The Acceptance towards Assisted Reproductive Technologies (ART) among Ruminant Farmers in Kelantan

By

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A report submitted in fulfilment of the requirements for the degree of Bachelor Applied Science (Animal Husbandry Science) with Honours

Faculty of Agro Based Industry

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2018

DECLARATION

I hereby declare that the work embodied in this report is the result of the original research and has not been submitted for a higher degree to any universities or institutions.

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I certify that the report of this final year project entitled “The Acceptance of Assisted Reproductive Technologies (ART) among Ruminant Farmers in Kelantan” by Mohamad Shaheen bin Sharun, matric number F14B0458 has been examined and all the correction recommended by examiners have been done for the degree of Bachelor of Applied Science (Animal Husbandry Science) with Honours, Faculty of Agro-Based Industry, Universiti Malaysia Kelantan.

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ACKNOWLEDGEMENT

First and foremost, I would like to thank my mother, Sharifah Norizan Binti Syed Ahmad together with my siblings for the aid and support that they have provided throughout the whole journey of completing this project.

I would also like to give credits to each and every one of my friends, for their never ending support as well as their willingness to help both directly and indirectly in accomplishing the task that was given to me.

Finally, I would like to express the highest gratitude for my supervisor, Madam Farah Adila Binti Abdullah, who not only supported me with her advice and guidance but also willing to spend her time for this clueless student of hers.

Thank you.

Acceptance of Assisted Reproductive Technologies among Ruminant Farmers in Kelantan

ABSTRACT

In this current time, the population of Malaysians are continuing to increase year by year. This has result to the increase of meat consumption in Malaysia. Despite poultry and pork production has reached self-sufficiency, beef subsector has failed to do so. Thus, this study was conducted to determine the acceptance of assisted reproductive technologies among ruminant farmers in Kelantan. There are three different independent variables that will be measured, namely, perceived usefulness, perceived ease of use and attitude. A total of 87 respondents among ruminant farmers in Kelantan have been selected in this study through simple random sampling technique. Based on the findings, highest level was contributed by attitude, followed by perceived usefulness and perceived ease of use. Besides that, perceived usefulness was found to have the highest strength of relationship with the acceptance of assisted reproductive technologies, followed by attitude and perceived ease of use. Hence, this study can be concluded that perceived usefulness is the main driving factor towards the acceptance of assisted reproductive technologies among ruminant farmers in Kelantan followed by attitude and perceived ease of use.

Keywords: Ruminant farmers, acceptance, assisted reproductive technologies

Penerimaan Teknologi Pembiakan Maju di Kalangan Penternak Ruminan di Kelantan

ABSTRAK

Dewasa ini, jumlah populasi penduduk di Malaysia semakin bertambah tahun demi tahun. Ini mengakibatkan peningkatan jumlah konsumsi daging di Malaysia. Walaupun ayam dan babi telah mencapai tahap mampu diri, subsektor daging masih gagal untuk mencapainya. Oleh itu, kajian ini telah dijalankan untuk menentukan tahap penerimaan teknologi pembiakan maju di kalangan penternak ruminan di Kelantan. Secara keseluruhannya, terdapat tiga pemboleh ubah tidak bersandar yang diukur, iaitu, tanggapan kebergunaan, tanggapan mudah guna dan juga sikap. Sebanyak 87 orang responden dalam kalangan penternak ruminan Kelantan telah dipilih untuk menjawab soal selidik melalui teknik persampelan rawak mudah. Hasil kajian ini menunjukkan bahawa sikap mempunyai tahap tertinggi diikuti dengan tanggapan kebergunaan dan tanggapan mudah guna. Di samping itu, tanggapan kebergunaan menunjukkan kekuatan hubungan tertinggi, diikuti, sikap dan tanggapan mudah guna. Oleh itu, kajian ini menunjukkan bahawa tanggapan kebergunaan merupakan faktor utama penerimaan teknologi pembiakan maju di kalangan penternak ruminan di Kelantan, diikuti dengan sikap dan tanggapan mudah guna.

Kata kunci: penternak ruminan, penerimaan, teknologi pembiakan maju

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ART	Assisted reproductive technologies
DVS	Department of Veterinary Services
AI	Artificial Insemination
MOET	Multiple Ovulation and Embryo Transfer
IVEP	*In Vitro* Embryo Production
SCNT	Somatic Cell Nuclear Transfer
MT	Metric Ton
%	Percentage

CHAPTER 1

INTRODUCTION

1.1 Research Background

Meat plays a crucial component in many parts of the world as it makes up a considerable portion of a typical diet, mainly due its abundance of nutrients such as protein, minerals, vitamins and fats, all of it needed to ensure a person's wellbeing. Hence, the reason why the livestock industry plays an important role for the Malaysian population. Despite the production of poultry, swine and eggs exceeding the local demand, enabling exportation to other countries, the production of ruminant products are still inadequate to satisfy the demand of Malaysians. An example, the production and demand respectively for beef are 51,000 metric ton (MT) and 201,000 MT in 2013 and for mutton, the demand was around 28,000 MT, while the production was a mere 4,000 MT in the same year (Fadhilah, 2015). A clear existence of the demand and production gap in the ruminant industry.

As years pass by, the increase of population and consumption per capita will also cause the increase of demand for beef. Consumption is expected to increase from 1.4 million MT in 2010 to 1.8 million MT in 2020 with a growth of 2.4% per annum (Fadhilah, 2015).

