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Abstract. Biosecurity has an important role to prevent the spread of contagious diseases on beef cattle farms. The purpose of this research was to identify biosecurity on beef cattle farms. The location of this research was in Panyangkalang subdistrict as the most populous of beef cattle in Takalar regency. Population of this research was 63 beef cattle farmers. Sample of this research was 39 beef cattle farmers. Data were collected from observation and deep interview by using questionnaire. There was 30 questions which consisted of vaccination, sanitation and traffic control. The data were analysed descriptively. The result showed that the level of biosecurity adoption on beef cattle farms was medium and categorized as "partial adopter". It can be suggested that training and extension were needed by beef cattle farmers.

1. Introduction

Beef cattle are very important for people, because they supply red meat with high value of animal protein. Indonesian government has issued several policies related to increasing productivity of beef cattle, but until now Indonesia still imports meat and beef cattle from neighboring countries such as Australia and New Zealand. The low productivity of beef cattle can be caused by several factors including the maintenance system which is still traditional and semi-intensive, cow breeds are less good, less quality feed because most only rely on field grass and low maintenance management knowledge. Other factors that need attention are human resources that are lacking in terms of quantity and quality, especially extension workers and veterinarian, distant locations with agricultural and banking institutions hamper access to information and credit.

Data from the Central Bureau of Statistics [1] shows that imports of beef from the Australia reached 85 thousand tons, or around 53% of the total imports weighing 160,197 tons. The value of imported beef from Australia reached US $ 296.3 million, equivalent to IDR 4 trillion of the total import value of IDR 7.7 trillion.

Biosecurity was one of government policies with the purpose to protect cattle from contagious diseases. According to Government Regulation of the Republic of Indonesia No: 47 of 2014, dated June 12, 2014, it was decided that in Article 36, Application of biosafety and biosecurity must be carried out at least in nurseries, cultivation, Animal shelters, Animal markets, Animal slaughterhouses, Animal transport equipment, places Animal health services, conservation units, and Veterinary Laboratories.

The aim of implementing biosecurity measures on cattle farms is: a) to preserve a high health status of animals by protecting them from new and existing pathogens and b) to ensure the production of safe

food. General biosecurity measures should be implemented in any farm regardless of any specific problem. In "open" herds, where cattle have contact with animals from different farms (purchase of breeding animals, participation in cattle shows, common pastures etc) more strict biosecurity measures (i.e., isolation of in-coming animals, clinical examinations, laboratory tests, vaccinations) should be implemented. Moreover, all farms must apply control-restriction measures for visitors and vehicles as well as control and protection measures for feedstuffs and water. Animals of other species (farm or companion animals) should not be kept on the farm, whereas the entry of stray and wild animals must be prevented. Planned control measures for insects, rodents and wild birds are imperative. Management practices, such as grouping according to the age of cattle, but avoiding mixing young with older animals, should be combined with high housing standards, including proper ventilation and frequent manure removal [2].

According to the Head of the Sub Directorate for Disease Prevention and Eradication [3], Anthrax cases occurred in Takalar regency in 2013. According to [4], more than one hundred cattle and buffaloes in two villages in Takalar were found to have contracted anthrax. The cow and buffalo experience convulsions then die. This case was found in Laikang Village and Punaga Village, Mangarabombang District, Takalar regency, South Sulawesi. In the past two months, more than 170 cows and buffaloes were killed in both villages. For this reason, the Takalar Regency Government has determined this case as an extraordinary incident. The aim of this study was to identify biosecurity in beef cattle farms in Takalar regency, South Sulawesi province.

2. Research Method

This research was conducted in Takalar regency. The location was in Panyangkalang subdistrict as the most populous of beef cattle. Population was all beef cattle farmers amounted 63 respondents. Sample was choosed through random sampling and it was 39 respondents. The calculation of sample came from [5].

$$\text{Slovin formula} \quad n = \frac{N}{N.d^2 + 1}$$

where:
n = sampel size   N = population size   d = estimation error

$$n = \frac{63}{63.(0.1)^2 + 1} \quad = 39$$

Data were consisted of primary and secondary data. The primary data were collected from observation and deep interview by using questionnaire. There was 30 questions which consisted of biosecurity measures such as vaccination, sanitation and traffic control adopted from [6]. The secondary data were collected from annual report of the Local Animal Husbandry Service and journals. Gutman scale was used to know that biosecurity has been adopted or not. Score 1 refer to adopted, score 0 refer to not yet adopted. The data were analyzed descriptively using mean and percentage. The level of biosecurity adoption was calculated by adoption index [7]:

$$\text{Adoption index} = \frac{\text{Respondent total score}}{\text{Total possible score}} \times 100$$

Depending upon the extent of adoption of biosecurity measures, the respondents were categorized as follows:
(1). Low adopter (up to 33%)
(2). Partial adopters (34 – 66%)
(3). High adopters (67 – 100%)

3. Results and Discussion

3.1. Characteristic of respondents

Respondents can be characterized as follows: According to table 1. Majority of respondents were men (83.79%). It can not be denied that to maintain beef cattle, a lot of power was needed such as cleaning the stable, looking for grass, bathing beef catlle, feeding and drinking. While women was only 16.21%, because they were busy with domestic duties such as looking after their children, cooking, cleaning the house, washing etc.

