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ANALYSIS OF THE IMPACT OF FOOT-AND-MOUTH DISEASE ON PRODUCTION MANAGEMENT AND BUSINESS FEASIBILITY OF *SAPI SONOK* IN SUMENEP REGENCY

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Abstrak

Penelitian ini bertujuan untuk mengetahui dampak penyakit mulut dan kuku terhadap manajemen produksi yang terdiri dari manajemen pemeliharaan, manajemen kandang, manajemen kesehatan, manajemen pakan dan analisis usaha ternak sapi sonok di Paguyuban Sapi Sonok Potre Koning Kecamatan Lenteng Kabupaten Sumenep. Penelitian ini menggunakan 21 orang responden yang terdiri dari 20 orang anggota paguyuban dan 1 orang paramedis. Data yang digunakan adalah data primer dan sekunder yang diperoleh dari penyebaran kuisioner dan wawancara.data quisioner dibagi menjadi tiga kelompok yaitu sebelum PMK, saat PMK dan pasca PMK. yang selanjutnya dianalisa menggunakan uji Manova dan Uji duncann. Hasil penelitian menunjukkan bahwa terdapat perbedaan yang signifikan pada manajemen perkandangan, manajemen Kesehatan, manajemen pakan dan Analisa usaha (p<0,05) PMKpada sebelum, saat dan pasca PMK. Manajemen perkandangan menunjukkan bahwa tidak ada perbedaan yang signifikan pada waktu sebelum, saat dan pasca, pada saat Analisis usaha pada saat PMK mengalami kerugian akibat menurunnya produktivitas sapi sonok. Manajemen kesehatan merupakan manajemen yang paling berpengaruh pada saat PMK. Peternak tidak memperhatikan keuntungan dalam pemeliharaan sapi sonok karena sapi sonok merupakan hobi bagi peternak.

***Kata Kunci**: Analisa Usaha, Manajemen Produksi, Penyakit Mulut dan Kuku*

Abstract

This study aims to determine the impact of foot and mouth disease (FMD) on production management consisting of maintenance management, cage management, health management, feed management and business analysis of sonok cattle in Potre Koning Sonok Cattle Association in Lenteng Sub-district, Sumenep District. This study used 21 respondents consisting of 20 association members and one paramedic. The primary and secondary data were obtained from the distribution of questionnaires and interviews. Questionnaire data are divided into three groups: before FMD, during FMD, and post-FMD, which were then analyzed using the Manova test and the Duncan test. The results showed significant differences in housing management, health management, feed management, and business analysis (p<0.05). Housing management showed no significant difference in the time before, during and after FMD, while business analysis during FMD suffered losses due to decreased productivity of sonok cattle. Health management is the most influential management during FMD. Farmers ignore the profitability of raising sonok cattle because sonok cattle are a hobby for farmers.

***Keywords**: Business Analysis, Production Management, Foot and Mouth Disease*

1. INTRODUCTION

Madura cattle are local cattle originating from the island of Madura and are designated as one of the Indonesian local breeds by the Ministry of Agriculture. They have a native geographical distribution on Madura Island and its surroundings. (SNI, 2020).

The Madura Island community not only uses Madura cattle as livestock but also uses Madura cattle as Sonok Cattle, which is a cultural characteristic and pride of the Madurese community. Sonok cattle are Madurese cows specially reared to preserve culture and pleasure through beauty contests and have high economic value (Zali, 2019). Sonok cattle have a high selling value because the cattle that become the material for the sonok cattle contest are selected cattle of high quality, and the costs require significant maintenance costs such as care, feed, and particular vitamins to maintain the condition and skin of the sonok cattle. The Sonok Cow Contest has become an attraction for tourism in Madura. Sonok Cows become a competition event that is simultaneously an iconic culture of the Madurese community.

Sumenep District, the easternmost district on Madura Island, holds immense potential in developing Sonok Cattle due to its large Madura Cattle population. DKPP Sumenep (2023) reported that the beef cattle population in Sumenep District in 2022 was 383,577 heads, with 201,575 adult female Madura cattle, indicating a promising future for Sonok Cattle development in the region.

One of the Sonok Cattle associations in Sumenep district and the LUGANTENG PA Seed Source area (Guluk - Guluk, Ganding, Lenteng, and Pasongsongan) launched by the Sumenep District Government is the Potre Koning Association in Ellak Daya village, Lenteng sub-district.

