

## A STUDY INTO THE ROLE OF EXTENSION AGENT IN ENHANCING THE FARM MANAGEMENT PRACTICES OF DAIRY FARMERS IN DISTRICT PESHAWAR.

|                              |                                                                                                                                                                                                               |
|------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Journal                      | Sarhad Journal of Agriculture (S&F Associated Journal)                                                                                                                                                        |
| Manuscript ID                | SANDF20141231031255                                                                                                                                                                                           |
| Manuscript Type              | Original Research Article                                                                                                                                                                                     |
| Date Submitted by the Author | Wed, 31 Dec 2014, 03:06 AM                                                                                                                                                                                    |
| Complete List of Authors     | <ul style="list-style-type: none"><li>■ Mr Ayat Ullah</li><li>■ Prof Khalid Nawab</li><li>■ Prof Muhammad Idrees</li><li>■ Dr Shoaib Sultan</li><li>■ Mr Mahmood Iqbal</li><li>■ Mr Muhammad Adrees</li></ul> |

# **A STUDY INTO THE ROLE OF EXTENSION AGENT IN ENHANCING THE FARM MANAGEMENT PRACTICES OF DAIRY FARMERS IN DISTRICT PESHAWAR.**

**Ayatullah, Khalid Nawab, Muhammad Idrees, Shoaib Sultan, Mahmood Iqbal, and  
Muhammad Adrees**

**Department of Agricultural Extension Education & Communication, Faculty of Rural Social Sciences, The University  
of Agriculture, Peshawar – Pakistan.**

**Department of Animal Nutrition, Faculty of Animal Husbandry and veterinary Sciences, The University of  
Agriculture, Peshawar - Pakistan**

## **ABSTRACT**

This research study is based on primary data gathered through a well prepared interview schedule from the total of 80 sample respondents in district Peshawar. The research was carried out in 2014. The study was conducted: to identify the role of extension agent in enhancing the management skills of the dairy farmers in the study area, to study the prevailing system among dairy farmers, and to identify the constraints faced by farmers in expanding the dairy farming in this district. The collected data were analyzed through SPSS using inferential statistics procedures. Results of the study showed that most of the respondents (61.2 %) were not aware of appropriate animal housing. Farmer's awareness regarding proper animal housing was found significantly associated with extension agent visits to them. It was found that maximum (86.2 %) of the respondents were lacking in technical knowledge to manage housing water practices at their farms. Farmer's ability to manage housing water practices showed significant association with extension agent visits. Majority (52.5 %) of the respondents was lacking in technical knowledge to identify and manage diseases in their animals. About (66.2 %) of the respondents stated that extension agent has not provided them with any skills through which they may identify or manage diseases in their animals. This is mostly because extension agent has not carried out any visit to them. However the extension agent visits to farmers showed significant association with farmer's ability to identify and manage diseases in their animals. Based on the results it was concluded that the role of extension agent was discouraging for establishing a modern dairy sector and the farmers lack skills to manage prevailing problems at their farms. It is recommended that extension services increasingly important for establishing a modern dairy sector; therefore extension agents should carry out their visits on regular basis, extension services should be delivered to all farmers without any prejudices or biases and extension agents should disseminate information based on training needs of the field conditions of the dairy farmers.

**Key words:** *Extension agent, management skills, animal housing, housing-water management, technical knowledge, modern dairy sector, training needs, field conditions.*

## **Introduction**

Agriculture is the leading sector of Pakistan's economy as it contributes 21.4% share in Gross domestic product (GDP) and directly supports 75% of its total population. It is the dominant sector that directly or indirectly involves 45% of the total work force of the country and supplies food for its population, original products for export and raw materials for agro allied industries. (GoP, 2012-13)

The progress of Pakistan primarily rests on agriculture sector. Regardless of the hectic government efforts for increasing agricultural productivity, average per hectare yield is far lower than those achieved in many other countries of the world. This can be attributed to poor farm management practices by farmers. This situation necessitates proper education of farmers on modern agricultural technologies, which can be realized through non-formal education by extension agencies (Rehman *et al.*, 2011).

