical information and skill obtained from veterinarians (19.38%) with a weighted mean score of 51.67 and 47.17 respectively (Table 6). The reason for it was that para-vets were trained and supposed to deliver door-step service and contact with veterinarians being part of their job environment provide the opportunity to learn skills by seeing and doing with them. Para-vets rated and revealed their ability to communicate technical information to farmers as high during the interview (geometric mean score 46.00), but contrary when farmers were asked they revealed that para-vets seldom convey technical information to them. A low level of technical expertise was found among para-vets for using animal health apps at field level (91.25%), on-spot search for solutions and ideas on the internet (90%), knowledge about drug withdrawal period and danger of indiscriminate use of antibiotics (85%), and use of email for official communication (88.75%). This finding agreed with the study conducted by Leyland *et al.* (2014) in Africa revealed that 70% of para-vets were found to have good knowledge regarding ITKs. However, they lack awareness regarding food safety issues farmers which reveal that that little emphasis was given by para-vets on drug withdrawal periods.

Accountability for reporting of vaccine failure to a higher authority, on-spot health hazard reduction by consulting vets in the uncommon situation, and dissemination of new tools and techniques to farmers (eg. CMT toolkit) were found low by 93.12, 86.62, 91.25% para-vets respectively (Table 6). The geometric mean for these roles was also found comparatively low. Persuading ability of fellows to ensure holistic participation was also not found very proficient among the respondents as revealed through the statements, influencing and motivating fellow para-vets within line of job ethics and persuade peers and active participation in learning and updating skills for grass root level application, for which technical expertise was low among 73.76 and 70% respondents respectively (Table 6). Similar findings were reported by Shubeena *et al.* (2019) in which they revealed that there was a low level of knowledge of para-vets and vets regarding the extension-related competencies, leadership, and management competencies. The institutional arrangement also affects the work efficiency of para-vets, through the performance of roles delegated by veterinarians, new learning through training, and their active participation in campaigns, surveys, etc. Para-vets lack sufficient expertise in the application of technical knowledge and strategies, accountability for the roles and services delivered by them, leadership pro-activity, and efficient performance in the institutional arrangement provided to them. However, for knowledge and strategies for application, and accountability towards the roles had geometric mean was 39.04 and 33.21 respectively, which represent progressive and forward approaches as well as responsiveness.

Categorization of respondents on various dimensions and categories of a role proficiency index: For the dimension, "work efficiency for assigned roles *vis-à-vis* institutional arrangement" weighted mean was found highest (40.25), followed by leadership (weighted mean 40.25) (Table 7). Nearly half of para-vets (47.50%) rated their proficiency in the medium category (0.41–0.69) on the role proficiency index, followed by 36.25% in the low category (less than 0.40) towards the assessed roles (Table 8).

Training need for para-vets as perceived by veterinarians: Among various roles of para-vets under curative services, more than 60% of trainers perceived training needs ranging from moderate to very high for minor surgical treatment. While about 65% of trainers perceived very high to high training need for knowledge about the latest trends in the therapeutic use of veterinary drugs (Table 9). About 40% of trainers perceived high to very high training need for control/treatment of common contagious diseases. Under preventive services, very high to high training needs were perceived for control of zoonoses at herd level and prevalent zoonotic diseases (55%), prophylactic animal health care by use of antimicrobials and sanitary measures (60%), and quarantine measures (93.33%). Under productive services, training need ranging from very high to high was perceived for fodder production and silage making (88.34%), latest trends in animal breeding, feeding and reproductive management (91.67%) and rise in production due to mineral mixture and concentrate feeding (88.33%). Among various miscellaneous services, high to very high training need was perceived for drug dispensation by keeping in mind of consequences of antibiotic resistance and quality input (86.67%) and knowledge about new technologies in Animal Husbandry evolved by research institutions (86.67%). The vast majority (93.33%) of respondents perceived high to very high training need for making para-vets aware of their role to ensure participation of farmers, veterinarians, and village panchayat.

