Assessing the Determinants of Albanian Cow Breeding Farmers' Willingness to Pay for Livestock Insurance

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Abstract: - Livestock insurance products protect and support the development of the livestock sector. The purpose of this paper is to identify the factors that influence the willingness of farmers to become part of the livestock insurance scheme, as well as identify factors that would increase the interest of insurance companies in offering livestock insurance products. Data was collected through two structured questionnaires. The first questionnaire was directed to cow breeding farmers, and the second was addressed to insurance experts. The variables were tested through the logistic regression model. 73% of the surveyed farmers were unwilling to pay for livestock insurance. The results show that the number of family members, number of cows, farm investment, land ownership status, and farmers' trust in insurance companies positively impact farmers' willingness to pay for livestock insurance. On the other hand, the experience in livestock farming and government assistance negatively affected the willingness of farmers to buy livestock insurance products. According to insurance experts, government premium subsidies and increased awareness among farmers about the importance of insurance schemes are the main factors that encourage insurance companies to increase the supply of livestock insurance products.

Key-Words: - Livestock insurance, willingness to pay, determinants, cow breeding farmers, supply, logistic regression, Albania.

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1 Introduction

Livestock farming is one of the most important sectors of the Albanian economy as it significantly contributes to the gross domestic product, employment level, and farmers' income, [1], [2]. However, this sector faces challenges. Farms are exposed to various risks that cause financial damage to farmers, [3]. In these circumstances, they need to take measures to mitigate the risks that may affect their business, [4]. An important action would be to raise farmers' awareness related to livestock farming risks and help them proactively understand them, [5]. Farmers in developing countries operate traditionally, old-fashioned to manage the risks, while farmers in industrialized countries use effective instruments such as insurance, [6]. Insurance is a very important method for reducing the negative consequences of risks, [7], [8], [9].

Due to various social and cultural factors, farmers in developing countries are often unaware of the importance of livestock insurance schemes, [10], [11]. As a result, their participation level in these schemes is low, [12]. Based on this, identifying the factors that affect the willingness of farmers to be part of the livestock insurance scheme

is of interest because, through it, can be identified the barriers that prevent Albanian farmers from paying livestock insurance.

This paper is of particular importance as, in Albania, there is a lack of studies on the willingness of farmers to become part of the livestock insurance scheme. Its purpose is to identify the factors that impact the willingness of Albanian cow breeding farmers to pay for livestock insurance products as well as make evidence of the main ones that could increase insurance companies' interest in stimulating the supply of livestock insurance products. Thus, it is crucial to help farmers understand the importance of insurance schemes.

2 Literature Review

Willingness to pay is the maximum amount an individual is willing to pay to buy a good or to receive a service, [13]. Such willingness is influenced by the characteristics of the buyers and the expected benefits, which then strongly impact the demand for insurance products, [13].

Theoretical and empirical studies indicate the following influencing factors such as demographical, psychological, socio-cultural, political, economic, as closely related to the willingness to pay.

Regarding the demographic factor, in several studies, results show that an increasing age positively impacts the willingness to pay for livestock insurance increases, [14], [15], [16], [17], [18], [19], [20]. On the other side, other studies show that farmers willingness to invest in livestock insurance products decreases with increasing age, [6], [14], [15], [20], [21], [22], [23], [24], [25], [26].

Regarding the education component, the studies show that well-educated farmers are more willing to buy insurance products, [6], [16], [17], [18], [19], [21], [22], [24], [25], [27], [28], [29]. On the contrary, other studies show that low-1evel education negatively impacts farmers' willingness to pay insurance, [14], [20], [23], [26], [30].

Concerning another component which is experience, having a high level of experience in livestock farming positively affects the willingness to pay for the insurance scheme [14], [16], [24], [25], [26], [28], [29]. Other researchers testify a negative relationship, [18], [27].

The last component considered within the demographic factor is the family composition affecting the willingness to pay for livestock insurance. Studies suggest that big families are more motivated to ensure their livestock farming, [18], [22], [26], [27]**.** On the opposite, other research show that small families are less willing to pay, [25], [28].

Analysing further the factors, with respect to psychological and social-cultural factors, studies demonstrate a strong correlation between trust and willingness to pay for insurance products, [24], [30]. Farmers are motivated to decide to purchase insurance products when they are assured that the insurance company will fulfill its promise of indemnity. If the terms of the contract are not clear, there may be a risk of confusion and mistrust among farmers regarding purchasing the insurance product.

