



Biosafety Training and Introduction to Livestock Diseases Using Participatory Rural Appraisal Method in Pade Angen Livestock Group East Lombok Regency

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Abstract: The community service aims to introduce the application of biosafety and biosecurity and provide the ability to recognize livestock diseases simply with the participatory rural appraisal (PRA) method in reducing the transmission of livestock diseases in East Lombok Regency. The implementation methods of the activities include a survey of the service location to identify problems, socialization of the program activity to the target community, education about biosecurity and biosafety, and an introduction to simple livestock disease detection based on community participation with PRA, then continued with training on applying simple biosecurity and biosafety and simple livestock disease detection methods with PRA proportional piling and matrix scoring methods. The data of PRA proportional piling and matrix scoring based on disease symptom data will be mapped and ranked using descriptive analysis. The results of this community service were obtained from members of The Pade Angen II Livestock Group could use personal protective equipment (PPE) correctly by 80%. The detection of disease based on symptoms using the proportional piling and matrix scoring methods obtained repeat breeding events with symptoms of repeated mating of 21%, helminthiasis with symptoms of worms of 14%, itching of 4%, diarrhea of 4%, and scabies with symptoms of itching of 8%. Foot and mouth disease was also still found with symptoms of wounds on the feet and salivation of 11%, miscarriage of 4% and fever of 1%, coccidiosis with symptoms of bloody diarrhea of 10%, colibacillosis with symptoms of diarrhea of 6%, bloat with symptoms of bloating of 3% and fever of 1%.

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Introduction

The recent national health disaster felt by the people of Indonesia and the Province of West Nusa Tenggara is foot and mouth disease (FMD). Foot and Mouth Disease (FMD) is a remerging disease that has existed in Indonesia since 1883, in 1990 Indonesia was declared free by the Office International des Epizooties (OIE) (Direktorat Kesehatan Hewan, 2022). FMD was declared to have reappeared in Indonesia in May 2022, significantly impacting socioeconomics (Chen et al., 2022). FMD was reported to have been in Gresik, East Java in July 2022 which has spread to 22 provinces in Indonesia. Another disease that can attack cattle and has the potential to become a disaster in West Nusa Tenggara Province is Lumpy skin disease (LSD). LSD in Indonesia was first reported in early 2022 in Indragiri Hulu



Regency, Riau, then at the end of 2022, LSD there was a report of suspected LSD disease in Sleman (Dinas Pertanian dan Pangan Kabupaten Kulon Progo, 2023).

Foot and mouth disease is a disease whose impact has been felt by livestock farmers in West Nusa Tenggara Province. FMD cases in West Nusa Tenggara Province as of November 16, 2022, have reached 118,684 heads and 116,480 heads have been declared cured (Dinas Peternakan dan Kesehatan Hewan Provinsi Nusa Tenggara Barat, 2022). The impacts of FMD in West Nusa Tenggara Province that are directly felt by farmers are medical costs, falling cattle selling prices, prolonged postpartum estrus, as well as calf deaths during birth. These impacts can be reduced if there is a unified and integrated national animal health system to control and overcome livestock diseases that can become epidemics.

Livestock Groups consisting of several local farmers will play an important role in overcoming livestock disease outbreaks, both emerging diseases such as LSD or reemerging diseases such as FMD because they interact directly with livestock. The Pade Angen II is a livestock farmer group located in Lando Village, Terara District, East Lombok Regency. This livestock farmers group has a business engaged in cattle breeding and fattening. The Head of the Pade Angen II Livestock Farmers Group stated that the group has 10 members with a population of 30 Balinese beef cattle and Limousin and Simmental crossbred cattle. The results of the survey and interviews with group leaders and farmers found that cows that had been infected with the Foot and Mouth Disease (FMD) virus experienced an extended period of re-estrus after giving birth of up to 3 months. In contrast, re-estrus after giving birth should occur in 30-70 days.

