RESEARCH ARTICLE Indian Journal of Agricultural Research, Volume 60 Issue 3: 467-473 (March 2026)

Factors Influencing Sheep Farmers' Decisions to Contract Farming in East Java Province, Indonesia

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10.18805/IJARe.AF-978

ABSTRACT

Background: This study investigates the factors influencing the choice of institutional models in sheep farming, specifically focusing on contract and non-contract models in East Java, Indonesia. The primary objective of this research is to identify the factors that influence farmers' decisions when selecting between these two institutional models and to evaluate the differences in characteristics between farmers engaged in contract and non-contract farming.

Methods: In this study, a quantitative approach employing a survey design was utilized for data collection. The survey encompassed 90 sheep farmers across three principal sheep-producing districts in East Java Province, namely Lumajang, Jember and Bondowoso. Data processing was conducted at the University of Jember over the period of November 2023 to April 2024. To examine the dataset, a binary logit model was employed to analyze and identify the determinants influencing farmers' decision-making processes. The variables considered included farming experience, educational attainment, age, cage capacity, baseline market prices and access to financial resources.

Result: The study's findings reveal that farmers' decisions to adopt the contract model are significantly influenced by base price and farming experience. Specifically, farmers with greater experience are more likely to avoid the contract model, whereas those with higher base prices are more inclined to opt for the contract model. Additionally, farmers with higher base prices are more inclined to opt for it. Formal education did not show a significant effect on the choice between contract and non-contract models. This study concludes that ensuring price stability through the contract model can provide risk management benefits for farmers, particularly for those with larger herds or limited market access. The research contributes to the existing literature by offering valuable insights into the factors that influence the selection of institutional models in sheep farming and provides recommendations for policymakers to promote the adoption of advantageous institutional models within the livestock sector.

Key words: Base price, Contract farming, East java, Farming experience, Sheep farming.

INTRODUCTION

The sheep farming sector in East Java plays a crucial role in the national economy, with a sheep population of 1.45 million head in 2022, contributing to the third position nationally (Ditjenpkh, 2023). However, farmers often face significant challenges in selecting the appropriate institutional model. This decision can impact the sustainability of their business, particularly in terms of market access, financing and risk management. The choice of institutional model depends on various internal and external factors, such as farming experience, educational background, herd size, farmer age, base price and access to financing. Despite the sector's considerable potential, the main challenges remain the unstable market fluctuations and the uncertainty of sheep prices at the farmer level (Belanche *et al*., 2021; Bhateshwar *et al*., 2022; Deep *et al*., 2025).

Contract Institutional Models play an important role in enhancing farmers' income, food security and productivity (Kar *et al*., 2020; Machimu, 2024; Ruml *et al*., 2022; Sendhil *et al*., 2021). Additionally, the contract institutional model offers resilience in managing market price risk fluctuations, as the risk is transferred to the partner company (Benjamin *et al*., 2022; Xing *et al*., 2025). However, the current situation shows that most sheep farmers prefer non-contract models, selling their livestock products to intermediaries or directly to the market. This is supported by research findings Raichur, Karnataka and Channappa, (2022); Tekletsadik *et al*. (2021). On the other hand, sheep farmers who do not choose the contract model generally have fewer livestock, if the herd size is larger, the logical reason is that these farmers possess extensive experience in managing large-scale operations and have access to markets.

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How to cite this article: Wiranata, M.A., Soetriono, Hani, E.S. and Aji, J.M.M. (2026). Factors Influencing Sheep Farmers' Decisions to Contract Farming in East Java Province, Indonesia. *Indian Journal of Agricultural Research*. **60(3):** 467-473. doi: 10.18805/IJARe.AF-978.

Submitted: 09-09-2025 **Accepted:** 24-11-2025 **Online:** 20-12-2025

This enables farmers to independently determine the appropriate strategies. However, the reality is that not all sheep farmers have the ability or access to the market (Bellemare *et al*., 2021; Jain *et al*., 2021; Kobba *et al*., 2021).

Contractual institutions are crucial for improving the performance of sheep farming enterprises. Numerous international studies have emphasized the impact of contract institutional models (Bellemare *et al*., 2021; Weituschat *et al*., 2023; Gelata and Han, 2024; Temesgen Gelata *et al*., 2024; Xing *et al*., 2025). Additionally, factors influencing farmers' decisions in selecting a contract institutional model have been explored. (Arouna *et al*., 2021; Abman and Lundberg, 2024; Pangapanga-Phiri *et al*., 2024).

