FARMERS' PERCEPTION OF LIVESTOCK EXTENSION SERVICE DELIVERY IN SELECTED DISTRICTS OF WESTERN BHUTAN

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ABSTRACT: Livestock farming is a major source of income for the Bhutanese population, and the availability and effectiveness of livestock extension services play a vital role in empowering livestock farmers. Evaluating farmers' perceptions of livestock extension service delivery is essential for understanding the services that align with farmers' needs. This study aimed to assess farmers' perceptions regarding livestock extension service delivery in selected districts of western Bhutan. A total of 180 livestock farmers from Thimphu and Samtse districts were interviewed. The data collected were analyzed using descriptive statistics, logistic regression, Fisher's exact test, and principal component analysis (PCA). Most respondents (Thimphu, 95.6%; Samtse, 98.9%) reported availing of livestock extension services. There was a significant association between the district and the perception of service provision ($p < 0.05$), with respondents from Thimphu expressing a more favorable perception compared to those from Samtse. Regarding farmers' perception of professionalism and staff attitude, a significant association was found with the frequency of service availed ($p<0.05$). Three main components were identified for respondents' perception of the impact of services (impact on farm management, farm productivity, and knowledge base of farmers). Additionally, there were some differences ($p<0.05$) between respondents from Thimphu and Samtse concerning the constraints affecting the effectiveness of extension service delivery. The primary constraint identified was the inadequate planning of extension programs, particularly in cases where a single extension worker was responsible for covering a large geographic area. The study revealed that, on the whole, farmers in the western region hold a positive perception of livestock extension service delivery. However, some variations in perception were noted between respondents from the two districts, underscoring the need for approaches to address specific regional challenges and enhance the effectiveness of extension services.

Keywords: Extension; perception; services.

1. INTRODUCTION

The livestock sector in Bhutan is one of the most important primary sectors supporting poverty alleviation, economic growth, employment generation, utilization of natural resources, and social development (Department of Livestock [DoL], 2019). To realize these, livestock extension services in Bhutan offer a variety of services such as inputs in feed and fodder, services related to animal breeding, veterinary services, information and technology dissemination, and livestock development initiatives (Department of Livestock [DoL], 2022). Through access to these services, farmers in Bhutan find themselves dependent for vital support (Ura et al. 2012) making the delivery of livestock services to farmers a priority, particularly for enhancing management practices and productivity (Rathod et al. 2012; Pousga et al. 2022).

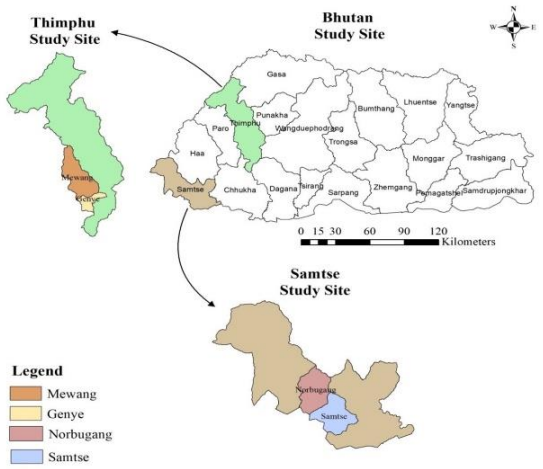

Figure 1: Study area

According to Miller and Nyathi (2017), the effectiveness of extension services depends mainly on their alignment with the farmer's actual needs and the extent of the farmer's involvement in decision-making processes. When services fail to address individual needs, smallholder farmers often disengage from seeking extension support (Anang et al. 2019). In most situations, a lack of clear information regarding the farmer's needs has resulted in the disregard of livestock extension services in developing countries. In many developing countries, misalignment between farmers' needs and services is due to the top-down approach which in turn leads to several challenges and the ineffectiveness of the extension service delivery system (Anang et al. 2019). Additionally, Bhutan's agriculture sector has witnessed a dramatic shift in recent years, transitioning from traditional and less productive farming to a sedentary and commercial approach (Ministry of Agriculture and Forests [MoAF], 2021). Extension services must therefore adapt to this changing landscape and evolving farmer's needs. Hence, it becomes essential to assess the needs of livestock farmers and their perspectives on the quality of livestock extension service delivery in Bhutan. With this, the primary objective of this study was to assess farmers' perception of the provision of livestock extension services in the selected districts of western Bhutan.

