

Willingness of Beef Breeders to Pay for Foot and Mouth Disease Vaccination in Bone Regency, South Sulawesi

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Article History	Abstract
Received: 06 June 2023 Revised: 05 Sept 2023 Accepted: 20 Nov 2023	The purpose of this study was to determine the willingness of beef breeders to pay (WTP) for Foot and Mouth Disease (FMD) vaccination. This is due to FMD vaccine limitations. This research was conducted in Bone regency, South Sulawesi in 2023. The population was all beef cattle breeders. The sample was determined purposively as many as 60 breeders. Primary data obtained through observation and interviews using a questionnaire. The secondary data was obtained from reports from the local Animal Husbandry Service and documentation. Data were analyzed descriptively using mean and percentage. The research revealed that WTP for FMD vaccine as many as 56 people (93.3%). WTP for FMD vaccination was dominated by IDR 50,000 (US\$ 3.3) as many as 33 person (55.00%).
CC License CC-BY-NC-SA 4.0	Keywords: Willingness to pay, beef breeder, foot and mouth disease, vaccination, immunization, Bone regency

1. Introduction

Meat is a source of highly nutritious animal protein which is needed by humans, because it contains essential amino acids. Some sources of meat are beef, chicken, goat and other animals. Domestic meat production from cattle is still low, so Indonesia has to import meat from other countries, such as Australia and New Zealand. One of the factors causing low meat production is disease.

The Central Statistics Agency (BPS) estimates that Indonesia will import 225.6 thousand tons of ox-type meat (cow, buffalo, and the like) in total for the year 2022. This volume set a new record high in the previous five years and rose by 6.7% annually compared to 2021 (Ahdiat, 2023).

World Health for Animal Health (2023) stated that Foot and mouth disease (FMD) is a serious, highly contagious viral disease that affects animals and is very expensive to treat. Cattle, swine, sheep, goats, and other ruminants with cloven hooves are all affected by the disease. It is a transboundary animal disease (TAD) that has a significant impact on livestock output and interferes with both domestic and global traffic in animals and animal products.

Paris (2022) argued that according to historical accounts of FMD outbreaks in Indonesia, the Dutch East Indies government brought dairy cows from the Netherlands to the island of Java in 1887, which led to the first reports of FMD cases. The last FMD outbreak was detected on the island of Java in 1983 after extensive and planned efforts. At the time, a widespread vaccination campaign was used to try to

eradicate FMD in Indonesia. Additionally, Indonesia was designated an FMD-free nation in 1986 by the Minister of Agriculture's Decree No. 260/Kpts/TN.510/5/1986, which was later strengthened by recognition by the OIE, a global organization for animal health, in a resolution released in OIE Number XI of 1990 after the organization joined forces with FAO/APHCA and ASEAN sent a team to assess the FMD situation in Indonesia. FMD free status can still be kept for another 36 years, or until the beginning of April 2022.

Foot and mouth disease (FMD) in cattle is now increasingly common. Based on the data received from the Ministry of Agriculture on Wednesday (June 15, 2022), there are 170,018 animals and 18 provinces affected by FMD. 190 cities and administrative regions. According to Sutawi et al. (2023), from upstream to downstream, FMD outbreaks have a detrimental effect on the livestock agribusiness: (1) the cattle population will decline; (2) imports of cattle and meat will rise; (3) beef consumption will fall; and (4) economic losses are significant. For farmers, FMD also has significant social repercussions, including sickness, stress, depression, stroke, divorce, and even suicide.

The government prohibits the movement of live animals, in this case cattle, in the areas of the sub-region affected by foot-and-mouth disease (red areas). The FMD processing task force under the director of the National Disaster Center specifically to provide this year's vaccines, or about 28 or 29 million doses, and all of them are funded with the Indonesian government central funds and provides guidance on the preparation of mechanisms for entry and exit of medicines, vaccines and livestock. The government is preparing compensation especially for MSME breeders, especially for animals violently destroyed or killed, about IDR 10 million per cow (PMI, 2022).

There is a need for about 28 million doses of priority vaccine; currently, 3 million doses have been imported, of which 0.8 million doses are being purchased by the government and 2.2 million doses are being refocused to pay for the budget. next that, vaccinations will be made available in three doses over the course of the next month through vaccine importers. Domestic vaccinations are produced by PUSVETMA and other domestic vaccine producers (Moegiarso, 2022).