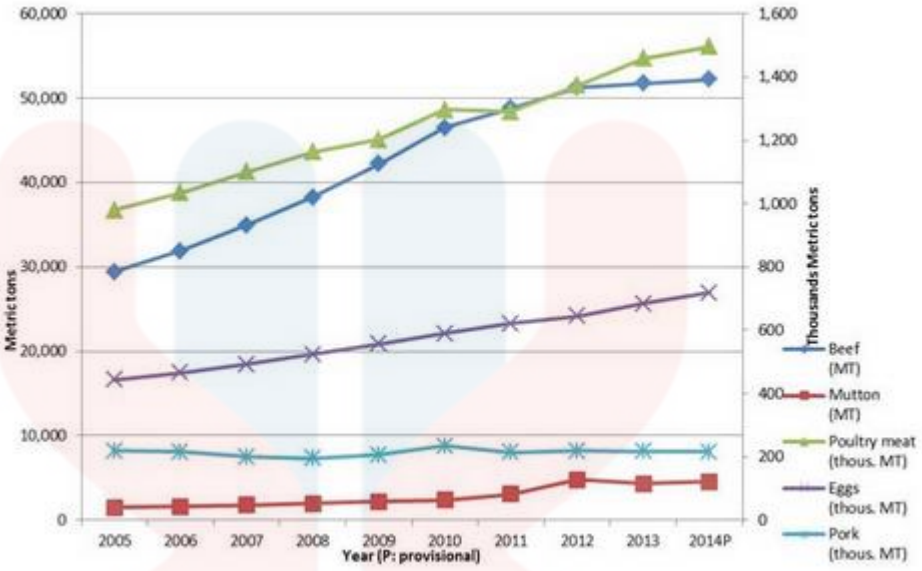

Figure 1.1: Trends of livestock product output in Malaysia

Source: Department of Veterinary Services

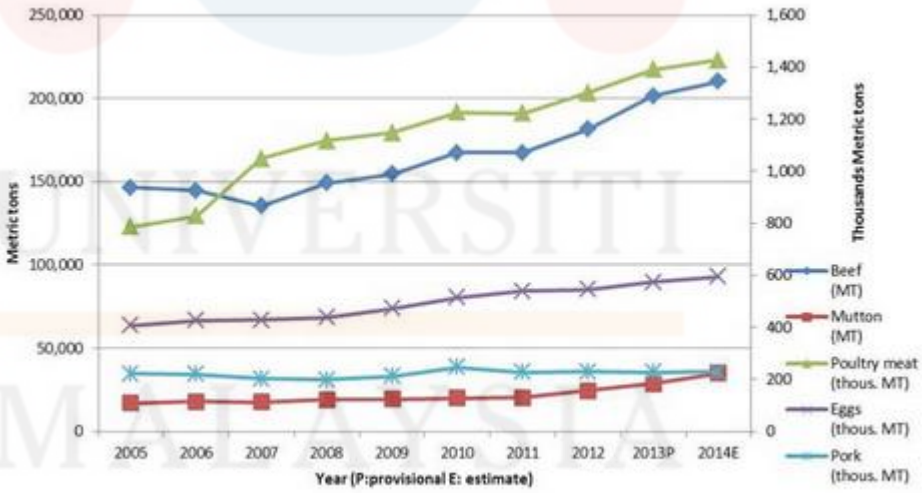

Figure 1.2: Trends of livestock consumption in Malaysia

Source: Department of Veterinary Services

The government has come out with initiatives and efforts in order to further increase the production in the ruminant subsector. Based on the Third National Agriculture Policy (1984-2010) and National Agro-Food Policy (2011-2020), the aim is to increase the efficiency of the ruminants industry through effective breeding services (Amna A'liah & Hifzan, 2015). Department of Veterinary Services also created Malaysian Livestock Breeding Policy 2013 in order to produce quality livestock products through sound genetic principles and practices that satisfies the need for economic and sustainable livestock industry, and fulfill the market requirements through Advanced Reproduction Technology (ART) (Department of Veterinary Services, 2013). There are a few technologies introduced namely; Artificial Insemination (AI), Multiple Ovulation and Embryo Transfer (MOET), *In Vitro* Embryo Production (IVEP) and Somatic Cell Nuclear Transfer (SCNT).

1.2 Problem Statement

Year after year, the demand for livestock products continues to grow following the increase in Malaysian population. Henceforth, consumption of livestock products is expected to increase from 1.4 million metric ton (MT) in 2010 to 1.8 million MT in 2020 with a growth of 2.4% per annum (Fadhilah, 2015). As a result, the demand for ruminant products, both dairy and meat will also incline. One of the reason for the low self-sufficiency level is because local Malaysian cattle, the Kedah-Kelantan accounts for the majority total number of beef cattle in Malaysia are a smaller breed of cattle and has a sluggish growth rate, thus reflects on the production of meat and milk (Abdulla et al., 2016). A measure to counter this problem, the Department of Veterinary Services (DVS) has imported exotic breeds for use as purebreds and for crossbreeding to genetically modify and improve the performance of the local breeds (Department of Veterinary Services, 2013). Not only that, different assisted reproductive technologies (ART) was also adopted. Even with multiple

efforts and initiatives done by the government, and the introduction of various breeding technology by the DVS, ruminant subsector has failed to achieve similar status as the poultry subsector and has also failed to capture the commercial market (Fadhilah, 2015). According to a study by Noraida et al., (2014) many farmers are still using natural breeding methods for their animals. After the introduction of ART, it has been gaining popularity. However, one of the issues stated in the Malaysian Livestock Breeding Policy 2013 is that the uptake and utilization of breeding policy is moving at a slow pace. Hence, the acceptance towards ART should be investigated to enable the researcher to identify the acceptance of ruminant farmers in Kelantan towards ART. ART is the solution to increase the productivity of the ruminant subsector in Malaysia as stated in the Malaysian Livestock Breeding Policy 2013.

1.3 Research Questions

1.3.1 What is the level of technology acceptance among ruminant farmers in Kelantan?

1.3.2 Does the level of perceived usefulness, perceived ease of use and attitude influence the acceptance of ART among ruminant farmers in Kelantan?

1.3.3 Does perceived usefulness, perceived ease of use and attitude have relationship towards acceptance of ART among ruminant farmers in Kelantan?

1.4 Objectives

1.4.1 To examine the level of technology acceptance among ruminant farmers on ART.

1.4.2 To examine the level of perceived ease of use, perceived usefulness and attitude among ruminant farmers in Kelantan.

1.4.3 To identify the relationship between perceived ease of use, perceived usefulness and attitude towards acceptance of ART among ruminant farmers in Kelantan.

1.5 Scope of study

The focus of this study is to determine the acceptance level of ART among ruminant farmers and producers in selected districts of Kelantan, Malaysia. The study is done by distributing questionnaire forms to the local farmers and the result will then be analyze, interpreted and finally presented.

1.6 Significance of Study

The aim of this study is to determine the acceptance of ART towards ruminant farmers in Kelantan through distribution of questionnaires. This research could help the ruminant farmers to understand the importance and benefits of assisted reproductive technologies (ART). Not only that, it also help these farmers to better comprehend the theory and practical behind the process of ART on their farm animals. From the data collected, the researcher would obtain the level of acceptance of ART among ruminant farmers in Kelantan. Hence, it will help extension agents in the future to come up with modules and workshops to educate these farmers to accept ART as part of the operation practiced in their farms. This would help in achieving the government agenda to reduce the imports of beef and milk and at the same time increase the local production of these products.

1.7 Limitation of Study

The purpose of this study is to examine the different factors that influences the acceptance of ART among ruminant farmers in Kelantan. However, because of the huge size of the state of Kelantan, only two different districts, Bachok and Jeli was chosen as

the area of data collection. The reason is because of time, manpower and resource constraints, this research was unable to be conducted throughout the whole state of Kelantan. In order to obtain a better finding in the future, it is advisable to diversify the population and sample by hiring more interviewers.

1.8 Operational Definitions

1. Assisted reproductive technologies

   In ruminants, the definition of assisted reproductive technologies is the manipulation of reproductive related procedures that is done with the final goal of achieving pregnancy with a healthy offspring in animals.

