

INVESTIGATING THE EFFICIENCY OF EXTENSION SERVICES IN PROMOTING DAIRY FARMING IN PAKISTAN

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Abstract

The provision of effective extension services to smallholder farmers is still a major challenge. The study explores the impacts of extension services on the understanding, knowledge, and adoption rates of smallholder dairy farmers in Pakistan. The dairy farming industry provides livelihoods and home expenses to rural people. The data was collected through a pre-tested well-structured questionnaire by 140 regionally-spread dairy farmers within a district Dera Ghazi Khan (Punjab). It results that there is a positive impact of education on skill improvement. The study found that a huge number of farmers (62.86-74.29%) produced milk for sale purposes, and obtained information through fellow farmers and extension field staff. As ICT has a vital role in disseminating knowledge in village areas, however, half of the participants reported mobile as their major source of information. The various services are provided to dairy farmers, in which artificial insemination, vaccination, etc. were stated satisfactorily. About one-fourth (22.86-25.71%) of the dairy developer had excellent awareness level and participation in vaccination and free medicine. The education, awareness, and experience affect dairy production, skills enhancement, and economical level by adopting these services. It was conveyed that by ICT's, smart extension services, and the involvement of educated individuals, It is easier to improve skills as well as the economic level of dairy farmers, so there is a need to train farmers to use ICT's especially to promote dairy business and overcome the hurdles.

Key words: extension services, dairy farming, livestock production

INTRODUCTION

Pakistan has a rural economy focused on agriculture and livestock production is one of the best fields that intrigued people. At present, it accounts for 60.6% of agriculture and 11.7% of GDP in 2019-20. The added gross value of livestock rose from Rs 1,430 billion (2018-19) to Rs 1,466 billion (2019-20), with a 2.5% rise over the same period last year [9, 10]. In general, livestock is a crucial asset for the rural population and provides important opportunities to increase household income [28, 27, 26, 35]. In Asian countries, animals had formed an essential role in the family farming system and rural women had

been involved in livestock farming since time immemorial [3].

Extension services play a vital role in the improvement of the dairy sector in developing countries. The goal of the extension is to provide research-based knowledge to rural communities to improve their farm productivity, leading to poverty reduction, rural development, and more sustainable rural livelihoods [36, 16, 12]. The role, function and structure of extension services in any country depend on farmer education level, availability, and use of technologies, level of commercialization and value of the product [23].

Dairying is the mixed farming system and it is a strong tool to develop the micro-economy in

villages [17, 7, 34, 32] to improve rural livelihoods and to alleviate rural poverty. About 40-45 million of Pakistan's population lived in rural areas is engaged in this sector [24]. Small household farming of 2 to 3 cattle/buffalo and 5 to 6 sheep and goats served by 2 to 3 workers that are obtaining 30 to 40% of income from it [8].

Generally, small farmers are traditionally dealing with livestock while commercialization is only limited around urban areas and approximately 5 million families in Punjab are dependent on the livestock sector for the economic viability of their livelihood [2]. Milk production is labor-intensive. There is a large number of biological, technical, and socio-economic constraints like shortage of feed, high mortality rate, poor genetic potentials, high input cost, scarcity of resources and inadequate marketing system are a few constraints in high milk production [14]. The small farmer fulfilled their needs of milk, food, and income on daily basis by rearing livestock. Mostly in rural areas, the people are landless and holding livestock for fulfilling their needs. Some of them had their livestock and some poor people are doing the job of caring for livestock and got paid for this work. Livestock is a subsistence sector dominated by smallholders. It is suggested that the policies towards the livestock and dairy sector have not always been beneficial because the farm small farmer is not always taken into consideration during the making of these policies. Improving livestock production is only possible by improving the conditions in rural communities by improving extension services, management, and effective disease control programs. The improvement of the rural areas also improves livestock farming. Extension workers could play a vital role in disseminating technologies to improve livestock and dairy production at a small level by engaging with the farming community in rural areas. That's why it is necessary to be familiar with scientific knowledge and updated technologies [22]. According to a study [16], the extension wing plays a key role in the dissemination of scientific knowledge to the farming community and

also provides the basic facilities according to their needs and services about animal health and breed improvement. But some of the areas need special attention from the extension department.