Various studies show a positive correlation between risk perception and farmers' willingness to invest in livestock insurance schemes, [19], [30]. On the contrary, other studies show in some cases that risk perception reduces farmers' willingness to pay for livestock insurance products, [25].

Farmers who are aware of the importance of insurance schemes show a positive preference for livestock insurance, [12], [19], [20], [26], [27]. Researchers concluded by [19], [26] prove a positive relationship between farmers' access to credit and their willingness to pay for livestock insurance, whereas studies concluded by [20], [26] demonstrate the opposite. Farmers who have a large number of cows on their farms show a positive preference for livestock insurance market participation, [19], [22], [25]. Conversely, other studies suggest this may not always be true, [20]. Farm size is another factor that influences farmers' willingness to pay for livestock insurance. The results of various studies show that farm size has a positive impact on farmers' willingness to pay for livestock insurance. [27], while other results prove the opposite, [22], [31]. As for the political factor, the governmental policies for some farmers mean enough support for them and there is no need for insurance products, [31].

Based on the literature review, the following hypotheses will be tested:

H1: Age, education, number of family members, experience in livestock, income from livestock farming, stability of income, farm size, number of cows, and farm investment have a significant impact on farmers' willingness to pay for livestock insurance.

H2: Farmers' trust in insurance companies, farmers' perception of the loss of livestock due to diseases, farmers' information about livestock insurance products, the importance of insurance in community culture, land ownership status, access to credit, and government support have a significant impact on farmers' willingness to pay for livestock insurance.

3 Materials and Methods

3.1 Survey Instrument

Data was gathered through two questionnaires designed based on an in-depth literature review. The questionnaires were designed with various question types, including closed, opened, dichotomous, multiple choice, and Likert scale ones. In order for the questionnaires to be comprehensible, reliable, and easy for the respondents to complete, they were organized into several sections. This design facilitated data categorization, results analysis, and interpretation. Variables included in the study are as presented in Table 1 (Appendix).

3.2 Sampling and Data Collection

Survey data were collected through the in-field distribution of questionnaires to cow breeding farmers and insurance market experts. Regarding the questionnaire addressed to the farmers, the sample reached was 205 respondents. To achieve an accurate result, simple random sampling was used. The database of cow breeding farmers was provided by the Ministry of Agriculture which consisted of 3980 farms that had at least 10 cows. Out of all databases, 300 farms were contacted, and 205 agreed to respond. Regarding the responses, 81.5% of respondents were male, and 18.5% were female. 76% of respondents had a high-school degree, 6.4% of them had a university degree. Regarding their experience in livestock farming, 58.5% of respondents had over 21 years of experience, and only 3.0% had up to 5 years of experience.

As follows, in the Table 2 are given results about the percentage of cows in the farms by each surveyed region. As indicated, the highest percentage of cows in Albania is found in the region of Fier, where 45% of the questionnaires were distributed.

Table 2. Percentage of Cows by Region, 2023

No.	Region	% of Cows by region
1	Berat	5
2	Dibër	8.7
3	Durrës	4.9
4	Elbasan	7.8
5	Fier	**14.8**
6	Gjirokastër	4
7	Korçë	11.7
8	Kukës	7.9
9	Lezhë	7.5
10	Shkodër	10.7
11	Tiranë	8.6
12	Vlorë	8.4
Total		100

Source: Authors' elaboration

The other part of the questionnaires, as presented in Figure 1, were distributed in all other regions of Albania, considering the database of cow breeding farms. The main criteria for selecting the farms for the survey was to have at least a flock of 10 cows.

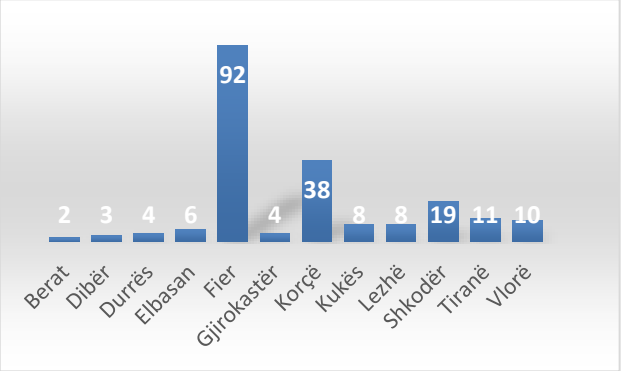

Fig. 1: Number of surveyed farms by regions
Source: Authors' elaboration

In addition to this survey, another survey was designed to be addressed to 105 insurance experts. Experts included in the survey were employees of the Financial Supervision Authority, insurance companies, and academics.

