



Pant Agri Smart: A Digital Livestock Advisory Platform for Improving Access to Information and Decision-Making

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Abstract

Livestock farming plays an important role in strengthening rural livelihoods and household income, particularly among small and marginal farmers. However, limited access to timely and reliable livestock information often affects farmers' ability to manage animal health, nutrition, breeding, and disease prevention effectively. In this context, the Pant Agri Smart application was developed as a digital livestock information and advisory platform to provide farmers with timely, need-based and expert-supported information. The present study was undertaken to assess the types and relative importance of livestock information provided through Pant Agri Smart. Information was collected from livestock farmers using a structured interview schedule, and the responses were analysed using mean score, standard deviation and mean rank. The findings revealed substantial improvement across all the assessed indicators after exposure to Pant Agri Smart. Overall, the proportion of respondents demonstrating the assessed livestock knowledge, access and decision-making indicators increased from 22.1 per cent before using the platform to 74.2 per cent after its use, showing an improvement of 52.1 percentage points. The highest improvement was observed in access to expert livestock advisory services (57.0 percentage points), followed by the use of mobile phones for livestock-related information (54.5 percentage points). Knowledge of scientific livestock management, balanced feeding practices, vaccination and disease prevention also showed considerable improvement. Confidence in making livestock management decisions increased by 49.5 percentage points. Image-based livestock problem reporting, emergency/first-level information, breeding and reproductive management, and housing and sanitation information also received favourable responses. The findings indicate that Pant Agri Smart provides information covering major dimensions of livestock management, with greater emphasis on animal health and preventive care. The study highlights the potential of digital platforms such as Pant Agri Smart in improving farmers' access to timely livestock information, supporting informed decision-making, and contributing to improved livestock management and productivity.

Keywords: Animal Health, Beta-casein, Crossbreed, Digital Agriculture, Digital Livestock Advisory, Exotic Cattle, Farmers, ICT, Indigenous Cattle, Livestock Information, Pant Agri Smart.

Introduction

Livestock is an integral component of the rural economy and contributes significantly to income generation, employment, food and nutritional security and livelihood diversification. (Sharma *et.al*, 2020). Small and marginal farmers frequently depend on dairy animals, goats, poultry and other livestock enterprises as complementary or alternative sources of income (Sharma and Kashyap, 2014). Despite its importance, livestock productivity is often constrained by inadequate knowledge regarding scientific feeding, disease prevention, vaccination, breeding, housing, sanitation and animal management. One of the major challenges faced by livestock farmers is the limited availability of timely and credible technical information. Conventional extension systems are valuable but may not always provide immediate advisory services when farmers encounter an animal health or management problem. (Sharma and Hasan, 2012). The increasing penetration of smartphones and mobile internet has created new possibilities for delivering agricultural and livestock information directly to farmers. Digital agricultural extension can provide information in a timely, accessible and farmer-friendly manner. (Sharma and Kashyap, 2013) Mobile applications can integrate text, photographs, videos, audio messages, expert advice and interactive communication within a single platform. Such systems can be particularly useful for livestock farmers because several livestock-related decisions are time-sensitive. (Sharma and Kumar, 2012).

The Pant Agri Smart platform, developed as a mobile-based agricultural information and advisory initiative, provides an opportunity to expand digital advisory services beyond crop production. (Kandpal, 2023). By incorporating a dedicated livestock module, the platform can develop into an integrated digital knowledge system for crop-livestock farming communities (Sharma, 2021). The proposed study may be undertaken with the following objectives:

1. To provide expert-validated livestock information through a farmer-friendly mobile interface.
2. To explore the feasibility of image-based livestock problem reporting through the mobile application.
3. To assess farmers' access to and perceived usefulness of digital livestock advisory services.
4. To examine the potential contribution of the digital advisory system towards improving livestock management and farmers' decision-making.

Materials and Methods

The study was conducted in Udham Singh Nagar district of Uttarakhand to assess the effectiveness and perceived usefulness of the Pant Agri Smart Livestock Advisory System. A total of 200 livestock farmers were selected as respondents for the study. Primary data were collected using a structured interview schedule covering livestock-related knowledge, access to expert advisory services, use of mobile phones for livestock-related information, confidence in livestock management decision-making, and perceived usefulness of different components of Pant Agri Smart. The responses of the farmers were assessed before and after exposure to the Pant Agri Smart platform. The collected data were coded, tabulated and analysed using appropriate statistical techniques. Frequency and percentage were used to analyse the responses, while mean score, standard deviation and mean rank were used to assess the perceived usefulness of different advisory components. The change in the assessed indicators before and after exposure to Pant Agri Smart was calculated in percentage points. The proposed Pant Agri Smart Livestock Advisory System will follow a farmer–digital platform–expert–advisory feedback model.

