Unlocking credit access for farmers (Case study of dairy farmers in East Java, Indonesia)

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Abstract. Access to credit is crucial for the economic development and sustainability of smallholder farmers in rural areas. In the context of Malang, East Java, Indonesia, this study delves into the factors that influence smallholder farmers' access to credit. Smallholder farmers play a pivotal role in ensuring food security, agricultural, and livestock productivity in Indonesia, making it imperative to understand the determinants of their credit access. This research was conducted between July and August 2023, employing a Probit Model and descriptive statistics to analyze data collected through a survey questionnaire. A multistage random sampling technique was employed, encompassing 70 smallholder dairy farmers in Malang. Findings from the Probit Model unveiled that several factors significantly affect the decision of smallholder farmers to adopt credit access. These factors include education levels among farmers, cattle ownership, access to the internet, participation in livestock training programs, and the employment of family members. The positive influence of these factors emphasizes the importance of targeted interventions to enhance smallholder farmers' credit access. To promote the adoption of credit access among smallholder dairy farmers in Malang, collaborative efforts between stakeholders and government entities are essential. These efforts should focus on improving the availability of livestock-related training programs and enhancing internet accessibility, particularly to bolster the sustainability of the livestock sector, with a specific emphasis on dairy farming. Such measures can help uplift the livelihoods of smallholder farmers, foster agricultural growth, and contribute to overall rural development in the region.

Keywords: Credit access, dairy farm, smallholder farmers, probit model, Indonesia

1 Introduction

In the history of rural economic development, credit has become a key factor in creating employment opportunities for rural communities by helping expand production and improving their well-being [1]. So far, several international studies have emphasized the importance of access to credit services, which are considered capable of reducing poverty among low-income populations. Guirkinger [2] revealed that credit is a vital instrument in

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poverty reduction, as it can assist rural communities, such as fishermen, in purchasing various production factors (fuel, supplies, and labor), thereby enhancing their productivity. However, participation in credit in rural areas, especially in coastal communities, remains low. Access to credit has been on the rise in various developing countries. In Asian countries, more than 515 million households have access to credit [3]. Furthermore, Beck et al. [4] explained that in African states, only 20 percent of households have access to credit. In coastal communities, low credit access has a negative impact on fisheries production [5]. Lack of access to credit is considered a significant reason why rural communities in various developing countries continue to live below the poverty line [6]. Livestock farmers are one of the groups facing obstacles in accessing credit. Therefore, livestock farming has become an interesting topic for researchers and policymakers, as it can help farmers break free from the cycle of poverty. Several previous studies have demonstrated the role of credit in rural communities. On the other hand, the allocation of credit to livestock farmers is seen as a challenge by financial institutions [2]. This is because the livestock sector is considered a high-risk investment due to its vulnerability to uncertainties like weather conditions and unpredictable yields [7]. Furthermore, Nordjo & Adjasi [8] pointed out that limited access to credit is due to the imperfections in the financial market caused by incomplete information.

Several previous studies regarding the impact of credit access on rural community productivity have been conducted, and the results obtained vary. Some of these studies indicate a positive and significant impact on rural community productivity [9, 10, 11]. In other words, with access to credit, fishermen are able to enhance their productivity by meeting input needs in their production activities. However, some researches have also found that rural communities face limitations in accessing credit, such as loan amounts not matching their requests, complicated requirements, and incomplete credit-related information [12, 13]. Therefore, this study tends to investigate the factors influencing credit access for dairy farmers in rural areas.

2 Materials and methods

2.1 Data collection

The study used cross-sectional data gathered from small-scale dairy farmers in East Java, Indonesia. The research sites were selected using a multistage random sampling method. Firstly, East Java province because it serves as the largest number of dairy cattle populations in the country. Then, the Malang District were selected based on the presence of farmers' associations with credit access from formal money lending institution. Finally, farmers in Wonokerto sub-district were listed and resulting in a total of 70 dairy farmers.

2.2 Data analysis

We applied the probit regression analysis to investigate the determinants of credit accessibility among dairy farmers. The study asserts that farmers' ability to access credit can be elucidated by their socio-demographic characteristics. Essentially, the model posits that:

$$ACC_i^* = \beta X_i + e_i, with\ ACC_i^* = 1\ if\ adoper, 0\ otherwise \quad (1)$$

where ACC is a livestock farmer's access to credit or not as described by a dummy variable (1 if farmer has access to credit and 0 otherwise); Xi is a socio-demographic variable, such as age, education, marital status, family members, and asset ownership; β is parameters to be estimated; and ei is an error.

3 Results and Discussion

3.1 Descriptive statistics

We observe several key variables characterizing farmers and their livestock context (Table 1). Credit access, represented as a dummy variable, is available to approximately 30% of the farmers. The average education level among farmers is 11.457 years, indicating a reasonable level of formal education. Farmers own on average land area of 0.104 hectares and possess on average of 18.093 years of farming experience, suggesting a mix of smallholders and experienced farmers. Regarding livestock ownership, farmers on average own 3.657 heifers, 3.014 calves, and 6.943 adult cattle. Internet access, as another dummy variable, is available to about 61.4% of the farmers. Training, rated on a scale from 1 (never) to 5 (very often), averages at 2.486, indicating some but not very frequent training. There is an average of 1.671 productive family members, highlighting family involvement, and access to market information, rated from 1 (very difficult) to 5 (very easy), averages at 3.043, indicating a moderate level of ease in accessing market data. These variables collectively provide valuable insights into the diverse circumstances and resources available to farmers, essential for understanding their livestock practices and livelihoods.

