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Adoption of Innovation among Beef Cattle Farmers in Peninsular Malaysia

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Abstract

Cattle farming has become one of the engine growth in agriculture industry since years ago. The role of this sector is assumed as essential to supply protein source for the population. However, the problem arises when the import rate for beef is higher, and the supply has failed to meet the population's demand. Hence, the introduced innovation such as artificial insemination, integration and feedlot technique is seen as a driver that can further accelerate this sector. The cooperation and involvement from other parties, including the government and private sector are essential to ensure the successfulness of the introduced innovation. This study examines the socio-demographic profile and the adoption level of beef cattle farmers in four regions of Peninsular Malaysia. Multi-stage random sampling has been employed, and 233 farmers have involved as the respondents of this study. The farmers' average age is 48 years and had 13 years of experience in beef cattle farming. Most of the farmers found that they had a high level of innovation adoption, but certain of them face

some obstacles such as financial and extension issues, which had hindered them from adopting innovation. The involvement of all stakeholders, including research centres, manufacturing and farmers, will benefit each other as the product can be supplied as the sample to enhance beef cattle production. Hence, a harmony and competitive situation can be created to ensure the food security of the country.

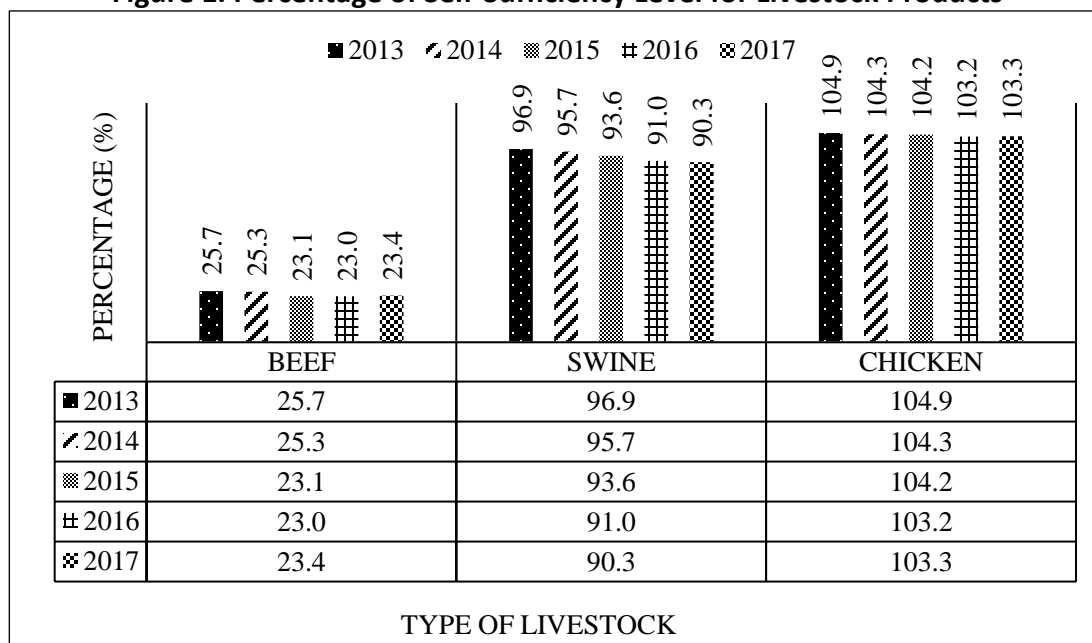
Keyword: Beef Cattle, Adoption, Innovation, Beef Cattle Farming, Food Security

Introduction

Agriculture in Malaysia has become one of the engine growth since independence in 1957. This sector comprises crops, fisheries, poultry and ruminant. It is also noted that the agriculture sector has become a weapon to combat poverty and decrease the unemployment rate (Abdullah & Abu Samah, 2014). The transformation of traditional agriculture into a modern practice has changed farmers' perception of current innovations, including technologies and practices. In beef cattle farming, several innovations have been introduced to improve the production and guarantee the nation's food security.

