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AGRICULUTURAL EXTENSION

FINANCIAL RISKS ASSESSMENT AND MANAGEMENT: AN EMPIRICAL ANALYSIS OF LIVESTOCK FARMERS IN PUNJAB, PAKISTAN

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ABSTRACT

The financial risks associated with livestock rearing have significantly increased in Punjab, Pakistan. Livestock farmers in this region often face financial uncertainty. This study aims to determine different types of financial risks and relevant coping strategies adopted by livestock farmers at the farm level. The research was conducted in Punjab, Pakistan, a major region for livestock production. The study used a benchmark survey in two purposefully selected districts (Rahim-Yar-Khan and Muzaffargarh), which generated a list of 3808 livestock farmers. A multistage sampling procedure was employed to draw a sample of 400 livestock farmers from the 40 selected villages. The data was analysed by using SPSS which facilitated rigorous examination, and presentation of findings through tables and graph. High input prices ($\bar{X}$ =4.30), inflation ($\bar{X}$ =3.96), and low output prices ($\bar{X}$ =3.38) were the three leading financial risks as perceived by the respondents. As such, personal saving ($\bar{X}$ =2.54), informal borrowing ($\bar{X}$ =2.26), and loan allocation ($\bar{X}$ =2.00) were the first-hand choices of farmers to deal with financial risks. In this study, a binary logistic regression was run to examine the impact of demographic characteristics on financial risk perceptions. The findings revealed that education, income source, land holding, and herd size had statistically significant impacts with the coefficient values of 0.365 (P<0.05), 0.731 (P<0.05), 0.335 (P<0.05) and 0.0.619 (P<0.05), respectively. The findings shows that small farmers in selected districts face a significant challenge of informal borrowing from middlemen, which often traps them in a never-ending cycle of debt. To mitigate financial risks, the government should prioritize the promotion of education, income diversification and affordable insurance options to enhance the financial stability of livestock farmers in the region.

Keywords: Livestock; Risks; Financial; Perception; Management; Pakistan

INTRODUCTION

Livestock rearing is closely linked with uncertainties. Risk in agriculture is commonly assumed and associated with negative outcomes (Knox *et al*., 2010). Livestock farmers in developing countries as compared to developed countries are more exposed to various risks and most of the time they failed to capitalize on the potential return provided by these risks (Abate *et al*., 2015). Farmer's understanding and management regarding risks in developed countries have been recognized but developing nations are lagging far behind (Akcaoz *et al*., 2009). Many researchers reported that risks associated with animals are increasing in the world, especially in developing countries (Doss *et al*., 2008; Headey *et al*., 2014; Matsaert *et al*., 2011; Chantarat *et al*., 2013). In livestock management systems, farmers face multiple risks. Of the various risks, the most prominent are production, legal/institutional, marketing, financial and human risks (Wilmer *et al*., 2016; Harwood *et al*., 1999; Aditto *et al*., 2012; Schneider, 2010). Different types of risks threatening livestock are presented in Figure 1.

Figure 1 Different types of risks threatening livestock

Out of these risks, the magnitude of financial risk is increasing rapidly, particularly due to current economic situation and inflationary trends around the world. Financial risks in agriculture are associated with the inability to have enough cash to meet expected obligations, generating lower profits than expected, and the loss of equity in the farm (Horcher, 2011). Such financial risks usually stem from the production

and marketing risks described earlier. Furthermore, financial risks may also arise from various factors such as rising input costs, increased interest rates, excessive borrowing, higher cash demands for family needs, insufficient cash or credit reserves, and unfavorable changes in exchange rates (Wilson *et al*., 1988).

