

INFORMATION NEEDS OF LIVESTOCK FARM FAMILIES: A CASE STUDY OF MULTAN

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ABSTRACT

In Pakistan, a country primarily reliant on agriculture with 62% of its population residing in rural areas, the agricultural sector, particularly the dairy industry, plays a crucial role, contributing significantly (60.6%) to both agriculture and the national GDP. Despite being the world's fourth-largest milk producer, Pakistan faces a production gap compared to countries like the USA, Germany, and New Zealand, attributed to a lack of awareness about modern dairy practices. This study, titled "Information Needs of Livestock Farm Families: A Case Study of Multan," aims to identify and address this gap. The population of the study was 303 (registered farmers of five randomly selected villages). The sample size was 101, that was calculated by using online sample size calculator www.qualtrics.com, while keeping the Confidence Level of 95% and Margin of Error 8%. A Well-designed interview schedule was used to collect the data. Collected data were analyzed by using software Statistical Package for Social Sciences (SPSS). Results showed that in the study area, mostly aged farmers were engaged in Livestock farming, they were illiterate and were relying on traditional practices due to limited exposure to modern methods. Farmers had small herd sizes, low technology adoption, and concerns about marketing. It indicates a need for targeted interventions to improve access to information, education, and technological resources within the farming community. Based on the study's findings, it is imperative to educate farmers through livestock extension activities, ensuring they are easily accessible. Additionally, ensuring information availability through the use of the internet and mobile phones highlights the need for reliable internet access in rural areas.

Key Words: Information, Livestock, Farmers, ICTs

INTRODUCTION

Pakistan is an agriculture-based country, with approximately 62% of its population residing in rural areas. A significant portion of the population is directly or indirectly involved in agriculture. When discussing the country's economy, agriculture plays a crucial role. The dairy sector contributes significantly to agriculture (60.6%) and also supports the national GDP (Mehmood et al., 2022). Pakistan

earns a substantial amount through the export of livestock products and by-products. With a vast herd size, the country ranks second among buffalo herd owners, eighth among cattle herd sizes, and third among goat herds globally (Rana et al., 2021).

Pakistan is one of the leading producers of milk, ranking as the fourth largest milk producer in the world after India, China, and the USA (Raza et

al., 2012), with an estimated production of 52.632 million tons annually (Government of Pakistan, 2015). However, the total milk production of the country does not meet domestic human needs (Government of Pakistan, 2009). Although milk production in Pakistan has increased in recent years, this increase is not primarily due to productivity per animal but rather due to an increase in the total number of animals (Shahid et al., 2012; Ahmad et al., 2012).

The production per animal in Pakistan is low compared to other countries such as the USA, Germany, and New Zealand. For instance, in New Zealand, one dairy animal produces milk equal to three dairy animals in Pakistan, while in Germany, one dairy animal produces milk equivalent to six dairy animals in Pakistan. Moreover, seven dairy animals in Pakistan produce milk equal to the milk produced by one animal in the USA (Khan et al., 2013). This gap exists due to a lack of information regarding recommended dairy production practices. In this modern era, the provision of information necessary for enhanced dairy production could be achieved through the effective use of Information Technologies.

One of the major causes of low production is the lack of proper extension services, hence the non-adoption of improved livestock technologies among livestock farmers. The current production level of livestock is quite low. The government's inadequate allocation of both development and non-development funds to this sector and the scarcity of suitably trained manpower are some of its major constraints (Ullah, 1998). Farooq and Qudoos (1999) reported unawareness about new livestock technologies, lack of capital, and high prices of inputs as the major constraints in the adoption of modern livestock practices.

Agricultural information sources serve as pivotal agents in knowledge dissemination within the farming community. Farmers employ a diverse array of information channels, encompassing traditional and contemporary modalities such as extension field staff, peer farmers, private sector entities, electronic media, print media, and information communication technology (ICT) devices, to acquire current and pertinent information essential for optimizing agricultural productivity (Yaseen et al., 2021).