In 2022, there was an outbreak of foot and mouth disease that could attack livestock such as cattle, buffalo, pigs, goats, and sheep; this also happened to livestock in Sumenep District, especially cattle. Foot and mouth disease is highly contagious and affects all farm animals with even or split hooves.

Foot and mouth disease is caused by an RNA virus belonging to the genus *Apthovirus, Picornaviridae* family. Many farmers, especially cattle farmers, are worried about the outbreak of this virus. Some farmers who contracted the foot-and-mouth disease virus suffered losses because they could not sell the infected livestock until they recovered. Some even experienced the death of the livestock.

This study aims to shed light on the significant impact of Foot and Mouth Disease on the production management and business feasibility of Sonok Cattle in 'Paguyuban Sapi Sonok Potre Koning' in Jambu village, Lenteng sub-district, Sumenep district. The study aims to raise awareness about the potential threats posed by this disease to the Sonok Cattle industry.

2. RESEARCH METHOD

This research uses a quantitative research method in the form of descriptive research, namely research describing or describing the effect of hoof and mouth disease on production management and livestock business feasibility at the time before FMD, during FMD, and post-FMD.

The population used in this study is the Sonok Cattle Association of Potre Koning Sonok Cattle, located in Jambu Village, Lenteng District, Sumenep Regency.

The sample in this study was cattle farmers in the neighborhood of the Sonok Cattle Association. This research then took 21 informants. Twenty members of the Paguyuban Sapi Sonok Potre Koning in Jambu Village, Lenteng Sub-district, Sumenep District, and one veterinary paramedic, who is an experienced professional in the field of livestock health management, manage or monitor farmers in Sumenep District regarding foot and mouth disease that occurs in Sumenep District.

Data analysis in this study used the IBM SPSS (Statistical Package for the Social Sciences) Statistics Version 27 program. The statistical test used was Multivariate Analysis of Variance (MANOVA) in a completely randomized design (RAL) factorial pattern to determine the effect of the condition given. If there is a significant difference, it will be continued with Duncan's Multiple Range Test to determine the best treatment.

3. RESULTS AND DISCUSSION

3.1 Respondent Characteristics

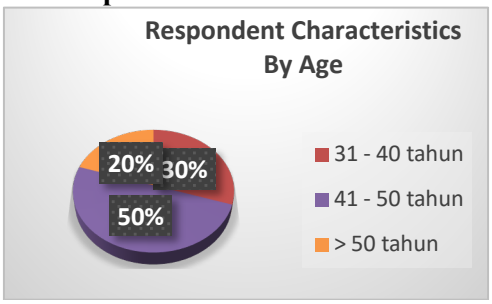

Figure 1. Characteristics of respondents based on age

Based on Figure 1, it is known that the frequency distribution of the age of the respondents is mainly 41-50 years old, namely 50%, the second is 31-40 years old, as much as 30%, and the last is age> 50 years, namely 20%.

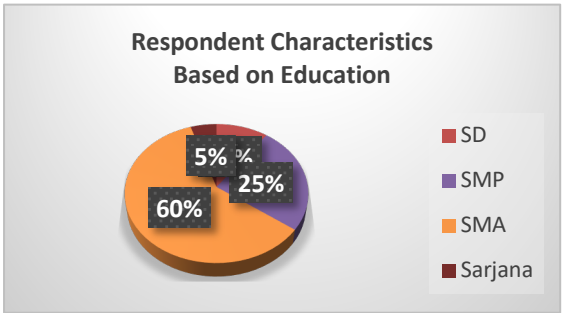

Figure 2. Respondents' characteristics based on education

The education of farmer members of the association varies widely. The frequency distribution of respondents' education is primarily senior high school, which is as much as 60%, while the lowest is a bachelor's degree, as much as 5%.