3.3 Analytical Techniques

The collected data were analyzed through descriptive analysis and the logistic regression model which was used to validate the hypotheses.
The average or expected value of y, as explained by [32], is given by the equation:

$$E(Y)= \alpha_0+ \alpha_1x_1+ \alpha_2x_2+ \cdots+ \alpha_nx_n \quad (1)$$

The relationship between E(y) and the independent variables is given by the following non-linear equation:

$$E(y) = \frac{e^{\alpha_0+ \alpha_1x_1+ \alpha_2x_2+ \cdots+ \alpha_nx_n}}{1+ e^{\alpha_0+ \alpha_1x_1+ \alpha_2x_2+ \cdots+ \alpha_nx_n}} \quad (2)$$

The objective is to predict the probability p, which takes values in the interval (0,1). To realize this, a log transformation is needed to normalize the distribution. The log transformation is as follows:

$$\text{logit}(p) = \log [p / (1 – p)] = \ln [p/ (1 – p)] \quad (3)$$

The following formula shows the relationship between the linear regression equation and the logistic one.

$$\log[p(x)] = \log\left(\frac{p(x)}{1-p(x)}\right) = a+b\,x_1+b_2\,x_2\,b_3x_3\ldots \quad (4)$$

Logistic regression, instead of using the least squares deviation criterion, uses the likelihood method for the best approximation of the model.

The probability p can also be calculated using the following formula:

$$p = \frac{\exp^{(a+ b_1x_1+ b_2x_2+ b_3x_3+\ldots)}}{1+\exp^{(a+ b_1x_1+ b_2x_2+ b_3x_3+\ldots)}} \quad (5)$$

where:
p = probability that a case is in a particular category
exp = base of natural logarithms (≈ 2.72)
a = constant in the equation

4 Results and Discussion

4.1 Descriptive Analysis

In this section, is presented a descriptive analysis of the main variables included in the study.

Regarding trust in insurance companies, results presented in Figure 2, collected through the questionnaire, demonstrated that Albanian farmers do not trust insurance companies. This is due to several factors such as lack of information among farmers about insurance companies, previous negative experiences of farmers with insurance companies, and the lack of supportive policies of these companies have farmers and farm development.

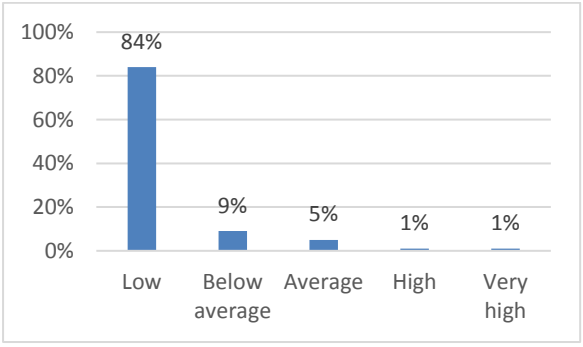

Fig. 2: Trust in insurance companies
Source: Authors' elaboration

As presented in Figure 3 only 27% of the farmers surveyed were willing to buy livestock insurance products to protect against losses due to disease. This is mainly due to farmers' lack of trust in insurance companies.

According to the results of the questionnaire addressed to insurance experts, the main challenges faced by insurance companies in providing livestock insurance products are the high risk that threatens the livestock sector and the lack of awareness among farmers about the importance of insurance schemes. In a multiple-choice question, insurance experts were asked what would increase the interest of insurance companies in expanding the supply of livestock insurance products.

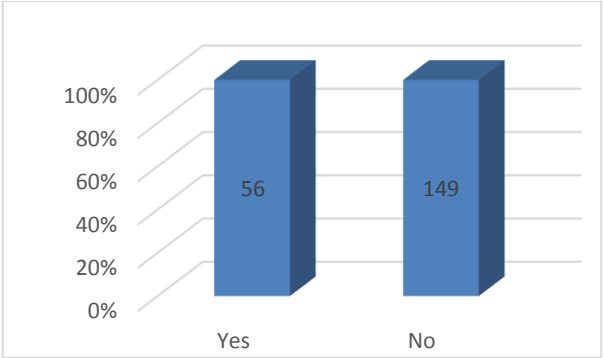

Fig. 3: Willingness to pay for livestock insurance
Source: Authors' elaboration.