In the dairy business, there are many issues in which lack of infrastructure facilities is the major issue. Animals are still sold in the local areas (known as Mandi). However, there are no best facilities as watering, feeding, and shelter, and health facilities in those areas [31]. Some of the other issues included improper vaccination, medicines, shortage of vegetation, insufficient marketing facilities, and improper services. In this regard, [2] argued that the Pakistan Dairy Development Company (PDDC) has improved the socio-economic conditions of the dairy farmers, especially small and medium dairy farmers by implementing new services. The calf losses are reduced by introducing and adopting new techniques of dairy management e.g. on-time colostrum feeding, hutch housing, feeding, and nutrition [30]. There was seldom use of synthetic and chemical substances for the wellbeing of livestock and agriculture. In Pakistan, there is an increasing trend toward organic farming. The majority has produced milk for sale purposes and no concern about the quality of milk due to their low income. Another issue of dairy marketing is that prices of milk are fixed by municipal authorities without keeping in view the production cost and quality [31].

Pakistan needs to make different strategies to improve dairy production also improvement in the livestock extension services such as vaccination, breeding, feeding, AI, and first aid services [29, 18]. The technical inefficacy of the dairy farmer is reduced when they participate in milk production. Milk production increased in the past years but this increase was not due to the productivity per animal this is because of an increase in the number of animals. There are many reasons for a decrease in productivity like lack of genetic resources and lack of good management system and shortage of food etc [2, 11, 15]. The reorientation of dairy extension services and research may not be a complete solution for sustainability in Asia as

the majority increase in livestock production originates from the industrialized orientation of the production system [25, 19].

MATERIALS AND METHODS

The present study was conducted in district Dera Ghazi Khan. There are 4 tehsils, 7 Markaz district (an Arabic term meaning "center", and also being used for subdivision of area like "country" and "district" etc.) and 48 union councils in the district. All of the Markaz was served for study. However, one union council was selected from each Markaz by using a simple random sampling technique and then two villages were selected from the selected union council by simple random sampling. From each selected village, ten farmer's respondents were selected conveniently. Therefore, the total size of the study was 140 respondents. The data was collected through a well-designed, structured, validated, and pre-tested interview schedule. Both open and close-ended questions were asked through face to face interviews. The interview schedule was prepared in English but asked in local languages. The data was analyzed through Microsoft excel and Statistical Package for Social Science (SPSS). Descriptive statistics were used to draw findings and conclusions.

RESULTS AND DISCUSSIONS

Sources of income

Dairying is a strong tool to improve the economy of people in rural areas and to alleviate rural poverty [16]. There were various sources of income but most (41.22%) of the respondents had livestock as the major source of income. One-fifth (26.35%) of the respondents have agriculture crops and a small number (11.82-16.89%) of the respondents reported government jobs and business as their sources of income. However, a negligible number (3.72%) of the respondents have a private job as the source of income (Table 1).

Tenancy Status

About three-quarter (74.29%) of the respondents reported ownership of the land

and a small (14.29%) number of the respondents were tenant (Table 1) and a few (11.43%) number of the respondents appeared as owner-cum tenant which is almost similar to results of Raza (2015).

Table 1. Distribution of respondents according to their sources of income (n = 140)

Source of income	%
Govt. Job	11.82
Private Job	3.72
Business	16.89
Crops	26.35
Livestock	41.22
Tenancy Status	
Owner	74.29
Owner-cum-tenant	11.43
Tenant	14.29

Source: Field Survey Result.

Size of land for dairy farm

The recorded data show that a fair majority (69.28%) of the respondents have up to 1.5 Kanal (which is a unit of area used in subcontinent and considered equal to 4,500 square feet) land for a dairy farm and about one-fifth (23.57%) of the respondents have 1.5-3 Kanal and a few numbers (7.14%) of respondents have their dairy farm larger than 3 Kanal (Table 2). It is also mentioned that the minimum land area of the respondent was half Kanal and the maximum size of the land was 4 Kanal. However, the average size of the land throughout the respondents is 1.37 Kanal.