A study, such as Rondhi *et al*. (2020) , discusses the factors involved in the selection of contract and non-contract models in broiler chicken farming in Indonesia. However, the article does not address sheep farming and there are several differing measurement variables. To the best of our knowledge, no previous study has specifically discussed the institutional models of sheep farming commodities and variables such as base price and farmers' access to financing. In line with this, the present study aims to explore the determinants of the selection of contract and non-contract institutional models in sheep farming in East Java Province. The objectives are: (a) to examine the differences in characteristics between farmers who choose contract and non-contract models and (b) to analyze the factors that influence sheep farmers' decisions in selecting between the contract and non-contract models.

MATERIALS AND METHODS

The research model employed a quantitative approach with a field survey design. Data were collected through surveys targeting 90 sheep farmers across three major sheep-producing districts in East Java Province, namely Lumajang, Jember and Bondowoso (Fig 1). The data collection period extended from November 2023 to April 2024, during which field surveys were conducted over six consecutive months. All data analysis was carried out at the Agribusiness Laboratory, Faculty of Agriculture, University of Jember.

The research sites were selected using a purposive sampling method, based on the consideration that the region's sheep population accounts for approximately 1.4 million heads at the national level. The three selected districts have an average sheep population of 64,000 head (Direktorat Jenderal Peternakan dan Kesehatan Hewan, 2020). The sampling design deliberately targeted sheep farmers involved in both partnership and non-partnership farming models across the three districts. A total of 90 respondents were evenly distributed across the study sites, ensuring equal representation between partnership and non-partnership farmers.

Analytical framework

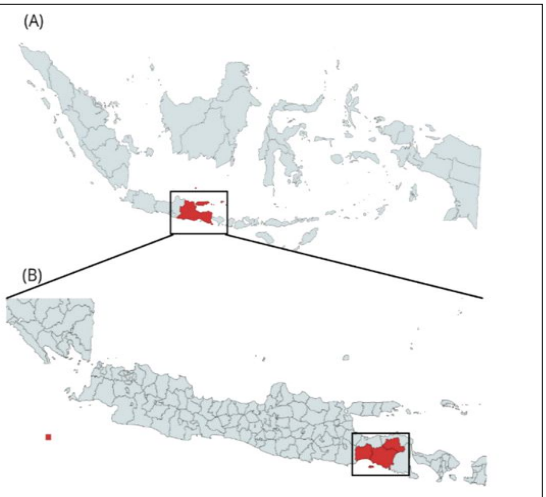
To assess the determinants influencing sheep farmers' decision-making process regarding the choice of contract or non-contract institutional models, a Logit function approach was used as a probabilistic model. In this model, the dependent variable is represented as the logarithm of the probability associated with a specific situation or attribute, which is valid depending on the presence of certain independent variables. Within the scope of this study, the decision-making process regarding the selection of either the contract or non-contract institutional models assumes that farmers are faced with two alternative choices between these two models (Suresha, 2024; Mugnier *et al*., 2021; Rondhi *et al*., 2020; Ruml *et al*., 2022). The determinants of institutional decision-making in sheep farming are assumed to follow a logit model function. Table 1 presents the variables and indicators used to evaluate the institutional model in sheep farming. The mentioned variables include the farmer's formal education background, experience in livestock enterprises, barn capacity, age, base price of sheep, sources of financing and the institutional framework of the sheep market. Logit analysis was employed in the study to identify the appropriate model for institutional decision-making in contract and non-contract sheep farming. The following binary logistic formula was used to analyze the institutional model for sheep farming.

$$Y = \ln\left(\frac{P}{1-P}\right) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_n X_n + e_1$$

RESULTS AND DISCUSSION

Characteristics of farmers

The age characteristics of the respondents (Table 2) exhibit variation, with the majority of sheep farmers being between 30 and 49 years old, comprising 72 respondents or approximately 80% of the total sample. Meanwhile, farmers aged 20 to 29 years and those over 50 years old each



(A) East Java Province, relative to Indonesia, (B) regions selected as sheep farming samples.

Fig 1: Study area map.

represented only 9 respondents (10%). The highest number of sheep farmers in this study was found in the 30-49 age group, which represents a balance between youthful innovation, mature experience and a greater openness to adopting new technologies and practices. This, in turn, leads to improved farm management and enhanced efficiency. This opinion is consistent with the findings of (Ma'arif *et al*., 2024; Matin Muta'Ali *et al*., 2023; Shivakumara *et al*., 2020), who indicated that farmers entering the productive age range of 40-49 years tend to demonstrate higher levels of innovation and management capability.

The characteristics of sheep farmers in this study, when viewed in terms of formal education, Table 2 show that the majority have completed their education at the high school level, comprising 40 respondents or 46% of the sample. Twenty-six respondents (30%) have completed junior high school, while 11 respondents (13%) have completed elementary school. Only 13 respondents (15%) hold higher education qualifications. Sheep farmers with higher education are expected to possess the ability to access and utilize information effectively, a view consistent with that of (Chaudhary and Gardhariya, 2024; Delgado-Demera *et al*., 2024).