Poor technical competency of para-vets, accompanied by lack of income security and un-established authority-responsibility relationships prevent veterinarians to rely on them and delegate minor veterinary services with accountability. Veterinarians perceive that due to inadequate manpower, finance, and time constraint; there exists little scope for them to provide prompt and effective animal health services to farmers of the locality. There existed varying competencies of para-vets in different states due to different provisions and criteria of minor heath service definition as notified by the state. Paraprofessionals desired to work under the supervision of veterinarians but they didn't receive any sort of remuneration from the government, so they practiced privately with poor morale. Initial qualification for getting inducted in para-veterinary training varied from 10^{th} standard to 12^{th}, for same job specification under minor veterinary services (Earlier it was 8^{th} standard, now few para-vets were found to have graduation qualification also).

Table 6. Distribution of respondents according to the level of technical expertise on role proficiency index for capacity building (in perspective of para-vets) (n=160)

Areas of technical expertise	Low	Medium	High	Weighted mean
1 Knowledge and strategies for application				
Able to communicate technical information to farmers.	81 (50.62)	42 (26.25)	37 (23.12)	46.00
Reciprocate technical information with peer para-vets with add of experience.	93 (58.12)	45 (28.13)	22 (13.75)	41.50
Able to learn, understand and utilize technical information and skill obtained from veterinarians.	68 (42.50)	61 (38.12)	31 (19.38)	47.17
Knowledge about drug withdrawal period and danger of indiscriminate use of antibiotics.	136 (85.00)	17 (10.62)	07 (04.38)	31.83
Access and delivery of basic inputs at farmer's door- step.	43 (26.87)	84 (52.50)	33 (20.63)	51.67
Use of animal health apps and extract information at ground level.	146 (91.25)	09 (05.26)	05 (03.12)	29.83
Able to feed data during the census in tablets.	96 (60.00)	33 (20.63)	31 (19.37)	42.50
Use of the email for official communication.	142 (88.75)	14 (08.75)	04 (02.50)	30.33
On-spot search for solutions and ideas on Internet.	144 (90.00)	09 (05.63)	07 (04.37)	30.50
II Accountability				
Reporting for vaccine failure to higher authority.	149 (93.12)	08 (05.00)	03 (01.88)	29.00
Active participation in surveillance.	135 (84.37)	18 (11.25)	07 (04.38)	32.00
Management and feedback of risky health situation at field.	113 (70.62)	29 (18.12)	18 (11.26)	37.50
On-spot health hazard reduction by consulting vets in uncommon situation.	137 (86.62)	14 (08.75)	09 (05.62)	32.00
Preparation of publications for distribution to fulfill extension roles.	121 (75.62)	22 (13.75)	17 (10.63)	36.00
Implement gained knowledge about the latest trends and experience at the field level.	118 (73.76)	27 (16.87)	15 (09.37)	36.17
Dissemination of new tools and techniques usable to farmers (eg. CMT toolkit).	146 (91.25)	09 (05.63)	05 (03.12)	29.83
III Persuading fellows to ensure holistic participation				
Influence and motivate fellow paravets within line of job ethics.	118 (73.76)	27 (16.87)	15 (09.37)	36.17
Active participation in learning and updating skills for grass root level application.	112 (70.00)	25 (15.62)	23 (14.38)	38.50
Search for scientific application of knowledge in participatory manner.	93 (58.13)	39 (24.37)	28 (17.50)	42.50
Participatory problem solving at personal and professional level.	88 (55.00)	41 (25.62)	31 (19.38)	43.83
IV Work efficiency for assigned roles vis-à-vis institutional arrangement				
Comfortably do work delegated by veterinarians.	79 (49.38)	53 (33.12)	28 (17.50)	44.83
Follow all instructions and guidelines issued by veterinarians.	86 (53.75)	41 (25.62)	33 (20.62)	44.50
Attain trainings to render services with proficiency.	123 (76.88)	21 (13.12)	16 (10.00)	35.50
Contact with research institutions and seminars.	142 (88.76)	11 (06.87)	07 (04.37)	30.83
Role in livestock census.	93 (58.13)	37 (23.12)	30 (18.75)	42.83
Participation in vaccination campaigns and survey.	41 (25.62)	72 (45.00)	47 (29.38)	54.33

