

# Barriers to Adopt Biosecurity at Smallholder Farmers

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## Barriers to Adopt Biosecurity at Smallholder Farmers

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**Abstract.** Biosecurity is one of the policies of the Indonesian government that should be followed on cattle farms to maintain healthy and disease-free cattle. The objective of this research was to identify barriers to adopting biosecurity on smallholder farmers. This research was conducted in the Bone Regency. The study enlisted the participation of 115 beef cattle ranchers. The data was acquired through surveys and observation as well as in-depth interviews. There were total of 17 of questions. The Guttman scale was used to see if biosecurity precautions have been implemented. A score of 1 was given to *yes*, while a 0 was given to *no*. The data were processed using SPSS software version 23 and descriptively analyzed by using frequency and percentage table. The results of this research showed that the cattle farmers were dominated by men. The respondents were mostly between the ages of 41 and 50 (58.26%). The majority of the respondents had completed primary school (55.65%). According to the family size, 74.78% of respondents have less than 5 dependents. The experience of raising cattle was dominated by those with fewer than 10 years of experience (60.00%). Mixed farming (87.83%) was the most common way for respondents to make a living. The majority of farmers have less than 5 head (79.13%). Only 33.04% of respondents who did the sanitation of the cage and 84.35% of the cages did not have a fence. The acquired cattle were not quarantined in 93.04% of the cases. The cowshed was opened to the public in 97.38% of cases. The research revealed that the primary barriers to biosecurity adoption were a lack of knowledge (64.35%), insufficient time (20.87%) and high cost (14.78%).

### 1. Introduction

Beef cattle produce beef, which is a protein-rich food. Demand for meat rises in lockstep with population expansion and community wealth. According to data from [1], the demand for meat in 2021 is expected to be 696,956 tons. In the meantime, 473,814 tons of beef were produced. As a result, a 223,142-tons deficit exists. Live cattle and frozen beef are imported from other countries, such as Australia and New Zealand, to meet domestic market demand. According to [2], the livestock industry's low production is attributed to a poor livestock management pattern in which breeders have not given enough attention to feed quality, recommended maintenance procedures, housing, disease prevention, and handling. Reference [3] stated that domesticated and non-domesticated animals, including wildlife, provide significant financial and nonfinancial benefits to the human community. However, disease can have a dramatic impact on the morbidity, mortality, and productivity of these animal populations, directly and indirectly affecting human communities.

Biosecurity is a government policy aimed at avoiding disease spread through isolation, cleanliness, and traffic control. This plan is outlined in the Republic of Indonesia's government regulation number 47 of 2014 on the management and prevention of animal diseases [4]. According to [5], isolation prevents animal interaction within a safe environment. Limiting cattle movement and commingling is the most critical step to control disease. Sanitation refers to the disinfection of new items, people, and



equipment, as well as the cleanliness of individuals who work there. For example, farmers require traffic control as they enter and exit their fields.

According to [6], biosecurity has grown more crucial in cattle herds, in order to avoid endemic and developing infectious illnesses. External biosecurity refers to management practices that protect cattle against infections that enter the herd from the outside, such as quarantine processes for newly purchased animals and the wearing of protective clothing by visitors (such as veterinarians) to herd facilities. Internal biosecurity refers to the procedures required to protect infections from spreading within a herd. Internal biosecurity techniques include separating sick from healthy cattle, farm worker hygiene (e.g., handwashing and boot-washing after handling animals), and facility hygiene.

Reference [7] stated that on-farm conditions are a challenge to maintaining adequate biosecurity. There was a misunderstanding about accountability that needed to be cleared up. Visitors must take responsibility for preventing disease transmission, while producers must ensure that the farm is biosecure.

Bone Regency is one of the most populous districts in South Sulawesi for beef cattle. The cattle business in Bone District is still dominated by smallholder farms with minimal output potential. The low productivity is exacerbated by the employment of livestock practices, which are still extremely traditional and a side industry since they are induced by the restricted production capacity [8].

In 2015, Bone Regency had the most anthrax cases, with 7 out of 19 cases in South Sulawesi province [9]. Reference [10] stated that the spread of anthrax, which reached Awang Pone district in 2000 and killed dozens of cows in an instant, occurred not only in Bone regency but also in other areas around Bone regency, such as Maros regency, which killed 48 animals due to the disease. Moreover, although the disease has decreased each year, there is still a possibility of it spreading.

Based on several research results, it shows that the application of biosecurity is still low. This study aimed to identify the obstacles to biosecurity implementation in beef cattle farms in Bone regency, South Sulawesi province.

## 2. Research method

This study was carried out in Bone Regency in 2021, which is the greatest beef cattle producer in South Sulawesi. A total of 115 beef cattle ranchers were chosen from three districts, namely, Benge, Barebbo, and Lappariaja. The data was made up of both primary and secondary sources. Interviews with beef cattle ranchers provided primary data, as were observations conducted at the research site. According to [11], a professional grading system ranging from 0 to 1 was developed for biosecurity indicators (measures). If a biosecurity measure was present (executed), it was coded as 1; otherwise, it was marked as 0 (not implemented). The final score of each metric was computed by summing all of the values collected on farms (either 0 or 1 per farm). Secondary data was gathered from the local Livestock Service Office, the South Sulawesi Province's Central Statistics Agency, and the Bone Regency's yearly reports. Data was analyzed using the SPSS version 23 program and was descriptively quantitatively examined using percentages.

## 3. Results and discussion

### 3.1. Cattle farmers characteristics

Table 1 showed that the cattle farmers were dominated by men. The bulk of responders (92.17%) were male, as shown in Table 1. Men's workforce participation rates are always greater than women's since men are the family's primary breadwinners. Although women are already overburdened with household responsibilities such as child care, cooking, housekeeping, and other responsibilities, they have the option of bringing in cows (7.83%).

