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WOMEN'S ROLE IN LIVESTOCK PRODUCTION AND ITS IMPACT ON LIVESTOCK INCOME

Muhammad Usman [1,*], Abdul Saboor [1], Abdul Qayyum Mohsin [1] and Anila Afzal [2]

[1] *Department of Economics, PMAS-Arid Agriculture University Rawalpindi (PMAS-UAAR), Pakistan*
[2] *Department of Sociology, PMAS-Arid Agriculture University Rawalpindi (PMAS-UAAR), Pakistan*

ABSTRACT

Livestock is adopted and managed extensively in rural and peri-urban areas of different countries as a source of livelihood and to fulfill a family's nutritional requirements. Its management is a full-time job for performing special activities requiring the involvement of both men and women. Women's role is very important, especially in small-scale production to generate family income and cater the nutritional needs. The current study aims to analyse the role of women in livestock production. For this purpose, a sample of 456 respondents was collected from Punjab's northern, central, and southern regions. Multiple regression analysis is used to assess the impact of women's participation on livestock income. The assessment shows that overall women's participation in livestock production activities was greater compared to men in all regions of Punjab except marketing. Similarly, women's age, livestock ownerships, participation in livestock activities, access to input markets, and women's education are the factors that have a positive and significant impact on livestock income. Women's participation can be much more productive by increasing women's empowerment in resources like livestock ownership, access to easy credit and opportunities like market access, access to non-farm income opportunities, and access to training and information.

Keywords: Women participation; Income; Livestock; Multiple regression.
** Email: musman3850@gmail.com*

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INTRODUCTION

The livestock sector contributes significantly to the economy of developing countries (Arshad et al., 2010). Its contribution to reducing the vulnerabilities of the rural class especially poor women has made it an appealing vehicle for development, gender equality, and empowerment (Amanat et al., 2015). Major part of income of small rural women farmers come from the sale of ruminants (Kyotos et al., 2022). According to Farnworth and Kathleen (2015), gender is the key player in every production system with men and women frequently playing distinct responsibilities in crop and livestock production. Livestock is adopted and managed extensively in rural and peri-urban areas of different countries as a source of livelihood and to fulfill a family's nutritional requirements (Naz and Khan, 2018). Its management is a full-time job for the performance of special activities, which requires the involvement of both men and women (Zahoor et al., 2013). Women in rural areas perform about 90 percent of activities (feeding, cleaning, milking, etc.) relevant to animal rearing. It has been estimated that women are involved in 70 percent of activities of livestock production in Asia and Sub-Saharan Africa. However, activities like marketing, slaughtering, and construction of farms are mainly managed by men (Farinde and Ajayi, 2005). Women's role as labour

working for livestock management and carrying out its activities is very crucial, but their work is accounted as unpaid (Ahmad, 2014). Like other developing countries, women in rural areas of Pakistan are extensively engaged in livestock and crop production. Their role, especially in small-scale production, is very important to generate family income and cater to nutritional needs (Younas et al., 2007).

Livestock rearing is regarded as a responsibility of women like other household chores in rural areas. Their contribution as labour input is more in milking, fodder cutting, feeding, shed cleaning, watering, and milk processing activities. They are also considered responsible for the manure collection and preparation of dung cake (Andaleeb et al., 2017). Women work for the management of both small and large ruminants (Hashmi et al., 2007), and their participation is recorded more than their counterparts. Women's participation in livestock activities offers them a lot of opportunities, like livestock is an asset mostly owned by rural women in developing countries (Grace, 2007). In most cases, their ownership is limited to small ruminants like sheep, goats, poultry, etc. to ensure financial security. Their participation in livestock activities is not only employment, but they earn worth through contribution in income from the sale of livestock products and get nutritious food for their family. Their contribution to the collection of manure reduces the farm budget through the provision of organic fertilizer for soil fertility and enhancement of crop yield (Batool et al., 2014). Women's active role in livestock activities increased their participation in decision-making and hence empowerment (Mahadi et al., 2014).