2. Ruminant farmers

   Refers to the people that rears herbivorous domestic animals that is categorized based on its eating behaviour of regurgitating curd and having four compartments of the stomach namely rumen, reticulum, omasum and abomasum.

3. Perceived usefulness

   A system that when used by an individual is believed to bring a positive gain as a result. For this study, the positive gain mentioned can either be an increase in profit or profits to the individual towards the ruminant farmer's farm.

4. Perceived ease of use

   The belief of an individual that a system when used would require least to no effort to understand, practice and become skillful.

5. Attitude

Generally, the word attitude can be define as the likeness of an individual towards using a specific system. This likeness can either be positively or negatively evaluated based on the farmer's perception towards it.

6. Acceptance

The inclination of an individual in taking or receiving a new technology and using it as a part of the operations being practiced by these ruminant farmers.

CHAPTER 2

LITERATURE REVIEW

2.1 Livestock Industry in Malaysia

Through observation, a clear disjunction can be seen for both the poultry and ruminant subsector of the Department of Agriculture. In 2013, livestock industry contributed 11.7% to the national agricultural GDP in Malaysia and from that percentage, the poultry sub-sector monopolizes the livestock GDP at 62.4% while the ruminant subsector being the least contributor at 12% (Fadhilah, 2015). Throughout the years, growth of the ruminant subsector has been moving rapidly due to multiple initiatives and efforts from the government. However, demand for ruminant products exceeds the production of the local producers and due to that the self-sufficiency level is still low. Moreover, the subsector are still in small-scale and majority of the production are by small-holder farmers, rearing one to 5 head of cattle on farms of less than two hectare in size in many villages in Kelantan, Terengganu, Pahang, Kedah and Johor and as consequence 60% to 70% farmers still maintains the usage of traditional farming method, using natural mating (Tey et al., 2008). Not only that, the reason why the ruminant subsector has yet to fulfill the demand of locals is due to the cattle and goats being petite in size, generating both low quality and quantity of meat and milk, thus affecting its production. Because small holder farmers still uses natural mating as means of reproduction, improvements genetically cannot be made to local Malaysian breeds such as Kedah-Kelantan cattle. A study by Tey (2008) concluded that Malaysian, especially from the lower income family prefer quantity over quality of beef, showing an importance of increasing the amount of meat that can be obtained via singular cattle or goat. According to Ariff et al. (2015), smallholders has vast potential for further

improvement especially in the breed improvement, increasing the efficiency of beef production.

2.2 Assisted Reproductive Technologies (ART)

Artificial insemination (AI) is not a new technology and is definitely not a foreign technology to the Malaysian people as the advantages and the need to intensify artificial breeding of livestock was realized in the 1970's (Department of Veterinary Services, 2013). Without AI, widespread dissemination of semen from superior male animals at a reasonable cost would not be possible, thus limiting genetic improvements through progeny testing (Chakravarthi & Balaji, 2010). The advantages of using AI instead of natural mating enables genetically superior sires to be use widespread and allows faster and increased genetic improvement, improving herd performance and productivity (Chakravarthi & Balaji, 2010). Not forgetting, AI is a relatively inexpensive method as it requires only a number of equipment and machineries. In addition, single ejaculate of a male ruminant are able to be inseminated into a number of animals further reducing the cost (Gordon, 2004). Moreover, the application of AI is not only easy, but it is also cheap and most importantly has a high successful rate of calving (Vishwanath, 2003). Disadvantages of AI would be acquiring a high quality semen and its price, better quality equals to higher price. Next would be the calving rate that is directly affected with management skills, poor management skill would affect the AI programs.

Multiple ovulation and embryo transfer (MOET) on the other hand is a beneficial method in increasing the reproduction rate of individuals or groups of animals of desired mating. Furthermore, the income of a farm could also be increased through embryo sales. However, the high cost of MOET has prevented farmers from exploiting this method of

ART as it involves many different procedures and machineries (Gordon, 2004). To execute this procedure, it requires an adept person as the transfer technique is depended on skill together with myriad hands on experiences. According to Gordon (2004) a study of 2000 superovulated beef cows resulted to a quarter of the collected embryo failed to yield any viability, displaying the chances of a successful embryo transfer procedure. In addition, the treatment itself is not the cause of superovulating problems, but rather the nature of the animals themselves. In a 10 year research, MOET are only able to obtain amount of embryos that are significantly below average at 1.6 embryos per flush as this procedure is dependent on the respective reproductive physiology of each individual animals as well as stress during handling (Gordon, 2004).

Through *in vitro* embryo production (IVEP) technology, mass embryo can be produced from selected donors with superior traits, allowing birth of ruminant animals with enhance traits. Furthermore, cost can be saved as the sexes of the animals can be determined, preventing unwanted rearing of animals (Mutembei et al., 2016). Notwithstanding, the technology itself has its downfall, mainly the cost of using the technology. Various different items such as specific culture media and equipment are needed in order to successfully culture the embryo. Not only that, a high amount of skill is crucial when performing the procedure.

Somatic cell nuclear transfer (SCNT) allows desirable traits such affects milk production and regulates growth, which is of economic importance can be inserted into embryos directly, cloning multiple copies the newly improved transgenic goat. This method tops in efficiency in producing genetically modified farm animals (Liu et al., 2009). It is also a useful method for conserving genetic diversity as somatic cells is easily attainable and be kept for later use (Liu et al. 2009). Limitations of SCNT includes its limited success rate, resulting abnormal phenotypes in clones due to incomplete programming. Furthermore,

possibly the greatest hurdle for this technology is the ethical and practical difficulties (Liu et al., 2009).

Among all the listed ART, the cheapest and easiest technology to be implemented and taught to the farmers would be AI. Cheapest is interpreted as it requires the least amount of expensive machinery, ensuring the chances of small scale farmers in Kelantan to implement this reproductive technique in their respective farms. Furthermore, it does not require an extensive amount of procedures and method. Unlike other ART, this method is also one of the easiest method to master and execute. Moreover, countries such as France and United States of America (USA), implements this method of reproduction commercially, integrating it into their routine management of the exploitation (Arredondo et al., 2015). Comparing with USA, introduction of AI technology to the public was done at 1970, the same period as Malaysia, however, by the end of 1990, a survey done depicts over 90% of the animals were mated through AI by the Americans (Safranski, 2016). However, up to this day Malaysian farmers are still loyal to their old ways. Seeing how other countries have already applied and advanced further in AI technology, it is time for Malaysian farmers, realize its advantages, in hopes for higher, much more quality meat production.