The average age of the age of 41 and 50 (58.26%). Due to the respondent's active age, he or she would have a better career. The mean length of formal education was  $7.93 \pm 3.76$  years. The majority of the respondents had completed primary school (55.65%), implying that the educational attainment of the respondents remained poor. Because of their lack of education, the responders will find it challenging to adopt technical information. On the other hand, transitioning to a new technology is a

difficult task. The average number of dependents was  $3.88 \pm 1.67$  people. According to the family size, 74.78% of respondents have less than five dependents, indicating that they come from small families. Family dependents can be employed to assist in managing livestock as a source of labor.

**Table 1.** Characteristics of cattle farmers

Characteristics of respondents	Mean	Frequency (person)	Percentage (%)
Sex			
a. Male		106	92.17
b. Female		9	7.83
Age (years)	$46.19 \pm 9.07$		
<30		7	6.09
30–40		18	15.65
41–50		67	58.26
51–60		16	13.91
>60		7	6.09
Educational level	$7.93 \pm 3.76$		
No schooling		1	0.01
Primary		64	55.65
Secondary		15	13.04
High school		30	26.09
University		5	4.35
Family size (person)	$3.88 \pm 1.67$		
<5		86	74.78
6–10		29	25.22

### 3.2. Farming characteristics

**Table 2.** Farming characteristics

Variables	Mean	Frequency (person)	Percentage (%)
Years of farming experience	$9.37 \pm 6.41$		
<10		69	60.00
10–20		42	36.52
21–30		4	3.48
Farming system			
Livestock based		14	12.17
Mixed (livestock and crop based)		101	87.83
Herd size (head)	$4.00 \pm 2.24$		
<5		91	79.13
5–10		22	19.13
>10		2	1.74

Based on farming experience, the cattle farmers spent  $9.37 \pm 6.41$  years on farming with a herd size of  $4.00 \pm 2.24$  head. As presented in Table 2, the experience of raising cattle is dominated by those with fewer than 10 years of experience (60.00%). Mixed farming (87.83%) is the most common way for respondents to make a living, which means they grow beef cattle in addition to farming. Based on the number of cattle, the majority of farmers have less than 5 head (79.13%). Livestock is a secondary business. The main livelihood of farmers is farming, mainly rice farming.

### 3.3. Identification of biosecurity practices

**Table 3.** Identification of biosecurity measures

Variables	Frequency (person)	Percentage (%)
a. Sanitation		
Yes	38	33.04
No	77	66.96
b. Isolation		
Barrier cage		
Yes	18	15.65
No	97	84.35
Livestock quarantine		
Yes	8	6.96
No	107	93.04
c. Traffic control (visitor traffic)		
Yes	3	2.61
No	112	97.39

According to [5], sanitation is a protective technique against feces-related contamination. Contamination from feces can enter the animal's mouth (fecal-oral cross contamination). Contamination can happen in the equipment that is used, such as feed and drinking areas. The removal of organic debris, particularly feces, is the initial step in sanitation techniques. Blood, saliva, respiratory secretions, and urine from sick or deceased animals are examples of other organic materials. To avoid infection, all equipment, particularly feed and drink containers, must be cleaned and disinfected.

As presented in Table 3, only 33.04% who did the sanitation of the cage. Based on observations, it can be seen that farmers do not have time to clean the dirt and equipment in the cage. If the farmer cleans the cage and equipment, they do not use disinfectant or soap. Farmers do not know that feces and equipment can be a source of disease. This shows that farmers' ignorance can be caused by lack of information.

Isolation may entail building a fence and placing cattle in quarantine. According to the respondents, 84.35% of the cages did not have a fence. Breeders usually make simple cowsheds. Cow cages are usually made of wood or bamboo. Most of the breeders keep their cows under the stilt houses or beside the house. Of course, to build a healthy cow shed requires a large amount of money. This contradict with [12] who found that the majority of farms in Australia adopt proper fence maintenance and use of vendor declaration forms.

According to the vast majority of respondents, the acquired cattle were not quarantined in 93.04% of the cases. Reference [12] found that only 45% of the farms practice quarantining new stock before combining it with other stock. According to [13], only one farmer (5%) has a physically segregated hospital pen. The cowshed is open to the public in 97.38% of cases. Table 3 also presents that beef cattle farmers have a low rate of biosecurity adoption, with less than half of them not using it. This is in agree with [14] who claimed that various research has revealed a low degree of biosecurity application, notably on cattle farms. Reference [15] discovered that Belgian cattle producers took few biosecurity measures, putting them at risk of disease transmission inside and between farms.

**Table 4.** Obstacles to adopt biosecurity

Obstacles	Frequency (person)	Percentage
High cost	17	14.78
No time	24	20.87
No information	74	64.35
Total	115	100.00

As presented in Table 4, the most significant limiting factor for biosecurity adoption was a lack of biosecurity information (64.35%), followed by a lack of time (20.87%) and high cost (14.78%). Reference [16] revealed that issues preventing the adoption of biosecurity to beef cattle farmers in Luwu Regency, South Sulawesi, sequenced from the greatest percentage, were a lack of veterinary services, a lack of technical animal husbandry skills, and a lack of capital.

6

#### 4. Conclusion

Based on this research, it can be concluded that the primary barriers to biosecurity adoption were a lack of information (64.35%), insufficient time (20.87%), and high cost (14.78%). It is recommended that the provision of counseling and information on biosecurity to beef cattle farmers through print and electronic media.

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