The results indicated that the main factors driving the interest of insurance companies to stimulate the supply of livestock insurance products were partial government premium subsidy (90.5%), increased customer awareness of the importance of insurance schemes (71.4%), and different insurance contracts for clients with different degrees of risk (61.9%). According to insurance experts, increasing government cooperation with insurance companies and facilitating administrative procedures are also very important steps towards developing the livestock insurance market in Albania.

4.2 Analysis of Statistical Result

The dependent variable in the logistic model is dichotomous. Y variable, in our case, is the same for the two hypotheses.

$$Y\begin{cases}0 \text{ farmers are not willing to pay for livestock insurance}\\ 1 \text{ farmers are willing to pay for livestock insurance}\end{cases}$$

As independent variables for the first hypothesis, we defined:

X_1-Age
X_2- Educational level
X_3- Number of family members
X_4-Experience in livestock
X_5-Income from livestock farming
X_6-Stability of income
X_7-Farm size
X_8-Number of cows
X_9 – Farm investment

The information presented in Table 3 was obtained through data processing using the EViews program.

The analysis began by testing the hypotheses regarding the significance of the model parameters. This step compares the significance level ($\alpha = 0.05$) with the probability value. If the p-value is smaller than the significance level (α), the variable under study has a statistically significant impact.

Table 3. Coefficients and P-Value

	Coefficient	S. E	Z-stat	P-value
Const	1.5327	0.4032	3.8013	0.0001
X_1	0.0203	0.0104	1.9490	0.0512
X_2	0.1356	0.0972	1.3940	0.1638
X_3	0.3054	0.1156	2.6410	0.0082
X_4	-0.4201	0.1453	-2.8940	0.0039
X_5	0.0958	0.0786	1.2189	0.2235
X_6	0.0523	0.0598	0.8730	0.3826
X_7	-0.1034	0.0697	-1.4847	0.1378
X_8	0.2489	0.0887	2.8042	0.0051
X_9	0.3472	0.1109	3.1313	0.0018

Source: Authors' elaboration

The results obtained from the EViews program, as shown in Table 1 (Appendix), indicate that $P(a_3)=0.0082$, $P(a_4)= 0.0039$, $P(a_8)=0.0051$ and $P(a_9)= 0.0018 < (\alpha = 0.05)$. In conclusion, the number of family members, experience in livestock farming, number of cows and farm investment are significant variables, while other variables are not.

The coefficient $a_3= 0.3054$ shows that with a unit increase in the number of family members, the log probability of willingness to pay will increase by 0.3054. The odds ratio= $e^{0.3054}\approx 1.3560$ means that with each increase in family members, the likelihood (chances) of willingness to pay for livestock insurance is approximately 1.3560 times higher, holding other factors constant.

The coefficient $a_4 = -0.4201$ shows that with the increase of one unit of experience in livestock farming, the likelihood of willingness to pay will decrease by 0.4201. The odds ratio $= e^{-0.4201} \approx 0.6562$ means that with each increase in livestock farming experience, the likelihood (chances) of willingness to pay insurance is approximately 0.6562 times lower, holding other factors constant. The odds ratios for a_8 and a_9 are 1.2839 and 1.4164, indicating a positive impact of the number of cows and farm investment on farmers' willingness to pay for livestock insurance.

We also tested the significance of the coefficients of the logistic model using the Wald test.

$$W=\left(\frac{\text{Coefficient}}{\text{Standard Error}}\right)^2 \quad (6)$$

The valid test has a X^2 distribution with a degree of freedom 1. If the W value (actual value) is greater than the critical value $X^2_{0.05,\,1}$ the coefficient is significant.

Critical value: $X^2=X^2_{\alpha,\ 9}=X^2_{0.05,\,1}=3.84$
If the value of W is greater than 3.84, the variable is significant.

The Wald test results are as illustrated in Table 4.

Table 4. Wald Test Results

Variable	Wald Statistic (W)
Const	14.45
X_1	3.79
X_2	1.94
X_3	6.98
X_4	8.37
X_5	1.48
X_6	0.76
X_7	2.20
X_8	7.86
X_9	9.80

Source: Authors' elaboration

It is more logical that even by the Wald test, the significant variables are the number of family members, experience in livestock farming, number of cows and farm investment.