No. of the workers in the dairy farm

Almost all (96.3%) of the respondents have up to 3 workers on their dairy farm (Table 2).

Table 2. Landholding and number of the worker in the dairy farms (n = 140)

Landholding (Kanal*)	%	Min.	Max.	Mean
Up to 1.5	69.28			
>1.5 to 3	23.57	0.5	4	1.37
>3	7.14			
Number of workers				
Up to 3	96.43			
>3 to 5	3.57	1.0	4	1.65

Note: *Unit of area, In Pakistan and India, it is generally considered equivalent to 4,500 square feet

Source: Field Survey Result.

Only a negligible number (3.57%) of the respondents has 3 to 5 workers on their dairy farm. The maximum number of the worker was 4 and the minimum was 1. However, the average number of the worker was 1.65. Almost similar results [8].

Types of animals

Animals have various classes in the examination zone calf, milking, and non-milking. One-fifth (25.71%) of the respondents had calves and a reasonable number (62.86%) of the respondents had animals for milking and half (50%) of the respondents detailed just non-milking animals. Buffaloes animal had found a large number in the study area while calves of the buffaloes were only one-fifth (20.71%) but a large number (60%) has reported about non-milking (Table 3).

Table 3. Types of animals in the dairy farm (n = 140)

Animals	Calf	Milking	Non-Milking
	%	%	%
Cows	25.71	62.86	50.00
Buffaloes	20.71	74.29	60.00
Goats	0.00	19.29	25.71
Sheep	0.00	2.14	5.00
Camels	0.00	2.86	3.57

Source: Field Survey Result.

Goats were just milking (19.29) and non-milking (25.71%) It also depicts that the minimum number of the animals were sheep and camel. Further, the estimated livestock population-based on inter census growth rate of Livestock Census 1996 & 2006 is shown (Figure 1).

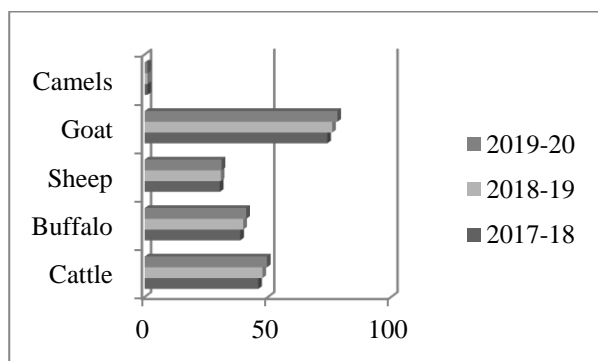


Fig. 1. Estimated livestock population (Million Nos.)
 Source: Ministry of National Food Security & Research.

Sources of information

There are now many aids used by dairy farmers as sources of information. The vast majority (85.71%) of the respondents obtained information from the extension officers as well as the veterinary officers was and appeared to be the best source of the information about the livestock. A greater number (75.71%) of the respondents received information from their fellow farmers (Figure 2). Mobile and television were the sources that were reported by more than half (53.57-58.57%) of the respondents. In past studies, mobile was reported as the best source of information used by farmers [30, 4]. There were a few (14.29%) respondents who collected information through the agriculture helpline. In Pakistan, the Punjab agriculture helpline was reported by the literate farmers [5].

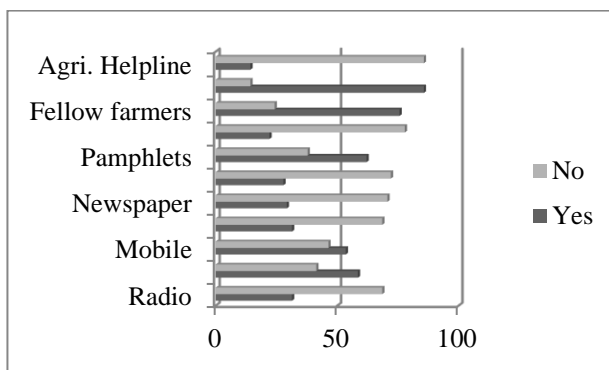


Fig. 2. Sources of information used by dairy farmers (%)

Source: Field Survey Result.