Livestock is an energetic sub-sector of agriculture: its contribution to GDP is a massive 11.9 % and 55.44 % of the income created in agriculture comes from this sector. The key products of livestock are milk and meat. The milk production increased by 3.2 % and meat 4.5 % in 2012-13 as associated to the same period last year (GoP, 2012-13).

Livestock performs an essential role in Pakistan's economy by offering basic items of the human diet in the form of milk, meat and eggs. The country's population is nearly 180 million, in which 36 million lives in the rural areas and depend heavily on the livestock and dairy sectors. In recent times Pakistan has been placed as the third largest milk producer in the world, but this recent growth in per capita milk production was pushed as a result of increase in the number of dairy animals instead of milk yield improvement. The recent growth in population has increased the food requirements which has developed the need to produce more milk. From extension professionals point of view the vital factors influencing the dairy sector is capacity development via participatory principles (Ahmad *et al.*, 2012)

Foreign earnings of the livestock sector go above 35 billion rupees yearly. It also delivers hair, hide, bones, skin, blood, wool, and farmyard manure and is a major source of motive power for cultivation and rural transportation (Bilal *et al.*, 2006).

The country has a vast potential and is abundant with dairy animals' breeds. Unhappily, farmers are far away to cash in the real potential of animals. Non-adoption of appropriate practices by farmers is the main productivity hindering factor (Ashraf *et al.*, 2013).

Because of the lack of appropriate management practices, milk production at national-level is hardly 1195 litres/lactation for cows and 800 litres/ lactation for buffaloes. For increasing

milk yield, most farmers use oxytocin injections, which are particularly common in market-oriented dairies. Adding of water (often contaminated) to milk for increasing its volumes is a common practice in Pakistan (FAO, 2011).

Farmers take interest in various management practices concerning feeding, breeding and disease management. However, farmers are only embracing that practice which requires no investment and technicality. More ever farmers are lacking in technical knowledge to maintain their animal's healthy (Ashraf *et al*, 2013).

Presently, there are 5.97 million cattle, 1.93 million buffaloes, 3.36 million sheep and 9.6 million goats in Khyber Pakhtunkhwa. In the above foresaid database, 1.87 million cattle and 0.81 million buffaloes are those that deliver milk. In addition to these, 0.6 million sheep and 5.5 million goats were female with age above one year. The current milk production of Khyber Pakhtunkhwa is 2.74 metric ton with 1579 liters of milk per buffalo per annum, 663 liters of milk per cow per annum, 95 lit of milk per goat per annum, and 64 lit of milk per sheep per annum. In contrast to the national and global average the data is far away from achievable production levels. Without buffaloes and goats where the farm level milk production is higher over the world and sheep where the farm-level milk production of Khyber Pakhtunkhwa is better than Pakistan and World. In general, KP milk production can be increased up to 5.82 metric ton by appropriate management and genetic improvement (Hassan *et al.*, 2014).

Thus the lack of an effective human resource development structure in the livestock sector is an important barrier to improve the farm management practices and increase the production of the dairy farmers in Khyber Pakhtunkhwa. Farmers lack skills to manage animal housing and provide better facilities for ventilation, sanitation and keep animals safe from diseases. This thus necessitate for extension agent to focus more on the development of management skills of the farmers so that they may become able to provide better facilities for their animals and increase the production of their milk yield.

### **Objectives of the study**

- 1) To study the role of extension agent in enhancing the management skills of dairy farmers in the study area.
- 2) To examine the prevailing management system among dairy farmers in the study area.
- 3) To identify the constraints faced by farmers in expending dairy farming in the study area.