Regarding farming experience (Table 2), the majority of respondents have between 4 and 7 years of experience, with 41 respondents (45.56%) falling into this category. Thirty respondents (33.33%) have between 1 and 3 years of experience, while 19 respondents (21.11%) have over 8 years of farming experience.

In terms of livestock population or cage capacity (Table 2), two groups have the highest populations. Thirty-eight respondents (42.2%) manage a medium-scale population (30-99 head of livestock), while 26 respondents (28.9%) each manage small-scale (<30 head) and large-scale (>100 head) populations, with equal numbers. These characteristics provide an overview of the profiles of farmers in the study location, which may potentially influence their decisions when choosing between contract or non-contract institutional models.

Factors affecting the choice of institutional model

The primary objective of this study is to identify the factors influencing sheep farmers' decisions to participate in contract farming. Based on the logistic regression results presented in Table 3, only two out of six examined variables demonstrate statistically significant effects. The following section discusses these findings in detail according to each category of factors. The results of the binary logistic regression analysis show the following equation:

$$Y = \ln\left(\frac{P}{1-P}\right) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_n X_n + e_1$$

$$Y = -0.3181 - 0.149X_1 - 1.446\ X_2 + 0.056\ X_3 - 0.038X_4 + 1.662X_5 + 0.536\ X_6$$

The results of this study indicate that the factors of farming experience and base price significantly influence the choice of institutional model, with farming experience

Table 1: Variables and indicators of institutional decision-making in sheep farming.

Variable	Description	Criteria	Unit
X_{1i} Formal education	Sheep farmer education	Elementary school = 6 Junior high school = 9 Senior high school = 12 Bachelor's degree = 16	Years
X_{2i} Farming experience	How long has the farmer been raising livestock		Years
X_{3i} Cage capacity	Total sheep capacity in the cage.		Head(s)
X_{4i} The farmer's age	Age of sheep farmers		Years
X_{5i} Base price	Base price at the farmer level in selling sheep	Very uncertain = 1 Uncertain = 2 Neutral = 3 Certain = 4 Very certain = 5	-
X_{6i} Source of funding	Sources of capital for sheep farmers	Very difficult = 1 Difficult = 2 Neutral = 3 Easy = 4 Very easy = 5	-
Institutional model	Institutional models in sheep farming, contract farming or Non-contract	1 = Contract farming 0 = Non contract	-

having a negative effect and base price having a positive effect on the selection of the contract model.

The formal education factor (X1) yielded a negative coefficient (B = -0.149), indicating that farmers with higher levels of formal education are more likely to prefer independent farming over the contract model. This finding suggests that formal education does not have a significant impact on the decision-making process regarding the selection of the institutional model. This implies that, even though formal education does not show a significant effect on the choice of institutional model, the result leads to the understanding that formal education is not always the primary factor driving farmers to choose the contract model. This finding contrasts with the idea that education can enhance farmers' capacity to understand and manage the complexities associated with contract farming (Puryantoro *et al*., 2024; Verma, 2024).

The farming experience factor (X2) shows a significant negative relationship between farming experience and the choice of contract model. The regression coefficient for this variable is -1.446, meaning that the more experienced the sheep farmers are, the less likely they are to choose the contract institutional model. This is further supported by the odds ratio, which shows a value of 0.235, indicating that each additional year of farming experience reduces the likelihood of choosing the contract model by 76.5%. These findings reveal that more experienced farmers tend to operate their sheep farming businesses independently (non-contract) rather than being tied to a contract agreement. This is consistent with research that states that farming experience influences the adoption of contract models in agriculture (Loquias *et al*., 2022). Experienced farmers already possess in-depth practical knowledge of risk management and market needs. Additionally, experienced farmers prioritize flexibility and complete control over their business operations. In this context, while the contract model offers guaranteed prices and stable marketing, it is considered less attractive to experienced farmers who prefer more flexible arrangements.

The livestock population factor (X3) shows a positive coefficient (B = 0.056), with an odds ratio of 1.058, indicating that farmers with larger livestock populations are more likely to choose the contract model. Each additional livestock unit increases the likelihood of choosing the contract model by 5.8%. This reflects that farmers with larger populations tend to require external assistance in managing the supply and demand for their products, which leads them to choose the contract model. The majority of farmers are in the medium-scale category (42.2%), showing significant potential for business development

Table 2: Description of respondent characteristics.