Awareness level of dairy farmers about extension services

The awareness level of the dairy farmers about the extension services varies from area to area. The vast majority (90.71%) of the respondents knew about the vaccination service as It is the service performed by the provincial government [1] and more than half (54.29-57.86%) of the respondents reported about first aid service and artificial insemination services (Figure 3). A large number (61.43%) of the respondents reported the awareness about the diseases and almost one-third (30.00-37.53%) of the respondents reported the awareness of fodder growing and cutting, new breeds, fencing, etc. It can also

be improved by seminars, training, and demonstrations [20, 21]. A few (14.29%) of the farmers know about the milking service provided by extension staff.

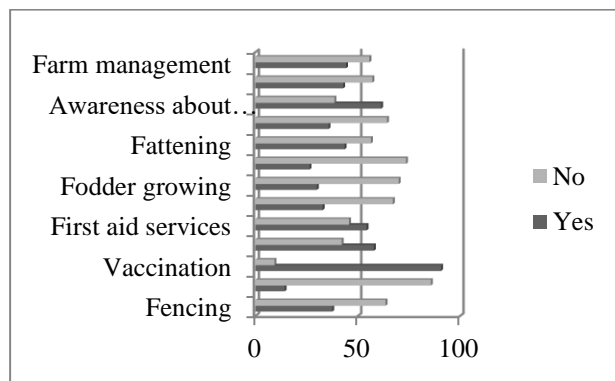


Fig. 3. Awareness' response of dairy farmers about livestock extension services (%)
 Source: Field Survey Result.

Awareness level of farmer according to various extension services

The study revealed that more than one-fifth (22.86-25.71%) of the respondents had an excellent awareness level about the vaccination and free medicine service which were provided by the extension field staff to them. Furthermore, only 9.29 to 13.57% of the respondents reported a good awareness level of fencing, farm management, fattening, diseases, latest technologies, and artificial insemination. Vaccination services were reported as satisfactory by one-fourth (25.00%) of the respondent. Fodder growing (14.29%) and cutting (11.43%) were the services that fell in the poor category (Table 4).

Table 4. Awareness level of dairy farmers about extension services provided by EFS (n = 140)

Services	P	F	S	G	E	M*	R
	%						
Fencing	0.71	3.57	10.71	9.29	5.71	1.06	10
Milking	1.43	3.57	6.43	0.71	1.43	1.38	8
Vaccination	9.29	7.86	25.00	27.86	22.86	3.26	1
Artificial insemination	7.14	16.43	11.43	13.57	9.29	1.75	4
First aid services	10.00	5.71	6.43	20.71	11.43	1.81	3
New breeds	5.71	10.00	2.86	6.43	4.29	1.01	11
Fodder growing	14.29	5.00	5.00	2.86	2.86	1.20	13
Fodder cutting	11.43	3.57	5.00	2.86	3.57	1.13	12
Fattening	8.57	4.29	11.43	12.14	6.43	1.32	7
Free medicines	5.00	12.14	17.86	23.57	25.71	3.06	2
Awareness about diseases	4.29	12.86	16.43	13.57	14.29	2.05	5
Latest Technologies	3.57	9.29	8.57	13.57	9.29	1.19	9
Farm management	4.29	12.86	12.40	11.20	9.30	1.49	6

Note: P = Poor, F = Fair, S = Satisfactory, G = Good, E = Excellent, M* = Mean, R = Rank
 Source: Field Survey Result.

Effectiveness of extension services provided by the EFS to dairy farmers

Various extension services were provided by extension field staff to dairy farmers in which vaccination (22.86%) and free medicine (18.57%) fell in the very high category. About one-fourth (21.43-25.71%) of the respondents reported artificial insemination,

vaccination, free medicine, and first aid services as a high level of effectiveness (Table 5).

Furthermore, a small number (9.29-12.86%) of the respondents had reported awareness about the disease, the latest technology, fodder growing services, etc.