Information and communication technology boost the process of learning mostly in farming society. Farmers find the information they need through different types of literature published or concerned

with mass media like television and other information sources. For example, audio and video cassettes are very important instruments that help in the learning process. ICTs have great potential to improve the education and learning of farmers (Khan, 2012). Information and communication technology are improving extension services delivery, with extension workers having easy access to their targeted farmers. The success of utilizing ICTs depends on the expertise of extension workers in using these technologies. With the use of these technologies, farmers can easily access the market and know the price of their products in the market (Umar, 2015). ICTs have played an important role in the healthcare of animal farmers in remote areas where livestock extension services cannot be reached. They are accessed with the help of communication technologies. Extension workers from their offices contact farmers to understand the problems they face regarding livestock production, marketing, and management, and solve these problems by giving them good advice and practices for controlling production, marketing, and livestock management difficulties (Burney, 2010).

Providing farmers with useful information is crucial for making agriculture better and improving the lives of rural farmers. However, there are challenges from both farmers and sources of information that can limit the impact of this agricultural information (Naveed et al., 2012).

Many farmers in Pakistan are either illiterate or less educated. They stick to traditional livestock farming techniques due to a lack of awareness about the latest farming methods. Consequently, morbidity and mortality rates are high among animals, especially in case of sudden disease outbreaks. There is a dire need to develop disease management systems and educate farmers about innovative livestock farming methods (Asad et al., 2023).

Objectives of the study:

1. To identify the socio-economic attributes of the respondents
2. To identify the information need of livestock farmers
3. To check the sources of information used by the farmers
4. To probe out reasons for poor utilization of Information sources by farmers.

Need for the study:

It is necessary to improve the dairy sector to fulfill the increasing demand. The high participation of both men and women, young and old, in various dairy production practices shows the importance of this sector in supporting and nurturing family labor. The government of Pakistan has prioritized the dairy sector for development. However, the sector does not currently show high potential due to various factors associated with dairy farmers. Factors such as information and communication technology (ICT) illiteracy and the lower interest of aged dairy farmers in advanced dairy practices hinder the adoption of recommended dairy production practices.

To address these challenges, it is crucial to increase the knowledge of dairy farmers and improve their decision-making abilities regarding the latest technologies and improved livestock activities. This can be achieved through various sources of information and media. Sustainable development of farmers is not possible without access to correct and reliable information. Dairy farmers require information related to innovative dairy production practices and market updates regarding aspects such as nutrition, disease treatment and control, new breeding techniques, and other management practices. Providing this information to dairy farmers can help improve their productivity, ultimately enhancing their living standards and boosting the economy.

There are different types of accessible ICTs that can be used by livestock farmers, including landline telephones, radio, television, mobile phones, and the Internet (which is assumed to be used on a computer). The utilization of these information and communication technologies can greatly assist in disseminating various types of information needed by farmers and improve their knowledge base.

The present study was designed to understand the information sources accessed by farmers, the purpose of accessing these sources of information, and the reasons for not adopting these information sources.

Methodology:

This section delves into the methods and tools employed for gathering, analyzing, and interpreting data pertinent to the present study. It encompasses discussions on the research area, techniques utilized, sampling procedures, pre-testing methodologies,

interviewing the respondents, as well as the challenges encountered during the data collection process.

Study area

The researcher has conveniently selected Multan District for the study. Multan holds significant importance, being blessed with productive irrigated land. It plays a crucial role in agricultural production, encompassing both crops and livestock sectors. Moreover, its significance is underscored by the presence of agro-based industries such as textiles, sugar, and flour, contributing significantly to the country's economy.

Geographically, Multan Division is situated between north latitude 29'-22' and 30'-45', and east longitude 71'-4' and 72'-4'55'. It occupies a strategic location, nestled within a bend formed by five confluent rivers. The Sutlej river marks its boundary with Bahawalpur District, while the Chenab river delineates its border with Muzaffargarh District.

District Multan spans over an area of 3,721 square kilometers, comprising the following four tehsils: Multan, Shujabad, Jalalpur Pirwala, and Kabirwala.