Research conducted at the Pade Angen livestock farmers group in Lando Village by Kholik et al. (2021) found *Escherichia coli* bacteria that were resistant to various antibiotics Penicillin G, Oxytetracycline, and Cefotaxime from Balinese cattle feces. *Escherichia coli* bacteria encoding blaTEM have also been successfully isolated from the reproductive tract of Balinese cattle at the Pade Angen Livestock Farmers Group (Kholik et al., 2023). *Escherichia coli* bacteria that are resistant to antibiotics and encode the resistance gene have the potential to cause disease in animals and humans.

Based on the background that there are livestock diseases that have just emerging diseases such as LSD or re-emerging diseases such as FMD and the presence of *Escherichia coli* bacteria that are resistant to antibiotics and encode resistant genes in the Pade Angen II livestock farmers group in East Lombok Regency. These facts show the knowledge of farmers on how to prevent the spread of early detection of diseases in livestock simply, so a community service program is needed that can develop the capacity of farmers in Lando Village to prevent the transmission of diseases and detect diseases early with a community participation approach with a simple method in preventing the emergence of livestock disease outbreaks in the West Nusa Tenggara Province area.

The problem faced by this livestock farmers group is the lack of knowledge in preventing disease transmission and early detection of diseases. The Pade Angen II livestock farmers groups were not yet familiar with biosafety and biosecurity as well as the introduction of livestock diseases in a simple way with the participatory rural appraisal (PRA) method which can be carried out by farmers. Participatory rural appraisal (PRA) will involve participation from livestock communities in knowing the disease situation in their group based on symptoms that can be reported by members of the livestock group. This service activity will equip farmers to detect and determine diseases based on disease symptoms in livestock.

Method

The education and training in biosafety and biosecurity were carried out by introducing and practicing 3 principles and elements of biosecurity. The introduction and practice of biosafety application in training are by practicing the use of minimal and maximal personal protective equipment (PPE) that can be used by farmers in carrying out daily activities. The Training and practice of simple livestock disease detection based on community participation with participatory rural appraisal (PRA) using the proportional piling disease ranking and Matrix Scoring method of livestock diseases against signs of disease according to A Guide for Trainers of Participatory Epidemiology Catley, (2005) and A Toolkit for Trainers of Participatory Epidemiology (Coffin et al., 2015). The proportional piling of livestock diseases and their impacts can be carried out by farmers using stones or seeds after discussing the rank and scoring of diseases according to Catley (2005) (Fig. 1), an example of ranking according to Coffin et al. (2015) (Fig. 1).

Matrix scoring can be done simply using stones or grains on livestock diseases based on signs of disease so that diseases can be ranked based on the symptoms that arise according to a guide for trainers. African Union/inter African Bureau for Animal Resources, Nairobi, Kenya (Fig. 2). The mapped and ranked of disease symptoms in livestock with proportional piling analysis using descriptive statistics and presented in the form of tables and images.



Figure 1. Disease Versus Disease Impact Proportional Piling Matrix Exercise



	Endorobo Trypanosomiasis	Oltikana ECF	Olukulu FMD	Emwilalas CBPP	Engluwet Blackquarter
Coughing	••	•••		•••• ••••	
Diarrhoea	•••• ••••				
Salivation		••	•••• ••••	•	
Abortion	•••		•••• ••••		
Enlarged lymph nodes	•••	•••• ••••			
Lameness			••••• •••••		••
Disease causes death		•••		•	••
Reduced milk yield		••	•••• ••••		

Figure 2. Matrix Scoring of Livestock Diseases for Signs of Disease



Result and Discussion

Biosafety Training

The biosafety and biosecurity training are conducted to provide knowledge on how to prevent and spread livestock diseases. Introduction and practice of three principles and elements of biosecurity include preventing the entry of disease agents into the body, preventing the growth of disease agents, and preventing the exit of disease agents from the livestock environment. The three principles of elements include sanitation, isolation, and control of livestock traffic. The training was conducted on September 11, 2024, at the Pade Angen II livestock group in Lando Village at the Pade Angen II livestock group in Lando Village, Terara District, East Lombok Regency. The training involved farmers who were directly responsible for livestock business activities in the village. Farmers have a variety of livestock, between 2-9 heads for breeding or fattening. Farmers who participated in this training came from various levels of education (Fig.3).