## MATERIALS AND METHODS

The methodology of a research study guides researchers on how to complete the process of collection, analysis and interpretation of data (Nachmias and Nachmias, 1992). This study was carried out in Peshawar district of Khyber Pakhtunkhwa. Peshawar is the main farming area of Khyber Pakhtunkhwa and is the hub of dairy farming. A multi stage cluster sampling technique was used for selecting farmers from district Peshawar. At first stage five Union councils i.e Dag, Nothia, Hassan Ghari, Achini Bala and Sufaid Dheri were selected purposively from overall 93 union councils. In the 2<sup>nd</sup> stage one village from each union council were selected purposively. Thus the total number of villages was also 5. In the 3<sup>rd</sup> stage 16 farmers were selected from each village. A visit was carried out to livestock and dairy development department and their documents were reviewed for selecting sample size. Thus the size of sample respondents for conducting the study was 80. Both the quantitative and qualitative data were used for conducting the study. For collecting the data a well-structured interview schedule was prepared and pretested in the field while randomly selecting two respondents from each village. Qualitative data were collected through observations and informal discussion. After collecting the data it were analysed by using computer software program Statistical Package for Social Sciences (SPSS). To judge whether different variables are associated or not chi-square test was applied. Significance was tested at the 5% confidence level. The descriptive analysis procedure was used in the study. The formula for chi-square test is:

$$\chi^2 = \sum_{i=1}^r \sum_{j=1}^c \frac{(O_{ij} - e_{ij})^2}{e_{ij}} \dots\dots\dots (3.2)$$

This test follows under the null hypothesis ( $H_0$ ) a  $\chi^2$ -distribution with  $(r-1)(c-1)$  degrees of freedom, in equation (3.2),  $O_{ij}$  specifies the observed frequency and  $e_{ij}$  specifies the expected frequency.

The analysis of chi-square was carried out by taking squared summation of frequencies for every cell, and dividing them by the expected frequency. The processed values are related with tabulated value of chi-square for proper degree of freedom at an exact probability level to determine the significance of association. The suitable degree of freedom was computed as follow:

$$df = (r-1) (c-1)$$

Condition for a chi-square test include that

1. The subjects for each group are randomly and independently selected
2. Each observation must qualify for one and only one category and
3. Sample size must fairly be large such that no expected frequency is less than 5, for  $r$  and  $c > 2$ , or  $< 10$  if  $r = c = 2$

But then again, the third assumption was disturbed in the data and for this reason; Fisher Exact Test was used as a substitute of simple chi-square. The association by the fisher is given in equation below (Baily, 1982);

$$\text{Fisher exact test} = \frac{(a + b)! (c + d)! (a + c)! (b + d)!}{N! a! b! c! d!}$$

Where a, b, c and d were the observed numbers in four cells of contingency Table and “n” the total number of observations.

## RESULTS AND DISCUSSION

### Knowledge of animal housing

At the time of making animal housing detailed attention should be given to the free movement of animals. There should be provided possible space for the resting of animals and they should be protected from hard surfaces such as concrete. For preventing udder abnormalities of the dairy animals it is necessary that the Animal housing must be kept clean.

**Table: I. Distribution of sample respondents by knowhow of animal housing**

| Village       | Knowhow of animal housing |       |       |       | Total |        |
|---------------|---------------------------|-------|-------|-------|-------|--------|
|               | Yes                       |       | No    |       |       |        |
|               | Count                     | % age | Count | % age | Count | % age  |
| Dag Lara      | 7                         | 8.8%  | 9     | 11.2% | 16    | 20.0%  |
| Nothia Qadeem | 6                         | 7.5%  | 10    | 12.5% | 16    | 20.0%  |
| Hassan Ghari  | 6                         | 7.5%  | 10    | 12.5% | 16    | 20.0%  |
| Achini Bala   | 4                         | 5.0%  | 12    | 15.0% | 16    | 20.0%  |
| Sufaid Dheri  | 8                         | 10.0% | 8     | 10.0% | 16    | 20.0%  |
| Total         | 31                        | 38.8% | 49    | 61.2% | 80    | 100.0% |

Source: Field Survey (2014)

Table I show that 49 farmers (61.2 %) were not aware of animal housing as compared to 31 farmers (38.8 %) who were aware of animal housing. This may be because of poor extension services in the study area. Knowledge of farmers about animal housing is statistically significantly associated with extension agent visit to them. This means that farmer's awareness regarding proper animal housing can be enhanced through proper extension services. The association of farmer's knowledge about animal housing with extension agent visit is given in table II.