However, the latest technology had the highest (2.88) mean value in these services.

Table 5. Effectiveness of extension services provided by EFS to dairy farmers (n = 140)

Services	V. L	L	M	H	V.H	M*	R
	%						
Vaccination	2.14	7.14	33.57	23.57	22.86	1.15	1
Free Medicines	9.29	13.57	18.57	25.71	18.57	0.34	2
Awareness about diseases	10.00	10.71	12.14	17.86	14.29	3.26	3
First Aid Service		7.14	10.00	25.00	9.29	1.86	4
AI	1.43	14.29	9.29	21.43	8.57	1.91	5
Mobile hospital	7.86	8.57	17.14	9.29	7.14	0.69	6
Farm management	9.29	9.29	7.14	10.00	7.14	0.72	7
Fattening	5.71	2.86	16.43	5.00	7.86	0.70	8
Milking	5.71	2.86	16.43	5.00	7.86	1.20	9
Latest Technology	12.14	6.43	2.86	7.86	6.43	2.88	10
Fodder growing	12.86	7.86	4.29	1.43	5.00	2.11	11
Fodder cutting	12.86	6.43	6.43	5.00	0	0.97	12
New breeds	2.14	10.00	5.00	3.57	3.57	1.25	13
Fencing	0.71	4.29	13.57	10.00	5.00	1.49	14

Note: V.L = Very Low, L = Low, M = Medium, H = High, V.H = Very High M* = Mean, R = Rank

Source: Field Survey Result.

Frequency of visit of the dairy farm by EFS

The data shows that more than one-third (36.43%) of the respondents had not visited by extension field staff and about one-fourth (25-25.71%) of the respondents visited by extension field staff (veterinary officers) on a monthly and occasionally base respectively (Table 6). Visit extension office and participation in training etc. will help to improve the dairy business for this purpose [13, 33, 6]. A small number (9.29%) of the respondents had visited the EFS fortnightly while a few (2.14%) of the respondents had paid visits on weekly basis.

Table 6. Frequency of visit of their dairy farm by EFS (n = 140)

Frequency of visit	%
Weekly	2.14
Fortnightly	9.29
Monthly	25.71
Half yearly	0.71
Yearly	0.71
Occasionally	25.00
Never	36.43

Source: Field Survey Result.

CONCLUSIONS

It was inferred from the survey results that that most of the respondents engaged with livestock and various services were provided to the dairy farmers by extension field staff. In which, vaccination, veterinary medicine, artificial insemination, and first aid services were very effective. The participants visit the extension office occasionally and fellow farmers and extension officers were the effective sources of information. Extension workers played a significant role in reducing the constraints faced and disseminating knowledge in dairy production. Most interviewees are aware of vaccination and free veterinary services. However, literate farmers were also satisfied with mobile hospitals, the latest technology and farm management services because they had improved their skills, production and economic level due to the adoption of these extension services. Based on the this study results, the following recommendations should be made:

- The Extension Department should conduct field tours on weekly basis in the rural areas.
- The Government should organize training programs for dairy farmers to maximize their technical skills in farm management.
- There should be conducted a live question session on television according to the basic needs of farmers and a question portal for the literate farmers.