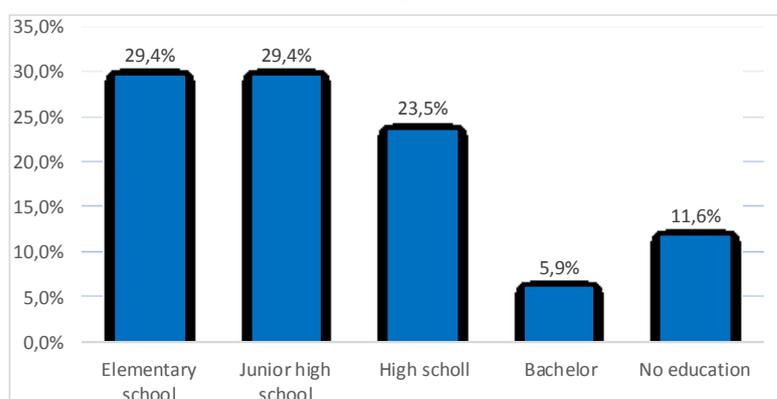


Figure 3. Diagram of Education Level of Farmers Participating in Training

Figure 3 informs that farmers in the Pade Angen II livestock group have varying levels of education ranging from elementary school to bachelor's degree. The last education is dominated by elementary and junior high school with a percentage of 29.4%, then high school (23.5%), no education (11.8%), and a bachelor's degree (5.9%). The majority of farmers have elementary and junior high school education levels and do not know about biosafety and biosecurity. The results showed that only one farmer (5.9%) knew about biosafety and biosecurity so counseling and training on biosafety and biosecurity are very important. A good level of education will provide the ability to understand and apply the latest innovations in science and technology.

Training on biosafety and biosecurity is very important to be known and applied by farmers because FMD has occurred in Lando Village. Foot and Mouth Disease is an infectious disease caused by a virus from the genus of Aphtovirus, a family of Picornaviridae which is highly contagious in cloven-hoofed animals. FMD is clinically characterized in cattle with high fever ($\sim 40^{\circ}\text{C}$) which causes vesicular lesions on the roof of the mouth, lips, gums, tongue, tooth pads, muzzle, interdigital gaps, and nipples (Aslam and Alkheraije, 2023). Prevention of the spread of FMD can be done by isolating sick livestock, limiting visits by people and using special clothing or Personal Protective Equipment (PPE).

The use of Personal Protective Equipment (PPE) is one of the efforts that can be made to prevent infectious agents from entering the body or the spread of disease to the environment. The minimum PPE that can be used by farmers is masks, gloves, booth shoes, and glasses. The use of minimum PPE for field biosecurity is included in the yellow level category because there are only suspected cases of infectious animals or there are zoonotic

diseases. The use of full or maximum PPE can be used for field biosecurity which is included in the red level category. The red level means that there is an active case or high-risk activity. Training on the use of Personal Protective Equipment (PPE) for farmers in Lando Village (Fig. 4).



Figure 4. Complete Personal Protective Equipment Use Training Introduction to Livestock Diseases Using the Participatory Rural Appraisal Method

Extension and training in livestock groups are carried out based on community participation. Farmers who participate in extension and training are made into groups consisting of 4-5 people. Each group then discusses to map the symptoms of diseases in livestock that are often encountered. The symptoms of the disease that have been mapped are then ranked based on the impact of the incident. The ranking of the disease is carried out with proportional piling using stones and continued with a matrix scoring of livestock diseases against signs of disease. The results of mapping and ranking of disease symptoms (Fig. 5).



Figure 5. Mapping and Ranking of Disease Symptoms in Livestock with Proportional Piling

Symptoms of disease in livestock obtained are diarrhea, abortion, fever, wounds on the legs, itching, and hypersalivation. The symptoms of the disease that have been made are then ranked. Data on symptoms of disease in livestock (Table 1).