**Table: II. Association between farmer's knowhow of animal housing and extension agent visit**

| Extension agent visit | Knowledge of Animal housing |    | Total |
|-----------------------|-----------------------------|----|-------|
|                       | Yes                         | No |       |
| Weekly                | 0                           | 1  | 1     |
| Monthly               | 12                          | 8  | 20    |
| once a year           | 9                           | 8  | 17    |
| Never                 | 10                          | 32 | 42    |

|       |    |    |    |
|-------|----|----|----|
| Total | 31 | 49 | 80 |
|-------|----|----|----|

Chi-Square value=9.830<sup>a</sup> with P-value= 0.020

### Housing water management

Possible supply of fresh water should be offered for animals, for washing the equipment's of milk picking and for minting the milking area clean. Entire animal housing must be suitably ventilated. There must be provided adequate supply of fresh air to remove humidity, let heat dispelled and stop development of gases such as carbon dioxide, ammonia or slurry gases. Proper place should be a provided for wastage disposal so as to prevent polluting environment and there must be proper sanitation facilities in animal housing in order to avert bad smell. Table III shows data on housing water management aspect of the farmers in the study area.

**Table: III. Distribution of sample respondents on the basis of housing-water management**

| Village           | Housing water management |       |            |       |             |       |                         |       |                     |       | Total |        |
|-------------------|--------------------------|-------|------------|-------|-------------|-------|-------------------------|-------|---------------------|-------|-------|--------|
|                   | Water                    |       | Sanitation |       | Ventilation |       | Manure/wastage disposal |       | Complete management |       |       |        |
|                   | Count                    | % age | Count      | % age | Count       | % age | Count                   | % age | Count               | % age | Count | % age  |
| Dag Lara          | 8                        | 10.0% | 0          | .0%   | 1           | 1.2%  | 0                       | .0%   | 7                   | 8.8%  | 16    | 20.0%  |
| No th i a Qadeem  | 0                        | .0%   | 14         | 17.5% | 0           | .0%   | 0                       | .0%   | 2                   | 2.5%  | 16    | 20.0%  |
| H a s s a n Ghari | 9                        | 11.2% | 0          | .0%   | 2           | 2.5%  | 3                       | 3.8%  | 2                   | 2.5%  | 16    | 20.0%  |
| A c h i n i Bala  | 16                       | 20.0% | 0          | .0%   | 0           | .0%   | 0                       | .0%   | 0                   | .0%   | 16    | 20.0%  |
| S u f a i d Dheri | 15                       | 18.8% | 1          | 1.2%  | 0           | .0%   | 0                       | .0%   | 0                   | .0%   | 16    | 20.0%  |
| Total             | 48                       | 60.0% | 15         | 18.8% | 3           | 3.8%  | 3                       | 3.8%  | 11                  | 13.8% | 80    | 100.0% |

Source: Field Survey (2014)

Table III presented use of improper housing-water management practices of respondents at 69 dairy farms. About 11 respondents used appropriate housing water management practices. Within above stated 69 respondents, 48 respondents indicated water as a main problem in their farm management, the 15 respondents stated sanitation and only 3 respondents stated ventilation and wastage disposal, respectively. These results are in contrast with the study of Muhammad *et al.* (2014). They found that about more than 70% of the respondents were

aware of the recommended housing conditions (such as about direction of shed, cemented, non-cemented, ventilated and lighted) however meager (less than one third of the respondents) had adopted it.

Data in table IV presents association of Extension Agents visit and respondents competence to manage housing-water practices at their farms. Significant association was found between farmer's ability to manage housing-water practices and the visit of extension agent to their clienteles. This indicates that extension agent has helped the farmers to manage housing-water practices at their farms.