2.3 Technology Acceptance Model

There are many variables that can affect the acceptance of a new technology, thus comes different types of model theory to measure key determinants of user acceptance, namely, Theory of Planned Behavior (TPB), Theory of Reasoned Action (TRA) and many more. Out of various research models, Theory of Acceptance Models (TAM) by is one of the most popular research models to predict use and acceptance of technology by

individual users (Surendran, 2012). The model investigates the causes for people's acceptance or rejection towards a new technology based on external factors and how it affects perceived usefulness and perceived ease of use. In a study by Bradley (2009), suggested the implementation of combination of TAM with other research model theory as it is expected to produce a more valuable research. On the contrary, attempts by multiple researchers to expand TAM has only created confusion (Benbasat & Barki, 2007). The general determinants of TAM of individual technology acceptance can be and has been applied to explain or predict individual behaviours of multitude amount of people. In addition, TAM provides a quick and inexpensive way of gathering generation information of individual's perception of technology as it is easily applicable compared to other model theory (Samaradiwakara & Gunawardena, 2014).

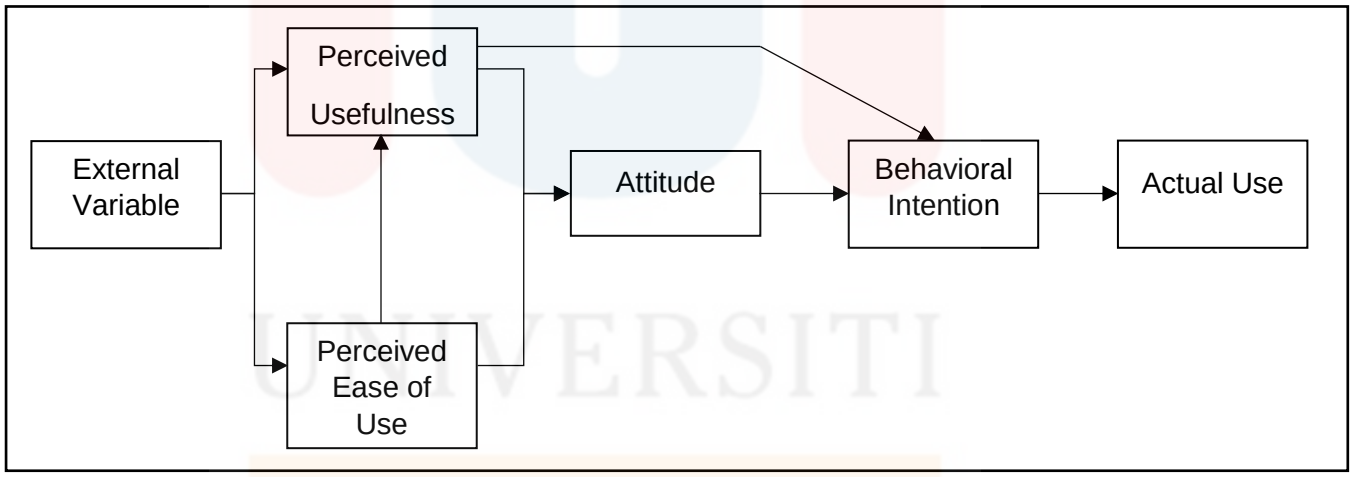

Figure 2.1: Technology Acceptance Model,

Source: Davis (1989)

2.3.1 Perceived Ease of Use

Perceived ease of use can be defined as the prospective user expectancy at a certain degree that the target system to be free of effort (Surendran, 2012). In other words, the

technology that is to be applied must not be difficult to understand, learn or operate. Not only that, it should serve as a better substitute as perceived by the consumer as compared to a previous technology or application as stated by Rogers (1983). Besides that, less complex technologies which are perceived to be easier to use has a higher percentage of being used and accepted (Agarwal et al., 1999).

2.3.2 Perceived Usefulness

According to Davis (1989), perceived usefulness is define as the belief of an application which improves the performance of a particular task affects the tendency of usage of such application. Perceived usefulness influence directly the user's attitude toward using the new technology which leads to behavioral intention and actual use (Surendran, 2012). Usefulness and usage has a strong link between each other as adoption of a technology is driven on its functionality and benefits. A study by Zeinab et al., (2016) further proves this point in her study among rural Malaysian communities whereby a positive attitude is likely to be developed towards the use of a technology when the technology is perceived to provide enhancement to one's productivity. Perceived usefulness should not be ignored for those that attempts to design or implement successful systems as it has a strong correlation with the user's acceptance (Davis et al., 1989)

2.3.3 Attitude

Positive or negative evaluation of an individual of performing a certain behavior is the definition of attitude towards a behavior (Kim et al., 2009). The adoption and continuous use of a technology depends on the user, a stronger favourable attitude towards a technology would equal to a higher chance of adopting it and for a person who weakly holds a favourable attitude would be less likely to adopt the said technology (Kim et al., 2009). Studies from different researchers such as Davis et al. (1989) describes that attitude serves at best a partial mediator as a partial and vague construct. However, this

was proven false in Yang & Yoo (2004) where he argues attitude can be used as a tool to improve user's acceptance of new technology as it is a malleable factor that can be influenced through motivations, capability, experiences and education. In addition, attitude plays a direct effect towards perceived usefulness, perceived ease of use on behavioral intention for cases of strong attitude group (Kim et al., 2009).

CHAPTER 3

METHODOLOGY

3.1 Research Design

The acceptance of assisted reproductive technologies (ART) among ruminant farmers in Kelantan is the aim that is to be identified in this study. The acceptance of ART among ruminant farmers in Kelantan is the dependent variable in this research survey while the independent variables are attitude, perceived ease of use and perceived usefulness. This study applies a quantitative research design. The data that was collected were then analyzed using SPSS software to determine the demographic profile together with both independent and dependent variables.

3.2 Research Framework

The Technology Acceptance Mode has been applied for this research study with one dependent variable and three independent variables.