REFERENCES

- [1]Afzal, M., 2009, Improving veterinary service in Pakistan. *Pakistan Veterinary Journal*, 29(4), 206-210.
- [2]Ahmad, S., Yaqoob, M., Hashmi, N., Tariq, M., 2010, Economic importance of camel: unique alternative under crisis. *Pak. Vet. J.*, 30(4), 191-197.
- [3]Akhtar, H., Khan, B., 2000, Women: Dynamic Partners in Livestock Production: Review, *Pak. J. Agri. Sci. Vat.*, 37(3-4), 195-199.
- [4]Angello, C., 2015, Exploring the use of ICTs in learning and disseminating livestock husbandry knowledge to urban and peri-urban communities in Tanzania. *International Journal of Education and Development using ICT*, 11(2), 5-22.
- [5]Arfan, M., Ali, S., Safdar, U., Khan, M.A.J., 2015, Study of association between demographic characteristics and increase in knowledge of farmers through Punjab Agricultural Helpline. *Journal of Agricultural Research*, 53(2), 287-294.
- [6]Ashraf, S., Iftikhar, M., Khan, G.A., Shahbaz, B., Ashraf, I., 2013, Performance evaluation of the dairy farmers regarding adoption of precise dairy farming practices in the Punjab, Pakistan. *African Journal of Agricultural Research*, 8(29), 4074-4080.
- [7]Bhowmik, A., 2019, A Study on Husbandry Practices of Different Dairy Farms at Chittagong Metropolitan Area, Bangladesh. A production report submitted in partial satisfaction of the requirements, <http://hdl.handle.net/123456789/1211>, Accessed on Nov.2020.
- [8]Bilal, M., Ahmad, A., 2004, Dairy hygiene and disease prevention. Usman and Bilal Printing Linkers, Faisalabad, Pakistan.
- [9]Chandio, A.A., Yuansheng, J., Rahman, T., Khan, M.N., Guangshun, X., Zhi, Z., 2015, Analysis of agricultural subsectors contribution growth rate in the agriculture GDP growth rate of Pakistan. *International Journal of Humanities and Social Science Invention*, 4(8), 101-105.
- [10]Chandio, A.A., Yuansheng, J., Magsi, H., 2016, Agricultural sub-sectors performance: an analysis of sector-wise share in agriculture GDP of Pakistan. *International Journal of Economics and Finance*, 8(2), 156-162.
- [11]Chattha, M.W.A., Fatima, A., Khuda, B., Hassan, S., 2013, Production and supply response of milk in Pakistan: Price and non-price determinants. *International Journal of Agriculture and Biology*, 15(1), 170-174.
- [12]De Silva, P. H. G.J., Sandika, A., 2012, The Impact of Agricultural Credit and Farmer Trainings on Small Holder Dairy Production in Southern Region in Sri Lanka. *2(3)*, 265-269.
- [13]Dulle, F., Aina, L., 1999, The information needs of small scale dairy farmers in Tanzania. *IAALD Quarterly Bulletin*, XLIV, 3/4, 173-176.
- [14]Guadu, T., Abebaw, M., 2016, Challenges, opportunities and prospects of dairy farming in Ethiopia: A review. *World Journal of Dairy & Food Sciences*, 11(1), 01-09.
- [15]Hussain, M., Ghafoor, A., Saboor, A., 2010, Factors affecting milk production in buffaloes: a case study. *Pakistan Vet. J.*, 30(2), 115-117.
- [16]Idrees, M., Mahmood, Z., Shafi, M., Sidique, U., 2007, Performance evaluation of extension services of livestock and dairy development department in district Peshawar (NWFP). *Sarhad Journal of Agriculture*, 23(2), 519-526.
- [17]Imtiaz, M., Rana, S., 2014, Problems faced by the small scale dairy owners in receiving veterinary services in selected areas of Chittagong. *Bangladesh Journal of Veterinary Medicine*, 12(1), 63-65.
- [18]Iqbal, M.A., Iqbal, A., 2015, Overviewing forage shortage for dairy animals and suitability of forage sorghum for ensiling. *Global Veterinaria*, 14(2), 173-177.
- [19]Kouakou, B., Gazal, O.S., Terrill, T.H., Kannan, G., Gelaye, S., Amoah, E.A., 2008, Digestibility, hormones and blood metabolites in dairy bucks subjected to underfeeding and refeeding. *Small Ruminant Research*, 75(2-3), 171-176.
- [20]Mapiye, C., Foti, R., Chikumba, N., Poshiwa, X., Mwale, M., Chivuraise, C., Mupangwa, J.F., 2006, Constraints to adoption of forage and browse legumes by smallholder dairy farmers in Zimbabwe. *Livestock Research for Rural Development*, 18(12).
- [21]Mekoya, A., Oosting, S.J., Fernandez-Rivera, S., Van der Zijpp, A.J., 2008, Farmers' perceptions about exotic multipurpose fodder trees and constraints to their adoption. *Agroforestry systems*, 73(2), 141-153.
- [22]Moaeen-ud-Din, M., Babar, M., 2006, Livestock farming in peri-urban areas of Faisalabad, Pakistan. *Livestock Research for Rural Development*, 18(1), 89-94.
- [23]Ngaka, M., Zwane, E., 2018, The role of partnerships in agricultural extension service delivery: a study conducted in provincial departments of agriculture in South Africa. *South African Journal of Agricultural Extension*, 46(1), 14-25.
- [24]Nosheen, F., Ali, T., Ahmad, M., Navaz, H., 2008, Exploring the gender involvement in agricultural decision making: a case study of district Chakwal. *Pak. J. Agri. Sci.*, 45(3), 101-106.
- [25]Olivier, J., Moyo, S.B., Montaldo, H.H., Thorpe, W., Zarate, A.V., Trivedi, K.R., 2002, Integrating genetic improvement into livestock development in medium-to low-input production systems. in 7th World