**Table: IV. Association between extension agent visits with farmer's ability to manage housing-water practices**

| Extension agent visit | Housing water management |            |             |                         |                    | Total |
|-----------------------|--------------------------|------------|-------------|-------------------------|--------------------|-------|
|                       | Water                    | Sanitation | Ventilation | Manure/wastage disposal | Complete mangement |       |
| Weekly                | 0                        | 1          | 0           | 0                       | 0                  | 1     |
| Monthly               | 10                       | 5          | 0           | 1                       | 4                  | 20    |
| once a year           | 12                       | 1          | 0           | 1                       | 3                  | 17    |
| Never                 | 26                       | 8          | 3           | 1                       | 4                  | 42    |
| Total                 | 48                       | 15         | 3           | 3                       | 11                 | 80    |

Chi-Square value= 11.407<sup>a</sup> with P-value= 0.494

Farmers indicated some issues after their poor management practices on the farms. These include:

- i. A non-stop power failure conditions in the area has produced water shortage, that's why farmers are using canals (sanitation canals) water for drinking and other purposes.
- ii. Lack of adequate space for dairy farming has produced ventilation problems. Most of the respondents are poor and are not able to establish farms at considerable places.
- iii. Exceptionally poor sanitation facilities are observed in Nothia Qadeem. Farmers used to dispose their waste in sanitation canals, which in return has blocked the canals.

## Identification and management of diseases

Avoiding diseases in animals are an important method of economic and environmental perfection on dairy farms because it results in better milk yield and to therapy reduction. Too much antibiotics are used for manipulating mastitis. Prevention of diseases and udder health management may be supplemented through extension programs. The objectives of those programs should be to discover animal health risks, to promote improvement strategies and to check results of those applied preventive measures (Ivemeyer *et al.* 2009). Table V represents data on the farmer's ability of disease management at their farms.

**Table: V. Distribution of sample respondents on the basis of their ability to identify and manage disease**

| Village       | Identification and Management of Diseases |       |       |       | Total |        |
|---------------|-------------------------------------------|-------|-------|-------|-------|--------|
|               | Yes                                       |       | No    |       |       |        |
|               | Count                                     | %     | Count | %     | Count | %      |
| Dag Lara      | 6                                         | 7.5%  | 10    | 12.5% | 16    | 20.0%  |
| Nothia Qadeem | 6                                         | 7.5%  | 10    | 12.5% | 16    | 20.0%  |
| Hassan Ghari  | 6                                         | 7.5%  | 10    | 12.5% | 16    | 20.0%  |
| Achini Bala   | 8                                         | 10.0% | 8     | 10.0% | 16    | 20.0%  |
| Sufaid Dheri  | 12                                        | 15.0% | 4     | 5.0%  | 16    | 20.0%  |
| Total         | 38                                        | 47.5% | 42    | 52.5% | 80    | 100.0% |

Source: Field Survey (2014)

Table V shows that 38 respondents were capable enough to identify and manage diseases in their animals. Heat stroke, Mastitis, FMD (Foot and Mouth Diseases), Hepatitis, Pox and Hemorrhagic Septicemia were the diseases they know about and they used to manage these diseases in their animals. They mostly used indigenous knowledge for the management of these diseases. Almost 42 respondents were found not capable to identify and manage diseases in their animals. These findings are also in agreement with the findings of Muhammad *et al.* (2014). He found that more than one quarter of the farmers were aware on drenching contrary to endo-parasite and dipping contrary to ecto-parasite but only small number of respondents has embraced it. More over, a simple majority knows about vaccination of FMD and HS although one-tenth of them had knowledge of HS and anthrax. In their adoption case less than half of them had adopted vaccination.

### Extension agent helps in identifying and managing diseases

The farmers were asked a question of help (if any) of extension personnel in providing any services concerning identifying and managing disease in their animals. The number of farmers on the basis of their answers is given in table VI.