2. MATERIALS AND METHOD

2.1. Study Area

From the five districts in the western region of the country, Thimphu and Samtse were selected. The districts and gewogs were purposively selected based on livestock population, diversity of livestock species, and annual livestock production. For the study, two gewogs were selected from each district: Mewang and Genye gewog of Thimphu and, Norbugang and Samtse gewog of Samtse.

2.2.Sampling method and data collection

From two gewogs of each selected district, three chiwogs with 15 farmers each were selected randomly through the draw lot method. In total, 180 farmers (Thimphu, n = 90; Samtse, n = 90) were selected to assess their perception of livestock extension service delivery. Data was collected using a semi-structured questionnaire divided into three sections. The first section gathered the socio-demographic characteristics of the respondent (age, gender, education level, source of income). The second section aimed to document the respondent's experience with the services availed from livestock extension centers. Finally, the third section delved into the respondent's perception of livestock extension service delivery, such as accessibility, the quality of service provision, professionalism and attitude of service providers, and constraints to the effectiveness of livestock extension services. Farmers were interviewed only if they reared livestock and were 18 years old and above.

2.3. Data analysis

Data was compiled in Excel 2016 and analyzed using International Business Machines- Statistical Package for Social

Sciences (IBM-SPSS) version 25. Both descriptive and inferential statistics were used. A descriptive analysis of the entire dataset was carried out to calculate frequencies, mean, and standard deviation. The questions for perception were based on a Likert scale (1, strongly disagree; 2, disagree; 3, neither agree nor disagree; 4, agree; 5, strongly agree) which were converted into three scales "Yes", "No" and "Don't know". Respondents' perceptions of service delivery were categorized into binary responses as 'good perception' or 'poor perception' for univariate logistic regression, where gender, education level (literate or illiterate), frequency of services availed (1-10 times or more than 10 times annually based on the mean value), herd size (< 6 and > 6 based on the mean value), and districts were considered as explanatory variables. Fisher's exact tests were also used to explore associations between districts and constraints affecting livestock extension service delivery.

The principal component analysis (PCA) was performed for meaningful presentation and interpretation of the perception of respondents on the impact of extension services. The orthogonal Varimax rotation was used to group variables that exhibited higher correlations with each other into distinct components. Before the interpretation of PCA results, the Kaiser-Meyer-Olkin (KMO) test and Bartlett's test were done to evaluate sampling adequacy. To determine the number of components in the PCA, the Kaiser criterion was utilized. Components with eigenvalues greater than 1 were considered to explain more variance compared to those with eigenvalues less than 1, following the approach outlined by Beavers et al. (2013). The scree plot further supported the decision as it showed a leveling-off point after the third component. As a result, the PCA effectively reduced the original nine items into three components, collectively explaining 59.59% of the variance. The first, second, and third components accounted for 20.83%, 20.76%, and 18% of the variance, respectively. These components were labeled based on the items that loaded most strongly under each one, as shown in Table 3.

3. RESULTS AND DISCUSSION

3.1. Respondent characteristics

More than half of the respondents were female (Thimphu, 63.3%; Samtse, 52.2%) as shown in Table 1. The mean age of the respondents was 42.13 ± 14.00 years (Thimphu) and 40.32 ± 12.73 years (Samtse). About half of the respondents fall in the age range of 30 to 45 years. The majority of the respondents in Thimphu (87.8%) and more than half of the respondents at Samtse (62.2%) were literate. Most of the respondents (Thimphu, 86.7%; Samtse, (81.1%) stated livestock farming as the main source of income. The respondents rear different domestic animals to meet their daily needs (Figure 2).

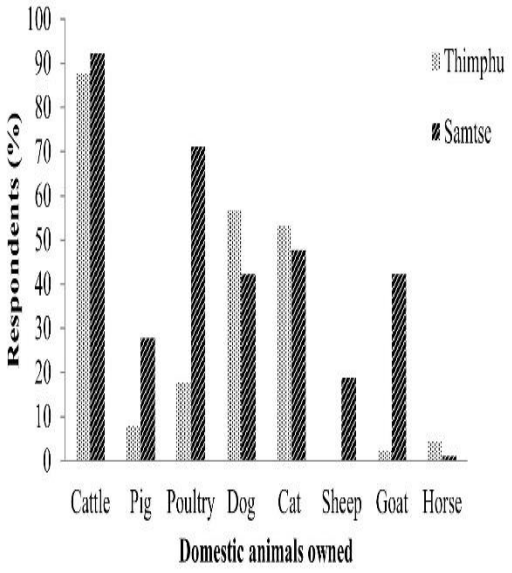

Figure 2: Livestock reared by the respondents in different study sites.