The dependency on import beef has affected Malaysian economics in terms of the foreign exchange rates and the value of the beef itself. The frozen imported beef is way cheaper than the fresh local beef due to higher price of feed, limited grazing area and poor breeding stock (Ariff, Sharifah, & Hafidz, 2015). Besides that, the halal status of imported beef is still doubtful among Muslim consumers. Meanwhile, Department of Veterinary Services (2017) reported that the percentage of self-sufficiency level (SSL) for beef and mutton is still low compared to swine and poultry. Figure 1 shows the SSL percentage for beef and mutton in year 2013 to 2017 have fluctuated in the different years since the supply was still not encouraging and the demand kept spiking.

Figure 1. Percentage of Self-Sufficiency Level for Livestock Products



The insufficient supply of beef has become the main concern on food security issues. Due to the high competition within the manufacturing and services industries, the limited grazing area has caused certain farmers to proceed with other agricultural outputs such as palm oil, fruits, and vegetables because these crops have higher productivity than other crops (Abdullah, Ali, & Noor, 2020). The cattle feed issues have been long abandoned discussion, and until now, there is still no concrete solution to overcome this problem. However, adopting innovation is one of the alternatives which practised by individual farmers to control the farm cost on cattle feed. The usage of agricultural waste, such as corn and rice straws, can reduce beef cattle spending (Baba, Dagong, Sohrah, & Utamy, 2019). Meanwhile, the use of silage or fermented silage can also overcome cattle feed problems during drought and flood season. It may also overcome the issues of the insufficient and high price of cattle feed. Hence, it is noted that innovation is understood as to simplify and ease the farming process as well as to enhance the production of the farm (Abdullah et al., 2020).

Many studies conducted by researcher on introducing the innovations in beef cattle farming, but unfortunately, those introduced innovations do not well assist by the extension workers, and farmers are financially unstable to invest in particular innovation (Baba, Dagong, & Risal, 2014; Baba et al., 2019; Wahyudi, 2017). Thus, this study aims to bridge the knowledge gap in the adoption of innovation among beef cattle farmers.

Literature Review

The researchers have introduced several innovations to ease the farming process. However, it is also noted that innovation does not rely on the technology itself. It includes resource-saving practice such as integrated farming system and producing feed from agricultural waste. An integrated farming system consists of a range of resource-saving practices that purposely to earn higher profits and sustained beef production levels (Md. Said & Man, 2014). This method can protect the environment and enhance biological processes such as nutrient recycling and improve crop yields (Reddy, 2016). Meanwhile, cattle feed from agricultural waste such as corn and rice straw will minimise the farming cost and maximise the profit. Baba et al. (2019) mentioned that farmers in Maros Regency, South Sulawesi, Indonesia, get influenced to produce cattle feed from crop residues by many factors such as contact with extension and the number of cattle.

On the other hand, artificial insemination is recognised as one of a tool in assisted reproduction techniques. This technique involves a procedure by injecting the bull semen into the cow's uterus, and it is believed that it will have a high conception rate to obtain a high-quality breed of calves (Yimer et al., 2015). Meanwhile, forage technology has also contributed to the improvement in cattle activity besides providing a good standard of living among farmers (Ashley et al., 2018). An improved and high-quality forage will become the solutions to the limited grazing area and spike up of pellet price. Furthermore, vaccination and biosecurity are also considered vital innovations to ensure the sanitation and high quality of beef. Cattle farmers tend to vaccinate their animals to prevent infectious diseases and ensure good feeding habits (Basunathe, Sawarkar, & Sasidhar, 2010). It is crucial to implement biosecurity at the farm to avoid transmitting infectious disease to humans (Lestari et al., 2019).

However, besides all the advanced method of innovations, less attention was paid to the basic farming method, such as record keeping and the implementation of bio-security (Yao, Stephen, &

Sulaiman, 2018). Moreover, there is also limited empirical evidence on the impact of innovation on beef production (Elias et al., 2013).