Table 1. Characteristic of Respondents

No	Characteristic	Average	Percentage
1	Sex		
	- Men		83.79
	- Women		16.21
2	Age (year)	50.22	
	- 15 – 49 (very productive)		43.24
	- 50 – 64 (productive)		56.76
3	Education (year)	9.78	
	- Elementary School		13.51
	- Junior High School		54.05
	- Senior High School		27.03
	- University		5.41
4	Farm experience (year)	10.68	
	- 1-5		5.41
	- 6-10		24.32
	- > 10		70.27
5	Number of family (person)	4.6	
	- 2 – 3		32.43
	- 4 – 5		37.84
	- 6 – 7		29.73
6	Number of cattle (animal)	9.54	
	- 3 – 7		21.62
	- 8 – 12		59.46
	- 13 – 18		18.92

The average age of respondents was 50.22 years. It was indicated that respondents were in productive age. According to The National Family Planning Coordinating Board, the Indonesian population is classified based on age to 3, namely non-productive age (< 14 years and > 65 years) and the productive age of 15-64 years [8].

On average, respondents spent 9.78 years at school. Majority of respondents (54.05%) graduated from Junior High School. Level of education has impact on the adoption of innovation. The higher the level of education, the greater the adoption of an innovation. Reference [9] showed that the education level of farmers could affect the way of thinking, learning ability, and intellectual level. The formal and informal education was expected to improve the farmer's knowledge and create the profitable innovation for their business.

Farm experience of respondents on average was good because it was longer than 10 years (10.68 year). It was supported that majority of respondents (70.27%) have farm experience more than 10 years. The length of farm experience influences farmers in making decisions. Number of family of respondents on average was 4.6 person. Majority of respondents came from medium family (37.84%). Number of family can be used as a source of man power in beef cattle farms. On average, number of

cattle for every respondents was 9.54 animal. It was bigger than other respondents in Luwu regency [10] which was only 4.36 animal for each respondent.

3.2. Level of Biosecurity Adoption

Table 2. Level of Biosecurity Adoption

Sanitation	Percentage
There is an effort to prevent contamination of feed and equipment from cattle dung	78
Cleaning equipment	86
Separating between sick and healthy cattle	70
Conduct routine evaluation of sanitation treatment	54
If livestock manure is related to feed or drinking water, cleaning action already provided	86
Use different equipment to feed and clean the cage or washed before the next use	62
Never step on animal feed	62
Never leave the equipment to clean the dirt in the cage	73
Cleaning vehicles and equipment before being used in healthy livestock	70
Routinely clean and disinfect food and other equipment for livestock	65
Routinely clean and disinfect equipment to treat livestock	54
	69.09
Vaccination	
Provide a clean area for treatment and isolation of sick animals	78
Provide facilities to prevent contamination of water, livestock manure, feed or equipment	73
Have a plan to regulate livestock based on body size and age for reduce disease transmission	45.9
Handle the healthiest cattle first compared to young cattle, old cattle and sick cows	43
Everyone in the farm applies strict sanitation	64.9
All dead animals are examined by a veterinarian	57
Veterinarians collect blood samples from sick cattle	41
Clean contaminated vehicles and equipment before being used in healthy livestock	64.9
	58.46
Traffic Control	
Knowing the health history of the cattle purchased	73
Bring cattle with a clean vehicle	70
Have a control program for outside animals that can spread the disease	37.8
Limit the number of visitors to the place where you mix feed and storage	43
Place to dip and lower the cattle away from the candlestick	73
The dead animal is immediately taken from the cage	75.7
Record every person who visits the house	30
	57.5
Average	**61.7**

Table 2 showed that sanitation has the highest percentage of biosecurity measures (69.09%) compared with vaccination and traffic control which only 58.46% and 57.5% respectively. Among variables of sanitation, the highest percentage were cleaning equipment and provided tool for cleaning. The purpose of cleaning was to eradicate germs that are in the pen. The percentage of pen and equipment cleaning were the lowest at 54%. This was because farmers did not do it regularly.

Among vaccination statement, the highest percentage was provide a clean area for treatment and isolation of sick animals (78%). The purpose was to protect other healthy beef cattle from sick animals. The lowest percentage was Veterinarians collect blood samples from sick cattle (41%). It was rare that Veterinerians came to beef cattle farmers to collect blood sample. Veterinerians were collected blood sample when there was a case. Among traffic control management, the highest percentage was the dead animal was immediately taken from the pen (75.7%). Beef cattle farmers knew that the dead animal was a source of odor and a nest of diseases, therefore livestock that have died must be immediately removed from the pen. The lowest percentage from traffic control management was record for every person who visits the pen (30%). Beef cattle farmers did not care who goes out or enters the cow pen. Likewise for vehicles or other livestock passing by. This was very risky for livestock, because they can contract the disease. Therefore, traffic control was needed.

Overall, on average the level of biosecurity adoption was 61.7%, this mean that beef cattle farmers in Takalar regency can be categorized as partial adopter. The result of this study was higher than that of [11] who stated that the level of adoption toward biosecurity in Barru regency, South Sulawesi province was 47.4% which also categorized as partial adopter.

4. Conclusion
Based on the results of this research, it can be concluded that the level of adoption of beef cattle farmers to biosecurity was categorized as "partial adopter".

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