Congress on Genetics Applied to livestock production. Montpellier, France. Vol. Session 25.

[26]Patel, S. J, Patel, M.D., Patel, J.H., Patel, A.S., Gelani, R.N., 2016, Role of women gender in livestock sector: A review. *Journal of Livestock Science*, 7, pp. 92-96.

[27]Pham-Duc, P., Cook, M.A., Cong-Hong, H., Nguyen-Thuy, H., Padungtod, P., Nguyen-Thi, H., Dang-Xuan, S., 2019, Knowledge, attitudes and practices of livestock and aquaculture producers regarding antimicrobial use and resistance in Vietnam. *Plos one*, 14(9), p. e0223115.

[28]Rae, A.N., Zhang, X., 2009, China's booming livestock industry: household income, specialization, and exit. *Agricultural Economics*, 40(6), 603-616.

[29]Ranjha, A.N., Bukhari, S.M.H., Roofi, Y., Shahzad, A., Ali, A., 2016, Empowerment of Smallholder Communities through Livestock in Periphery Areas of Cholistan Desert, Bahawalpur, Pakistan. *Pakistan Journal of Life & Social Sciences*, 14(3).

[30]Razaque, A., Sallah, M., 2013, The use of mobile phone among farmers for agriculture development. *Int. J. Sci. Res*, 2, pp. 95-98.

[31]Raziq, A., Younas, M., Rehman, Z., 2010, Continuing education article prospects of livestock production in Balochistan. *Vet J*, 30(3), 181-186.

[32]Shamsuddin, M., Alam, M.G.S., Hossein, M.S., Goodger, W., Bari, F.Y., Ahmed, T.U., Hossain, M.M., Khan, A.H.M.S.I., 2007, Participatory rural appraisal to identify needs and prospects of market-oriented dairy industries in Bangladesh. *Tropical Animal Health and Production*, 39(8), 567-581.

[33]Simpson, B.M., Franzel, S., Degrande, A., Kundhlande, G., Signola, T.M.A., 2015, Farmer-to-farmer extension: Issues in planning and implementation. *Modernizing Extension and Advisory Services*.

<http://apps.worldagroforestry.org/publication/farmer-farmer-extension-issues-planning-and-implementation>, Accessed on Nov. 2020.

[34]Singh, K., Pundir, R., 2001, Problems and prospects of smallholder dairy production and marketing in South Asia: An overview. in *Proceedings of a South-South workshop held at National Dairy Development Board (NDDB) Anand, India*, pp. 88-104.

[35]Uduji, J.I., Okolo-Obasi, E.N., 2019, Corporate social responsibility initiatives in Nigeria and rural women livestock keepers in oil host communities. *Social Responsibility Journal*. Vol. 15 No. 8, 1008-1032.

[36]Warriach, H., Wynn, P., Ishaq, M., Arif, S., Bhatti, M.A., Latif, S., Kumbher, A., Batool, Z., Majeed, S.S., Bush, R.D., 2019, Impacts of improved extension services on awareness, knowledge, adoption rates and perceived benefits of smallholder dairy farmers in Pakistan. *Animal Production Science*, 59(12), 2175-2183.