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An Empirical Analysis of Livestock Activities of the Model Farm Service Center in Khyber Pakhtunkhwa

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Abstract | This research aimed to determine current situation of livestock activities especially related to extension work and explore the knowledge of farmers and their linkages with government as well private sector for livestock improvement in Khyber Pakhtunkhwa (KP) province. A total of 480 respondents from four districts, namely Swat, Mardan, Abbotabad and Dera Ismail Khan were randomly selected for interview purpose. Descriptive statistical techniques along with independent sample t-test and dummy variable regression were used for analysis. It is observed during the study that livestock extension department and private livestock doctors are the key sources where farmers get advice regarding livestock production. Majority of the respondents are quite satisfied regarding the effectiveness of these advices. Results further indicate that farmers visit or contact livestock expert mainly for livestock diseases and artificial insemination. However, some of the respondents report long distance, lack of proper facilities and high charges for not visiting the livestock experts. Majority of the respondents both member and non-member respondents have not attended any training on livestock or related program. Few of the respondents have participated in field days, workshop and seminars regarding livestock program. Moreover, results reveal that cows' milk yield per day of the member respondents are significantly higher than milk yield of the non-member respondents of the model farm services center. The facilitation of farmers through these centers in term of involving private livestock doctors and the provision of livestock inputs on reasonable rates can boost the prosperity in farming community.

Introduction

Like several other countries, Pakistan is an agriculture-based economy where majority of the population depends on agriculture for their livelihoods. Livestock is prominent sub-sector of agriculture that and satisfies farmers' needs in terms of dairy products, income generation, poverty alleviation and improving their socio-economic condition.

According to Pakistan economic survey, livestock account almost 11.11% to national GDP while 58.92 percent value adding to overall agriculture sector during year 2017-18 with 3.76 percent growth rate. In Pakistan livestock consist of cattle, goats, buffalo, camels, sheep, horses and mules. This sector has a unique position in community and is considered a supplementary source of income generation in rural areas. The importance of this sector is critical from

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the fact that approximately 35 million population of the country is engaged in livestock related activities, contributing to 40% of their income.

Pakistan is ranked fourth among the high milk producing countries after China, India and USA (Rahman et al., 2017). The total value of milk products is higher than the two major crops; wheat and cotton but still many of the dairy products are imported to meet the local needs. Based on economic survey report 9,423 exotic dairy cows were imported to pakistan, which adding about 61 million tons of milk during the financial year 2017-18.

There are many threats affecting this sector including growing population, crop land competition and declining food productivity. A considerable portion of the population is affected from malnutrition. Also, it is a big challenge to keep balance between demand and supply of food items from the animal source. Ample efforts are needed to meet an ever-increasing demand for meat, milk, eggs and various dairy products. There is a lack of comprehensive health coverage to animals. Training programs for rural farmers are not available. Existing of poor markets and lack of efforts to improve the marketing system in rural areas for poverty alleviation is being noticed. There is a lack of research-based information available to conduct applied research to directly benefit the stakeholders. The potential role of media has not received importance. All efforts to raise awareness among the stakeholders through media must be made. Poor and week efforts for the conservation of indigenous breeds are made. There is a weak relationship between private sector and livestock development initiatives. Enhancement of private sector involvement in livestock development is highly desirable. Lack of resources for the grooming, cleaning and prevailing poor management conditions for the animals make them susceptible to diseases and look ugly etc.

Keeping animals is not only a prime source of household's livelihood but also provide an opportunity for obtaining institutional as well non-institutional loans. In addition, livestock also help in irrigating crops, act as a source of organic fertilizer, field preparation and generating income in terms of carrying loads. (Randolph et al., 2007) identified a positive association of livestock with human nutrition, health and poverty reduction in developing countries. They also suggested that proper intervention of the

government in boosting such sectors can improve human health and eliminate poverty in the regions. Several efforts have been made to enhanced livestock production in the country, but little attention has been paid to marketing system (Jalil et al., 2009).

This study is an attempt to identify the current situation of livestock in the area especially that related to extension work. Efforts are made to explore knowledge of the farmers and their linkages with the government and private sectors for livestock production. Some of the livestock inputs purchasing sources, types of livestock training programs and the respondent's satisfaction will also determine in the area. In order to make this work more voluble the numbers of livestock keeping by the farmers and their yield (milk) differences will be analyzed. The novelty of this research work can be judged through different aspects. It is the first study analyzing the farming community in term of members and non-members of the model farm service centers (MFSCs) in the area. The output of this study will obviously provide a benchmark for policy makers to generate an effective policy for livestock.