Table 1. Descriptive statistics

Variables	**Measurement**	**Mean**	**Std. Dev**
Credit Access	Dummy, 1 if the farmers had access to credit; 0 otherwise	0.300	0.462
Education	Farmers' education level in year	11.457	4.416
Total Area	Total cultivated area	0.104	0.196
Farming Experience	Total of farming experience in year	18.093	13.994
Calves	The number of calves owned by farmer (head)	3.014	4.066
Heifers	The number of heifers owned by farmers (head)	3.657	3.863
Adults	The number of adults cattle owned by farmers (head)	6.943	7.689
Internet	Dummy, 1 if the farmers had internet access; 0 otherwise	0.614	0.490
Training	Livestock training (1= never – 5=very often)	2.486	1.018
Employed Family Member	Total of employed family member (person)	1.671	0.737
Market Information	Access to market price, 1=very difficult-5=very easy	3.043	0.859

3.2 Descriptive statistics

Table 2 sheds light on several key factors that influence individuals' ability to secure credit. Firstly, education emerges as a critical determinant, with a coefficient of 0.197 and a highly significant p-value of 0.002. This indicates that higher levels of education positively impact access to credit, underscoring the importance of investing in education to enhance financial opportunities. Conversely, the total area of residence, as indicated by a coefficient of -2.237, does not significantly affect credit access, with a p-value of 0.159. Farming experience, with a negligible coefficient of 0.004 and a high p-value of 0.826, is shown to have no significant bearing on credit access. This implies that lenders may prioritize other factors over an

individual's level of experience. Ownership of livestock, particularly adult cattle, emerges as an influential factor with a coefficient of 0.133 and a p-value of 0.046, indicating a statistically significant positive relationship between owning adult cattle and credit access. This suggests that livestock ownership may serve as collateral or a source of income, facilitating access to credit. Intriguingly, internet access, represented by a coefficient of -1.480 and a significant p-value of 0.005, is found to have a negative impact on credit access. This surprising result warrants further investigation into whether online financial behaviors or online sources of credit are associated with higher risks. Training, with a coefficient of -0.844 and a significant p-value of 0.006, negatively influences credit access. This suggests that some forms of training might not align with credit eligibility criteria or that training may not directly enhance financial prospects.

Table 2. Factor Influencing Farmers' ability to Access Credit: Probit Model

Credit Access	**Coef.**	**Std. Err**	**Z**	**P-value**
Education	0.197	0.065	3.030	0.002***
Total Area	-2.237	1.588	-1.410	0.159
Farming Experience	0.004	0.016	0.220	0.826
Calves	-0.039	0.089	-0.440	0.660
Heifer	-0.111	0.113	-0.980	0.327
Adults	0.133	0.067	1.990	0.046**
Internet	-1.480	0.524	-2.820	0.005***
Training	-0.844	0.309	-2.730	0.006***
Employed Family Member	1.134	0.315	3.600	0.000***
Market Information	0.106	0.283	0.370	0.709
_cons	-2.466	0.981	-2.510	0.012
Log likelihood	-30.118107			
LR chi2(10)	25.28			
Prob > chi2	0.0048			
Pseudo R2	0.2957			

Notes: **/*** indicate statistical significance at the 5 and 1% levels, respectively.

The presence of more productive family members is strongly associated with improved credit access, with a substantial coefficient of 1.134 and a highly significant p-value of 0.000. This underscores the significance of family networks and collaborative economic activities in securing credit. Access to markets, surprisingly, does not significantly affect credit access, as indicated by a coefficient of 0.106 and a high p-value of 0.709. This finding suggests that other factors, such as collateral or credit history, may play a more substantial role in credit decisions. This analysis reveals that education, ownership of adult cattle, internet access, training, and the presence of productive family members are notable determinants positively impacting credit access. Meanwhile, the total area, experience, ownership of heifer or calf cattle, and access to markets do not appear to be significant drivers of credit availability. These insights can inform policies and strategies aimed at improving financial inclusion and

credit access for individuals and communities. Further research may be needed to explore the nuanced relationships uncovered, particularly the unexpected negative association between internet access and credit availability.

4 Conclusion

In this study, several key determinants of credit access among dairy farmers in East Java, Indonesia were identified. Higher education levels positively influenced credit access, while farmer experience had no notable effect on credit accessibility, and ownership of adult cattle was positively associated with credit access. Surprisingly, internet access was found to have a negative influence on credit accessibility, warranting further investigation. Training programs appeared to negatively affect credit access, calling for alignment with credit criteria. The presence of productive family members strongly correlated with improved credit access, underlining the importance of family networks. Access to markets did not significantly affect credit access, indicating the relevance of other factors in credit decisions. These findings have implications for policy and strategies aimed at enhancing financial inclusion and credit access in rural communities, and further research is needed to explore the unexpected negative impact of internet access on credit availability.

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