In the logistic model, the MC Fadden coefficient is used to explain the effect of the factors on the dependent variable. A McFadden R squared value over 0.4 indicates that the model fits the data very well and has high predictive power.

Table 5. Logistic Regression Analysis Results

McFadden R-squared	0.460558
S.D. dependent var	0.424733
LR statistic	48.64133
Prob(LR statistic)	0.000185
S.E. of regression	0.403361
Total obs	205

Source: Authors' elaboration

As presented in Table 5, MC Fadden $R^2=0.460558$ indicates that the model explains about 46% of the variation in farmers' willingness to pay for livestock insurance products. To test the significance of the model we use the LR test. As shown in Table 5, this value is LR=48.64. Critical value using the Chi-Square distribution is $X^2=X^2_{\alpha,\ 9}=X^2_{0.05,\,9}=16.92$. It turned out that the actual value (LR) was higher than the critical one. That means that the model is important.

The probability test also confirms the significance of the model, as:
$P(LR)=0.000185$; $\alpha=0.05$; $P(LR)<\alpha$

Analysis of the second hypothesis is as follows:
As an independent variable we defined

X_1-farmers' trust in insurance companies

X_2-farmers' perception of the loss of livestock due to d iseases

X_3-farmers information about livestock insurance products

X_4-the importance of insurance in community culture
X_5-land ownership status
X_6-access to credit
X_7-government assistance

After data processing using the EViews program, we derived the following information, as illustrated in Table 6.

Table 6. Coefficients and P-Value

	Coefficient	**S. E**	**Z-stat**	**P-value**
Const	0.4876	0.1023	4.7712	0.0000
X_1	0.2518	0.0732	3.4368	0.0018
X_2	0.0345	0.0498	0.6927	0.4892
X_3	-0.0197	0.0603	-0.3275	0.7441
X_4	0.0453	0.0399	1.1353	0.2564
X_5	0.1396	0.0632	2.2084	0.0271
X_6	0.0924	0.0905	1.0210	0.3079
X_7	-0.3147	0.0783	4.0186	0.0001

Source: Authors' elaboration

Testing the hypothesis for the importance of the model parameters reveals that the variables trust in insurance companies, land ownership status, and government assistance were significant, while the other variables were not.

The coefficient $a_1 = 0.2518$ shows that with the increase of one unit of trust in insurance companies, the log odds of willingness to pay will increase by 0.2518. Odds ratio $= e^{0.2518} \approx 1.2867$ means that with each increase in trust in insurance companies, the likelihood (chances) of willingness to pay for livestock insurance is approximately 1.2867 times higher, keeping the other factor constant. Meanwhile, the odds ratio for a_5 is 1.1495 indicating a positive impact of land ownership status on willingness to pay, while the odds ratio for a_7 is -1.3706, suggesting a negative impact of government assistance on willingness to pay.

Table 7. Wald Test Results

Variable	**Wald Statistic (W)**
Const	22.4160
X_1	14.7921
X_2	0.4965
X_3	0.2040
X_4	0.5097
X_5	4.887
X_6	0.9650
X_7	17.1823

Source: Authors' elaboration

Even from the verification of the hypotheses of the parameters of the model by using the Wald test, as presented in Table 7, X_1, X_5, X_7 were significant variables.

Table 8. Logistic Regression Analysis Results

McFadden R-squared	0.438095
S.D. dependent var	0.452463
LR statistic	40.48903
Prob(LR statistic)	0.000001
S.E. of regression	0.330573
Total obs	205

Source: Authors' elaboration

Logistic regression analysis results is presented in Table 8. The coefficient MC Fadden $R^2 = 0.438095$ shows that the model explains about 43.8% of the variation in farmers' willingness to pay for insurance.

From Table 4, the actual value of LR=40.49. We find the critical value using the Chi-Square distribution and compare the two values.

$$X^2=X^2_{\alpha,\ \vartheta}=X^2_{0.05,\ 7}=14.067$$

The actual value (LR) is higher than the critical one, which means that the model is important.
The probability test also confirms the significance of the model, as:
P(LR)=0.000001; α=0.05 ; P(LR)<α.