**Table: VI Distribution of sample respondents on their view of extension agent help in enhancing their skill to identify and manage diseases in their animals**

| Village       | Extension help in identifying and managing diseases |       |       |       | Total |        |
|---------------|-----------------------------------------------------|-------|-------|-------|-------|--------|
|               | Yes                                                 |       | No    |       |       |        |
|               | Count                                               | %     | Count | %     | Count | %      |
| Dag Lara      | 6                                                   | 7.5%  | 10    | 12.5% | 16    | 20.0%  |
| Nothia Qadeem | 5                                                   | 6.2%  | 11    | 13.8% | 16    | 20.0%  |
| Hassan Ghari  | 5                                                   | 6.2%  | 11    | 13.8% | 16    | 20.0%  |
| Achini Bala   | 6                                                   | 7.5%  | 10    | 12.5% | 16    | 20.0%  |
| Sufaid Dheri  | 5                                                   | 6.2%  | 11    | 13.8% | 16    | 20.0%  |
| Total         | 27                                                  | 33.8% | 53    | 66.2% | 80    | 100.0% |

Source: Field Survey (2014)

Table VI indicates that 27 respondents were with the view that extension agent has assisted them to identify and manage diseases in their animals as compared to 53 respondents who stated that extension has not provided any help through which farmers may identify and manage diseases of their animals.

The extension agent visit and the farmer's ability to be skilled enough to identify and manage diseases in their animals were found significantly associated with each other. This means that the visit of extension agent has increased the skills of farmers to identify and manage diseases in their animals. Extension agent has not paid visit to majority of the farmers. However, all those farmers to whom extension agent paid visits stated increase in their skills to identify and manage diseases in their animals. The association between both the variables is given in table VII.

**Table: VII Association between Extension Agent visit and farmers ability to identify and manage diseases in animals**

| Extension agent visit | Identification and management of diseases |    | Total |
|-----------------------|-------------------------------------------|----|-------|
|                       | Yes                                       | No |       |
| Weekly                | 0                                         | 1  | 1     |
| Monthly               | 18                                        | 2  | 20    |
| once a year           | 12                                        | 5  | 17    |
| Never                 | 8                                         | 34 | 42    |
| Total                 | 38                                        | 42 | 80    |

Chi-Square value=32.659<sup>a</sup>with P-value= 0.000

#### **Availability of incentives to farmers:**

In order to motivate farmers to hold Good Agricultural Practices (GAPs), and raise the level of agriculture production, farmers should be given incentives. The incentives for farmers to adopt Good Agricultural Practices (GAPs) include economic incentives for instance increasing and/or stabilizing income, declining routine prices, recovering market access, enhanced capital valuation of farm assets, decreased susceptibility to poorer agricultural practices of other farmers; regulatory or legal incentives comprising modifications in possession rights or tax burdens, accountability rules, subsidies; and human capital incentives like access to up-to-date skills. Disincentives for farmers to take GAPs encompass economic disincentives such as: enhancing production costs, investment in assets that are special for a worker and/or cannot be recovered if the buyer-seller link interrupted; institutional constraints like unsatisfactory quality monitoring infrastructure, unskilled or corrupt government institutions for administering GAPs, and; human capital limitations such as literateness constraints on documenting abilities; constraints on labour or management time, poor public extension, etc (FAO, 2003). Data concerning this aspect are given in table VIII.

**Table: VIII Distribution of sample respondents on the basis of incentives availability**

| Village       | Incentives |       |       |       | Total |        |
|---------------|------------|-------|-------|-------|-------|--------|
|               | Yes        |       | No    |       |       |        |
|               | Count      | %     | Count | %     | Count | %      |
| Dag Lara      | 3          | 3.8%  | 13    | 16.2% | 16    | 20.0%  |
| Nothia Qadeem | 5          | 6.2%  | 11    | 13.8% | 16    | 20.0%  |
| Hassan Ghari  | 1          | 1.2%  | 15    | 18.8% | 16    | 20.0%  |
| Achini Bala   | 1          | 1.2%  | 15    | 18.8% | 16    | 20.0%  |
| Sufaid Dheri  | 1          | 1.2%  | 15    | 18.8% | 16    | 20.0%  |
| Total         | 11         | 13.8% | 69    | 86.2% | 80    | 100.0% |

Source: Field Survey (2014)

Table VIII shows that 69 respondents said that government have not provided any incentive to adopt GAPs. Eleven respondents stated that up to some extent government has offered them some incentive to adopt GAPs. The word “Up to some extent” was used by all latter farmers. This is disheartening for all those poor farmers who lack assets and who are believed as small farmers to invest further in dairy farming.