Materials and Methods

Study area
The present research was conducted in KP province of Pakistan. The study was based on secondary data (literature review) as well as on a series of field surveys of all respondents. A comprehensive survey of member and non-member respondents of the model farm service centers (MFSCs) in KP province was carried out. The main function of these centers is to facilitate local farmers under the one roof at their doorstep and boost farming at every district in the KP province. It is the leading province of the country based on the number and activities of established MFSC in different districts. Within KP province a dual sampling procedure was used in which, four districts were purposively selected, namely Swat, Mardan, Abbotabad and Dera Ismail Khan. The geographical locations of these districts are shown in Figure 1. These four districts are relatively developed having all types of necessary facilities including food, health, education, transportation and market availability.

Sample size
We randomly selected equal number 120 respondents i.e. 60 member farmers of the MFSC and 60 non-

member farmers of the MFSC in each district. In this way a total sample size consisted of 480 respondents keeping the same ratio 50% of members as well of 50% of non-member farmers with the assumption to represent the whole population of the province.
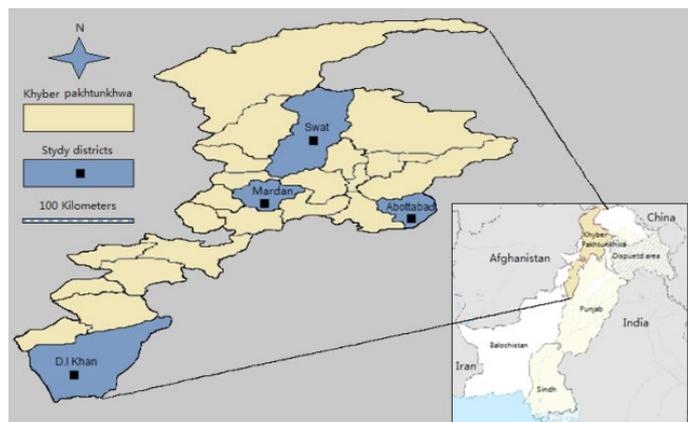

Figure 1: *Map of the study districts Khyber Pakhtunkhwa, Pakistan.*

Respondent interviews

For data collection we used a planned structured questionnaire, including general demographic characteristics and socio-economic status of the respondents as well as details about the input use and output of some their livestock. Data were collected through face to face meeting with the respondents. During filling the interview schedules every question and their purpose was explained to respondents so that accurate and reliable information could be gathered.

Data analysis

Data were analyzed through descriptive statistics (means, frequencies and percentages) to generate summaries and figures of the both member and non-member respondents using Statistic Package for Social Science (SPSS). An addition independent sample t-test was applied to determine the differences in their general characteristic as well as the farming methods of members and non-member farmers of the MFSC. More ever a dummy variable regression was used to identify the actual difference in the yield of both types of respondents using the following equation.

$$y_i = \alpha_0 + \alpha_1 D \text{--} + \varepsilon$$

Where;
y_i= Yield of crops/livestock; α_0= Constant; α_1= Coefficient; D= Dummy variable equals to 1, if the respondents are members of MFSC and 0 if non-member.

$$\varepsilon = random\ error$$

Results and Discussion

This portion deals with the complete information of the respondents regarding the livestock. Efforts were made to illustrate all the livestock related activities of the both respondents.

In Pakistan the most important livestock are cows, buffaloes, goats and sheep. Figure 2 shows the number of cows and buffaloes raised by both respondents. Data in the figure indicates that member farmers have more number of cows than of non-member farmers while their bulls, bucks and rams of the member farmers are less than of non-member farmers. Data also indicates that the total number of member's buffaloes is higher than of non-member farmers as well their bulls, bucks and rams. Buffaloes are not native animals of Khyber Pakhtunkhwa province and regularly procured from other provinces for its local demand of milk. Nili Ravi, Kundi and Aza Kheli are the buffalo breeds commonly found in the country. Nili Ravi breed also consider one of the best breeds around the world. The most popular cattle breeds are Cholistani, Sahiwal, Red Sindhi, Bhagnari, Dhanni, Achai, Dajal, Gibrali, Lohani, Kankraj, Rojhan and Thari. Among these all three breeds (Sahiwal, Cholistani and Red Sindhi) are internationally famous for its dairy products and distinct characteristics.