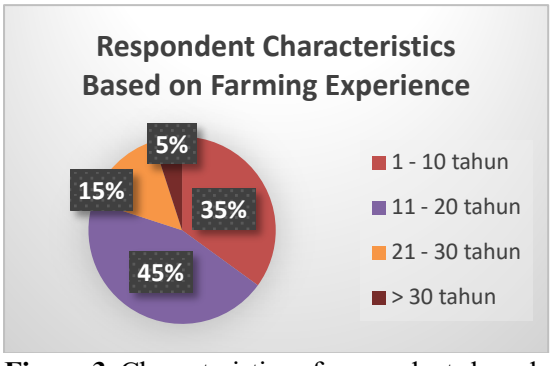

Figure 3. Characteristics of respondents based on farming experience

The highest frequency distribution of respondents' farming experience was 11-20 years, 40%; the second was 1-10 years, 35%; the third was 21-30 years, 15%; and the last was >30 years, 5%.

The characteristics of breeders in the sonok cattle business are needed to manage the business. Members of the Potre Koning Association have the highest age range between 41-50 years, as much as 50%, which indicates that the association members are members of productive age. Productive age is the age of someone who can work properly and efficiently. Halidu et al. (2021) explain that farmers who have a productive age at the age range of 15-64 years have better physical and thinking abilities in accepting changes, innovations, and adaptations in their livestock businesses compared to older (non-productive) ages.

The research results obtained by the level of education taken by members of the Potre Koning Paguyuban are primarily at the high school level, as much as 60%. This high school education level is relatively high because it has reached the nine-year government program. The level of education taken by association members is expected to increase the openness of breeders' insights in the maintenance of sonok cows. The same thing was also stated by Hasan *et al* (2022). The higher the level of education of farmers, the further the livestock business they have is expected to develop.

Regarding the breeding experience of members of the Potre Koning Association, 11-20 years of breeding experience was obtained. This is an essential factor in the maintenance of sonok cattle because the longer the experience of raising sonok cattle, the farmer will better understand how to choose sonok cattle properly considering that the maintenance and care techniques of sonok cattle are different from beef cattle in general.

3.2 Nursery Management

The results of the research on nursery management are presented in Table 1.

Table 1. Mean ± SD and P-value of sonok cattle breeding management under three different conditions

Group	N	Mean ± SD
Before	20	1.00 ± 0.858^{b}
When	20	0.00 ± 0.000^{a}
After	20	1.00 ± 0.858^{b}

Superscript letters (a, b, c) that differ in the same column show that there is a significant difference ($p<0.05$)

Table 1 shows nursery management under three different conditions. The average before FMD with 20 respondents is 1.00, during FMD 0.00, and post FMD 1.00. The significant difference seen from the three conditions is during FMD. Prior to FMD, the mating method in the potre koning association used natural mating and artificial insemination. The results showed that natural mating was the most widely used method. The selection of natural mating is because farmers want to make direct selection related to the pedigree of the bulls to be mated. Agustiyana (2022) mentions that the characteristics of the males selected for breeding sonok cows have the characteristics of fat, upright, sagging, and prominent body shapes.

The natural mating method used by many breeders could be more efficient. This is because the costs incurred are high. Farmers have to pay Rp. 500,000 - Rp. 1000,000 for transportation costs and natural mating services for each natural mating performed; therefore, some farmers in the Sonok Cattle Association have begun to switch to artificial insemination methods.

At the time of the FMD outbreak, farmers did not breed any sonok cattle. This was done to minimise sonok cattle infection, resulting in the farmer's losses. Special treatment was also given to pregnant sonok cows during the FMD outbreak. Healthy pregnant sonsok cows are separated from other sonsok cows, and if the pregnant sonsok cows are attacked by FMD, the farmer will conduct several therapies and treatments. This is done so that farmers do not suffer losses.

After FMD, farmers return to breeding their sonok cattle. The breeding remains the same using natural mating and artificial insemination methods. Zaenuri et al. (2023) explained that the advantages of artificial insemination are the efficiency of superior males, increasing the potential for genetic selection, and saving the cost of maintaining males.

3.3 Housing Management

The results of the study on housing management are presented in Table 2.

Table 2. Mean ± SD and P-value of housing management of sonok cattle in three different conditions

Group	N	Mean ± SD
Before	20	4.05 ± 1.820[a]
When	20	4.48 ± 1.954[a]
After	20	4.80 ± 1.956[a]

The same superscript letter (a) in the same column shows there is no significant difference ($p > 0.05$)

Table 2 shows housing management under three different conditions. The average before FMD with 20 respondents was 4.05; during FMD, 4.48; and post-FMD, 4.80. of the three conditions, there was no significant difference.

