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FOOT AND MOUTH DISEASE ON CATTLE IN PENINSULAR MALAYSIA: TOWARDS A SUSTAINABLE LIVESTOCK

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Abstract: Foot and mouth disease (FMD) is a highly contagious disease of cloven-hoofed animals including cattle and it remains one of the biggest economic threats to agriculture and other sectors. This disease is endemic and it will contribute to the loss of work efficiency in draught animals in developing countries and sanctions on exports of animals and animal products. Thus, this study is to identify the most observed FMD symptoms among cattle by farmers in Peninsular Malaysia. By including six states in Peninsular Malaysia, face-to-face interviews were conducted among 349 cattle farmers from April and October 2018. Using descriptive analysis, result demonstrated that the main FMD symptom observed by farmers of their cattle in Peninsular Malaysia was drooling (95.4.%), a loss of appetite (77.7%) and blisters on tongue, lips, mammary glands and around mouth and hoof (67.9%). As the FMD is one of the most highly infectious diseases among cattle, learning of the FMD symptoms earlier, will assist the cattle farmer to take fast effective action to reduce the spread and impact of FMD outbreaks. Aside from this, it can help in addressing Sustainable Development Goals (SDG) 2, end hunger, achieved food security and improve access to nutrition.

Keywords: Foot and mouth disease, symptom, Malaysia, sustainability, cattle.

Introduction

Foot and mouth disease (FMD) is non-zoonotic disease and popular among the cloven-hoof animals. As pointed out by Chakraborty *et al*. (2014), FMD is the most highly infectious and transboundary viral diseases among cloven-hoofed animals that has a significant economic impact. However, FMD is not related to the hand, foot and mouth disease (HFMD) which is commonly found in children. Both diseases are spread through different types of viruses. In fact, FMD only infects any cloven-hoofed animals (e.g., cows, buffaloes, goats, sheep, pigs and deer) and caused by the *Aphthovirus* from the *Picornaviridae' family* while HFMD is caused by the *Coxsackievirus A16* and *Enterovirus 71*. In general, the FMD symptoms includes lameness, drooling, a loss of appetite, drastically reduced milk production and blisters on the tongue, lips, mammary glands and around mouth and hooves of the diseased animals. The FMD virus normally takes around 14 days to incubate (Malaysian Veterinary Protocol, 2011). However, most of the animals affected with FMD will not die but they will suffer from depression, loss of appetite, weakness and may be unable to produce meat and milk like they did before (Malaysian Veterinary Protocol, 2011).

Statistics show, Malaysia imports live animal from FMD outbreak prone countries such as Thailand and Vietnam (Department of Veterinary Services Malaysia, 2016). Since Malaysia exhibits a significant dependence on the import of live animals, rationally, it will be exposed to the risk of animal diseases including an outbreak of FMD. This argument cannot be disputed, when Abdul-Hamid *et al*. (2011) proved that the FMD virus found in Malaysia was closely related to those from neighbouring countries. The belief that the FMD virus in Peninsular Malaysia was spread through the movement of animal also has been proven by a

study from Ramanoon *et al*. (2012). This occurs especially during religious and cultural festivals (Ramanoon *et al.,* 2012).

Worldwide, there are several factors which contribute to the diffusion of FMD. The most cited factors include the age of animals, sizes of the herd (Bayissa *et al.,* 2011; Elnekave *et al.,* 2015), number of animals being purchased, sharing the same water resources and dependency on the livestock as a primary source of income (Cleland *et al.,* 1996). However, the spread of animal diseases in certain places is also usually influenced by other factors. Temperature, wind and precipitation are some of the factors that can have direct and indirect impact on the level of cattle survival (Hugh-Jones & Wright, 1970; Martin *et al.,* 1975a; 1975b) apart of management practice (Withers, 1952; Leech *et al.,* 1968).

In fact, during the wet season, the FMD virus can easily spread and multiply due to the suitability of the environment (Waltner-Toews *et al.,* 1986). Hence, to overcome the spread of virus, a new strategy has been implemented by industry players. However, Kaneene and Hurd (1990) added that three cattle groups have the greatest risk of being infected by the disease; these include lactating and dry females and young cattle (male and female). Therefore, knowing the factors that spread the disease and symptoms, it is possible to provide the earlier information to the farmers to take action and eradicate the FMD before it spreads.

Valarcher *et al*. (2008) stated that FMD is the most common disease that affects cloven-hoofed animals occur in Europe and sometimes, epidemic was very limited and at other times, they were the cause of devastating economic losses. As the global population grows, more effort and ingenuity will be required to sustainably expand agricultural production, strengthen the global supply chain, reduce food losses and waste, and ensure that all people who are hungry or malnutrition have access to healthy food.

Many people around the world believe that world hunger can be eradicated within the next generation and they are working together to achieve this goal. Thus, it is important to identify the most observed FMD symptoms among cattle by farmers in Peninsular Malaysia as to support sustainable development goals (SDG) 2, zero hunger, achieved food security and improved nutrition.