The agricultural economy depends on various aspects, especially the price instability of agricultural products being an important one. Fluctuation in crops prices each year affect the supply of products and production decisions of growers (Arısoy and Bayramoglu, 2017). In Pakistan, the informal credit and loaning system are the primary means of support for smallholder households during times of disaster or emergency. Due to the complicated procedures and strict conditions of formal loaning systems, small farmers are reluctant to adopt them. A large percentage of farmers rely on a middleman or large farmers in their area to fulfill their financial needs. Research by Khan *et al*. (2015) indicated that livestock had a positive impact on poverty reduction in Lasbela district of Balochistan province, Pakistan. The availability of credit and healthcare for livestock were found to boost households' returns from livestock, leading to poverty reduction. Similarly, the accessibility of agricultural credit is also a crucial tool for rural development, and investment are key in materializing a successful business venture. For example, khan *et al*. (2018) reported that agricultural credit facilities have almost doubled the livestock income of farmers and are highly productive in improving the socio-economic status of farmers. Pakistan is one of the top five producers of milk, but the nation's dairy sector faces challenges. A dependence on imported milk products results from the low national production. These challenges in Pakistan's livestock sector are a result of ineffective management techniques, including dairy farmers' ignorance and financial constraints (Shahzad, 2022). This study was particularly planned to analyse financial risks faced by dairy farmers and to identify coping strategies available to them in the Punjab province of Pakistan. The previous literature on financial risks related to livestock farmers in Punjab was found to be limited. This study aimed to conduct a rigorous scientific inquiry into the root causes of financial risks in Punjab, Pakistan, related to livestock. Its goal was to identify more efficient methods for managing these risks. The anticipated outcomes held significant potential to offer valuable support and guidance, contributing to the enhancement of the nation's economy. Furthermore, the findings and analyses were poised to assist in formulating comprehensive policies for the livestock sector, catering to both immediate and long-term needs, at both the micro and macro levels.

MATERIALS AND METHODS

Punjab, Pakistan, encompasses approximately 4.20 million hectares of cultivated land and holds a prominent position in livestock farming, boasting a population of 127,681,655 individuals (Government of Pakistan, 2023). The country is home to five renowned buffalo breeds, namely Nili, Ravi, Nili-Ravi, Azi Kheli (or Azakhale), and Kundhi, alongside a diverse array of cattle breeds, including Sahiwal, Red Sindhi, Cholistani, Achai, Tharpaker, crossbred animals, and exotic breeds (Deb et al., 2016). The selection of Rahim Yar Khan and Muzaffargarh as the study area was purposeful, primarily driven by their substantial populations of cattle and buffalo (Government of Pakistan, 2018). The sampling methodology employed a multi-stage approach, commencing with the identification of target districts and subsequently the random selection of tehsils within each district. Within these tehsils, four were chosen randomly, and from each of these, five rural union councils were also selected through randomization.

From each union council, two villages were selected, resulting in a total of 40 villages. The field survey was conducted in three phases. In the first phase, a benchmark survey was completed from March 19 to 30, 2019, in the villages, resulting in a list of 3,808 livestock farmers. From this list, a random sample of 400 farmers was selected for the study. In the second phase, pretesting of the interview was carried out with 20 farmers from April 7 to 11, 2019, and reliability was assessed using Cronbach's Alpha test and its recorded value was 0.84. In the third and final stage of the field survey, actual data collection took place with the selected 400 respondents from April 21 to May 12, 2019. Descriptive and inferential statistics were used to determine the relationship between the respondents' demographic profile and the adoption of

different coping strategies. The collected data were initially put in an Excel sheet and later analyzed using the Statistical Package for Social Sciences (SPSS).

Table **1: Complete detail of the sampling procedure**

			Union Councils	Villages	B.M.S	Farmers	Sample
Punjab (36 district)	Rahim Yar Khan (4 Tehsile)	Liaquatpur (25 UCs)	Zaffar Abad	Basti Chanan	93	10	Total sample size 400
				Jungle	100	10	
			Amin Abad	Dadpotra	100	10	
				Rinda Minor	92	10	
			Dufli Kabir Khan	Basti Machhi	97	10	
				Jhok Gulab Shah	93	10	
			Chak No 10/ABS	Basti Kamal	87	10	
				Chani Goth Railway Station	100	10	
			Gul Muhammad Langah	Chakar Nurwala	100	10	
				Bet Baluch	81	10	
		Sadiq Abad (29 UCs)	Chak No 264/P	Gunji	100	10	
				Darbar Baba Majid Shah	100	10	
			Adam Sohaba	Basti Warind	95	10	
				Mimbri	100	10	
			Drigra	Tobay Mohanay	95	10	
				Basti Bhattian	80	10	
			Nawaz Abad	Rahman Farm	93	10	
				Nazir Khan Dadpota	100	10	
			Rasool Pur	Chah Aldriwala	100	10	
				Bhuta Wahan	98	10	
	Muzaffargarh(4 Tehsile)	Alipur (20 UCs)	Khangarh Doma	Basti Kohar	100	10	
				Rakh Sarki	81	10	
			Seetpur	Chhotewali	98	10	
				Chah Boharwala	95	10	
			Murad Pur Janubi	Malik Sharif	99	10	
				Kabir Gopang	95	10	
			Fateh Pur Janubi	Pauliwala	100	10	
				Gehnewala	100	10	
			Madawala	Madwala Protected Forest	95	10	
				Chah Aduwala	100	10	
		Kot Addu (28 UCs)	Ghazi Ghat	Khwaswala	90	10	
				Angra	80	10	
			Sinawan	Dost Aliwala	93	10	
				Tibba Shumali	100	10	
			Wandar	Bhunda	89	10	
				Rakh Thalwali	98	10	
			Hinjraee	Kahli Pul	100	10	
				Upper Magassan Canal	98	10	
			632/T.D.A	Muhammadwala	98	10	
				Suhianwala	95	10	