Methodology

The multi-stage sampling technique was identified as the most appropriate sampling technique for this study. A stratified random sampling has been used to determine the potential respondents in Johor, Selangor, Kedah, and Kelantan, representing the four regions in Peninsular Malaysia. The selection of these four regions is to identify the criteria of the entire population in Peninsular Malaysia. It followed by simple random sampling, which involves 233 beef cattle farmers from the four states to ensure that all respondents had an equal chance to be selected (Sekaran, 2006). According to the pilot study, the Cronbach Alpha value for adoption of innovation is 0.897. It is supported by Husin, Ali and Noor (2014), strong items for a variable has a higher value of Cronbach Alpha.

Meanwhile, the questionnaire was adopted from the previous research done by other scholars and theoretically based on the Diffusion of Innovation Theory by Rogers (1983). The questionnaire of this study consists of 5 parts: the socio-demographic profile, adoption of innovation, farm management skills, access to information, and farm information. The 4-point Likert scale ranges from 1 to 4, which represented strongly disagree to strongly agree. Descriptive statistics were employed to examine the socio-demographic profile and the level of adoption of innovation among beef cattle farmers in Peninsular Malaysia.

Result

The average age of the respondents is 48.4 years old and had 13 years of experience in beef cattle farming. Male and Malay farmers are the majority, with 96.1 % and 99.6%. Moreover, 36.1% of the farmers also found that the majority had completed their secondary education. Meanwhile, 63.5% of them also had off-farm activity instead of beef cattle farming.

Table 1. Socio-demographic profile of the respondents

Socio-economic profile	Frequency (n=233)	Percentage (%)	Mean	SD
Age (years)			48.4	13.65
Years of experience in beef cattle farming (years)			13.17	11.38
Gender				
Male	224	96.1		
Female	9	3.9		
Ethnicity				
Malay	232	99.6		
Others, Siamese	1	0.4		
Level of education				
Master Degree	1	0.4		
Bachelor Degree	10	4.3		
Diploma/ STPM/ STAM	26	11.2		
SPM/ MCE	84	36.1		
Secondary school	59	25.3		
Primary school	42	18.0		
None	11	4.7		
Off-farm employment	148	63.5		

The average distance from farm to the Department of Veterinary Services (DVS) is 12.4 kilometres (km), and the mean size of the farm is 3.4 acres. Furthermore, most of the farm also had grazing area to graze in the provided area freely. Meanwhile, about 38.2% of the farmers hire their family members while 15.5% hire other people such as foreign worker or local people. The influence of farmer-to-farmer extension programs had a more significant impact than the government extension program with 91% and 77.7%.

Table 2. Farm background

Item	Frequency (n=200)	Percentage (%)	Mean	SD
Farm distance to DVS (kilometre)			12.4	9.8
Farm size (acre)			3.5	5.0
Has grazing area	183	78.5		
Has family labour	89	38.2		
Has non-family labour	36	15.5		
Influenced by government extension programs	181	77.7		
Influenced by the farmer-to-farmer extension programs	212	91.0		

Table 3 below shows the frequency, percentage and mean score of each item for adopting innovation in beef cattle farming. Item 1 to 5 shows that majority of the respondents agreed with the statements on adopting innovations. They are adopting innovations at their farm (59.2%) and believed that

adopting innovation improved productivity (53.2%). Besides that, the farmers also shared their opinion that it is essential to adopt innovation in beef cattle farming (51.1%), and they had benefited by adopting innovation (47.2%). The farmers also agreed that they are well informed with the current innovation (53.2%). However, for item six, 35.2% of farmers disagree that adopting innovation does not require high costing, while 31.8% of farmers agree that adopting innovation requires higher cost than those who are not. On the other hand, 49.4% of farmers agree that they had been exposed to the importance of innovation in beef cattle farming and 46.4% also agree that employing good farm management can also be considered as adopting innovation.