Goats are mainly raised by poor farmer. About 16 percent of goat population and 12 percent of sheep population of Pakistan is in Khyber Pakhtunkhwa. Mostly people keep goats and sheep for their meat, milk, wool, bones, hair, fat, hides and skins purposes domestically. Their horns provide a variety of practical and decorative articles including spoons, forks, buttons, combs, toggles, shoes, napkin rings and different kind of wall decoration pieces. In the country millions of animals are slaughtered annually. Pakistan is one of the largest producers of good quality hides and skins around the world. The faeces of these animals used as a fuel and organic fertilizer in rural community. Leather is also known as most important raw material for Pakistan economy. Figure 3 indicates that the total number of goats, sheep and their herds of the member respondent are higher than of non-member respondents.

Historically livestock sector continued to be an essential component of the small holder farmer for milk production and regular cash income. Therefore, this sector considered one of the most secure sources
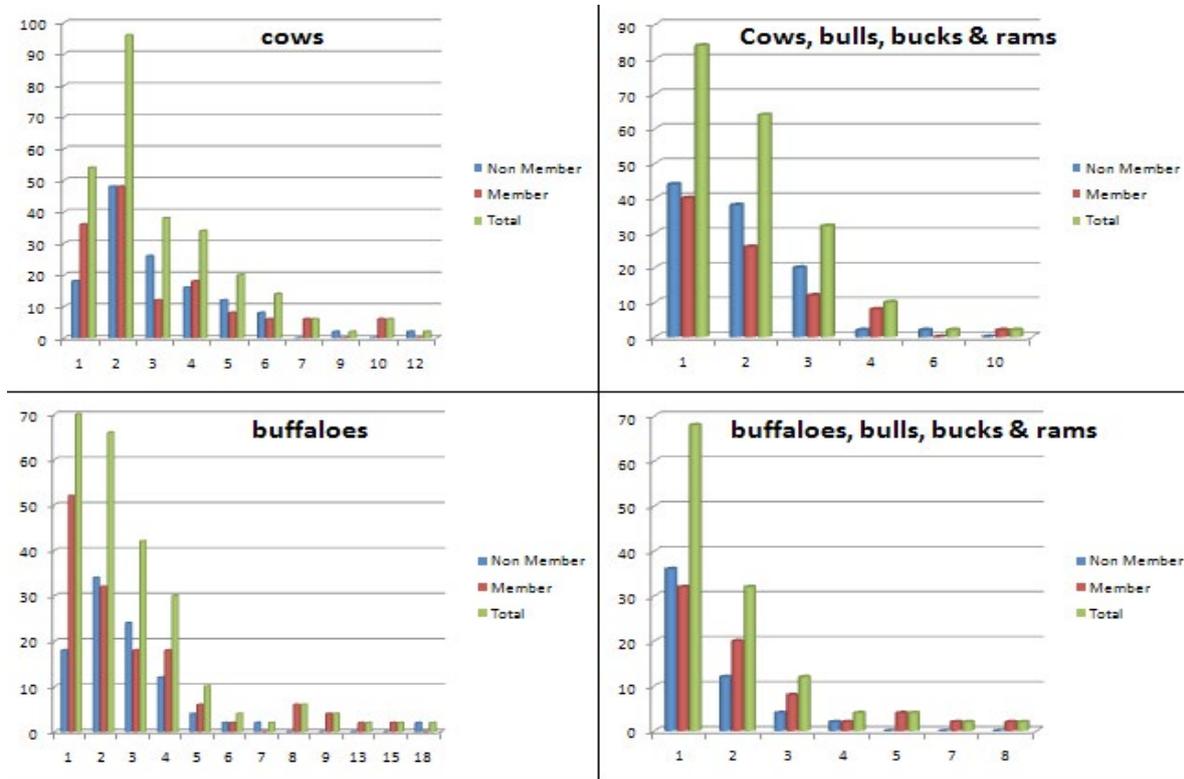
Figure 2: *Distribution of the respondents regarding cows and buffaloes.*
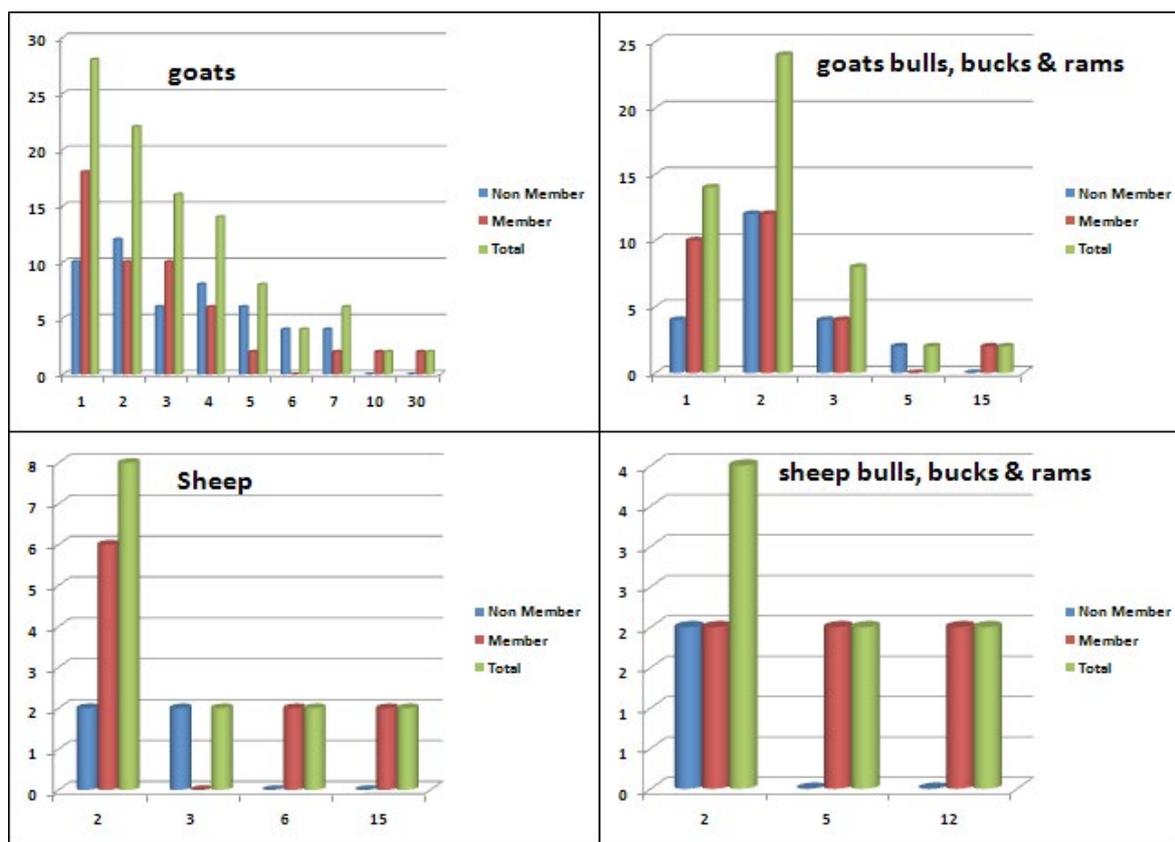