Table 7. Dimension wise geometric mean of proficiency of para-vets for various dimensions of a proficiency index

Dimensions of roles and responsibilities for capacity building	Weighted mean
Knowledge and strategies for application	39.04
Accountability	33.21
Leadership	40.25
Work efficiency for assigned roles *vis-à-vis* institutional arrangement	42.14

Table 8. Categorization of respondents based on scores obtained on role proficiency index in delivery of animal health services (in perspective of para-vets) (n= 160)

Category	Frequency	%age
Low (Less than 0.40)	58	36.25
Medium (0.41– 0.69)	76	47.50
High (More than 0.70)	26	16.25

Various problems and challenges in the delivery of para-veterinary services as perceived by stakeholders: Lack of proper recognition of minor veterinary services and poor competency of para-vets due to low level of education attributed to poor proficiency in the delivery of service. Farmers revealed that during one shot insemination, para-vets use two semen straws by reasoning that it would increase the conception rate. Thus, they charge for two

Table 9. Distribution of respondents as per training need as perceived by veterinarians (n= 60)

Areas of training	Training needs analysis				
	Very High	High	Moderate	Low	Very low
I Curative services					
Minor surgical treatment	16.67	21.67	26.67	18.32	16.67
Gynaecological and obstetrical treatment	18.33	18.33	25.00	23.34	15.00
General dispensation	15.00	16.67	31.60	21.67	15.00
Pregnancy diagnosis	13.33	16.60	21.67	26.67	21.67
Knowledge about the latest trends in the therapeutic use of veterinary drugs	26.67	50.00	18.33	05.0	00.00
Control/treatment of common contagious diseases	23.33	26.67	36.67	06.67	06.67
II Preventive services					
Pre-requisites for vaccination such as vaccination schedule and doses	10.00	16.67	30.00	18.33	25.00
Appropriate post- castration measures and follow-up	08.33	10.00	15.00	31.67	35.00
Deworming schedules for herd and animal wise	06.67	15.00	21.67	25.00	31.67
Control of zoonoses at herd level and prevalent zoonotic diseases	30.00	25.00	26.67	10.00	08.33
Prophylactic animal healthcare by use of antimicrobials and sanitary measures)	26.67	35.00	18.33	11.67	08.33
Tools and techniques for dehorning of calves	05.00	06.67	08.33	31.67	48.33
Quarantine measures	65.00	28.33	03.33	03.33	00.00
III Productive services					
Fodder production and enrichment (Silage making and ration formulation)	56.67	31.67	08.33	03.33	00.00
Handling of frozen semen and door- step AI	08.33	15.00	21.67	20.00	35.00
Latest trends in animal breeding, feeding, and reproductive management	65.00	26.67	05.00	01.67	01.67
Rise in production due to mineral mixture and concentrate feeding	60.00	28.33	08.33	02.50	00.00
IV Diagnostic and curative services					
First aid and basic healthcare	10.00	15.00	16.67	25.00	33.33
Care and management of calves and heifers during treatment	28.33	36.67	25.00	05.00	05.00
Care of equipment	10.00	15.00	16.67	25.00	33.33
Awareness about principles of animal management and disease control	51.67	31.67	16.67	00.00	00.00
Preparation of ointments, lotions and stock solution	10.00	13.33	15.00	30.00	31.67
Sufficient information about rapid test kits	50.00	23.33	16.67	06.67	03.33
Detect outbreak of diseases and follow the standard of protocol	60.00	30.00	06.67	01.67	01.67
V Miscellaneous services					
Communication of extension messages (eg. main livestock schemes in operation)	08.33	11.67	21.67	30.00	28.33
Livestock management	20.00	23.33	28.33	15.00	13.33
Disease recording, disease reporting, sample / specimen collection and forwarding	11.67	16.67	18.33	26.67	26.67
Assistance in emergency shelters/health camps	06.67	10.00	15.00	28.33	40.00
Drug dispensation by keeping in mind of consequences of antibiotic resistance and quality input	56.67	30.00	10.00	03.33	00.00
Collection of livestock census	05.00	11.67	13.33	33.33	20.00
Systematic skill development and supervisory guidance under registered veterinary practitioners	20.00	23.33	25.00	16.67	15.00
Maintenance of technical and non-technical registers	05.00	08.33	10.00	21.67	55.00
Knowledge about new technologies in Animal Husbandry evolved by research institutions	68.33	18.33	10.00	03.33	00.33
Role to ensure participation of farmers, veterinarians, and village panchayat	58.33	35.00	06.67	00.00	00.00