Patel et al. (2016) argued that functions performed by different household members in livestock production must be understood and valued. Production and productivity will improve if the income generated from the sale of livestock production is under the control of stakeholders. Women's access to the market, mobility, and control over income generated by livestock is very important in this regard. Special training and tailoring catering to the specific need of women and considering gender-related social constraints can enhance their income. Ownership of livestock by a female farmer has increased the family consumption of livestock products which improved the health and nutritional diversity of the children in Africa (Aylee and Peacock, 2003). In Ethiopia, Hoddinott et al. (2014) reported better milk consumption by the children and a reduction in stunting growth status due to cattle ownership by the women and hence improved empowerment status. In a study in Nepal conducted by Malapit et al. (2013) on the status of women empowerment in livestock, they found that improved maternal health and reduced child mortality were associated with women's control of livestock output and income. Livestock is an essential part of mixed farming, which is largely occupied by women have strength of three fourth part of the labour force with a 30 percent contribution to national production (Birthal and Taneja, 2012).

Among the world's poor, 70 percent are women, and they prefer to have livestock as a source of livelihood (FAO, 2011). Women comprise 93 percent of the labor force working in the dairy sector (Borkar et al., 2017). They spend 12-14 hours of their daily life to perform activities related to livestock production (Manzoor et al., 2018). In the rural asset portfolio, livestock is one of the largest widely owned assets by rural households due to its multifunction performance including its use in farming, having the highest expected returns through the sale of animal-derived products and their consumption. The livestock is also used as a store of value and security against uncertainty for smooth consumption. Due to its role in life, livestock is a source of employing two-thirds of the world's rural women, i.e., 600 million (Kristjanson et al., 2010), who are earning their livelihood and securing their dietary needs (Thornton, 2003). Local livestock species have the additional benefit of rarely becoming explicit with a potential for self-replication. The animals multiply like interest on money in the bank and accumulate value (Ferguson, 2008). Women can easily own livestock as an asset in developing countries either through inheritance or through market purchase which is also a source of reducing asset parity between male and female as compared to owning

other financial, physical or land assets (Rubin et al., 2010). Women as likely as men hold livestock heads although their numbers are less, they prefer to have poultry and small ruminants (FAO, 2009).

The informality of livestock assets is disadvantageous to women when their right of owning livestock is challenged or in case of theft. The interventions/safeguard policies to protect women's rights and access and insurance against the death of an animal can lead to their poverty reduction. Little work is published in the field of livestock's importance for women as compared to their involvement in small-scale crop farming and interventions, policies are required to boost their role (Quisumbing and Pandolfelli 2010; FAO 2011; World Bank 2012). The current study is designed to assess the role of women in livestock and its impact on the income generated from livestock.

METHODOLOGY

The current study is based in the Punjab province. Punjab is the largest province of Pakistan by both human and livestock populations with a diversity of crops and livestock production. The classification of regions suggested by Wilder (1999) is adopted. He divided Punjab into northern, central, southern, and western regions (Figure 1) based on geographical boundaries, official district and (old) division borders, regional economic differences, variations in irrigation, agriculture, and cropping patterns, differences in farm size and land tenure patterns, and distinct historical, cultural, and linguistic influences in each region. Wilder's (1999) classification over Gazdar's (1999) and Malik's (1991 and 2005) is preferred because it is more nuanced and comprehensive and takes into account a wider range of factors in classifying different regions.

Malik's (2005) classification restricts itself to agronomic zones. The commercialization of livestock, animal healthcare facilities livestock holding also varies in these regions. The language, caste, attitude, education level, poverty distribution and even infrastructure are different in these three areas. Northern Punjab comprises the Rawalpindi, Sargodha and some districts of Gujranwala division, central comprise Lahore, Faisalabad Sahiwal and Gujranwala while Southern and Western Punjab comprises Multan, Bahawalpur and D.G Khan Division. Rawalpindi district was selected from the northern region, Faisalabad from central region and Bahawalpur district from the Southern region came in the orbit of selection for the data collection.

Figure 1. Regional map of Punjab province; Source: Regional classification by Wilder (1999).

Sampling Framework

To get a representative sample of 456 respondents (Using Morgan Table) from three regions of Punjab were selected based on their livestock population (Northern, Central, and Southern Punjab), while the western region was skipped due to similar culture and livestock rearing practices. One district from each region is randomly selected which has the largest livestock population. Two rural tehsils were purposively selected from each selected district, and one union council from each tehsil is selected for data collection. The households of each Union Council are identified who have livestock and have women participating in livestock activities. Collectively 76 households were interviewed from each union council and 152 respondents from a district. A well-structured draft of the questionnaire was prepared which has information regarding the location, personal, social, and economic information of the respondents. Data is collected by personal interview of the respondent. For this purpose, initially, women's role in livestock is understood and their participation in different livestock activities like grazing, feeding (collection and preparation), watering, cleaning of animal sheds, milking, disease control/ caring for animals, marketing of livestock products and processing of livestock's production is estimated and secondly impact of their involvement on livestock income is determined.