Farmer → Problem Identification → Mobile App → Information/Image Submission → Expert/Subject Matter Specialist → Advisory/Recommendation → Farmer Action → Feedback

The system can therefore function as an interactive rather than merely an information-dissemination platform.

Results and Discussion

The findings presented in Table 1 indicate a substantial improvement in farmers' knowledge, access to livestock advisory services and decision-making ability after exposure to the Pant Agri Smart Livestock Advisory System. The overall proportion of respondents having adequate knowledge and access to livestock-related information increased from 22.1 per cent before using the application to 74.2 per cent after using it, showing an overall improvement of 52.1 percentage points.

Table 1: Comparison of Livestock Knowledge and Decision-Making Indicators Before and After Exposure to Pant Agri Smart

S. No.	Indicator	Before Using Pant Agri Smart n (%)	After Using Pant Agri Smart n (%)	Change (% Point)
1	Knowledge of scientific livestock management	42 (21.0)	148 (74.0)	53
2	Knowledge of balanced feeding practices	51 (25.5)	156 (78.0)	52.5
3	Knowledge of vaccination and disease prevention	46 (23.0)	151 (75.5)	52.5
4	Knowledge of common livestock diseases and symptoms	39 (19.5)	143 (71.5)	52
5	Knowledge of breeding and reproductive management	44 (22.0)	137 (68.5)	46.5
6	Knowledge of scientific housing and sanitation	58 (29.0)	161 (80.5)	51.5
7	Ability to identify early symptoms of livestock problems	35 (17.5)	139 (69.5)	52
8	Access to expert livestock advisory services	31 (15.5)	145 (72.5)	57
9	Use of mobile phone for livestock-related information	49 (24.5)	158 (79.0)	54.5
10	Confidence in making livestock management decisions	47 (23.5)	146 (73.0)	49.5
	Overall	44.2 (22.1)	148.4 (74.2)	52.1

The highest improvement was observed in access to expert livestock advisory services, which increased from 15.5 per cent before using Pant Agri Smart to 72.5 per cent after its use, representing an improvement of 57.0 percentage points. This was followed by the use of mobile phones for livestock-related information, which increased from 24.5 to 79.0 per cent, showing an improvement of 54.5 percentage points. Knowledge related to scientific livestock management also increased considerably, from 21.0 per cent before using the application to 74.0 per cent after its use, resulting in an improvement of 53.0 percentage points. Similarly, knowledge of balanced feeding practices increased from 25.5 to 78.0 per cent, while knowledge of vaccination and disease prevention increased from 23.0 to 75.5 per cent, with improvements of 52.5 percentage points in both indicators. A considerable improvement was also observed in farmers' knowledge of common livestock diseases and their symptoms, increasing from 19.5 to 71.5 per cent, an improvement of 52.0 percentage points. The ability to identify early symptoms of livestock problems increased from 17.5 to 69.5 per cent, also showing a 52.0 percentage-point improvement. Knowledge of scientific housing and sanitation increased from 29.0 to 80.5 per cent, representing a 51.5 percentage-point improvement.

The improvement in confidence in livestock management decision-making was from 23.5 to 73.0 per cent, indicating a gain of 49.5 percentage points. Similarly, knowledge of breeding and reproductive management increased from 22.0 to 68.5 per cent, showing an improvement of 46.5 percentage points, which was the lowest improvement among the indicators studied, although the gain was still substantial.

Overall, the results suggest that the Pant Agri Smart Livestock Advisory System can play an important role in improving farmers' access to livestock-related information and strengthening their knowledge and confidence in livestock management. The relatively high improvement across almost all indicators indicates the potential of a mobile-based, expert-supported advisory system as an important component of digital agricultural extension and livestock development.