Cowsheds in Paguyuban Potre Koning are made of mixed materials made of bricks, wood, and bamboo as cage walls; for the cage's roof, farmers use tiles, and the floor is made of sand, wood, or cement. The capacity of the sonok cattle pens in the paguyuban potre koning ranges from 1-3 heads with an elongated cage shape. Cattle in this association are placed in line with the semi-open cage type. The standard of cage construction consists of several things, namely materials made of wood, bricks, roof tiles, thatch or steel, types of floors using cast cement, sawdust, and sand, cattle laying system in the cage using a parallel system or head to head with an open, semi-open and closed cage system (Anugerah et al., 2016).

Cattle pen sanitation needs to be considered by farmers because the pen environment will affect the performance of the cattle. Farmers of the Potre Koning Association clean their cages at least twice a day using a hoe or rake to clean the feces, which will then be collected in a shelter and used as plant manure. In addition, feed bins and drinking places are also cleaned from leftover feed and drinking water. Sanitation of pens and equipment uses cleaning fluids to minimize the spread of disease in sockeye cattle. Sanitation carried out by farmers According to the opinion of the Ministry of Agriculture (2021), cage sanitation is carried out at least once a day by cleaning the cage from feces that are collected in a place or directly flowed through the sewer to the waste installation or grass garden, cleaning the remaining feed and drinking places and cleaning the environment around the cage.

During the FMD outbreak, Potre Koning farmers paid close attention to cage sanitation in order to prevent their sonok cattle from contracting the FMD virus, which could reduce cattle performance and selling prices. Cage sanitation during FMD was carried out at least three times a day, and some farmers even cleaned cow feces every time. In addition, disinfectants and cleaning fluids are used more during FMD to prevent FMD transmission. Waste utilization during FMD: Farmers choose to bury livestock waste on farmland. However, many farmers still use waste (feces) as manure because they believe their sponsor cattle are healthy and not infected with FMD.

After FMD outbreaks, farmers continue to maintain the cleanliness of their cages by sanitising their cages and equipment more often 80% of farmers pay more attention to cage sanitation after FMD outbreaks because farmers are worried that their sonok cattle will be infected again.

3.4 Health Management

The results of the study on health management are presented in Table 3.

Table 3. Mean ± SD and P-value of health management of suckler cows under three different conditions

Group	N	Mean ± SD
Before	20	4.15 ± 1.348[a]
When	20	7.20 ± 2.285[b]
After	20	7.10 ± 2.222[b]

Superscript letters (a, b, c) that differ in the same column show that there is a significant difference ($p<0.05$)

Table 3 shows health management in three different conditions. The average before FMD with 20 respondents was 4.15; during FMD, it was 7.20, and post-FMD, it was 7.10. There was a significant difference between the three conditions.

Sonok cattle in the Potre Koning Association are kept in an intensive rearing system, as the cattle are kept in a cage and only released for display, bathing, training, and contests. Sonok cattle are bathed and displayed 2-3 times a week. This is consistent with Agustiyana's research (2022) that sonok cattle in West Dempo Village are released for display, training and bathing on average three times a week. However, for road training, farmers do it every two weeks according to the schedule determined by the head of the association. Farmers bathe and display the sonok cattle in the yard.

During FMD, cattle are not displayed and bathed; they are only wiped down with warm water. Exercise schedules were also eliminated to minimize contact with cattle and other things that could transmit the FMD virus. After the FMD outbreak subsided, farmers returned to their original routine by displaying and bathing sonok cattle 2-3 times a week and conducting walking exercises according to a predetermined schedule with more vigilance against the spread of the FMD virus.

Treatment and multivitamins are administered to cattle exposed to the virus. Authorized veterinarians and paramedics carry out treatment. Furthermore, cattle that have not been exposed and have recovered from FMD are given vaccines to increase the body's immunity to the FMD virus. This is by Pratama's research (2024) that FMD handling can be done by handling by animal health officers by giving multivitamins or energy supplements, giving antiseptic to wounds in the mouth and hooves, giving gusanex to treat wounds, and giving vaccinations as FMD prevention.

3.5 Feed Management

The results of the study on health management are presented in Table 4.