Table 1. The Symptoms of Disease in Livestock

Symptoms of Disease	Frequency
Fever	64.7%
Diarrhea	58.8%
Wounds on the legs	58.8%
Hypersalivation	58.8%
Itching	52.9%
Abortion	17.6%



Based on Table 1, data on symptoms of livestock diseases that are often found by farmers in the Pade Angen II livestock group, Lando Village, were obtained. Fever is the most common symptom known by farmers, which is 64.7%, then diarrhea, wounds on the legs and mouth lesions and hypersalivation, each of which is 58.8%. Itching and miscarriage are 52.9% and 17.6%, respectively.

The results of the mapping of livestock disease symptoms can be concluded in several diseases. Symptoms of wounds on the feet, lesions in the mouth, hypersalivation, and fever are symptoms of Foot and Mouth Disease (FMD) (Aslam and Alkheraije., 2023). Bovine Ephemeral Fever (BEF) is a disease that attacks livestock with clinical symptoms of fever, muscle weakness, and usually lameness in the locomotory apparatus (Stokes et al., 2020). Coccidiosis or bloody diarrhea can be found in livestock with clinical symptoms of diarrhea accompanied by blood, fever, anorexia, and weight loss (Ayana et al., 2017). Scabies disease is also often reported in livestock with symptoms of alopecia, itching anorexia, and erythema (Rathore et al., 2023). Based on the results of disease mapping, monthly disease incidents will be obtained, which will be outlined in a calendar (Table 2).

Table 2. Disease Calendar Based on Symptoms in Livestock in Lando Village

Month	Diseases
January	Foot and Mouth Disease (FMD)
February	Foot and Mouth Disease
March	Foot and Mouth Disease
April	Foot and Mouth Disease
May	Foot and Mouth Disease
June	Foot and Mouth Disease
July	Foot and Mouth Disease
August	Foot and Mouth Disease
September	Foot and Mouth Disease
October	Foot and Mouth Disease
November	Scabiosis, Helminthiasis, FMD, Hipocalcemia, Bovine ephemeral fever (BEF)
December	Scabies, Helminthiasis, FMD, Hipocalcemia, BEF

Based on Table 2, it can be seen the time of occurrence of livestock diseases in Lando Village, Terara District. FMD disease is a disease that is estimated to occur every month and requires intensive treatment. Scabies, Helminthiasis, Hypocalcemia, and Bovine ephemeral fever (BEF) are diseases that are estimated to occur in November and December due to adequate environmental conditions for the development of the disease.

The follow-up to this activity is to conduct surveillance and disease management activities based on the priority of diseases that have been detected by the participatory rural appraisal (PRA). The follow-up to this activity is to conduct surveillance and disease management activities based on the priority of diseases that have been detected by the PRA. Follow-up activities will be carried out in collaboration with the community and related government agencies.

Conclusion

The results of this community service were obtained from members of the Pade Angen II Livestock Group could use personal protective equipment (PPE) correctly by 80%. The detection of disease based on symptoms using the proportional piling and matrix scoring methods obtained repeat breeding events with symptoms of repeated mating of 21%,



helminthiasis with symptoms of worms of 14%, itching of 4%, diarrhea of 4%, and scabies with symptoms of itching of 8%. Foot and mouth disease was also still found with symptoms of wounds on the feet and salivation of 11%, miscarriage of 4% and fever of 1%, coccidiosis with symptoms of bloody diarrhea of 10%, colibacillosis with symptoms of diarrhea of 6%, bloat with symptoms of bloating of 3% and fever of 1%.

Recommendation

Recommendations for livestock groups are to immediately implement biosafety and PRA to detect diseases with continuous assistance from universities and government agencies. Recommendations for village governments to facilitate disease detection activities. Recommendations for government agencies to aid with equipment and medicines in handling diseases and preventing the spread of infectious diseases in livestock.

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