The findings indicate that Pant Agri Smart has considerable potential as a digital livestock advisory platform for strengthening farmers' access to timely livestock information and improving their knowledge and decision-making confidence. The highest improvement in access to expert livestock advisory services suggests that digital platforms can help bridge the gap between farmers and technical experts, particularly when timely guidance is required. The marked improvement in the use of mobile phones for livestock-related information further indicates the growing relevance of mobile-based communication in livestock extension. Improvements in knowledge related to scientific livestock management, balanced feeding, vaccination, disease prevention, housing and sanitation suggest that need-based digital advisory can support farmers in adopting more informed livestock management practices. The improvement in confidence in livestock decision-making further indicates the potential of expert-supported digital communication to complement conventional extension services. These findings support the role of ICT-enabled extension approaches in making livestock advisory services more accessible, timely and farmer-oriented, particularly in situations where immediate access to field-level technical guidance may be limited.

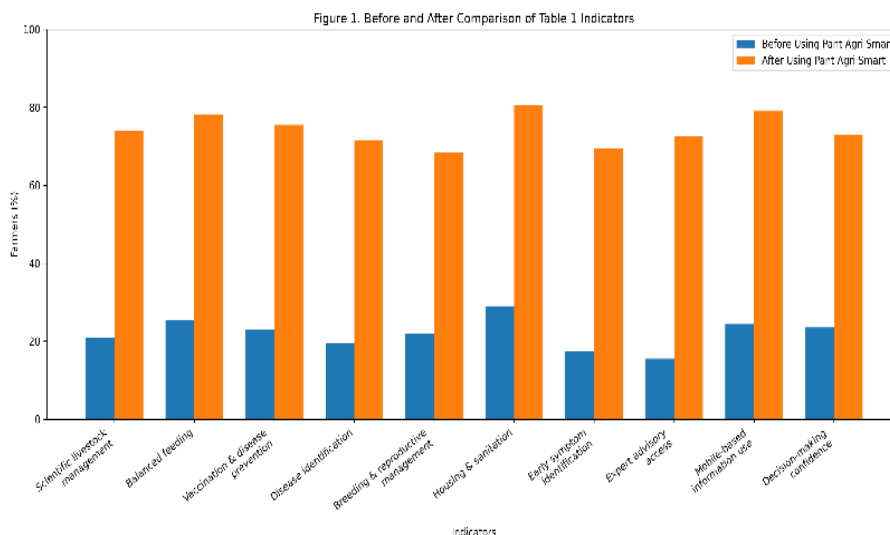


Table 2: Farmers' Perceived Usefulness of Different Components of Pant Agri Smart Livestock Advisory System

S. No.	Advisory Component	Mean Score	SD	Mean Rank	Rank
1	Disease identification and prevention	2.62	0.58	6.21	I
2	Vaccination information	2.57	0.61	5.83	II
3	Feeding and nutrition advisory	2.53	0.63	5.47	III
4	Expert advisory/feedback	2.51	0.64	5.31	IV
5	Image-based livestock problem reporting	2.48	0.67	5.08	V
6	Emergency/first-level advisory information	2.46	0.66	4.91	VI
7	Breeding and reproductive management	2.43	0.68	4.68	VII
8	Housing and sanitation practices	2.40	0.70	4.51	VIII

The perceived usefulness of different advisory components of Pant Agri Smart was assessed using a three-point rating scale, where 3 = highly useful, 2 = useful, and 1 = less useful. A mean score was calculated for each advisory component based on the responses of the farmers. Higher mean scores indicated greater perceived usefulness of the respective advisory component. Standard deviation was used to assess the variation in responses. Mean ranks were calculated to determine the relative importance of the different advisory components, with Rank I representing the highest perceived usefulness and subsequent ranks indicating lower relative importance.

The findings presented in Table 2 show the types of livestock information provided through Pant Agri Smart and their relative importance as perceived by the respondents. Information on disease identification and prevention received the highest mean score (2.62) and mean rank (6.21), securing Rank I. This indicates that disease-related information was the most important and frequently valued information among the respondents. The SD of 0.58 indicates relatively low variation in the responses.