Table 4. Mean ± SD and P-value of feed management of suckler cows under three different conditions

Group	N	Mean ± SD
Before	20	3.20 ± 1.196[a]
When	20	8.20 ± 2.262[b]
After	20	3.20 ± 1.196[a]

Superscript letters (a, b, c) that differ in the same column show that there is a significant difference ($p<0.05$)

Table 4 shows health management in three different conditions. The average before FMD with 20 respondents is 3.20; during FMD, 8.20, and post-FMD 3.20; there is a significant difference from these three conditions.

In general, the source of animal feed is divided into 2: forage and non-forage. Forage feed can be obtained from grasses, leaf legumes, and agricultural waste plants. Non-forage feed can be obtained from seeds and minerals. Potre Koning farmers use both materials as animal feed and forage as the main feed. Forage feed that is usually given is field grass, elephant grass, corn stalks, straw, and several types of legumes such as lamtoro, while non-forage feed (Concentrate) consists of rice bran, banana gedebong, and tofu pulp mixed with salt to add flavor to the concentrate feed. Forage feeding is done twice a day, while concentrate feed is given once a day. Devri et al. (2020) stated that banana stems and tofu pulp can be used as concentrate feed ingredients for cows because they have benefits and nutritional content that is quite good. Banana stems contain 87.7% dry matter (BK), 25.12% ash, 14.23% crude fat (LK), 29.40% crude fiber (SK), 3.01% crude protein (PK), and 28.24% extract without nitrogen (BETN). Meanwhile, tofu pulp contains 8.66% protein, 3.79% fat, 51.63% water, and 1.21% ash.

During FMD, feeding and herbal medicine to cattle differs from before FMD. FMD-affected cattle have decreased appetite, resulting in reduced forage consumption. This is overcome by feeding the sick cattle with concentrate.

After-FMD feed management is not much different from the conditions before FMD; farmers return to their initial habits before FMD by giving forage 2 -3 times a day and concentrating once a day. Based on interviews with farmers, sonok cattle are usually given concentrate feed in the afternoon before night. This is to keep the cattle total until the next day. Herbal medicine is also given 1-2 times a month according to the needs of the cattle.

3.6 Business Analysis

The results of the research on business analysis are presented in Table 4.

Table 5. Mean ± SD of business analysis of sonok cattle under three different conditions

Group	N	Mean ± SD
Before	20	2.20 ± 0.834^{b}
When	20	1.50 ± 0.761^{a}
After	20	2.15 ± 0.988^{b}

Superscript letters (a, b, c) that differ in the same column show that there is a significant difference ($p<0.05$)

Table 4 shows health management in three different conditions. The average before FMD with 20 respondents is 2.20, during FMD 1.50, and post-FMD 2.15; there is a significant difference between these three conditions.

The sale of sonok cattle is influenced by the performance and achievements of sonok cattle. Agustiyana (2022) explained that the criteria for selling sonok cattle can be seen from the performance which includes body shape, skin colour, sagging and firmness of the cow, so that it can affect the selling price of sonok cattle. During the FMD outbreak, fixed and variable costs changed. Electricity and water usage increased because farmers often cleaned their cages and facilities.

After FMD outbreak, fixed and variable costs followed the variable costs before FMD because post-FMD activities began to be held again, such as contests and training. However, the selling price of sonok cattle has been lower than before FMD because farmers are still affected by the FMD outbreak. Farmers are more selective in choosing sonok cattle to keep. Interviews with farmers found that large or small profits for some farmers are not a big problem because farmers cultivate sonok cattle because of their hobbies, cultural values, and high economic status. This is to Agustiyana's research (2022), which explains that the people of West Dempo do not mind profit or loss in raising sonok cows because sonok cows have become a hobby and culture of the local community, people who own sonok cows are known for their high economic status by displaying their sonok cows in sonok cows contests throughout Madura without calculating the costs that have been incurred. Indeed, the sonok cow culture must be maintained so that the purity of Madurese cattle is maintained and continues to be preserved.

4. CONCLUSIONS AND SUGGESTIONS

Based on the results and discussion presented, it is known that foot and mouth disease impacts breeding management, health management, feed management, and business analysis of sonok cattle before, during, and after FMD. . Health management is the most influential management during FMD. And farmers ignore the profitability of raising sonok cattle because sonok cattle are a hobby for farmers.

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