Materials and Methods

Data Collection

To obtain the data, a face-to-face interview method applied. By distributing a set questionnaire from April to October 2018, a total of 349 responses were collected. The collection of data was conducted among small cattle farmers in six states in Peninsular Malaysia (Kelantan, Pahang, Selangor, Melaka, Negeri Sembilan and Johor) via random sampling technique.

The selection of states is based on the approval of the Department of Veterinary Services (DVS) Malaysia. Undoubtedly, DVS Malaysia has provided an extensive list of cattle farmers (over 15,000 in six states) and only a few livestock farmers were shortlisted due to research limitations. The selection is based on a few specifications, including accessibility to the location, the number of respondents contacted and number of cattle grown by farmers. The majority of cattle are raised in rural areas, estates or in conjunction with agricultural crops (e.g., oil palm or rubber tree), making them inaccessible to researchers.

Statistical Analysis

The frequency score and percentage were calculated to determine the associated symptoms observed by farmers on their cattle. These analysis were done by using a descriptive methodology on IBM-SPSS software (version 22). Descriptive analysis was chosen as the method of testing the data as it is able to simplify

large data volumes and better display the results which helped this research paper to answer the research objectives. This approach was also applied to current research by Purwanto *et al.* (2020) and Halim *et al.* (2020) which proves its effectiveness as an analysis tool.

Results and Discussion

Demographic

Table 1 summarises the demographic of respondents. Most of the respondents are aged between 30 and 70. The age group with the highest number of farmers is between 56 and 65. Of the 349 respondents, only 18 were female. All of them are Malay Muslims. Most of the

Table 1: Demographic of respondents

Demographic		n	%
Age	≤ 25	10	2.9
	26-35	44	12.6
	36-45	66	18.9
	46-55	91	26.1
	56-65	92	26.4
	66 ≥	46	13.1
Gender	Male	331	94.8
	Female	18	5.2
Race/religion	Malay/Muslim	349	100.0
	Non-Malay/non-Muslim	0	0.0
Marital status	Married	298	85.4
	Single	36	10.3
	Divorced/widow	15	4.3
Experience (year)	≤ 10	161	46.1
	11-20	96	27.4
	21-30	44	12.4
	31-40	31	8.9
	≥ 41	18	5.2
Education (year)	Not attend	33	9.5
	UPSR	64	18.3
	PMR	84	24.1
	SPM	143	40.9
	STPM/Diploma	19	5.4
	Degree	6	1.8
Monthly household income (RM)	≤ ,1000	172	49.3
	1,001 – 2,000	161	46.1
	2,001 – 3,000	10	2.9
	3,001 – 4,000	2	0.5
	4,001 – 5,000	3	0.8
	≥ 5,000	1	0.4

Note: n = 349

respondents are married (298), followed by single adults (36) and divorced or widowed (15).

Over time, the number of farmers decreased as their years of experience increase. In fact, almost half of the farmers (161) have experience of less than 10 years and only 18 farmers have experience of more than 41 years.

Despite of most of the cattle farmers were interviewed from the rural areas and they grew-up using the traditional cattle-rearing methods, interestingly, only 33 farmers do not have any formal education, while the rest have at least attended primary school. As most of them were born in the early 1940s and 1950s, there is a high incidence of farmers who do not have a formal education. In addition, as the respondents were from rural areas, it was not so surprising that on the average, their monthly income is also small. In fact, of the farmers that took part in the survey 172 earned less than RM1,000, 161 farmers earned between RM1,001 to RM2,000 and only 16 farmers earned more than RM2,001.

Farm Characteristic

Table 2 shows the descriptive result of the farm characteristics. From 349 respondents, only 5 farmers have received government aid and 89 farmers have received training on farm management. More than half of the farmers (185) have financial problems regarding the costs of rearing cattle.

Most of the farms are operated on a small scale and around the residential premises, it is interesting to know that only 18 farmers share their farm equipment and 55 share their rearing system with others. More interestingly, almost half (141) of the farmers have contacts with veterinary services.

Even though most of the interviewed farmers are from rural areas, only 87 operated their farm in traditional rearing system, while 262 farmers used modern rearing systems. Then, only 312 farmers feed their cattle with a grass and 37 feed their cattle using additional feed like silage, forage or pallets.

Even with the easy availability of information on social media and the ease-of-use-of modern communications technology, many farmers are still unfamiliar with and have not yet created a club or group to share information regarding farm management.

As shown in Table 2, only 8 (2.3%) farmers acknowledge that they have joined the livestock club while 341 (97.7%) have not.