Figure 3: *Distribution of the respondents regarding goats and sheep.*

especially for rural and poor farmer for their income generation. In the previous literature three kinds of system of livestock production have been identified known as (a) grassland base system mainly depending on pastoralism and ranching (b) landless livestock production system generally for ruminants and especially for poultry production (c) mixed farming system consist of irrigated and rainfed sub categories. Each of this production system has specific nature depends on environment e.g., landless livestock

production system is mainly responsible for rapid growth for meat requirement in developing countries.

The provision of better animal health services and the control of diseases have an important impact on the livestock productivity. Mostly in developing countries up to 30% of the livestock is lost due to different diseases (FAO, 1990). For many tropical diseases, techniques and treatment is available but the proper delivery and application services are the problem still exists. In the study area the available public sources for livestock production and management are the government research departments, MFSC, input dealers, hospital/private doctor, radio/TV and fellow farmers. Figure 4 reveals that majority of both respondents take advice from the livestock extension department and private livestock doctors for their livestock management. Data in the figure also shows that some of the respondent's counsel and take advice from the fellow farmers who have some experience about livestock. For the prosperous production of livestock, the public sector involvement in animal health services is critical. This will also help in poverty alleviation as supporting animal health with proper management among the poor livestock holders. However, the unavailability of public funds and lake of adequate financial support, these delivery services mainly rely on privatization and ultimately paid by the livestock producers (James and Upton, 1995).
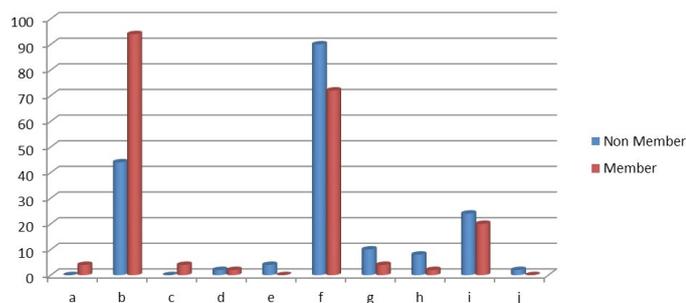