Table 1: Respondent's characteristics in the study areas (%)

Characteristics	Thimphu	Samtse
Gender		
Male	36.7	47.8
Female	63.3	52.2
Age		
15-30 years	20	18.9
30-45 years	47.8	
45-60 years	17.8	24.4
>60 years	14.4	7.8
Education Level		
Illiterate	12.2	37.8
Non-formal education	1.1	3.3
Primary School	28.9	31.1
Secondary school	42.2	20.0
>High school	15.6	7.8
Source of income		
Livestock farming	86.7	81.1
Agriculture	75.6	63.3
Business/Shop	8.9	11.1
Civil service	10	14.4
Tourism	3.3	0

3.2. Livestock extension services availed

It was recorded that the majority of respondents in both Thimphu (95.6%) and Samtse (98.9%) had availed of some form of livestock extension services. Among these respondents, 81.4% in Thimphu and 86.5% in Samtse reported having availed at least 1-10 times per year while the rest had availed more than 10 times. Those who did not avail of services from the centers (Thimphu,4.4%; Samtse, 1.1%), cited reasons such as distance from the service center and the proximity to the veterinary hospitals. While AI services are available, 70 % in Thimphu and 63.2 % in Samtse preferred natural breeding over AI. It was recorded that the livestock extension worker rendered all the AI services in the Thimphu district. Whereas, in Samtse about 57.1 % of the respondents reported availing of AI services provided by Community Artificial Insemination Technicians (CAIT). The same population also reported preferring CAIT over the extension worker for AI services citing easy access and timely services rendered by the CAIT. Respondents also availed services such as vaccination & and treatment of animals, obtaining fodder seeds for pasture development, and attending livestock-related training.

3.3. Respondent's perception of livestock extension service quality

Service provision

While the majority of respondents in both Thimphu (95.6%) and Samtse (98.9%) reported availing some form of livestock extension services, approximately half of the respondents (51.4%) admitted to being unaware of the complete range of extension services provided (Table 2). However, the

majority conveyed that the livestock extension services are relevant and align well with their needs (95.4%) and are deemed important and effective (96%). Among the five explanatory variables considered—gender, education level, cattle herd size, frequency of availing services, and district—only district had a significant impact on farmers' perceptions of service provision (p = 0.01). Specifically, respondents from Thimphu had 2.54 times higher odds of holding a positive perception of service provision compared to those from Samtse. This could be primarily due to variations in livestock composition because farmers in Thimphu engage mainly in dairy farming, which allows extension worker to promptly reach their farms, ensuring timely service delivery and raising awareness about available services. In contrast, farmers in Samtse rear a diverse range of livestock species, making it challenging for extension workers to provide services to all farmers thus resulting in a lower awareness regarding other available services.

Time and accessibility

The majority of respondents (76.8%) expressed ease in contacting livestock extension workers, while 69.7% reported no difficulty in accessing the services. Despite the strategic placement of extension centers to ensure accessibility to all farmers (MoAF, 2022), 20% of the respondents reported distance from the center as a challenge. Additionally, 39.4% of the respondents expressed concerns about delayed response times, particularly for services like clinical outcalls citing reasons such as scattered settlements, particularly in remote areas. This dual challenge of geographical distance and delayed responses could also imply that while the distance from the extension centers does impact service accessibility, the proactiveness of the livestock extension workers could equally affect the efficient delivery of extension services.

Professionalism and attitude

The study also looked into the perception of farmers on the professionalism and attitude of the extension workers. The livestock extension workers were reported as knowledgeable and capable of delivering services to farmers by 86.3% of respondents (Table 2). About 97.7% of respondents reported that the extension workers are courteous, helpful, considerate in their interactions, and maintain a positive and respectful working relationship with farmers while ensuring quality service delivery. A positive perception of the attitude of extension workers, which includes a dedication to duty, use of appropriate language to communicate with the farmers, good manners, and on-time delivery is reported to establish a good relationship between extension workers and farmers (Giginyu and Bala 2020). Moreover, the confidence of farmers in the competence of the extension workers and in their motivation to help the farmers realize their goals is an important determinant of an effective extension program (Machiadikwe et al. 2016).