On Government Regulation No. 510/KPTS/PK.300/M/6/2022 concerning Vaccination in the framework of managing FMD, that the procurement of vaccines can be carried out by the government, private sector and independently (Minister of Agriculture of the Republic of Indonesia, 2022).

According to Government Regulation of Indonesia, FMD vaccination is free, but FMD vaccination for officers, the cost of each dose of immunization is IDR 25,000 and is covered by central fund. Based on the results of observations in the field, the limited number of vaccines makes breeders have to wait a long time, there is a sense of fear that their cattle will be contaminated.

Research on WTP for vaccination programs has been carried out in Ethiopia (Jemberu et al. 2020) and Turkey (Ozturk et al. 2020). However, there was no research on WTP for FMD vaccination in Indonesia even in South Sulawesi. Therefore, the objective of this research was to know beef breeders' willingness to pay for FMD vaccination.

2. Materials And Methods

This research was conducted in Bone regency in 2023. Bone Regency is one of the locations with the largest cattle population in the province of South Sulawesi. Population was all beef breeder; sample were chosen by purposively random based on the district where FMD exist. Total sample was 60 beef breeder which were affected FMD and not affected FMD. The types of data consist of quantitative and qualitative data, while the data sources are primary data and secondary data. Primary data was obtained through face-to-face interviews using questionnaires, surveys and FGDs. The questionnaire was consisted of respondent's characteristics: sex, age, education level, farming experience, number of dependent and number of cattle. The secondary data was obtained from reports, documents from the local Animal Husbandry Service. The data obtained was processed using descriptive statistics using the mean, frequency and percentage.

To know the willingness to pay for breeder for FMD vaccination, Contingency Value Method was used. Contingent valuation is a survey-based economic technique for the valuation of non-market resources. While these resources do give people utility, typically the survey asks how much money people would be willing to pay (or willing to accept) to maintain the existence of FMD vaccination.

Data analysis in Contingent Valuation Survey

Simple representation of equation to estimate WTP for FMD vaccination attribute as follows:

$$WTP (mean) = \sum_{i=1}^N \frac{WTP_i}{N}$$

Where:

WTP : willingness to pay

N : number of samples

3. Results and Discussion

Characteristics of beef breeders and the farms

The characteristics of beef breeder and the farms can be seen in Table 1.

Based on Table 1. it can be seen that the majority of respondents were male (60%), while female respondents were 40%. This shows that raising cattle requires strong energy. The average age of the respondents is 48 years. minimum age is 22 years and the maximum age is 82 years. In general, the respondents are included in the category of productive age. The average respondent studied formally at school for 7 years, and the majority of respondents graduated from elementary school. Based on their farming experience, the average respondent has been raising cattle for 24 years. The majority of respondents with farming experience of more than 10 years (73.33%). The number of family dependents is dominated by 4-6 people (46.67%), this shows that the respondents are in the medium family category. On average, the number of cattle kept is 8.48 head. The number of cattle kept is predominantly between 6-10 heads (38.33%).

Table 1. Characteristics of beef breeders and the farms

Characteristics	Average	Min	Max	Frequency	%
Sex					
a. Male				36	60
b. Female				24	40
Age (years)					
a. 22 – 31				3	5
b. 32 – 41				10	16.67
c. 42 – 51	48.38	22	80	20	33.33
d. 53 – 61				10	16.67
e. 62 – 71				7	11.67
f. 72 – 82				10	16.67
Education level					
a. No schooling				10	16.67
b. Elementary school	7.62	0	16	21	35.0
c. Intermediate school				10	16.67
d. Senior high school				16	26.67
e. University				3	1.22
Farm experience (year)					
a. < 5	24.9	2	26.9	2	3.33
b. 5 – 10				14	23.33
c. > 10				44	73.33
Number of dependents (person)					
a. 0 – 3	3.04	0	9	31	51.67
b. 4 – 6				28	46.67
c. 7 - 9				1	1.67
Number of cattle (head)					
a. 1 – 5	8.48	1	20	22	36.67
b. 6 – 10				23	38.33
c. >10				15	25.00

Source: Primary data 2023

Willingness to pay for FMD vaccination

The willingness of beef breeder to pay for FMD vaccination can be seen in Table 2. It can be seen that the number of farmers whose cattle died from the FMD outbreak was 3 people (5%). Cattle breeders feel sad when their cattle die because it is a big loss. The number of dead livestock reported to the livestock service was 5 cases (8.33%). The results was supported by Sieng et al. (2021) who found that

most farmers neglected to take simple biosecurity precautions and opted to notify village animal health workers (VAHW), acquaintances, neighbors, and family members rather than government officials when FMD outbreaks occurred.