RESULTS AND DISCUSSION

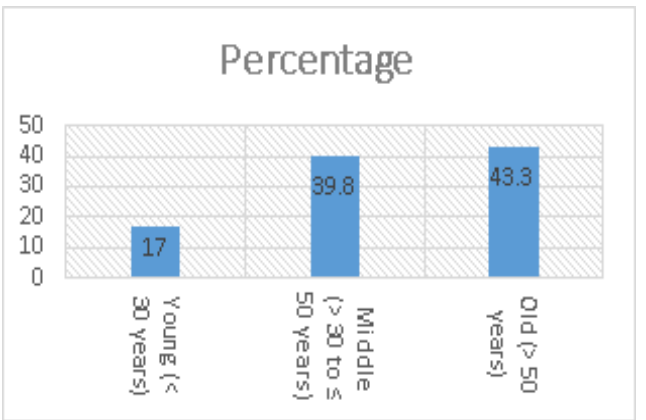
Socio-economic characteristics

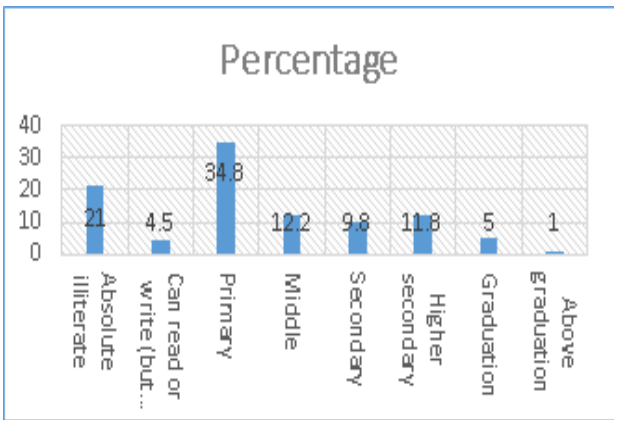
Socio-economic characteristics of the livestock farmers in this study include age, education, family size, landholding, sources of income and livestock experience. Results about different attributes are presented in Figures 2, 3, 4, 5, 6 and 7. Information about all these factors not only provide a picture of the rural background of the male livestock herder but also help to determine how they respond in different roles or perspectives or condition in livestock occupation. More than two-fifth (43.3%) of the respondents were old and slightly less than two-fifth (39.8%) were middle-aged farmers. Considering the literacy level slightly more than one third (34.8%) were literate up to primary followed by absolute illiterate whose strength was slightly more than one fifth (21.0%) in the study area. More than half (53.8%) of the farmers have "between 5 to 10 members" in their families and more than one fourth (28.5%) had family strength less than five members. Little more than one third (65.0%) of the respondents were scanning themselves under the umbrella of the small farmers (less than 12.5 acres) category followed by medium farmers (12.5 to 25 acres) as they were less than one fifth (17.8%). Livestock + crop farming was the leading source of income as their percentage

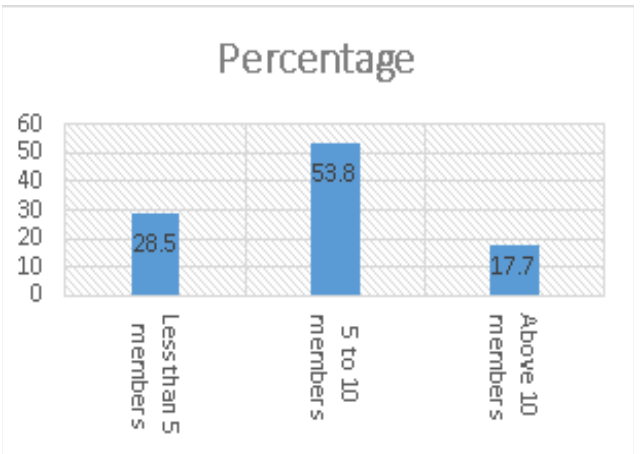
was approaching half (43.3%) of the total sample. There was just 4.5 percent of farmers who were new to the livestock-raising sector. The other three types of cattle experience were essentially identical, with 30 to 40 percent each.