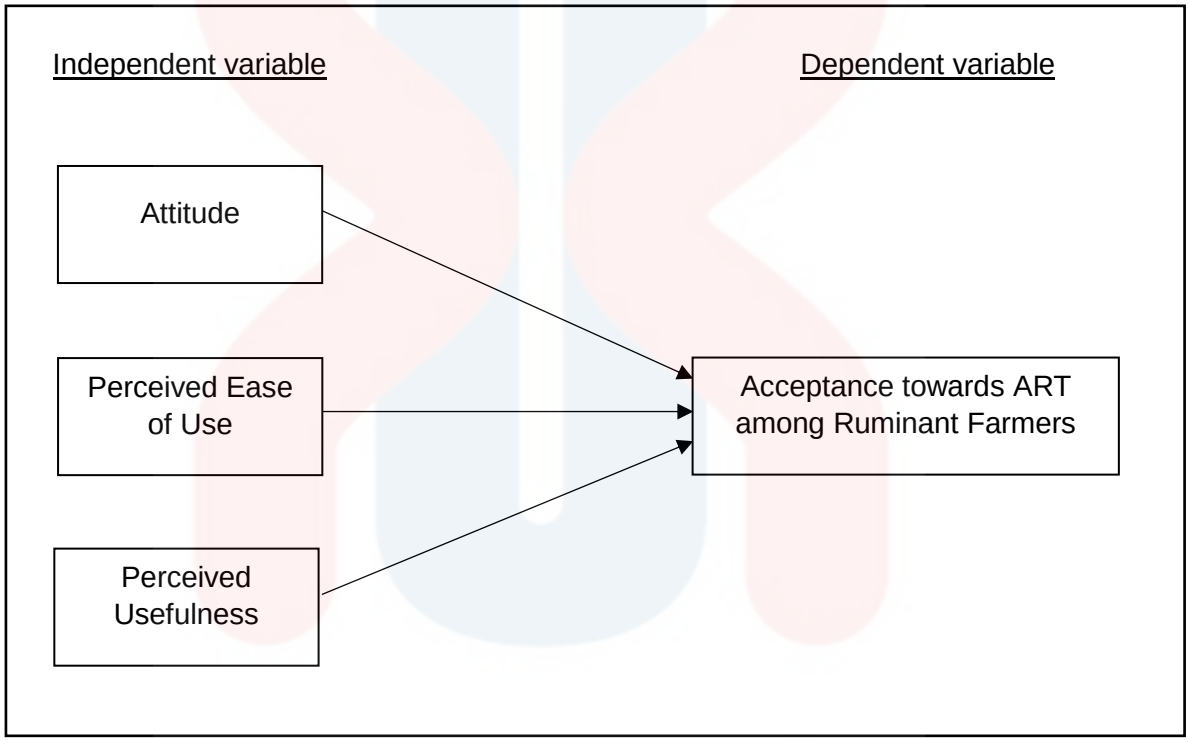

Figure 3.1: The dependent and independent variables used in this study

3.3 Research Hypotheses

Hypotheses for this study are:

H1: There is significant relationship between perceived usefulness and the acceptance of ART among ruminant farmers in Kelantan.

H2: There is significant relationship between perceived ease of use towards the acceptance of ART among ruminant farmers in Kelantan.

H3: There is significant relationship between attitude and the acceptance of ART among ruminant farmers in Kelantan.

3.4 Instrumentation

The questionnaire had been divided into five different parts consists of Part A (socio-demographic), followed with the dependent variable in Part B (acceptance of ART). Meanwhile, Part C (perceived usefulness), Part D (perceived ease of use) and Part E (attitude) contains items for independent variables. Finally, additional information in Part F inquired with questions relating to farmer's relationships with government bodies and their personal opinions in regards of ART. All items had been measured by using a Likert scale ranging from 1 (Strongly Disagree), 2 (Disagree), 3 (Average), 4 (Agree) and 5 (Strongly Agree). The data that has been successfully collected were then analyzed using SPSS.

Part A: Socio-demographic profile

Questions pertaining to demographic information were asked in this part, it included the respondent's age, gender, level of education, years of business and level of income in order to identify their background.

Part B: Acceptance of ART among ruminant farmers

Acceptance of ART is the dependent variable for this study and it measures among the ruminant (cattle, goats and sheep) farmers throughout Bachok and Jeli area. Altogether, there are two different parts, acceptance and benefits of ART and each of

these parts consists of 14 different questions. The respondents are required to answer the question given using the Likert scale ranges from 1 (Strongly Disagree), 2 (Disagree), 3 (Average), 4 (Agree) and 5 (Strongly Agree). Each items were modified by the researcher to ensure relevancy to the context of the study. In addition, the items of this section were also referred from the previous study by Agarwal (1999).

Part C: Perceived usefulness

Perceived usefulness was one of the independent variables for this study and is it contains five items. Similar to the Part B above, Likert scale has been used to measure the items ranging from 1 (Strongly Disagree), 2 (Disagree), 3 (Average), 4 (Agree) and 5 (Strongly Agree). Each items had been restructured from the previous study conducted by Davis (1989).

Part D: Perceived ease of use

There are five items in this part of the questionnaire and the respondents were required to answer the given items by using Likert scale ranging from 1 (Strongly Disagree), 2 (Disagree), 3 (Average), 4 (Agree) and 5 (Strongly Agree). In this section, the items were modified as well in order to maintain relevancy and scope of this study. Furthermore, previous study by Davis (1989) were referred before restructuring the items in this section. Primarily, the items in this part of the questionnaire were examined to determine the respondent's view on ART and the difficulty in conducting this kind technology.

Part E: Attitude

All six items in Part E were used to measure the attitude of the ruminant farmers towards ART by using a Likert scale ranging from 1 (Strongly Disagree), 2 (Disagree), 3 (Average), 4 (Agree) and 5 (Strongly Agree). Besides that, previous study conducted by Kim et al., (2009) were referred to for the items in the attitude part of this study.

3.5 Population and Sample

The survey is going to be conducted on two different districts of Kelantan, namely, Bachok and Jeli.

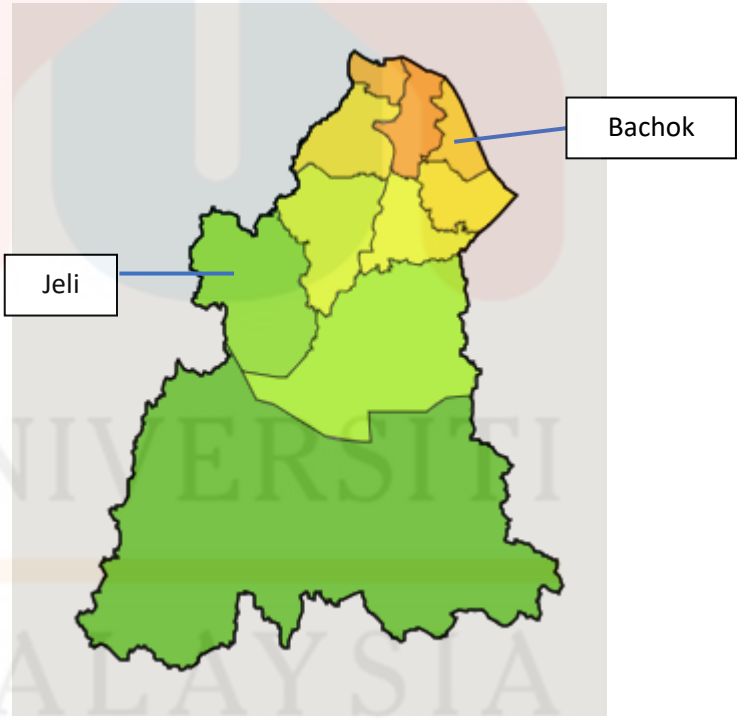

Figure 3.2: Map of Kelantan

Since there are various livestock farmers available in Kelantan, only ruminant (cattle, goat and sheep) farmers and suppliers in the Bachok and Jeli area were chosen as respondents for this study. From the list of ruminant farmers obtained from the

headquarters of the Department of Veterinary Services of Kelantan, there are altogether, 787 number of farmers that rears cattle, sheep and goats. Roscoe (1975), proposed a Rule of Thumb, stating rules for appropriate sampling which is statistical analyses with less than ten samples is not recommended and should be between 30 to 500 respondents. The reasons for the number above is due to time constrains, lack of manpower, shortage of fund, thus, a larger number of respondents could not be chosen.