Research Population

All farmers residing in the study area constitute the population of the study. To maximize the benefits of the research, a sample of the population was chosen for the study. Due to the large size of the population, testing each individual is often impractical, expensive, and time-consuming. Therefore, a representative sample was selected for analysis.

Sample Size

For the purpose of the study, five villages from Tehsil Multan were selected randomly. The list of registered farmers in these villages was obtained from the Livestock and Dairy Development Department, totaling 303 livestock farmers. The sample size was calculated by using online sample size calculator www.qualtrics.com, while keeping the Confidence Level of 95% and Margin of Error 8%. The calculated sample size was 101.

Furthermore, the number of farmers selected from each village was determined using proportionate sampling, as outlined below:

Villages	No. of Registered Farmers	Sample Farmers
Village -1	81	27
Village- 2	50	17
Village-3	64	21
Village-4	70	23
Village-5	38	13
Total	303	101

Data Collection Tool

In accordance with the objectives of the study, a meticulously organized questionnaire was developed with the assistance of experts. The questionnaire was carefully structured to elicit all the necessary information from the respondents.

Interviewing the respondents

Interviews were conducted with the respondents to gather factual information. The investigator personally conducted each interview to ensure unbiased responses. Subsequently, each questionnaire was meticulously reviewed for accuracy and uniformity. This was essential as it was challenging to approach the same respondent at any subsequent stage.

Analysis of data

The collected data were analyzed using the Statistical Package for Social Sciences (SPSS). Descriptive statistics, such as means, standard deviations, and standard errors, were computed from the collected data. Additionally, for ranking purposes, weighted scores and means were calculated.

Difficulties faced during Research

The researcher encountered certain unavoidable difficulties during the data collection period. Data collection proved challenging in cases where respondents were illiterate. Despite the researcher's efforts to explain the purpose of the study, some farmers remained suspicious about its nature, particularly when asked about sensitive information such as the size of their land holdings and sources of income.

Concerns arose among some respondents who feared that providing information could lead to potential government imposition of new taxes. Assurances that their information would be kept confidential, with only the study's conclusions published for educational purposes, helped alleviate the suspicions of these farmers.

Moreover, transportation facilities in most villages were underdeveloped, with many villages lacking access to main roads. This posed significant challenges for researchers attempting to reach respondents residing in these remote villages.

Results and Discussion

Table 1: Socio-economic attributes of the farmer

Socio-economic attributes of the farmer					
Age	f	%	Sources of income	F	%
≥30	11	10.9	Livestock farming only	17	16.8
30-40	43	42.6	Crop farming & livestock farming	67	66.3
40-50	26	25.7	Livestock+ business	12	11.9
50	21	20.8	Livestock farming + service	5	5.0
Education			Structure of shed		
<= 0	41	40.6	Kacha	28	27.7
1 – 5	25	24.8	Mix	60	59.4
6 – 8	12	11.9	Pakka	13	12.9
9+	23	22.8	Water sources		
Herd Size			Hand pump	30	29.7
<= 4	22	21.8	Canal + Hand Pump	26	25.7
5 – 8	53	52.5	Canal	2	2.0
9 – 12	19	18.8	Motor Pump+ Tap	2	2.0
13+	7	6.9	Motor Pump+ Canal	1	1.0

Shed Area (Marlas)			Motor Pump	40	39.6
<= 3	13	12.9	Style of Livings of Animals		
4 – 6	37	36.6	Are the animals tied?		
7 – 9	27	26.7	Yes	95	94.1
10+	24	23.8	No	6	5.9

Table 1 illustrates that less than half (42.6%) of the respondents were between 31-40 years of age, while only one-tenth (10.9%) fell below the age of 30. Rehman et al. (2011) found similar results regarding the age distribution of respondents, with approximately half (45%) falling within the 40-50 age category.

Regarding education, it was observed that more than half (40.6%) of the respondents were uneducated, and only one-tenth (11.9%) had education between 6th and 8th grade. This finding aligns with Bukhsh's (2010) study, which reported that one-fourth of respondents had education up to middle school, while over one-third were illiterate, with 12.5% having primary education and 23% possessing metric or higher education.