Five variables viz. gender, education level, herd size, frequency of availing service, and district were considered as influencers on respondent's perception of professionalism and staff attitude. From all the predictor variables, only the frequency of availing service significantly contributed to the model (p =0.004). There was a notable association between the frequency of availing services and farmers' perceptions. Specifically, the majority of respondents who availed services from one to ten times per year (81.7%) were more likely to have positive perceptions compared to those farmers who utilized services more frequently. It is important to note that this

Table 2: Respondent's perception of service quality (%)

Service quality	Yes	No	Don't know
Service provision			
Farmers have prior awareness of every service	45.7	51.4	2.9
There is diversity in extension methods	44.6	50.9	4.6
Services are relevant to the needs or situation of the farmer	95.4	2.3	2.3
Extension services are important and effective	96	2.3	1.7
Accessibility and time			
Easy to contact Livestock Extension Officer	76.6	19.4	4
Easy access to RNR-Extension Centres	69.7	22.9	7.4
Services are provided at the right time	65.1	28.6	6.3
Less waiting time in the office	65.1	29.7	5.1
Livestock extension workers do not take much time to reach the farm.	57.7	39.4	2.9
Professionalism and attitude			
Staff provide proper treatment of farmers	97.7	0	2.3
Staff are devoted to service provision	69.7	15.4	14.9
Staff have consideration for the farmer's situation	94.3	1.1	4.6
Staffs respect farmer's experience	96.6	0	3.4
Staff are knowledgeable about services and capable of providing required service	86.3	0	13.7

finding highlights the potential influence of service utilization patterns on farmers' perceptions, and further investigation may be warranted to better understand the factors contributing to this observed difference.

Unlike the perception of service provision, there was no significant difference in the perception of farmers from Samtse and Thimphu regarding the professionalism and attitude of extension workers (p =0.30). This suggests that both groups of respondents felt that extension workers had a good attitude and exhibited professionalism. This is important because the extension system is only as good and effective as the extension workers are and a positive perception of farmers regarding extension workers' attitude and professionalism can be seen as a strong indicator of the motivation and dedication of these extension workers (Ura et al. 2012).

3.4 Respondent's perception of the impact of extension service delivery

First component: Impact on farm management

The first component loaded four items associated with the impact of services on farm management and explained 20.83% of the variance. The respondents typically obtained information related to markets and market-related issues from fellow farmers and news outlets rather than seeking guidance from extension services as evidenced by a low average rating. Likewise, respondents expressed the perception that extension workers were not actively involved in conducting programs aimed at enhancing the skills of farmers.

This implies that there may be a gap in terms of skill-building initiatives provided by extension services (Table 3). Farmers need to make decisions daily to counter issues on farms such as disease outbreaks, inadequate management practices, and a lack of resources. However, the extension workers were not perceived as actively assisting farmers in the decision-making process for these critical matters (Table 3). Respondents believed that extension workers did not effectively provide information about new advancements in farming practices (Table 3). This finding collectively suggests that the impact of extension services on enhancing farm management may be limited in terms of knowledge on marketing, technical skill development, and sharing advancements in the field. To address these, it is recommended that extension services adopt a more demand-driven approach which can render services that are more responsive to their need and efforts should be made to train farmers in technical-skill development. For instance, unlike Thimphu, some farmers in Samtse were trained in performing AI (CAIT) which improved the availability of AI services in their villages.

Second component: Impact on-farm productivity

This component loaded three items associated with the impact of extension services on farm productivity explaining 20.76% of the variance. With the availability of services such as vaccination and treatment of animals, farmers stated that heavy livestock losses are often reduced. As a result, the farmers mentioned that these

Table 3: Respondent's perception of the impact of extension service delivery

Impact of extension service	Factor loadings	% of variances	Rating (Mean ± SD)
First component: Impact on farm management			
Livestock extension services helped me effectively understand the market and marketing issues.	0.774		2.49 ± 0.98
Livestock extension services provide opportunities for skill development.	0.670	20.829	2.74 ± 1.07
Livestock extension services have empowered my farm decision-making process.	0.610		2.34 ± 0.90
Livestock extension services provide information on new advancements in the field.	0.559		2.83 ± 1.07
Second component: Impact on-farm productivity			
Livestock extension services play a vital role in increasing livestock production.	0.942		3.70 ± 0.81
The services provided by the livestock extension have improved farm profitability and income generation.	0.930	20.762	3.67 ± 0.94
Livestock extension service providers visit the farms consistently.	0.894		2.97 ± 1.10
Third component: Impact on the knowledge base			
Livestock extension services are conducting a need-based training program.	0.935	17.997	3.17 ± 1.11
The livestock extension services have helped acquire a distinguished increment in knowledge among farmers.	0.918		3.42 ± 1.22

livestock extension services help to improve livestock productivity. This is also evident from the fact that extension workers visited the livestock farms consistently (Table 3), indicating an active and ongoing presence in the field. Taken together, these findings suggest that livestock extension services have a positive impact on farm productivity and income generation.