3.5.1 Sampling Size and Procedure

The process of selecting a sufficient number of elements from the population in order to conduct is the definition of sampling. The gathered information from the survey is then used by the researcher, within limits of random error, to generalize findings from a drawn sample back to a population. The reason for such method being conducted is because collecting data from or examining every element is impractical as it requires a high amount of resources such as costs, time and human resources. It is essential for the researcher to determine the sample size and at the same time dealing with nonresponse bias. According to Bartlet et al. (2001) the quality and accuracy of a research is influenced when the sample size is inappropriate, inadequate or excessive. Based on Roscoe (1975) Rule of Thumb, sample size lesser than ten is not recommended, the appropriate amount of sample size must be more than 30 samples but less than 500 samples.

For this the study, the researcher employed probability sampling as the selection of respondents. The specific method of sampling used is simple random sampling without replacement where equal chance of every population to be selected can be provided through a one-step selection method. Because of the method used, the samples that has been employed can only be used once, thus, making the respondents from the pilot test before are unusable in the actual data collection.

About 106 questionnaires were distributed to Kelantan ruminant farmers in Jeli and Bachok district. Out of the 106 questionnaires, 19 were discarded due to incomplete responses. The reason this study was conducted towards Kelantan ruminant farmers is because of the slow uptake and utilization of assisted reproductive technologies among Malaysian farmers despite the introduction of different policies assisting these people (Department of Veterinary Services, 2013). Besides that, a study by Noraida et al. (2014), states that there are many farmers that are still using natural breeding methods for their animals in their farms.

For the data collection, it was conducted through a combination of methods of approaching the respondents, firstly via personal interviews, guiding the respondents throughout the whole survey, in order to retrieve a valid result. Furthermore, according to Glasgow (2005), direct interaction interview could capture additional insight from gestures and body language, thus could open up to new possibilities of variables. Through this method also, the response rate can be increased by the interviewer as respondents can stimulate the interests of the person being interviewed in taking the survey and at the same time reassuring the respondent of any concerns such as confidentiality issues (Statistics Canada, 2010). The second method of data collection is via computer assisted self-interviews where the respondents use a computer to answer the questionnaires via the internet. The reason for selection of method is to expand the parameters and to gain a more variety of respondents. In addition, it is to provide the respondents with flexibility and convenience enabling them to answer the questions during their free time without any distractions (Statistics Canada, 2010).

3.6 Data Preparation

3.6.1 Pilot Study

Before the study was conducted, a pilot test or preliminary study was conducted on 10 ruminant farmers that came over to Universiti Malaysia Kelantan Kampus Jeli for an artificial insemination seminar. Once the information was gathered through the distribution of questionnaires, the researcher then tested the reliability of each items to obtain Cronbach's alpha value. Meanwhile, the respondents that had taken part in the pilot test are disallowed from being the respondents for the actual data collection.

3.6.2 Reliability of Instrument

After the successful distribution of ten questionnaires for the pilot study, feasibility and reliability of the questionnaires were determined by examining each of the items using the reliability test to acquire Cronbach's alpha value. According to Sekaran (2003), it is better when the reliability coefficient gets closer to 1.0, however, the minimum value must be at least 0.60 to 0.70.

The value of Cronbach's alpha for dependent variable is 0.474 at first. On the other hand, for independent variables which are the perceived usefulness, perceived ease of use and attitude, the values are 0.840, 0.943 and 0.717 respectively. Ensuring reliability and for the questionnaire can be applied for the actual data collection, one item of the dependent variable was omitted in order to obtain a higher Cronbach's alpha at 0.645.

Table 3.1: Reliability coefficient of the research instruments before being omitted

Construct	Number of Item	Alpha (n=10)
Acceptance	8	0.474
Perceived Usefulness	5	0.840
Perceived Ease of Use	6	0.943
Attitude	5	0.717

Table 3.2: Reliability coefficient of the research instruments after being omitted

Construct	Number of Item	Alpha (n=10)
Acceptance	7	0.645
Perceived Usefulness	5	0.840
Perceived Ease of Use	6	0.943
Attitude	5	0.717

3.7 Data Analysis

The data that were collected was then analyzed using SPSS software. Descriptive and correlation analysis was employed to answer all the objectives of the research.

3.7.1 Descriptive Analysis

Frequency, percentage, mean together with standard deviation are the elements in the descriptive statistics that was exerted to clarify the demographic of the respondents. Moreover, with descriptive analysis, level of each variable was measured respectively.

Table 3.3: Interpretation of mean score

Mean score interpretation	Mean score
Low	1 to 2.33
Moderate	2.34 to 3.66
High	3.67 to 5

Table 3.2 depicts the interpretation of mean score. This was achieved by taking the value of response from the questionnaire and was then divided into three levels which are low, moderate and high with values of 1 to 2.33, 2.34 to 3.66 and 3.67 to 5 respectively.

3.7.2 Correlation Analysis

In order to determine the relationship between the dependent and independent variables, the researcher employed the correlation coefficient to examine the magnitude of relation of the variables. The unit for Pearson's Correlation Coefficient is *r* and it varies from 0 to 1. It can either have a positive or a negative value and as the relationship of two variables becomes stronger as it becomes closer to 1. Thus, Guildford Rule of Thumb has been employed to measure the strength of relationship of this study.

Table 3.4: Strength of correlations

Pearson coefficient (*r*)	Strength of relationship
<0.2	Negligible relationship
0.2-0.4	Low relationship
0.4-0.7	Moderate relationship
0.7-0.9	High relationship
>0.9	Very high relationship

Based on Table 3.3, the *r* value determines the strength of relationship between variables. The strength of relationship is assumed negligible when the value of *r* is lesser than 0.2 and is directly proportional as the *r* value increases. For instance, when the value of *r* is 0.2 to 0.4, 0.4 to 0.7, 0.7 to 0.9 and greater than 0.9, the strength of relationships can be measured as low, moderate, high and very high relationship respectively.