In terms of livestock management, over half (52.5%) of the farmers had herd sizes ranging from 5 to 8 animals, while only 6.9% had more than 13 animals. Akhtar (2005) highlighted the importance of both large and small ruminants for various aspects of agriculture and household security.

Regarding housing, a majority (59.4%) of respondents had mixed-type houses, while approximately one-tenth (12.9%) lived in pakka-type houses. The overwhelming majority (94.1%) of farmers kept their animals tied, while a small percentage (5.9%) allowed their animals to roam freely.

In terms of water sources for animals, about one-third (39.6%) of farmers used motor pumps, while only 1% used a combination of motor pumps and canals. Additionally, one-fourth (25.7%) used a combination of canals and pumps. Jahangir et al. (2000) noted variations in water source preferences based on factors such as geographical location and economic status.

Sources of Information

The larger the network, the greater the spread of information. Multinational companies often exhibit higher efficiencies compared to indigenous ones. Progressive farmers serve as role models for smallholders and successors, as they adopt the best available technologies driven by their interest.

Consequently, they become primary sources of disseminating information.

The Agriculture Department (Extension) plays a vital role by publishing and distributing paper materials and conducting field meetings with farmers to introduce site-specific technologies based on the latest recommendations. Non-governmental organizations (NGOs) also contribute significantly by implementing projects funded by international and national agencies, particularly in rural areas. Numerous NGOs operate at the grassroots level, addressing various agricultural and social issues.

The invention of television has transformed the world into a global village, providing access to diverse information through multiple channels. Farmers often rely on television for breaking news and other informative content. Additionally, farmers seek advice from veterinary doctors to enhance animal health and milk production, making them another source of information dissemination.

Although farmers may have limited access to newspapers due to high illiteracy rates, some exposure to print media exists. In the digital age, mobile phones play a crucial role in sharing information among common people, including farmers. Radio remains relevant, especially in rural areas, where it is utilized in local languages to deliver programs comprehensible to villagers.

However, internet access is limited in many remote areas of Pakistan, posing a challenge to information dissemination. Efforts are needed to address this issue and leverage the internet as another valuable source of information transmission.

Table 2: Sources of Information used by Livestock Farmers in the study area

Information sources	Mean	SE	SD	WS	Rank
Personal Information Sources					
Farmer meetings	2.13	0.077	0.770	215	1
Personal Observation	2.08	0.075	0.757	210	2
Fellow farmers	1.93	0.062	0.621	195	3
Impersonal Information Sources					
Mobile phone	1.91	0.095	0.950	193	4
TV	1.90	0.085	0.854	192	5
Livestock extension department	1.38	0.093	0.936	139	6
Radio	1.01	0.086	0.866	102	7
Newspapers	0.72	0.090	0.907	73	8
Telephone	0.28	0.072	0.723	28	9
Magazines	0.23	0.061	0.615	23	10
Milk Processing companies	0.16	0.039	0.393	16	11
Internet	0.04	0.020	0.196	4	12
Brochures/Pamphlets	0.03	0.017	0.171	3	13

Table 2 illustrates that farmers' meetings, whether organized by the extension department or initiated by farmers themselves, ranked first (with a mean value of 2.13) as the most authentic and reliable source of information. Personal observations ranked second, based on farmers' statements and rankings. Farmers indicated that they consulted fellow farmers when facing difficult situations and obtained information from them, ranking this source third with a mean value of 1.93. Mobile phones ranked fourth among sources of information for farmers, with a mean value of 1.91. Similarly, television and pamphlets were tied in terms of importance for farmers, both with a mean value of 1.90, while pamphlets provided minimal information or sources of information for farmers (mean value 0.03). Farmers' responses indicated that the internet and brochures/pamphlets were the least important sources of information, as they had the lowest mean values compared to other sources.