Third component: Impact on the knowledge base of farmers

The third component loaded two items associated with the impact of services on the knowledge base of farmers and explained 18.00% of the variance. This component revealed important insights regarding the knowledge-enhancing aspects of these services. The trainings and advocacies on the management of farms including vaccination, mutilation procedures as well as animal stocking, housing conditions for animals, and biosecurity measures were conducted by the extension workers. In Samtse, some of the farmers were trained in performing artificial insemination (CAIT) and this enhanced the availability of AI services in the community. Additionally, information on the selection of the best breed of animal and animal health (awareness on outbreak of diseases and biosecurity measures) was provided. These indicators collectively express that livestock extension services are linked to an increment in the knowledge base of farmers.

3.4. Respondent's perceived constraints to the effectiveness of extension service delivery

There was a significant difference (p <0.05) between the two districts regarding the perceived constraints to effective extension services (Table 4). In particular, the majority of the respondents, especially those from Thimphu, highlighted two critical constraints to effective service delivery. One

Table 4: Respondents' perceived constraints to livestock extension service delivery (%)

Perceived constraints	Yes	No	Don't know	*p*-value
Improper planning of the extension program				
Thimphu	87.2	12.8	-	
Samtse	70.8	27.0	1.1	0.01
The large scope of the area to be covered by extension worker				
Thimphu	95.3	2.3	2.3	
Samtse	70.8	24.7	4.5	0.00
Insufficient extension personnel				
Thimphu	91.9	8.1	-	
Samtse	76.4	22.5	1.1	0.01
Inadequate extension equipment				
Thimphu	84.9	7	8.1	
Samtse	73	22.5	4.5	0.01
Lack of motivation				
Thimphu	32.6	64	3.5	
Samtse	23.6	76.4	-	0.05
Insufficient funds from the government				
Thimphu	68.6	31.4	-	
Samtse	70.8	23.6	5.6	0.05
Lack of dissemination of information				
Thimphu	54.7	44.2	1.2	
Samtse	64	34.8	1.1	0.46

is the vast areas that extension workers had to cover and the other is a limited number of extension workers (typically one to two per gewog) (Table 4). This constraint was particularly concerning, as it meant that extension workers had to manage extensive territories, leading to increased workloads and potential burnout. Such conditions could adversely affect the quality of service delivery (Giginyu and Bala, 2020).

Respondents from Thimphu also expressed greater concerns about improper planning of extension programs and inadequate extension equipment compared to those in Samtse ($p < 0.05$). They mentioned the need for adequate extension equipment, citing instances where services like AI were affected by the unavailability of equipment. Furthermore, concerns were raised about pay revisions that excluded travel and daily expenses for extension workers, which, as noted in Maoba's (2016), could impact farm visits by extension workers. Insufficient funds from the government (Thimphu, 60.8%; Samtse, 70.8%) and lack of dissemination of information (Thimphu, 54.7%; Samtse, 64%) were also perceived as constraints to the delivery of services and these perceptions did not differ significantly between the two districts ($p > 0.05$). Respondents indicated that information on emerging advancements, such as sex-sorted semen technology, oestrus synchronization, and AI in pigs, was not readily available. Interestingly, respondents from both Thimphu and Samtse districts (Thimphu, 64%; Samtse, 76.4%) did not consider a lack of motivation among extension workers to be a constraint to the effectiveness of livestock extension service delivery, likely due to the established rapport between farmers and extension workers.

4. CONCLUSIONS

The overall perception of farmers regarding the quality of extension services, encompassing aspects such as service provision, accessibility, timeliness, and the attitude and professionalism of extension workers, was positive in both Thimphu and Samtse districts, reflecting trust, effective communication, and motivation for active engagement between farmers and extension workers. There is a potential influence of service utilization patterns on farmers' perceptions. For instance, there was a notable association between the frequency of availing services and farmers' perceptions. Further investigation may be warranted to better understand the factors contributing to this observed difference. In terms of perception of the impact of service delivery, enhancing farm management may be limited in terms of knowledge on marketing, technical skill development, and sharing advancements in the field for instance sex-sorted semen technology, oestrus synchronization, and AI in pigs. While the overall perception of farmers concerning the delivery of extension services was favorable, disparities in perception emerged regarding the constraints to extension service delivery between the two districts. Commonly cited constraints included inadequate program planning and a shortage of extension personnel to cover extensive geographic areas. This underscores the need for adaptive and responsive extension programs that align with evolving farmer needs and regional challenges.

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