Figure 4: *Distribution of the respondents regarding advice source for livestock production.*

[a]MFSC; [b]Livestock Extension Department; [c]Livestock Research Department; [d]Input Dealers; [e]Fellow Farmers; [f]Private Livestock Doctors; [g]Fellow Farmer + Private Doctors; [h]Livestock Extension Department + Fellow Farmer; [i]Livestock Department + Private Livestock Doctor; [j]Livestock Extension Department + Livestock Research Department.

Figure 5 shows majority of non-member (154) and member (166) respondents were satisfied from effectiveness of the advices for their livestock departments, MFSC and private doctors followed by (26) non-member and (30) member respondent expresses that advices of the livestock department, MFSC and private doctors were indifferent, while few of both respondents were dissatisfied from these advices.

Figure 6 express that majority of the (66) non member and (98) member repondents contact the MFSC, livestock depeartment, input dealers, private doctor mainly for diseases treatment, while some of respondents contact them for vaccination of the cattle, technical advises and artificial insemination.
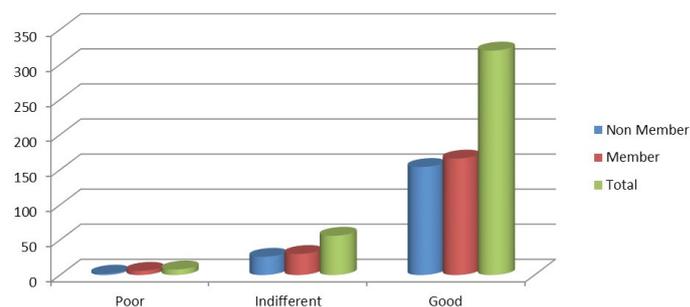

Figure 5: *Distribution of the respondent satisfaction regarding advice effectiveness.*
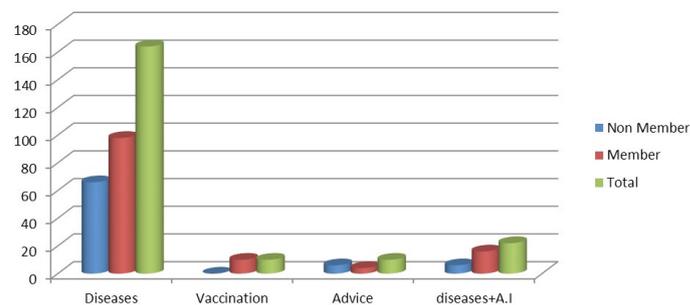

Figure 6: *Distribution of respondents regarding purpose for contact Livestock officer/stock assistant.*

Majority of world rural poor population depend livestock for their livelihood (Thornton, 2002) and have little opportunities for income generation. Figure 7 reveals the reasons of the both respondent for which they did not contact with livestock department. Some of the non-member (12) and member respondent (6) respondents indicates that livestock departments take high charges when they come to homes for animals' treatment. Some of the non-member (30) and member (18) respondents stated that they do not have many facilities for livestock. Majority of the non-member (32) and member (22) respondents reported that faraway distance was main reason for no contact with the livestock department. Unavailability of the doctor