Women' role in Livestock Production and Income

Women's participation in livestock production is accessed by estimating the number of hours spent by women and female children for different livestock species like buffalos, cow, goat/sheep, chicken, etc., and conversion of child houses to adult equivalent units in different livestock production activities feeding, watering, cleaning of the shed, milking, milk processing disease control/ caring of sick animals, marketing and others.

Table 1. Components of livestock income.

	Components
Livestock Income	Income obtained from the sale of animals
	Income obtained from the sale of birds
	Income obtained from the sale of milk
	Income obtained from the sale of butter/ghee
	Income obtained from the sale of hide skin/wool
	Income obtained from the sale of animal draft power
	Income obtained from the sale of animal manure

The impact of women's participation in livestock activities on income obtained from livestock is estimated from the following model.

$$Y = \alpha + \sum_{i=1}^{n} \beta_i X_i + \mu_i \quad (1)$$

Where

Y= Total income obtained from livestock.

α = Total income obtained from livestock when no woman participates in any livestock activity

β_i = the impact of women participation in ith activity when Xi=1

X_i = is the hours spent by the women in different livestock activities/operations like feeding, watering, milking, cleaning of animal sheds, etc.

RESULTS AND DISCUSSION

Table 2 shows the composition of livestock farm in different regions of Punjab, which show that in Bahawalpur most of the households prefer cows and small ruminants, which comprise 31 percent and 48 percent of farm, respectively, in Ahmadpur and 14 percent and 41 percent in Yazman. Similarly, the households in Faisalabad where women participate in livestock activities have a majority of buffaloes and small ruminants on their farm i.e., 22 percent and 35 percent in Faisalabad respectively and 18 percent and 34 percent in Jaranwala while in Rawalpindi 21 percent livestock is buffaloes and 29 percent small ruminants in Gujar Khan and 23 percent and 24 percent in Kotli Sattian respectively. In Faisalabad proportion of cows is 18 percent of total livestock, which is 17 percent in Jaranwala 16 percent in Gujar Khan and 14 percent in Kotli Sattian. In Ahmadpur calve forms 7 percent of total livestock while Yazman and Faisalabad have same 9 percent share which is 13 percent in Jaranwala, 10 percent in Gujra Khan and 14 in Kotli Sattiyan. The contribution of domestic poultry is found 4 percent in Ahmadpur, 24 percent in Yazman, 14 percent in Faisalabad , 17 percent in Jaranwala, 24 percent in Gujar Khan and 22 percent Kotli Sattian.

Table 2. Composition of livestock herd in different regions of Punjab.

District	Tehsil	Buffalo	Cow	Calves	Goat/Sheep	Poultry	Others
Bahawalpur	Ahmadpur East	16 (10)	53 (31)	24 (7)	44 (48)	12 (4)	1 (1)
	Yazman	27 (11)	34 (14)	21 (9)	47 (41)	16 (24)	1 (1)
Faisalabad	Faisalabad	36 (22)	34 (18)	18 (9)	42 (35)	15 (14)	2 (2)
	Jaranwala	36 (18)	36 (17)	17 (13)	44 (34)	19 (17)	1 (1)
Rawalpindi	Gujar Khan	51 (21)	47 (16)	21 (10)	36 (29)	24 (24)	1 (1)
	Kotli Sattian	30 (23)	(26) (14)	41 (14)	43 (24)	42 (22)	1 (0)

Note: () have the %age of household livestock herd while other value is frequency of having that animals.