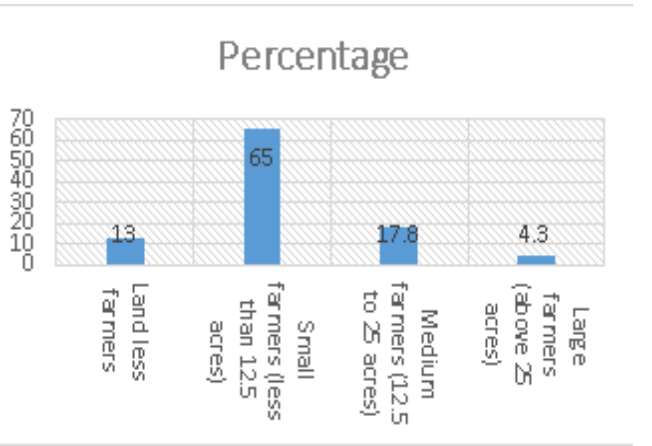
Financial risks perceptions

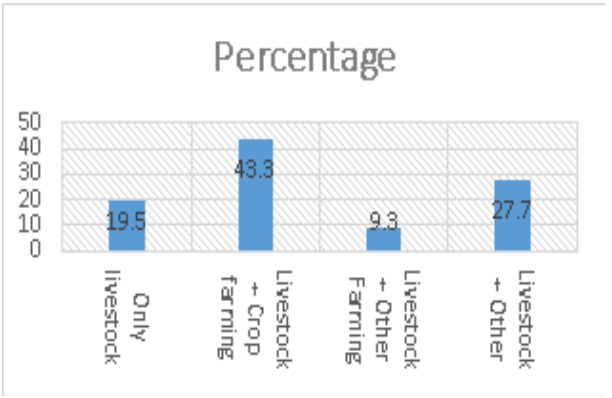
Financial risk contains such risks that can damage the financial strength of a business. This risk may be due to uncertainty over future interest rates, the willingness of an investor to deliver the necessary funds, and the capacity of the farm to generate enough output for installment payment (Tazhibaev *et al*., 2014). Highly vulnerable farmers are small farmers who mostly borrow money at higher interest rate than they can manage with the tough conditions and fails to fulfill them, and sometimes force them to sell their animal or land for repayment. Low yield, low market prices with higher input rates, higher interest rates and changing climatic conditions are all risks that lead to a farmer under finical threat. The flow of cash is very important in any business as one has many obligations in daily routine i.e. purchasing inputs, paying installments, taxes and family expenses. These financial risks were categorized into ten different categories i.e. High input prices, inflation, low output prices, family obligations, unavailability or lack of liquid money, excessive borrowing, poor record-keeping, lack of credit facility financial instability and change of interest. Data regarding financial risks faced by the sampled livestock farmers in the study area were gathered and analyzed given in **Table 2.**











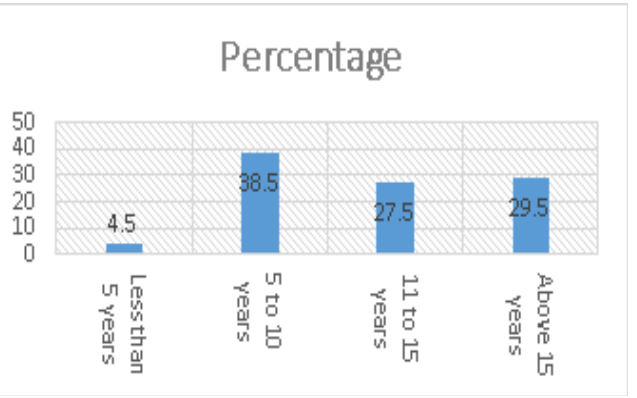


Table 2: Distribution of livestock farmers according to the perceived financial risks

Financial risks	Yes		Central tendency		R.O. based on $\bar{x}$
	f	%	$\bar{x}$	SD	
High input prices	400	100	4.30 ± 0.90		1
Inflation	384	96.0	3.96 ± 1.10		2
Low output prices	400	100	3.38 ± 0.96		3
Family obligations	349	87.3	2.66 ±1.36		4
Unavailability or lack of liquid money	328	82.0	2.53 ± 1.36		5
Excessive borrowing	196	49.0	2.38 ± 1.24		6
Poor record keeping	259	64.8	2.22 ± 1.11		7
Lack of credit facility	321	80.3	2.10 ± 1.05		8
Financial instability	246	61.5	1.86 ± 0.84		9
Change of interest	63	15.8	1.84 ± 1.00		10