5 Conclusions and Recommendations

Livestock insurance schemes are very important to protect livestock farming from risks associated with several unexpected events such as disease outbreaks, natural disasters, etc. In order to attract the attention and interest of farmers for livestock insurance schemes, it is essential to arouse the willingness to pay, [12]. The results showed that the family size composition is an important factor that positively affects the willingness of farmers to pay insurance premiums. This conclusion aligns with studies done by others, [22], [27], [31]. Big families tend to have higher incomes, and, as a result, they can pay the premium. The farmers are strongly influenced by their family members when deciding whether to purchase or not the insurance product.

For the Albanian case, the empirical analysis of the data showed that with increasing experience in livestock farming, the willingness of farmers to pay insurance decreases. Other authors have concluded the same result for their respective cases, [27], [31]. Going further with this study's results, farmers with more experience in livestock farming are older compared to farmers with less experience. The increasing age of the farmers indicated a lower level of knowledge regarding insurance products.

Therefore, they do not easily adapt to new practices and understand the importance of livestock insurance schemes.

A number of cows positively influences farmers' willingness to pay for livestock insurance. This conclusion is consistent with research conducted by other authors, [19], [22], [25], [31]. A large number of cows indicates a higher investment in the farm. Farmers who have invested more are more motivated to insure their cows.

Based on this paper's research, the surveys conducted showed that 73% of surveyed farmers were unwilling to pay for livestock insurance, and 84% of all respondents did not trust the insurance companies. The component of trust is one of the most important ones meaning that it positively influences farmers' willingness to pay for livestock insurance products. In order to mitigate distrust a good tactic would be to increase transparency for the terms and conditions of insurance contracts.

Land ownership status is another factor that positively impacts the willingness of farmers to pay for livestock insurance products. The positive impact shows that farmers who have purchased land were more motivated to insure their cows.

Another conclusion of this research was that government assistance negatively impacts cow breeding farmers' willingness to pay for livestock insurance products. This aligns with the findings of .another researcher, [19]. Farmers consider government assistance as financial support, which discourages them from investing in livestock insurance products. Additionally, due to cultural factors, in the event of a natural disaster, Albanian farmers perceive that the government is responsible for covering the damages.

Insurance experts listed three main factors that would increase insurance companies' interest in promoting livestock insurance products. 90.5% suggested partial premium subsidy as the most important factor, while 71.4% highlighted the need to raise customer awareness about insurance schemes. Additionally, 61.9% recommended offering different insurance contracts for customers with different levels of risk. According to insurance experts, government cooperation with insurance companies is another important alternative that would stimulate the supply of livestock insurance products.

In developing countries like Albania, it is necessary to undertake reforms to develop the livestock insurance industry. There is a need to create laws and regulations for livestock insurance, which are almost non-existent in Albania. Cooperation with international insurance companies and learning from their experience is necessary.

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APPENDIX

Table 1. Variables Included in the Study

Variables	Type of variable and related attributes
WTP for livestock insurance	Binary, 1 is the willingness to pay, and 0 is otherwise
Age (X_2)	Scale variable, presented in a number of years
Education level (X_3)	Scale variable in categories of education 1=No education; 2=Elementary; 3= 8 years; 4= Agricultural high school; 5= High School; 6=Non-agricultural university; 7= Agricultural University;
Number of family members	Scale variable, presented in the number of members
Experience in livestock (X_5)	Scale variable, presented in a number of years
Income from livestock farming	Scale variable, presented in value
Stability of income	Ordinal/Likert scale; 1= Strongly disagree, 2=Disagree, 3=Neutral, 4=Agree, 5= Strongly agree
Farm size	Scale variable, presented in value
Number of cows	Scale variable, presented in the number of cows
Investment in livestock	Scale variable, presented in value
Farmers' trust in insurance companies	Ordinal/Likert scale; 1= Low, 2=Below average, 3=Average, 4=High, 5= Very high
Farmers' risk perception of the loss of livestock due to diseases	Ordinal/Likert scale; 1= Low, 2=Below average, 3=Average, 4=High, 5= Very high
Farmers' information about livestock insurance products	Ordinal/Likert scale; 1= Low, 2=Below average, 3=Average, 4=High, 5= Very high
Importance of insurance in community culture	Ordinal/Likert scale; 1= Strongly disagree, 2=Disagree, 3=Neutral, 4=Agree, 5= Strongly agree
Land ownership status	Binary, 1 if the land is farmers' property and 2 if the land is rented
Access to credit	Binary, 1 if the farmer has access to credit and 2 if otherwise
Government assistance	Scale variable, presented in value

Source: Authors' elaboration