Gender wise Participation in Livestock Activities

Women's participation in livestock production is assessed by estimating the number of hours spent by women and female children for different livestock species like buffalos, cow, goat/sheep chicken, etc. and conversion of child house to adult equivalent units in different livestock production activities feeding, watering, cleaning of the shed, milking, milk processing disease control/ caring of sick animals, marketing and others. Table 3 shows the participation of men and women in different livestock activities. Women participation in grazing activity is greater in Ahmadpur and Faisalabad as compared to men but less in Yazman, Jaranwala and Gujar Khan while equal in Kotli Sattian. Time allocated by the women is more in the feeding of animals in all three districts as compared to men, similar to the findings of Parveen (2005). Men have more contribution to the watering of animals as compared to their counterparts. Cleaning of sheds and milking of the animals is among the major responsibilities of women in all three districts. Men spend more time caring for diseased animals as compared to men.

Women's participation in marketing activities is negligible in Bahawalpur and Rawalpindi; however, very little time is allocated by the women of Faisalabad. On average, women of Ahmadpur spend 6.9 hours daily for livestock activities as compared to men, who spend 2 hours, while in Yazman women's participation is 6.3 hours in comparison to males, i.e., 5.4 hours daily. In Faisalabad women participation is 5.3 hours daily while allocated 3.9 hours for livestock as compared to Jaranwala where men's participation is higher, i.e.,

4.8 hours than women who spend 4.5 hours on an average on a daily basis. Men and women's share in the time allocated to perform livestock activities is almost similar in both tehsils of Rawalpindi District. Ahmad (2014), Amin et al. (2010), Saghir et al. (2005) conducted similar studies in Punjab, and Andleeb et al. (2017), Naz and Khan (2018) and Banuree (2019) in KPK have the same findings.

Table 3. Participation of different genders in livestock activities (hours).

District	M/ W	Bahawalpur		Faisalabad		Rawalpindi	
Tehsil		Ahmadpur	Yazman	Faisalabad	Jaranwala	Gujar Khan	Kotli Sattian
Grazing	M	0.4	1.4	0.6	1.2	1.3	1.5
	W	1.3	1.1	0.9	0.9	1.1	1.5
Feeding	M	0.3	1.3	0.5	0.7	1.3	1.5
	W	1.9	1.7	1.1	1.1	1.5	2
Watering	M	0.2	0.7	0.9	0.8	1.2	1.7
	W	1	0.8	0.8	0.6	1	1.4
Cleaning	M	0.1	0.3	0.4	0.4	0.8	1.3
	W	1.1	1.3	0.9	0.8	1.2	1.7
Milking & Processing	M	0.1	0.5	0.5	0.6	1	1.7
	W	1.1	0.7	0.9	0.6	1.1	1.5
Caring of diseased	M	0.8	1	0.6	0.8	0.6	1
	W	0.4	0.7	0.7	0.5	0.4	0.6
Marketing	M	0.25	0.2	0.3	0.2	0.01	0
	W	0	0.04	0.03	0.05	0	0
Total	M	2	5.4	3.9	4.8	6.2	8.7
	W	6.9	6.3	5.3	4.5	6.1	8.6

Impact of Women's Participation on Livestock Income

The impact of women's participation on livestock income is estimated by use of regression analysis (Roy, 2017) where the household's livestock income is a dependent variable and other factors like women's age, livestock ownerships by women, women's participation in livestock activities, women empowerment livestock index, women's access to input market and women's educations are independent variables.

Table 4 shows the results of the log-linear regression model. Income was a dependent variable, and the age of principal women or respondents, total number of livestock, number of livestock owned by women, women participation, women participation in revenue-generating activities, women empowerment livestock index, women access to input market and women's education are the independent/ explanatory variables. Results reflect that women's age, livestock ownerships, participation in livestock activities, access to input markets, and women's education are the factors that have a positive and significant impact on household income, similar to the findings of Rahman (2013). Due to an hour increase in women's participation in livestock activities household income increased by 0.16 percent. Similarly, women's ownership can also be defined by explaining the standardized co-efficient that if women's livestock ownership increased by 1 unit the household income is increased by 0.32 percent. Women empowerment livestock index has an inverse relationship with monthly livestock income which is defined as that with 1 unit increase in index value reduces the livestock income by 0.24 percent. The finding of the study is reconciled with Roy (2017) and Harkness (2010).

Table 4. Impact of women's participation on livestock income.