A study conducted in Nigeria revealed that farmers utilized similar sources of information, including

extension field staff, fellow farmers, and radio (Opara, 2008). Conversely, in India, farmers obtained information from public sector extension departments, mass media, television, radio, newspapers, magazines, mobile phones, cyber extension, and NGOs (Sing et al., 2016). Different findings were reported by Panda et al. (2022), indicating that farmers exhibited the highest level of utilization of Information and Communication Technology (ICT), followed closely by mass media and extension agency contact. These preferences suggest that farmers' choices of information sources vary depending on their availability and complexity (Dewi et al., 2021).

In Ethiopia, farmers used several sources for obtaining livestock-related information, including extension agents, family members, neighbors, progressive farmers, radio, cell phones, printed material, meetings and conferences, television, consulting researchers, and input suppliers (Brhane et al., 2017).

Table 3: Information seeking behavior of farmers

Information Seeking	Mean	SE	SD	WS	Rank
Seeking Information about ICTs?					
Application	3.01	0.076	0.768	304	1
How/from where to get relevant information	2.74	0.078	0.783	277	2
How to operate	2.62	0.061	0.614	265	3
Utilization	2.59	0.068	0.681	262	4
Access/availability	2.27	0.052	0.527	229	5

Seeking information about Livestock production					
Marketing of livestock products	3.61	0.090	0.905	365	1
Health of animals	3.26	0.086	0.868	329	2
Shed management	2.46	0.101	1.015	248	3
Breeding practices	2.27	0.090	0.904	229	4
Feeding	2.24	0.073	0.737	226	5
Sanitation	2.09	0.097	0.971	211	6

Table 3 indicated farmers response Regarding ICTs, the majority of farmers (with a mean value of 3.01) expressed a desire for training in the application of these technologies. Following closely, farmers (with a mean value of 2.74) expressed interest in understanding where and how to obtain relevant information. Some farmers (with a mean value of 2.62) expressed a desire to learn how to operate ICT tools, while seeking knowledge about the accessibility and availability of information sources ranked last (with a mean value of 2.27).

In terms of livestock production, the majority of farmers (with a mean value of 3.61) expressed a desire for information about the marketing of livestock and their products. Some farmers (with a mean value of 3.26) sought information about the health of their herds, while information about

sanitation requirements was ranked lowest (with a mean value of 2.09).

In India, farmers sought similar information regarding livestock, including health, breeding, feeding, and management practices, as reported by Singh et al. (2016). However, Nwafor et al. (2020) found that prevailing market prices for livestock were crucial for 65% of respondents, while 18% emphasized the significance of information related to livestock auctions, and 17% considered contact details for livestock buyers or agents important. Additionally, Prasad and Ponraj (2016) stated that most farmers in India searched for information regarding balanced animal feeding, animal treatment, artificial insemination techniques, pregnancy diagnosis, deworming of calves, and clean milk production.

Table 4: Distributions of the respondents according to reasons for poor utilization of ICTs

Reasons	N	Mean	SE	SD	WS	Rank
Inadequate technical advice	98	2.97	0.084	0.831	291	1
Lack of awareness	90	2.88	0.097	0.922	259	2
Complexity	92	2.78	0.074	0.708	256	3
Low quality	84	2.70	0.089	0.818	227	4
Un affordability	76	2.58	0.084	0.735	196	5
Personal disliking	42	2.64	0.189	1.226	111	6
Climatic condition	47	2.30	0.142	0.976	108	7
Social norms	27	2.22	0.172	0.892	60	8

Table 4 clearly indicates that the unavailability of adequate technical advice ranked first (with a mean value of 2.97) among the reasons for the poor utilization of ICTs, while lack of awareness about ICTs ranked second (with a mean value of 2.88). Conversely, social norms ranked last (with a mean value of 2.22) among the reasons for the poor utilization of information technologies.

A study conducted in India identified different reasons for poor utilization of information sources, including farmer literacy, language barriers,

incomplete information, doubt about information reliability, and lack of access to complete information (Singh et al., 2016). This suggests the need to tailor information sources according to farmers' mentality and education levels, as recommended by Nwafor et al. (2020). When planning information channels for smallholder livestock farmers, factors such as age, gender, education, social background, income differences, and accessibility to communication channels should be considered.