The number of livestock infected with FMD was 13 heads (21.33%). Cattle that die from FMD make farmers traumatized and sad, because farmers experience economic losses. The number of livestock infected with FMD sold was 14 heads (23.33%). According to Indonesian government regulations, livestock infected with FMD may not be sold, this is because infected livestock can transmit the disease to new areas. According to Jones et al. (2015), in smallholder systems, it can be difficult to control FMD, especially when moving was restricted. Smallholder systems in underdeveloped nations frequently fail to fully execute key FMD management measures including vaccination, biosecurity, and livestock movement regulations.

Table 2. The Willingness to Pay for FMD Vaccination

Statement	Frequency (person)	Percentage (%)
There are dead cows	3	5
Livestock that died were reported to the Animal Husbandary Service	5	8.33
Cattle affected by FMD outbreak	13	21.67
FMD infected cattle for sale	14	23.33
Willing for FMD vaccination	56	93.3
Unwilling for FMD vaccination	4	6.7
Amounted of WTP for FMD vaccination		
a. IDR 0	18	30.00
b. IDR 25,000	5	8.33
c. IDR 50,000	33	55.00
d. IDR 75,000	4	6.67

Source: Primary data (2023)

The willingness for FMD vaccination as many as 56 peoples (93.3%). This showed that farmers are very enthusiastic if there is a free FMD vaccination program. This result was higher than that of Win et al. (2021) who argued that over 60% said they would be willing to vaccine their animals. The research agrees with that of Nampanya et al. (2018) who found that more than 91% of farmers said their animals had FMD vaccinations in their responses. According to Ralley (2019), the FMD vaccination was unpredictable, just like the flu vaccine. This was as a result of the numerous changing strains that make developing a vaccine challenging. Furthermore, vaccine expenses and manufacturing losses from a failing vaccine may outweigh any potential benefits. Livestock-dependent households must strike a balance between their investments in livestock for long-term returns and their immediate requirements, such as their immediate food or health needs. Most households were prepared to pay for both choices. They would, however, pay more for an urgent immunization. The reasoning behind this was because an emergency vaccine an immediate danger. Singh et al. (2019) asrued that in India, a widespread immunization program aims to contain and ultimately eradicate foot-and-mouth disease (FMD). Along with vaccination, biosanitary measures and FMD monitoring are being carried out. The frequency of FMD has significantly decreased as a result of the execution of the FMD control program.

The WTP for FMD vaccination was dominated by IDR 50,000 as many as 33 person (55.00%). Jemberu et al. (2020) found that farmers in market-oriented systems were substantially more willing to pay for the vaccine than farmers in mixed crop livestock systems. In addition, it was much greater for farmers who kept exotic breed cattle and their crosses than for farmers whose primary source of income was not livestock they solely raise indigenous cattle breeds. With a rise in farmers' perceptions of FMD's impact and their awareness of the vaccine, willingness to pay increased dramatically. Farmers are excited about employing the FMD vaccination, as seen by the high mean WTP estimations. If formal FMD vaccination is planned for the nation, market-oriented farmers with higher willingness to pay may be more likely to pay the full cost than mixed crop livestock farmers. Increased farmer use of vaccines for disease control may result from animal health extension on the effects of livestock diseases and vaccines. Ozturk et al. (2020) stated that in high-risk locations, intensive FMD management measures may be more economical than the present control strategies in Turkey.

4. Conclusion

Based on the research, it can be concluded that 93.3% of cattle farmers were willing for FMD vaccination and the highest value for willing to pay for FMD vaccination was IDR 50,000 of 55% of cattle breeder.

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Conflict Of Interest

The authors have declared there was no conflict of interest related to material discussed in this manuscript.

Authors' Contribution

To plan and carry out the research, to analyze the findings, and to write the article, Veronica Sri Lestari worked with Djoni Prawira Raharja, Sitti Nurani Sirajuddin, Farida Nur Yuliati, Siti Nurlaelah, and Alima Abdullahi.

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