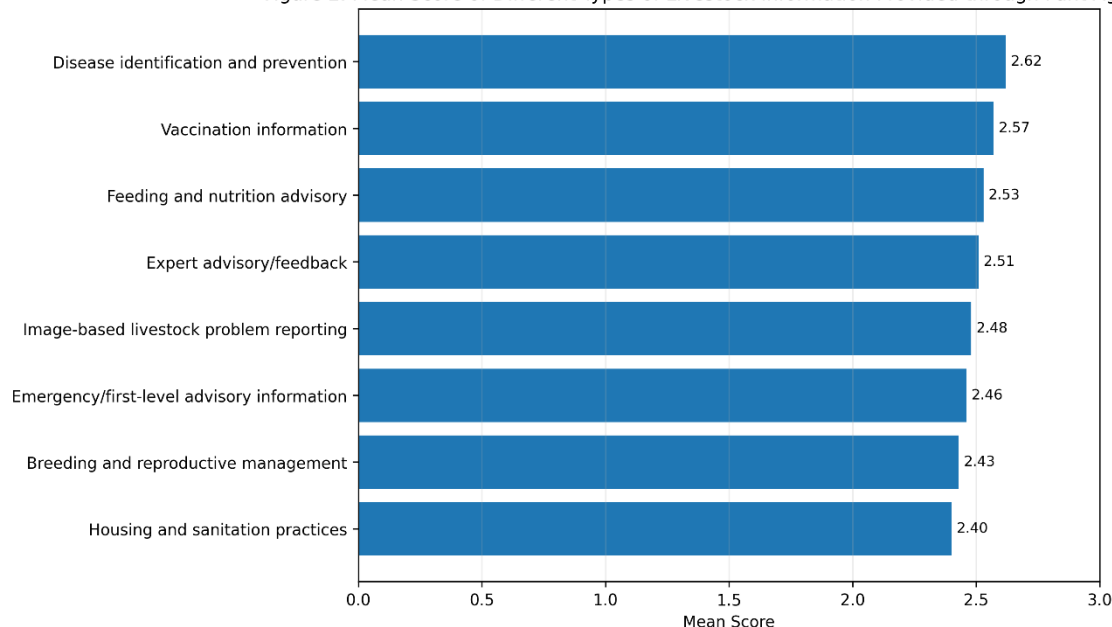
Vaccination information ranked second, with a mean score of 2.57, SD of 0.61, and mean rank of 5.83. This suggests that farmers considered information on vaccination schedules and preventive animal healthcare highly useful. Information on feeding and nutrition ranked third (mean = 2.53, SD = 0.63, mean rank = 5.47), indicating the importance of information related to proper feeding practices and nutritional management.

Expert advisory/feedback occupied the fourth rank (mean = 2.51, SD = 0.64, mean rank = 5.31), demonstrating the usefulness of expert-based information for addressing livestock-related problems. Image-based livestock problem reporting ranked fifth (mean = 2.48, SD = 0.67, mean rank = 5.08), indicating that respondents valued the facility of sharing images of livestock problems for obtaining appropriate information or feedback.

Emergency/first-level information ranked sixth (mean = 2.46, SD = 0.66, mean rank = 4.91), followed by breeding and reproductive management information, which ranked seventh (mean = 2.43, SD = 0.68, mean rank = 4.68). Housing and sanitation information received the eighth rank, with a mean score of 2.40, SD of 0.70, and mean rank of 4.51.

Overall, the findings indicate that Pant Agri Smart provided information covering major aspects of livestock management, with disease identification and prevention, vaccination, and feeding and nutrition emerging as the most important information areas. The relatively small differences in mean scores suggest that respondents found all the information categories useful. The results also highlight the potential of the platform to provide timely, need-based and expert-supported livestock information, particularly in the areas of animal health and preventive management.

Figure 2. Mean Score of Different Types of Livestock Information Provided through Pant Agri Smart



Conclusion

The findings indicate that Pant Agri Smart provides useful and need-based livestock information covering major aspects of livestock management. Among the different types of information, disease identification and prevention received the highest priority, followed by vaccination information and feeding and nutrition information. Information related to expert feedback, image-based problem reporting, emergency care, breeding and reproductive management, and housing and sanitation was also valued by the respondents.

Overall, the results demonstrate that Pant Agri Smart has considerable potential as a digital livestock information and advisory platform, particularly for improving farmers' access to timely information on animal health, preventive care, nutrition, and expert guidance. The platform can therefore contribute to better livestock management, improved decision-making, and enhanced livestock productivity among farming communities.

Contribution by Authors

All the authors contributed equally to writing the manuscript. The final manuscript was read by all authors and consented to publication.

Conflict of Interests

There is no conflict of interest.

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