Similarly, Prasad and Ponraj (2016) noted that livestock farmers' information-seeking behaviors are influenced by socio-economic factors such as occupation and education. Extension contacts, mass media exposure, risk orientation, and cosmopolitaness-localiteness also play roles. However, age displays a negative correlation, indicating that younger farmers are more inclined to utilize various information sources.

Brhane et al. (2017) reported different challenges faced by smallholder farmers in Ethiopia, including inadequate infrastructure, limited access to ICT due to service fees, low interest, and insufficient user skills in seeking information. Rahman et al. (2020) highlighted factors affecting farmers' access to information sources in Bangladesh, including norms and perceptions, cost, awareness, low literacy levels, and poor infrastructure. Luqman et al. (2019) also identified various reasons for the poor or non-utilization of information sources by farmers.

Conclusion

The study reveals that Livestock practices in the surveyed area are predominantly led by elderly farmers with limited education, often lacking literacy skills. These farmers heavily rely on traditional livestock farming methods and sources of information due to their limited exposure to modern and scientific approaches. Additionally, the herd size per family is relatively small. The adoption of contemporary technologies, such as internet and mobile phones for accessing information, remains low due to factors like unawareness, illiteracy, social norms, and financial constraints. The findings highlight concerns among farmers, particularly regarding the marketing of livestock products. Many farmers in rural areas own animals primarily for self-consumption, and the long distances to urban centers make transportation challenging. Consequently, these farmers end up selling their dairy products to middlemen at lower rates. Furthermore, farmers express anxiety about obtaining essential information related to health, shed management, breeding practices, balanced feeding, and emergency preparedness for their animals. Addressing these concerns would likely require targeted interventions to improve access to information, education, and technological resources within the farming community.

Recommendation

1. It is essential to empower and support farmers in Pakistan by providing subsidies on inputs such as fodder seeds and farm machinery.
2. There is a need to enhance farmer education through the improvement of livestock extension department services, utilizing modern technologies like the internet and radio.
3. The government should establish fixed prices for livestock products and by-products to prevent the exploitation of farmers.
4. The government should monitor and regulate the supply chain of livestock products and by-products to ensure that farmers have easy access to markets for their products.
5. Livestock-related information, especially in emergencies, should be disseminated to farmers, emphasizing the importance of proper monitoring by the Livestock Department.

References:

- Ahmad, S., Hinch, G., Prior, J., Thomas, P. and Burrell, D. 2012. The role of extension in changing the dairy industry in Pakistan: a review. *The Journal of Animal and Plant Sciences*. 22: 113–116.
- Asad M, Qadeer S, Ashraf A, Ullah S, Riaz A, Ali K and Kausar S, 2023. Sustainable Goals for Achieving Disease Control in Livestock and Animal Industry. In: Khan A, Abbas RZ, Aguilar-Marcelino L, Saeed NM and Younus M (eds), *One Health Triad*, Unique Scientific Publishers, Faisalabad, Pakistan, Vol. I, pp: 182-189
- Asghar, S., Ashraf, I., Cabrera, V. E., Chaudhary, K. M., & Bilal, M. Q. (2021). Perception and Correlation of Dairy Cattle Farmers Concerning Electronic Media as a Source of Information in Punjab, Pakistan. *Dairy*, 2(3), 489-499.
- Brhane, G., Mammo, Y., & Negusse, G. (2017). Sources of information and information seeking behavior of smallholder farmers of Tanqa Abergelle Wereda, central zone of Tigray, Ethiopia. *Journal of Agricultural Extension and Rural Development*, 9(4), 47-52.
- Burney.A.M (2010) Information and Communication Technology in Healthcare Management Systems: Prospects for Developing .*Int.j.of Com. Applications*4(2).
- Dewi, N. M. A. K., Syahlani, S. P., & Haryadi, F. T. (2021). The choice of information sources and marketing channel of Bali cattle farmers in Bali Province. *Open Agriculture*, 6(1), 413-425.
- Farooq, M.K. and A. Qudoos. 1999. Constraints in the Adoption of Modern Livestock Practices. *Pakistan Vet. J.* 19: 53-55.