CHAPTER 4

RESULTS AND DISCUSSION

4.1 Reliability Coefficient

A total 106 questionnaires were distributed and collected but only 87 questionnaires were accepted and the other 19 questionnaire were deemed unusable, hence, were rejected. The collected data were then analyzed using the SPSS analysis. Afterwards, the reliability test was conducted and the Cronbach's alpha value was collected and it was found that the value was above 0.6 for every single factor both dependent and independent variables. The value of Cronbach's alpha are 0.743, 0.895, 0.901 and 0.890 for acceptance, perceived usefulness (PU), perceived ease of use (PEoU) and attitude respectively. The best situation is when the reliability coefficient is as close as possible to 1.0, however, the value must be at minimum 0.6 (Sekaran, 2003). This statement is further strengthen by Manerikar & Manerikar (2015), Cronbach's alpha of minimum 0.6 is in the acceptable internal consistency range. Based on table 4.1, each and every item was found to be reliable.

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Table 4.1: Reliability coefficient of the research instruments

Construct	Number of Item	Alpha (n=10)
Acceptance	7	0.743
Perceived Usefulness	5	0.859
Perceived Ease of Use	6	0.901
Attitude	5	0.890

4.2 Normality Test

It is common in a scientific literature to have an error especially statistical procedures that falls under parametric tests. This is based on the assumption that the sample populations that was taken from are normally distributed. The assumption of normality is a critical matter as drawing accurate and reliable conclusions about reality would be made impossible if the data does not have a normal bell-shaped curve. For this study, the Kolmogorov-Smirnov (K-S) together with Shapiro-Wilk test were employed to identify the normality of the data collected. It is when the probabilities are greater than 0.05 that the data of the relative study is normally distributed (Ghasemi & Zahediasl, 2012). Table 4.2 depicts that the probabilities for K-S and Shapiro-Wilk tests are 0.20 and 0.18 respectively which are greater than 0.05 indicating that the data collected for this study are normally distributed.

Table 4.2: Test of Normality

Normality Test	p
Kolmogorov-Smirnov test	0.20
Shapiro-Wilk test	0.18

4.3 Demographic Profile of the Respondents

The demographic profile of the respondents were explained through the application of descriptive analysis like frequency, percentage, mean and standard deviation. The age of ruminant farmers in this study ranged from 16 to 75 with mean score 41.3 and standard deviation of 14.1. The findings of the present study indicated that the majority of the ruminant farmers here in Kelantan are male, range of age from 31 to 40 and has the highest education of SPM at 27.6%, 93.1% and 31.0% respectively. One of the plausible explanation for these findings is the influence of age that affects the acceptance of ART,

and younger farmers are more likely to accept and utilize a new technology. In addition, age is one of the factors that influences the use of ART as found in a research by Tambi et al., (1999), producers within the age group of below 50 has a positive and significant relationship with the demand of ART. Besides that, education is also a factor that influences the acceptance of ART among farmers. The positive relationship between level of education and use of assisted reproductive technologies (ART) is supported by Murage et al. (2014), farmers are likely to use ART services as they are better informed with the advantages of ART such as increase in performance of their animal as their level of education increases. The increase of likelihood of using ART is a result of the improvement of education level of ruminant farmers (Tambi et al., 1999).

Other than that, from the total respondents interviewed provide evidence that the large sum of year of business of the ruminant farmers are at 73.6% ranging from 1 to 10 years and an annual income between RM 1,001 to RM10,000 at 50.6% with an average of RM 6050.57. Based on the results, other factors that influences a farmer to use ART services is the income of that particular company. The demand of ART increases in likelihood to the increase of annual income of the producer (Tambi et al., 1999). This is because with higher income, these farmers are more financially able to use ART (Gros, 1994). However, the findings in this study also shows that quite the sum of farmers with experiences of around one to two years are without any income and this is due to the fact a cattle requires around two years in order to reach the marketable age (Tatum, 2001). These farmers searches for income through other farming activities such as rubber tapping for example. Other than that, years of business experiences also affects the acceptance of new technologies, the longer the business experience, the more likely farmers would accept ART as part of their farming activities (Sapkota et al., 2016). This is due to the realization of importance of ART and the benefits that it brings for a farm.

Table 4.3: Frequency Distribution of Demographic Profile among Respondents

Variables	Frequency	Percentage	Mean	SD
Age			41.3	14.1
≤20	5	5.7		
21-30	16	18.4		
31-40	24	27.6		
41-50	19	21.8		
51-60	14	16.1		
≥60	9	10.3		
Gender				
Male	81	93.1		
Female	6	6.9		
Education Level				
UPSR	9	10.3		
SRP/PMR	14	16.1		
SPM	27	31.0		
STPM/Diploma	10	11.5		
Degree	22	25.3		
Others	5	5.7		
Years of Business			8.6	9.4
1-10	64	73.6		
11-20	16	18.4		
21-30	4	4.6		
31-40	2	2.3		
41-50	1	1		
Annual Income (RM)			6050.5	7070.5
0	17	19.5		
≤1000	10	11.5		
1001-10000	44	50.6		
10001-20000	13	14.9		
20001-30000	3	3.4		

4.4 Constructs of the Study

In this study, three things were highlighted by the researcher where each single item in the instrument together with the level of each construct were examined. This is done by calculating the cumulative mean score from each construct and from there the overall level for could be accessed. The cumulative mean score was categorized into three categories, low (1-2.33), moderate (2.34-3.66) and high (3.67-5). Besides that, correlation analysis were also adapted onto the dependent and independent variables to answer the

analyze the third objective of this study which is the relationship between perceived usefulness, perceived ease of use and attitude of this study together with the employment of Technology Acceptance Model in order to determine the acceptance of ART among ruminant farmers in Kelantan.

4.4.1 Acceptance of Assisted reproductive technologies

Based on the table, on a five point Likert scale, 25.3% respondents agreed that they do not know about assisted reproductive technologies (ART). In addition, majority of the respondents, at 46.0% believes that performing ART onto their animals is a difficult task and they are unable to perform it on their own without the help of a skillful person such as a veterinarian. However, at 36.8%, respondents have taken their time to take notice of new ART besides artificial insemination (AI), such as somatic cell nuclear transfer (SCNT) and many other procedures. On the other hand, 34.5% of the ruminant farmers in Kelantan strongly agrees that there is no importance of ART onto their own company. In addition, 46.0% of the respondents thinks that there is no importance to use ART onto their farm animals. The respondents partially agrees at 28.7%, that the cost to use ART is expensive. For the last item in this section, ruminant farmers that were interviewed said that the importance of ART was not exposed to them by anyone.