at office, very difficult to bring the animal in the hospital and busy schedule of their daily life were also reported by (6) and (16), (14) and (12) and (12) and (6) non-member and member respondents respectively.
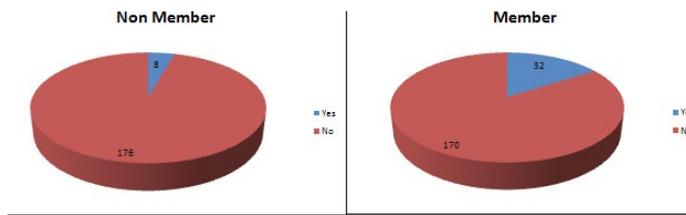
member respondents attained workshop, while (4) of the non member and (12) of the member respondents take part in field day program. Only (2), (2) and (4) member respondents of the MFSC participate in cattle show, kisan mila (exhibition) and livestock training program respectively. The study of (Giles and Stansfield, 1991) and (Nuthall, 2001) express that proper formal training programs can increase the knowledge and managerial skills of the adult farmers. (Kilpatrick, 2000) also determined that appropriate training is necessary to change the farm management practices and enhanced farm portability.
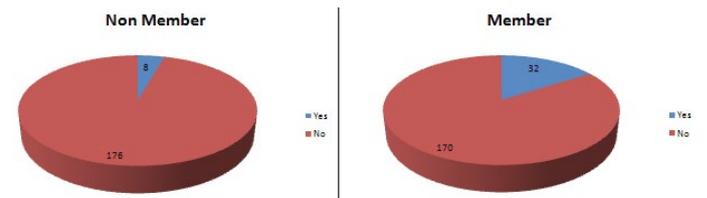

Figure 7: *Distribution of reasons regarding no contact livestock department.*

Figure 8 indicated some of the both (8) non member and (32) member respondents of the province attend any livestock program for livestock purpose while majority of both (176) of non member and (170) of the member respondents did not attainted any livestock or related program.

The adjustment of livestock to field crops plays a significant role in mutual benefits such as growing cover crops, green manures and annual as well as perennial forages when livestock by-product would use in the practices (Chen, Neill, Burgess and Bekkerman, 2012). Data in Figure 9 shows different types of livestock programs. Some (4) non member respondents and (2) member respondent attained seminar, only (10) of the

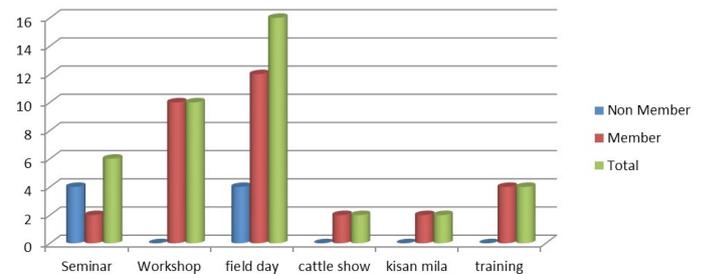**Figure 8:** *Distribution of respondents regarding attendance of animal programs.*

Figure 9: *Distribution of respondents regarding type of livestock program they attained.*

Table 1: *Information of the respondents regarding number of livestock.*

Respondent Status	Non Member	Member	Average	Mean Diff	P-value
Total number of cows	3.08	2.99	3.03	0.09	0.72
Cows currently milking	1.49	1.56	1.52	-0.07	0.53
Cows currently dry	1.48	1.58	1.54	-0.10	0.61
Cow's milk yield (kgs/day)	5.80	6.75	6.29	-0.95	0.02*
Total number of Buffaloes	2.94	2.99	2.97	-0.05	0.89
Buffaloes currently milking	1.77	1.69	1.72	0.08	0.79
Buffaloes currently dry	1.79	1.79	1.79	0.00	0.99
Buffaloes milk yield (kgs/day)	7.70	7.98	7.86	-0.28	0.49
Total number of goats	3.32	3.77	3.55	-0.45	0.60
Goats currently milking	1.75	2.19	2.00	-0.44	0.54
Goats currently dry	3.00	3.00	3.00	0.00	1.00
Goat milk yield (kgs/day)	1.25	1.08	1.15	0.17	0.34
Total number of sheep	2.50	5.40	4.57	-2.90	0.31
Sheep currently dry	1.00	4.00	3.25	-3.00	0.24
Bulls Number (N0.)	1.40	2.00	1.57	-0.60	0.04*
Total number of poultry	1065.82	9.59	537.71	1056.24	0.09**

*5% level of significance; ** 10 % level of significance.