Scale 1= Very Low, 2= Low, 3= Moderate 4= High, 5= Very High

Table 3: Distribution of livestock farmers according to the coping strategies for financial risks

Coping strategies for livestock financial risks	Yes		Central tendency		R.O. based on $\bar{x}$
	f	%	$\bar{x}$	SD	
Personal saving	148	37.0	2.54 ± 1.32		1
Informal borrowing	102	25.5	2.26 ± 0.86		2
Loan allocation	68	17.0	2.00 ± 1.41		3
Formal borrowing	42	10.5	1.21 ± 1.32		4
Insurance	-	-	-		-

Scale 1= Very Low, 2= Low, 3= Moderate 4= High, 5= Very High

According to the data in Table 2, almost all livestock farmers perceived that high input prices (100%), inflation (96.0%), low output prices (100%), a lack of credit facility (80.3%), and family obligations (87.3%) were the major sources of financial risks in herding. Financial instability (61.5%) and poor record keeping (64.8%) were also viewed as financial risks by a simple majority. Considering the level of these financial risks at farms, high input price ($\bar{x}$= 4.30 ± 0.90) was the topmost rated and change of interest rate ($\bar{x}$= 1.84 ± 1.00) was at the least level. Baruwa and Adesuyi (2018) also discussed the financial risks in the livestock business. In different factors responsible for financial risk high costs of inputs were the leading risk as identified in their study. All the results were not exactly similar, as a low net return or high input price was also considered in financial risk, but it was not ranked as higher as in this study. Harwood *et al*.

(1999) have summarized US studies. US farmers were most concerned about commodity price risk, changes in state laws and regulations and production risk. Dairy farmers in Arizona saw the cost of running farm inputs as the biggest source of risk (Wilson *et al*., 1993). Bishu *et al*. (2018) also endorsed the results as they reported that high prices of fodder were the most prominent risks associated with poor livestock farmers. The farming community was not threatened by the change in interest rate because the majority of them were not involved in formal borrowing. They tried relying on their resources and did not think out of the box. When fodder was scarce, they fed more wheat straw to their animals, and when fodder and straw both were scarce, they fed less. They compromised on animal feeding, which resulted in poor animal performance. Inflation ($\bar{x}$= 3.96 ± 1.10) and low output prices ($\bar{x}$= 3.38 ± 0.96) were the second and third highest level of risk in herder perception. It was so unfortunate that the inflation rate was very speedy due to a couple of reasons including devaluation, high energy prices and sharply rising labor costs but at the same time prices of farm products like meat and milk were much slower. Poor record keeping was not rated high though a considerable percentage (64.8%) of the farming community considers it a risk in farming. Results of Abebe (2012) also endorsed the current results as he stated in his finding that record keeping was not in practice for livestock farmers. There were many reasons behind this lack of record keeping, but the leading one was the poor literacy of the farmers. Some farmers believe in the importance of the records but still, they were not recording any data about their herds.

Coping strategies for livestock financial risks

Different coping strategies adopted by the farmers in the livestock business for financial risks may include loan allocation, informal borrowing, formal borrowing, personal saving and insurance (MacDonald and McBride, 2009; Dercon *et al*., 2002). Data regarding coping strategies for livestock production risks adopted by the sampled livestock farmers in the study area were gathered and analyzed given in **Table 3.**

Data in Table 3 revealed that the farming community didn't have many options to cope with financial risks. Just over one third (37.0%) use personal savings and one fifth (25.5%) of them go for informal borrowing to cope with the financial risks. Loan allocation (17.0%) and formal borrowing (10.5%) were the least adopted coping strategies for financial risks. In this modern era where everything can be insured not a single farmer opted for it. Considering the adoption level of these coping strategies personal saving ($\bar{x}$ = 2.54 ± 1.32) was the top and formal borrowing ($\bar{x}$ = 1.21 ± 1.32) was the least adopted strategy. The adoption level of any strategy in the study area was quite low. Results were in line with those of Baruwa and Adesuyi (2018) as they reported farmers adopted different buffers to bear the financial fluctuations in livestock rearing. Similar to the findings of this study, personal saving was the best strategy to adopt in these thin times of livestock entrepreneurship. The results of the study were partly similar to those of Nazir *et al*. (2018) who concluded that precautionary saving or involvement in off-farm activities was the strategy of the farmers to cope with financial risks. The results of the study were not similar to those of Nazir *et al*. (2018) in sense of insurance who concluded that insurance was the strategy of the farmers to cope with financial risks. In this study, some farmers were thinking about the insurance of their farm though they have not adopted it yet.