semen straws at one time to earn extra money. There exist various kinds of challenges in capacity assessment and capacity building of para-vets. Identifying various problems and formulating solution for it could only be ensured by multi-stakeholder participation. With this viewpoint, an attempt has been presented in Table 10 to suggest some solutions to tackle the alarming issue. The findings of the study were in consonance with few recommendations of the Biennial conference of All Assam Veterinary Field Assistant Association (Barbaruah 2019).

Table 10. Solution for various problems and challenges in delivery of para-veterinary services as perceived by stakeholders

Problem	Solution
Insufficient recognition to para- veterinary services in VCI Act, 1984.	Separate para-vet cadre could give recognition as well mention the provision of the minor-veterinary services.
Numerous nomenclature for para-veterinary courses.	It would be better to accredit all the para vet schools under the state-level regulatory body.
Differing provisions for para-veterinary services from state to state.	There should be a central level statutory body monitoring the para-veterinary services of each state and a separate fund for auxiliaries of the animal health delivery system. The funds should be distributed through a central regulatory body, thus states would have obligation to synchronize their para-veterinary provision with the central statutory body.
Quakes delivering services who don't have suitable degrees, also practice at field level.	Identity cards and records of para-vets should be under the district-level database.
Various professionals delivering para-veterinary services under different organizations.	Professionals should practice only skills which they are trained for (eg. BAIF and J& K Trust professionals should perform AI because they are specialized in it. There should be provision for compulsory attainment of training under para vet school to deliver other tasks of minor- veterinary services.
Para-vets who attain 1-month training also charge the same fee as to those of para-vets who even completed a diploma of 2 years.	There should be different color identity cards for para-vets, in which colour code could reveal their level of training.
Proficiency in delivery of para-veterinary services improves with experience, but farmers don't know about years of experience of paraprofessional (eg. few VLDA and even private para-vets, they have vast knowledge and awareness of advances in animal health service).	Para-vets having more than 20 years of experience could be given a chance to get inducted into government service as a dispensary for assisting the veterinarians. Any certificate revealing the year of experience of para-vets should be issued by a district-level authority.
Low job opportunities for para-vets in the market just after the finish of training.	Para-vets should be allowed to work under the monitoring and supervision of government veterinarians to get mentorship and tasks. After one year, the para vet could compete in the market.
Para-vets irrationally use antibiotic drugs.	Over-the-counter obtaining of antibiotics to para-vets should be avoided. It should be provided after the para vet obtain the prescription from the veterinarian.
Low competency of para-vets.	Provision of refresher training for para-vets at the district level.
Income of para-vets was found seasonal, as surge during winter and pre-monsoon period.	Para-vets should be inducted in mobile van delivery of animal health services at farmer's doorstep with veterinarians and get daily wages.
Lack of coordination with veterinarians and communication with peers.	Para-vets should visit the dispensary regularly twice/ thrice or more a week. Connect with peers through an application such as Whatsapp, and Facebook.
Preference to para-veterinary services was mainly limited to the poor socio-economic condition of the smallholder and marginal farmers.	Availing of para-veterinary services to more extent was realized as a compromise between service quality and money. Thus need to change the perception of the quality of service provide by para-vets through the issue of certificates mentioning their expertise in various roles so that even large farmers would not feel to use para-veterinary service as a compromise.
Low efforts of para-vets in extension and outreach activities.	Para-vets could perform better in extension and outreach activities but they didn't receive any monetary incentives as remuneration for their work. Instead, per day wage should be fixed for them for extension activities under state-level health service funds.