## **CONCLUSIONS**

From the present study it is concluded that the role of extension agent is discouraging for establishing a modern dairy sector. Farmers are lacking in technical knowledge to manage prevailing problems on their farms. Heat stroke, Mastitis, FMD (Foot and Mouth Diseases), Hepatitis, Pox and Hemorrhagic Septicemia are some of the main prevailing diseases in the study area. It was found that the extension agent visits can increase the ability of farmers to identify and manage diseases in their animals, however, majority of the farmers were not visited by the extension agents of livestock and dairy development department (Extension). Moreover farmers were not provided any incentives to adopt Good Agricultural Practices (GAPs).

## **RECOMMENDATIONS**

Based on the findings of the study, the following recommendations were formulated for adoption by all concerned like the policy makers and administration.

- i. Extension services are increasingly important for establishing a modern dairy sector; therefore, extension agents should carry out their visits on regular basis.
- ii. Extension services should be delivered to all farmers.
- iii. Extension agent should disseminate information based on training needs of the dairy farmers.
- iv. Farmers should be given incentives for adopting good agricultural practices (GAPs).

## LITERATURE CITED

- Ahmad, S., G. Hinch, J. Prior, P. Thomas and D. Burrell. 2012. The Role of Extension in Changing The Dairy Industry in Pakistan: A Review. *The Journal of Animal and Plant Sciences*. 22(2 Suppl.): 113-116.
- Ashraf, S., M. Iftikhar., G. A Khan., B. Shahbaz and I. Ashraf. 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. Retrieved on April 15, 2014, from <http://www.academicjournals.org/AJAR>.
- Bilal, M. Q., M. Suleman and A. Raziq. 2006. Buffalo: Black gold of Pakistan. *Livestock Research for Rural Development* 18 (9). Article #128. Retrieved on April 15, 2014, from <http://www.lrrd.org/lrrd18/9/bila18128.htm>.
- FAO. 2003. Report of an expert consultation on a Good Agricultural Practice approach 10-12 November. Rome, Italy.
- FAO. 2011. Experts report on Dairy development in Pakistan, by Umm-e-Zia, T. Mahmood and M.R. Ali. Rome. Pp 11.
- GoP. 2013. Economics Survey of Pakistan. Economic advisor's wing, ministry of finance, Islamabad. Pp 17, 18, 29,30.
- Hassan, H., M. Ishaq, N. A. Shah and A. Farooq. 2014. Milk Production Potential in Khyber Pakhtunkhwa. *Pakistan J. Agric. Res.* 27 (1): 30-40.
- Ivemeyer, S., M. Walkenhorst, F. Heil, C. Notz, A. Maeschli, G. Butler and P. Klocke. 2009. Management factors affecting udder health and effects of a one year extension program in organic dairy herds. *Animal*. 3 (11): 1596–1604.
- Muhammad, G., M. Q. Bilal, A. Saghir and M. Sami-Ullah. 2014. Adoption Gap in Livestock Production Practices. *The International Asian Research Journal* 2 (3): 5-9.
- Nachmias, C. F. and D. Nachmias. 1992. *Research methods in the Social Sci.* (4<sup>th</sup> ed.). Martin Press Inc. Kent, UK.
- Rehman, F., S. Muhammad, I. Ashraf and S. Hassan. 2011. Factors Affecting the Effectiveness of Print Media in the Dissemination of Agricultural Information. *Sarhad J. Agric.* 27 (1): 119-124.