Variable	Standard Error	Standardized Coefficients Beta	T	Sig.
(Constant)	0.16		59.52	0.0000
Age of Woman Respondent	0.00	0.13	3.26	0.0012
Total No. of Livestock	0.02	0.18	4.29	0.0000
No. of Livestock owned by Women	0.02	0.32	7.50	0.0000
Women Participation	0.01	0.16	3.91	0.0001
Women Participation in Revenue Generating Activities	0.02	0.02	0.39	0.6974
Women Empowerment Livestock Index	0.17	-0.24	-5.87	0.0000
Women Access to Input Market	0.07	0.10	2.42	0.0159
Women Education	0.01	0.04	0.92	0.3571
R square	0.31	Adjusted R Square		0.30

Dependent variable: Log of livestock income.

Table 5. Impact of women's participation on livestock income in Bahawalpur.

Variable	Standard Error	Standardized Coefficients Beta	T	Sig.
(Constant)	0.16		59.52	0.0000
Age of Woman Respondent	0.00	0.13	3.26	0.0012
Total No.of Livestock	0.02	0.18	4.29	0.0000
No. of Livestock owned by Women	0.02	0.32	7.50	0.0000
Women Participation	0.01	0.16	3.91	0.0001
Women Participation in Revenue Generating Activities	0.02	0.02	0.39	0.6974
Women Empowerment Livestock Index	0.17	-0.24	-5.87	0.0000
Women Access to Input Market	0.07	0.10	2.42	0.0159
Women Education	0.01	0.04	0.92	0.3571
R^2	0.20	Adjusted R^2		0.15

Dependent variable: Log of livestock income.

Table 5 shows the results of the log-linear regression model in Bahawalpur, where the age of women, total livestock, women's ownership of livestock, women's participation in livestock activities, and access to input markets have a positive relation with livestock income, but women empowerment has a negative relationship with 20 percent value of R square.

Table 6 shows the results of the model showing the impact of women participation on livestock income in Faisalabad. According to the results of total livestock, women's livestock ownerships and her access to input markets are highly significant factors influencing livestock income positively, while women's age and their participation in livestock activities are also significantly influencing livestock income. The overall model has a 0.34 value of R square for Faisalabad.

Table 6. Impact of women's participation on livestock income in Faisalabad.

Variable	Standard Error	Standardized Coefficients Beta	T	Sig.
(Constant)	0.31		28.89	0.000
Age of Woman Respondent	0.01	0.13	1.87	0.063
Total No. of Livestock	0.03	0.27	3.60	0.000
No. of Livestock owned by Women	0.05	0.43	6.02	0.000
Women Participation	0.02	0.16	2.25	0.026
Women Participation in Revenue Generating Activities	0.03	0.01	0.20	0.841
Women Empowerment Livestock Index	0.39	-0.18	-2.41	0.017
Women Access to Input Market	0.15	0.30	4.18	0.000
Women Education	0.02	0.05	0.66	0.508
R square	0.34	Adjusted R Square		0.30

Dependent variable: Log of livestock income

Table 7. Impact of women participation on livestock income in Rawalpindi.

Variable	Standard Error	Standardized Coefficients Beta	T	Sig.
(Constant)	0.23		41.65	0.000
Age of Woman Respondent	0.00	0.08	1.17	0.244
Total No. of Livestock	0.03	0.25	3.23	0.002
No. of Livestock owned by Women	0.02	0.35	4.78	0.000
Women Participation	0.01	0.23	3.27	0.001
Women Participation in Revenue Generating Activities	0.03	0.04	0.57	0.569
Women Empowerment Livestock Index	0.30	-0.13	-1.94	0.055
Women Access to Input Market	0.10	0.02	0.30	0.763
Women Education	0.01	0.00	-0.03	0.975
R 2	0.39	Adjusted R2	0.54	

Dependent variable: Log of household income.

Table 7 shows the impact of women participation on another variable livestock income in Rawalpindi District. The results show that total livestock, women ownership of livestock and women's participation are the significant variable that positively influences the household monthly income women empowerment in livestock has a negative relationship with livestock income. The overall model explains 39 percent variation in dependent variables due to independent variables.

CONCLUSIONS

Women's participation in livestock activities is more than men's in non-commercial activities like grazing, feeding of animals, cleaning of sheds, etc. In contrast, their role in marketing and revenue-generating activities is less. Women's participation in livestock enterprises has had a positive impact on live income, food security, and poverty reduction and has a positive role in gender equality. Women's participation can be much more productive by increasing women's empowerment in resources like livestock ownership,

access to easy credit and opportunities like market access, access to non-farm income opportunities, and access to training and information.

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