Figure 10 shows main sources of inputs including medicine in the study area. Data in figure indicate that only two of the member respondents buy their basic livestock input from MFSC. Few (8) non member and (14) member respondents buy livestock inputs from government livestock department while majority (168) non member and (176) member respondent buy livestock inputs from private clinic. Only eight of each respondents reported that they buy from both livestock department and private clinics while only two of the member respondents buy their livestock inputs from MFSC and private clinic.
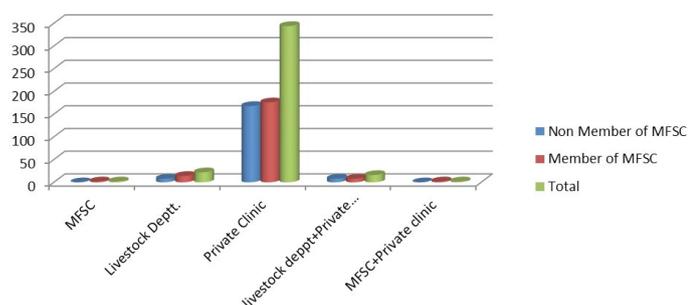

Figure 10: *Distribution of respondents regarding purchasing of livestock inputs.*

The study province has enormous grazing area with a potential to produce different kind of feed for dairy animals. Livestock sector covered a key position in the agriculture. Approximately twenty percent of the net income of farm households and land-less families generated from animal husbandry. A considerable population in Swat, Malakand, and D.I Khan District depends on livestock for their livelihood. The provision of new breed for milk and beef will boost this sector to the desired level. Crop-livestock integration is the gathering of both livestock and crop on the same farm. Most probably the aim of such practice is integrating the function rather than isolation. (Schiere et al., 2006). Several studied determined that the combination of both livestock and crop on the same farm minimize the use of Agro chemical and enhance sustainability in different aspects. Among others, some of them are involved nutrient exchange, utilization and consumption of crop waste, and integrating pest management. This mutual combination also results in developing a sustainable farming pattern in terms of nutrient exchange and proper land and input resources (Moraine, Duru, Nicholas, Leterme and Therond, 2014). Such integration also improve income and income constancy (Franzluebbers and Stuedemann, 2007); (Russelle, Entz and Franzluebbers, 2007) along with liability to moderate the emission of

greenhouse gas from both crop and livestock systems (Asgedom and Kebreab, 2011). Table 1 shows information of the rearing cattle number and their current situation regarding milk production. Mostly both of the respondents keep livestock for their own milk requirement.

Some factors like population, urbanization, industrialization and proper remuneration in developing regions stimulate the increasing demand for global food and animal production. Such factors also challenge the crops and livestock in term of enhancing cropping area while decreasing grasslands (Rota, 2010). Table 2 indicates the number and actual amount of milk yield determined by dummy regression variables of the respondents.

Table 2: *Dummy regression variable regarding livestock.*

Crops/Livestock	Constant	dummy	p-value
Total number of cows	3.08 (0.18)	-0.09 (0.25)	0.00 0.72
Cow milk yield (kgs/day)	5.80 (0.30)	0.95 (0.42)	0.00 0.02
Total number of Buffaloes	2.94 (0.27)	0.05 (0.35)	0.00 0.89
Buffaloes milk yield (kgs/day)	7.70 (0.31)	0.28 (0.41)	0.00 0.49
Total number of goats	3.32 (0.61)	0.45 (0.85)	0.00 0.60
goat milk yield (kgs/day)	1.25 (0.13)	-0.17 (0.18)	0.00 0.34
Total number of sheep	2.50 (2.31)	2.90 (2.73)	0.30 0.31
Total number of poultry	1065.82 9437.44)	-1056.24 (618.63)	0.02 0.09

Standard errors in parentheses.

Conclusions and Recommendations

This study highlighted a variety of issues such as lack of participating in developmental programs, faraway distance of these centers, lack of proper facilities and high charges of treatment, which are affecting the livestock activity of the farming communities. As livestock extension department is the main advising source for the local livestock holders so they need to arranged specific livestock training for the local farmers. In addition, they should provide proper medicine for livestock diseases on reasonable price. Although majority of the respondents are satisfied from their services still there is gap for further improvement. Crop-livestock integration on the

same farm should arrange to boost prosperity. The participation of local farmers in developmental base program, mutual linkages of the livestock holders with all advising sources and the motivation of non-member farmers towards MFSC can bring the desire change in the livestock production.

Author's contributions

Tariq shah designed the research plan and data analysis for this study and prepared the first draft of the manuscript. Umar Hayat assisted in results interpretation and discussion part. Muhamamd Suleman Bacha performed tabulation and reviewed the manuscript. Muhamamd helped in overall improvement of the final draft of the manuscript

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