(Table 10. ... *concluded*)

Problem	Solution
Awareness of para-vets about the colour code of semen straw of various breeds was lacking.	Para-vets were aware of the straw color of 2 breeds of cattle and the straw color of buffalo on average which were in high demand. Para-vets should also have semen of various breeds which in turn will increase the breed diversity as well as knowledge about its colour code.
Para-vets perceived the least role priority for miscellaneous roles, followed by curative and diagnostic services.	Increase the monitoring and supervision of para-vets under veterinarians which would result in accountability and reporting of para-vets to veterinarians. Almost all the miscellaneous and curative roles need to be delegated by veterinarians. The enriching job with responsibility and accountability could improve the role performance of para-vets in miscellaneous and curative services.

Excessive and injudicious abuse of antibiotics by para-vets, mainly oxytetracycline and 4th generation antibiotics of mainly fluoroquinolones group was prevalent in the study area. Overdose of drugs for control of parasites, especially injection of Ivermectin, more than recommended dose limit of 60 mg/ kg of body weight by twice or thrice was also found. Para-vets overuse diclofenac for pain relief. They gave an overdose of calcium supplementation (starting from 21 days before the parturition, rather than recommended ± 4 days of parturition). The use of pregnancy kits to obtain milk from non- calved animals (RBSH+ Corticosteroid + Hormone therapy) was also found at field level, but very rarely. Veterinarians revealed that non-technical fraction in case of dystocia was practiced by para-vets, whereby improper placement of hooks to take out the calf. In case of non-curable disease leading to non-productivity of animals (eg. prolapse), para-vets go for non- humane killing of animals to avail the insurance money to farmers for the death of the animal as provided by the state government. Veterinarians revealed that para-vets bring those cases to them which were of severe and critical condition. When para-vets fail to treat the animals, they seek help from veterinarians. Irregular supply of generic drugs and drug shortage was perceived as a major problem by them.

Effective linkage, feedback, backup, and coordination mechanism between service providers in need could be executed at grass- root level to increase the accountability of para-veterinary services. It was found that the role performance of para-vets varied from task to task. Accountability for reporting for vaccine failure to higher authority, on-spot health hazard reduction by consulting vets in the uncommon situation and, dissemination of new tools and techniques to farmers were found low. Para-vets were found low on the level of technical expertise regarding the use of animal health apps, on-spot search for solutions and ideas on the internet, judicious use of antibiotics, use of email for official communication. Nearly half of para-vets rated their proficiency in the medium category on the role proficiency index towards the assessed roles. Para-veterinary services were most skillful in Hisar district, followed by Jaipur and Ahmadnagar district, and least proficient in Mathura district. Veterinarians perceived high training needs for quarantine measures, fodder production and silage making, latest trends in animal breeding, feeding and reproductive management, and awareness about principles of animal management and disease control (83.34%). To have a deeper insight into the delivery of minor veterinary services, the study should be done in case study mode on, particularly performance of NGOs, private veterinarians, drug dealers, other paraprofessionals, and SDAH in minor veterinary services.

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