Table 3 summarises the farm profile by breeds. Out of 349 cattle farmers affected by FMD surveyed, three groups of cattle breeds were identified namely Kedah-Kelantan, Charolaise and Limousine. Kedah-Kelantan has the highest number of herd and cattle (197 herd and 1,630 cattle) followed by Charolaise (100

Table 2: Descriptive of farm characteristic

Characteristic	Yes		No	
	n	%	n	%
Receive government aid	5	1.4	344	98.6
Receive government info	89	25.5	260	74.5
Have financial problem	185	53	164	47
Share farm equipment	18	5.2	331	94.8
Share rearing system	55	15.8	294	84.2
Contact with veterinary	141	40.4	208	59.6
Traditional rearing system	87	24.7	262	75.1
Fully depend on grass	312	89.4	37	10.6
Member to any livestock club	8	2.3	341	97.7

Note: n = 349

Table 3: Farm profile by breeds

Indicator	Kedah–Kelantan	Charolaise	Limousine
No. of farm/herd	197	100	52
No. of cattle	1,630	604	245
Average herd per farm (farm size)	8	6	5
Average production a year (RM)	7,544.37	9,366	9,267.31

Note: n = 349

herd and 604 cattle) and Limousine (52 herd and 245 cattle).

On average, the farm sizes of all breeds are small, with 8, 6 and 5 for Kedah-Kelantan, Charolaise and Limousine, respectively. Breed of Charolaise (RM9,366) recorded the highest value of average production a year followed by Limousine (RM9,267.31) and Kedah-Kelantan (RM7,544.37).

FMD Symptoms Observed by Cattle Farmers

FMD is a common disease among the cattle in Peninsular Malaysia. Therefore, the symptoms can be easily identified by the farmers. During the interview session, farmers can well describe FMD symptoms observed among their cattle. They are categorised as well informed about FMD if they able to describe at least three out of five FMD symptoms listed by DVS. The main FMD symptom observed by the cattle farmers are drooling (95.4%) followed by the no appetite (77.7%) and blister on tongue, lips, mammary glands and around mouth and hoof (67.9%), as shown in Table 4. While lameness (39.5%) and reduction in milk production symptom was less observed by the farmer (15.2%).

As the DVS Malaysia are held accountable deals with the animal health, policies such as vaccinations, movement controls and culling is needed (Garner & Lack, 1995; Velthuis & Mourits, 2007; Ferrari *et al.,* 2014; Roche *et al.,* 2014). As pointed out by the Mohamad and Hamzah (2020), improving the hygiene of the cattle rearing process is vitally important to reduce the FMD impact on cattle and farmers in Peninsular Malaysia.

In other words, by adapting hygienic procedures one can increase the value of the total cattle production per year apart of reducing economic losses and improving agricultural nutrition to support SDG2 goals. As proved by the previous studies, improving the hygiene procedure in the rearing system is not limited to the increases in the milk production per cattle (Derks *et al.,* 2014b) but also increase total revenue per head of cattle (Derks *et al.,* 2014a).

This is because, unhealthy animals are a problem nor only for the farmer but the local

Table 4: FMD symptoms observed by cattle farmers

FMD Symptom	Yes		No	
	n	%	n	%
Drooling	333	95.4	16	4.6
Lameness	138	39.5	211	60.5
No appetite	271	77.7	78	22.3
Milk production drops drastically	53	15.2	296	84.8
Blisters on tongue, lips, mammary glands and around mouth and hoof	237	67.9	112	32.1

Note: n = 349

economy as well. Problems may arise if the infected animal is not culled and movement the animals are not curtailed as a mix of healthy and unhealthy animals may result in the entire herd getting infected.

Therefore, any economic activity (related to meat or milk products) could have adverse effects on the farmer, his business and profits as well as the health and safety of consumers that have the milk or meat form the diseased animals.

This causes additional burdens, such as additional fixed costs, higher costs of feeding and costs of housing and caring for the infected or diseased animal. Additionally, the farmers may suffer from mental health issues following the cattle losses (Olff *et al.,* 2005).

Conclusion

The findings of this study are clear: drooling, no appetite and blister on tongue, lips, mammary glands and around mouth and hoof are some of the FMD symptoms observed by Malaysian farmers. By understanding what the farmer knows of FMD symptoms, this study hopes it will assist the Department of Veterinary Services (DVS) and increase farmer's awareness together in surveillance and curb, control or otherwise eliminate FMD outbreaks in Peninsular Malaysia.

It is because, without understanding what the farmer knowledge of FMD and its symptoms, efforts by the DVS to monitor and eradicate FMD outbreaks may fail. In areas where the risks of the disease are alarming and or persistently high, it is important not just to understand the epidemiology of the disease but also farmer's perceptions, explanations, predictions and response to a particular disease or type thereof that affects the cattle (i.e., FMD).

Government efforts to reduce disease risks may be ineffective without a thorough grasp of local farmer's experiences, perspectives and risk perceptions. All the information collected in this study will help to create more well-informed advocacy messaging and can provide significant insights on local diseases affecting cattle, which can then be used to inform experts in order to accomplish Sustainable Development Goal 2: Zero hunger by achieving food security and improved nutrition.

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