	Variables	F	%
Age	20-29 years	9	10
	30-49 years	72	80
	>50 years	9	10
Education	Elementary School	11	13
	Junior high school	26	30
	Senior high school	40	46
	Bachelor's degree	13	15
Farming experience	1-3 years	30	33.33
	4-7 years	41	45.56
	>8 years	19	21.11
Cage capacity	Small scale (<30 tail)	26	28.9
	Medium scale (30-99 tail)	38	42.2
	Large scale (>100 tail)	26	28.9

Source: Primary data 2024.

Table 3: Estimation results of logistic regression.

Variable	Regression coefficient (B)	Exp (B)	Wald	Sig.
X_{1i} Formal education	-0.149	0.862	0.236	0.627
X_{2i} Farming experience	-1.446	0.235	10.612	0.001***
X_{3i} Cage capacity	0.056	1.057	0.022	0.881
X_{4i} The Farmer's Age	-0.038	0.962	1.105	0.293
X_{5i} Base price	1.662	5.271	11.243	0.001***
X_{6i} Source of funding	0.536	1.709	1.427	0.232

Source: Data analysis, 2024

Note: ***= Significant at 99% confidence level, **= significant at 95% confidence level, *= Significant at 90% confidence level.

through contracts. This is consistent with the findings of (Temesgen Gelata *et al*., 2024), who found that dairy farmers with larger-scale operations are more likely to participate in agricultural contracts, viewing them as a management step for supply and demand issues.

The farmer age factor (X4) has a statistically insignificant negative coefficient (B = -0.038, p = 0.293). The odds ratio of 0.963 indicates that each one-year increase in age reduces the likelihood of choosing the contract model by 3.7%. Although age does not have a statistically significant effect, this finding suggests that older farmers tend to prefer independent models, likely due to their longer experience in managing their farming operations independently. This result aligns with previous studies indicating that age influences, but is not statistically significant in, the adoption of contract models in farming (Rantlo and Bohloa, 2022).

The base price factor (X5) has the strongest influence on the farmers' decision to choose an institutional model, with a positive coefficient (B = 1.662, p = 0.001), indicating a significant effect at the 95% confidence level. The odds ratio of 5.271 suggests that every increase in the base price will increase the likelihood of choosing the contract model by 425.6%. This indicates that the base price plays a key role in farmers' decisions to choose the contract model, providing them with a more stable price guarantee compared to the uncertain market system. This finding aligns with contract theory, which states that base price can reduce the risks faced by parties involved in a contract (Bellemare *et al*., 2021; Xing *et al*., 2025). Theoretically and practically, base price serves as a reference for the predictability of livestock product sales prices. In the core elements of contract farming, price uncertainty can pose a significant barrier to farmers, as price fluctuations create uncertainty in income planning and business sustainability. Therefore, the contract institutional model may be an attractive choice for farmers seeking financial security and better risk management. This opinion is supported by Dinh *et al*. (2024), who state that base price in timber contracts for tree farmers provides higher price guarantees, thereby reducing risks for farmers.

The availability of capital access (X6) shows a positive influence (B = 0.536), but it is not statistically significant (p = 0.232). The odds ratio of 1.710 indicates that farmers with greater access to capital are more likely to choose the contract model. Although the capital factor has a positive influence, its effect is not statistically significant, which suggests that other factors, such as experience and base price, play a more dominant role in the decision-making process regarding the choice of institutional model. The non-significant effect of capital availability is consistent with the research by (Ndimbo and Haulle, 2024), further reinforcing the results of this study. Although capital is often a constraint for farmers in business operations, in this context, it shows no significant effect.

CONCLUSION

Base price and farming experience are factors that influence sheep farmers' decision-making in choosing between contract and non-contract institutional models in the study area. Given that the certainty of base price leads farmers to prefer the contract model, this is because it provides price stability and better management of fluctuating market risks. Conversely, farmers with more experience tend to prefer managing their farming operations independently (non-contract), valuing the flexibility and greater control over their operations.

This study offers policymakers insights into designing programs that promote price stability and market access for farmers, while also educating them on the benefits of the contract model in risk management. As a suggestion, future research could examine the influence of social, cultural and local economic dynamics on the choice of institutional model, to enrich the understanding of strategies for the sustainable and inclusive development of livestock farming businesses.

ACKNOWLEDGEMENT

The author would like to express sincere gratitude to the Doctoral Program in Agricultural Science at the University of Jember for their support, guidance and invaluable technical assistance throughout this research Special thanks also go to the sheep farmers in Lumajang, Jember and Bondowoso Districts, East Java Province, as well as to all parties who have contributed to making this research possible and successful.

Conflict of interest

All authors declare that they have no conflict of interest.

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