Table 3. Frequency and percentage for each item on the adoption of innovation

Items	n = 233 (100%)				Mean
	Strongly disagree (1)	Disagree (2)	Agree (3)	Strongly agree (4)	
1. I adopt innovation for beef cattle farming.	16 (6.9)	22 (9.4)	138 (59.2)	57 (24.5)	3.01
2. I adopt innovation to improve the productivity of the farm.	15 (6.4)	26 (11.2)	124 (53.2)	68 (29.2)	3.05
3. In my opinion, the adoption of innovation is vital in beef cattle farming.	7 (3.0)	19 (8.2)	119 (51.1)	88 (37.8)	3.24
4. I gained benefits from adopting innovation.	10 (4.3)	32 (13.7)	110 (47.2)	81 (34.8)	3.12
5. I am well informed with the innovation introduced in beef cattle farming.	20 (8.6)	28 (12.0)	124 (53.2)	61 (26.2)	2.97
6. Adopting innovation does not involve high costing.	24 (10.3)	82 (35.2)	74 (31.8)	53 (22.7)	2.67
7. I have been exposed to the importance of innovation in beef cattle farming.	25 (10.7)	44 (18.9)	115 (49.4)	49 (21.0)	2.81
8. Adopting better farm management is also counted as embracing innovation.	9 (3.9)	33 (14.2)	108 (46.4)	83 (35.6)	3.14

Table 4 demonstrates the adoption of innovation in beef cattle farming with the mean = 3.001 and SD = 0.703. 48.1% of respondents had a high level of the adoption of innovation, while 36.5% had a medium level of innovation adoption. Then, only 15.5% of them had a low level of adoption of innovation in farming activity. Hence, the results showed that most of the beef cattle farmers in the four regions of Peninsular Malaysia had a high level of adoption of innovation in beef cattle farming.

Table 4. Level of adoption of innovation in beef cattle farming

Level	Frequency	Percent	Mean	SD
Low (1.0 – 2.0)	36	15.5	3.001	0.703
Medium (2.1 – 3.0)	85	36.5		
High (3.1 – 4.0)	112	48.1		

Discussion

Based on the result, it is clearly shown that most beef cattle farmers had employed innovation in their farm practice. As been mentioned earlier, innovation is to simplify and ease the farming process (Abdullah et al., 2020). Factors such as education level and farm distance to DVS has proven can influence farmers to adopt innovation. Educated farmers tend to adopt innovation than those who are not because they are more ready to accept new changes and willing to learn (Paul et al., 2017; Rathod, Chander, & G., 2017; Wahyudi, 2017). In this study, most farmers had completed their secondary school and obtained *Sijil Pelajaran Malaysia* (SPM) or Malaysian Certificate of Education (MCE). Meanwhile, the distance from farm to DVS is vital for the farmers in adopting innovation. As the distance is only 12.4 km, it is considered acceptable for them to adopt innovation introduced by the DVS (Rathod et al., 2017).

On the other hand, extension service either from the DVS or among the farmer's association plays as the main actor to ensure the increase in cattle production and sustain in this sector. Their active role among farmer's community is essential to help them know about the current innovation and practice it at their farm (Baba et al., 2019; Paul et al., 2017). Some of the farmers were more comfortable with the farmer's association than the DVS extension worker. This situation is due to the understanding of their practice, culture, and the local condition (Kiptot et al., 2016).

As the correspondence towards food security issues, it is a positive view on adopting innovation in beef cattle farming activity. The majority of the farmers believed that adopting innovation in the right way will increase beef cattle production and earned higher profit.

Conclusion

This study concludes that most beef cattle farmers have adopted innovation in their farming activity, but a minority of them are not. Even though the farmers have positive feedback on the innovation introduced, the role of relevant parties, including the government, private sector, and farmer's association, is vital to enhance beef production as one of our country's protein supply. The farmers' ideas and suggestions must also be considered because they are the most important actors in this activity. Additionally, the government or non-profit organisation's extension service must also play their role by transferring and assisting those farmers with the current innovation. A structural change is a need to improve an existing policy and ensure a brighter future for this farming activity.

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