Impact of demographic attributes on perceived coping financial risks

Numerous social, physical, economical, and biological factors combine to influence the nature of livestock farming in any part of the world. It is believed that socioeconomic factors of the people including age, education, experience, interest, size of landholding, size of the herd, social and economic status, family size, family type and income source affect their approach and style to different businesses and practices (Asadullah and Rahman, 2009). To examine the impact of demographic attributes on the perceived financial risks, binary logistic regression analysis was run while keeping financial risks as a dependent variable and age, education, family size, land holding, herd size, income source and livestock experience were the independent variables. A total of four coping strategies for financial risks were computed into a single variable. As result of the computation, the minimum score of all four coping strategies for financial risks was 5 and the maximum was 14. The computed score was divided by two to make the variable binary. For this purpose, a score from 5-9 was given the value of 0 and a score from 10-14 was denoted with a value of 1. The value of 0 represented "No" and 1 was denoted "Yes". "No" implies that farmers didn't adopt the different coping strategies for financial risks while 1 explained that farmers were adopting coping strategies for financial risks. This computed variable was used as a "dependent variable" to run the binary logistics regression model. Overall, the model was fit as it explained 46% of the statistical variance among variables. The model was statistically significant as well ($P<0.05$). Results are displayed in **Table 3**.

Table 3: Impact of demographic attributes on perceived coping financial risks

Demographic attributes	Coeff.	S.E.	Wald	Sig.
Age	-0.805	1.216	0.438	0.508
Education	0.365	1.581	0.040	0.009*
Family size	-2.103	1.209	3.025	0.082
Landholding	0.335	0.047	0.670	0.010*
Income source	0.731	1.543	1.258	0.000**
Experience	-2.076	1.209	2.947	0.086
Herd size	0.619	1.023	0.923	0.040*
Pseudo R^2= .467, P<0.05, Log likelihood= 237.18				

Results presented in **Table 3** showed that the education, land holding, herd size and income sources of the respondents were statistically significant with the perceived coping marketing risks (P<0.05). Other attributes like age, family size and experience were statistically non-significant with perceived coping financial risks (P>0.05).

The education and income source of the respondents had statistically significant impacts, with coefficient values of 0.365 (P<0.05) and 0.731 (P<0.05), respectively. The findings suggest that for every unit increase in education or income source of the respondents, the likelihood of coping with financial risks seems to be increased by 37% (β= 0.365) and 73% (β= 0.731) respectively. In a rural context, the primary source of income of farm families is a highly significant and basic indicator that demonstrates farmer's choice and behavior toward livestock farming. The impact of diverse income sources on agriculture was discussed by Khan *et al*. (2011) who reported that having more money encourages farmers to invest more in agriculture. Likewise, the land holding, and herd size of the farm were also statistically significant with coefficient values of 0.335 (P<0.05) and 0.0.619 (P<0.05), respectively. This implies that for every unit increase in land holding or herd size, the likelihood of employing a coping strategy to manage financial risks increases by 37% (β= 0.365) and 62% (β= 0.619) respectively.

CONCLUSION

This study aimed at exploring financial risks associated with livestock farming and identifying effective management practices. Based on findings, recommendations were suggested to curtail the magnitude of financial risks in livestock farming. The study revealed that education and income sources of respondents had statistically significant impacts with coefficient values of 0.365 (P<0.05) and 0.731 (P<0.05), respectively. The result indicated that financial risks were serious concerns especially in times of high inflation, which restricted farmers access to required inputs. Similarly, farmers never had any insurance policy for livestock rearing. The lack of insurance facilities for crop growers and ranchers was a big misfortune. Without insurance, people may be burdened by financial uncertainty which makes it more difficult to plan for the future. However, our findings suggest that governments, private insurers, and other stakeholders can work collectively to make insurance facilities more accessible for farmers and ranchers, to promote the benefits of risk management and planning for long-term in future.

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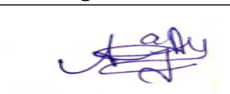
1.	Hafiz Amjad Ali Rana	Conceptualisation, data collection, analysis and drafting of paper	
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3.	Saleem Ashraf	Data collection, analysis	
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