- Govt. of Pakistan. 2009. Economic survey. Economic Advisor's Wing, Finance Division, Government of Pakistan, Islamabad.
- Govt. of Pakistan. 2015. Economic survey. Economic Advisor's Wing, Finance Division, Government of Pakistan, Islamabad.
- Khan, M. J., A. Abbas, M. Naeem, M. M. Ayaz and S. Akhter. 2013. Current issues and future prospects of dairy sector in Pakistan. *Science. Technology and Development*, 32: 126-39.
- Khan, M. S. H., 2012. Barriers to the introduction of ICT into education in developing countries: the example of Bangladesh.
- Mehmood, H. Z., Afzal, H., Abbas, A., Hassan, S., & Ali, A. (2022). Forecasts about livestock production in Punjab Pakistan: implications for food security and climate change. *JAPS: Journal of Animal & Plant Sciences*, 32(5).
- Naveed, M. A., Anwar, M. A., & Bano, S. (2012). Information seeking by Pakistani farmers: A review of published research. *Pakistan Journal of Information Management and Libraries*, 13(1).
- Nwafor, C. U., Ogundeji, A. A., & van der Westhuizen, C. (2020). Marketing information needs and Seeking behaviour of Smallholder livestock Farmers in the eastern cape province, South Africa. *Journal of Agricultural Extension*, 24(3), 98-114
- Opara, U. N. (2008). Agricultural information sources used by farmers in Imo State, Nigeria. *Information Development*, 24(4), 289-295.
- Panda, P., Tiwari, R., Handage, S., & Dutt, T. (2022). Information source utilization by livestock and poultry farmers of Uttar Pradesh. *Indian Journal of Extension Education*, 58(1), 172-175.
- Prasad, N., & Ponraj, P. (2016). Sources of information in adoption of scientific dairy farming. *Adv. Anim. Vet. Sci*, 4(2s), 13-18.
- Rahman, T., Ara, S., & Khan, N. A. (2020). Agro-information service and information-seeking behaviour of small-scale farmers in rural Bangladesh. *Asia-Pacific Journal of Rural Development*, 30(1-2), 175-194.
- Rana, H. A. A., Iftikhar, M., Watto, M. A., & Bilal, M. Q. (2021). Institutional role in coping livestock diseases on farm level in rural areas of Punjab, Pakistan. *Pakistan Journal of Agricultural Sciences*, 58(4).
- Raza, S. A., Ali, A. and Mehboob, F. 2012. Role of agriculture in economic growth of Pakistan. *International Research Journal of Finance and Economics*. 83: 180–186.
- Singh, A., Sidhu, S., Hundal, J. S., & Chahal, U. S. (2016). Information sources for Indian livestock farmers. *Journal of Livestock Science*, 7, 150-156.
- Singh, N., Malhotra, P., & Singh, J. (2016). Information needs and seeking behaviour of dairy farmers of Punjab. *Indian Journal of Dairy Science*, 69(1), 98-104.
- Shahid, H., Shafique, O. and Shokat, A. 2012. Dairy industry of Pakistan. *European Journal of Business and Management*. 4: 1–4.
- Ullah, E. 1998. The Study of Small holders Milk Production in the Central Punjab and Strategies for an Effective Development Approach. MSc Theses, Department of Livestock Management, University of Agriculture, Faisalabad.
- Umar, S. 2015. Awareness and Use of Information and Communication Technologies among Extension Agents in Kaduna State of Nigeria. *J. of Agri Extension*. 19 (1) .
- Yaseen, M., Shiwei, X., Wen, Y., Luqman, M., Saqib, R., Ameen, M., ... & Butt, T. M. (2021). Farmers Preferred Information Sources for Agricultural Productivity in Hebei Province, China. *Sarhad Journal of Agriculture*, 37(2), 468-474.