Table 4.4: Percentage Distribution of Respondents by Items for Acceptance on ART (n=87)

Items	1	2	3	4	5
I do not know about ART	16.1(14)	23.0(20)	21.8(19)	25.3(22)	13.8(12)
I believe ART is difficult	2.3(2)	10.3(9)	20.7(18)	46.0(40)	20.7(18)
I do not have time to take notice of new ART	11.5(10)	36.8(32)	12.6(11)	18.4(16)	20.7(18)
I think ART has no importance to my company	5.7(5)	17.2(15)	10.3(9)	32.2(28)	34.5(30)
I think there is no importance to use ART	5.7(5)	11.5(10)	6.9(6)	29.9(26)	46.0(40)
I think the cost to use ART is expensive	24.1(21)	21.8(19)	28.7(25)	18.4(16)	6.9(6)
I was not exposed to the importance of ART	12.6(11)	35.6(31)	13.8(12)	29.9(26)	8.0(7)

The results from Table 4.2 shows that the mean score for the dependent variable was 2.73 which places it in the moderate range. 51.7% of the respondents were accepting the introduction of ART onto their farms and their companies. The acceptance of technology involves multiple different factors such as attitude, perceptions and so on and is a multi-dimensional event (Rezaei & Bagheri, 2011). In addition, professionals are claiming that the importance of different ART, especially artificial insemination are emerging (Rathod et al., 2016).

Table 4.5: The level of Acceptance of ART

Level	Frequency	Percent	Mean	SD
			2.73	0.75
Low (1-2.33)	13	33.3		
Moderate (2.34-3.66)	45	51.7		
High(3.67-5)	29	14.9		

4.4.2 Perceived Usefulness

In this study, majority of the respondent, at 46.0% agreed that with the help of ART, the farmers are able to plan the reproduction and rearing process of the animals. At the same time, the interviewed farmers, at 44.8% agreed that they are confident, with the use of ART, it will increase the performance of their animals. Furthermore, the respondents at 48.3% agrees that they believe by using ART, their total income as well as the output of their company will increase. Majority, at 43.7%, agreed that they believe ART makes reproduction and rearing process easier. Last but not least, more than half of the respondents, 55.2% strongly agreed that ART is very useful.

Table 4.6: Percentage Distribution of Respondents by items of Perceived Usefulness (n=87)

Item	1	2	3	4	5
I am confident I can plan the reproduction and rearing process with the use of ART	0	10.3(9)	10.3(9)	46.0(40)	33.3(29)
I am confident ART will increase the performance of my animals	2.3(2)	3.4(3)	11.5(10)	44.8(39)	37.9(33)
I believe total income and output will increase with the use of ART	1.1(1)	1.1(1)	8.0(7)	48.3(42)	41.4(36)
I believe ART makes reproduction and rearing process easier	1.1(1)	9.2(8)	10.3(9)	43.7(38)	35.6(31)
I think ART is very useful	2.3(2)	1.1(1)	6.9(6)	34.5(30)	55.2(48)

The result of this study highlights ART is perceived as a useful technology by the ruminant farmers in Kelantan and is placed highest among the rest of the independent variables at 85.1%. Moreover, the level of ART being perceived useful is also in the range of high as the mean score of this independent variable is at 4.17 with the standard deviation at approximately 0.72. Based on this, perceived usefulness affects the acceptance of ART and this is supported by Meena et al. (2013). This is because farmers

has a higher tendency to accept a technology based on the needs, in this case, usefulness to increase production as well as profits (Flett et al., 2004).

Table 4.7: The Level of Perceived Usefulness

Level	Frequency	Percent	Mean	SD
			4.17	0.72
Low (1-2.33)	3	3.4		
Moderate (2.34-3.66)	10	11.5		
High(3.67-5)	74	85.1		

4.4.3 Perceived Ease of Use

Findings in this study shows that at 42.5%, the respondents agreed that they think the process behind ART is easy to understand. Moreover, this study also depicts that the respondents agreed at 44.8% that they think to learn about ART is easy. The results also show that 44.8% of these ruminant farmers also agreed that in their opinion, to executing ART is relatively easy to do by themselves. These farmers also agreed that in their own opinion, to be skillful in ART is easy. Furthermore, slightly more than half of the respondents agreed, in their opinion, ART is a relatively easy to practice technology. Lastly, they also agree at 47.1% of these farmers believes that in the future, they will continue using ART onto their farm animals more often.

Table 4.8: Percentage Distribution of Respondents by items for Perceived Ease of Use (n=87)

Item	1	2	3	4	5
I think it is easy to understand the process behind ART	0	18.4(16)	23.0(20)	42.5(37)	16.1(14)
I think it is easy to learn about ART	1.1(1)	12.6(11)	23.0(20)	44.8(39)	18.4(16)
In my opinion, executing ART is easy	1.1(1)	11.5(10)	24.1(21)	44.8(39)	18.4(16)
In my opinion, it is easy to adept in ART	3.4(3)	11.5(10)	25.3(22)	42.5(37)	17.2(15)
In my opinion, ART is an easy to practice technology	2.3(2)	10.3(9)	18.4(16)	51.7(45)	17.2(15)
I believe I will continue using ART more often in the future	3.4(3)	6.9(6)	6.9(6)	47.1(41)	35.6(31)

For perceived ease of use, the mean score is categorized as high at 3.70 with a standard deviation of approximately 0.79. Meanwhile, the percentage of level of this independent variable is ranged high at 60.9%. This means that farmers are likely to accept ART as part of the operations in their farm as long as the application of the technology is simple and can be understand. Farmers believed that they can easily use ART as a method of reproducing their animals (Rezaei & Bagheri, 2011).

Table 4.9: Level of Perceived Ease of Use

Level	Frequency	Percent	Mean	SD
			3.70	0.79
Low (1-2.33)	6	6.9		
Moderate (2.34-3.66)	28	32.2		
High(3.67-5)	53	60.9		

4.4.4 Attitude

It is apparent from Table 4.8, at 46.0%, the respondents strongly agreed that when they do not use any ART, they feel left out. Additionally, 41.4% of the Kelantan ruminant farmers strongly agreed they are more confident in using ART on their farm animals. However, for the item if the farmer feels comfortable using ART compared to traditional reproduction methods, 39.1% of the respondents agreed that they do feel comfortable. Also, these farmers, strongly agreed at 44.8%, would encourage the local community be it their family, friends or acquaintances to use ART in their farm. Finally, majority of these respondents strongly agreed at 69.0%, that they need and would prioritize workshops and seminars about ART if there were one, in order to strengthen their skills and also their knowledge.

Table 4.10: Percentage Distribution of Respondents by Items for Attitude (n=87)

Item	1	2	3	4	5
I feel left out if I do not use any ART	3.4(3)	6.9(6)	10.3(9)	33.3(29)	46.0(40)
I am more confident in using ART on the animals in my farm	4.6(4)	5.7(5)	8.0(7)	40.2(35)	41.4(36)
I feel comfortable using ART compared to using traditional reproduction methods	3.4(3)	6.9(6)	14.9(13)	39.1(34)	35.6(31)
I would encourage my local community to use ART	1.1(1)	3.4(3)	6.9(6)	43.7(38)	44.8(39)
I need and prioritize workshops and seminars about ART in order to strengthen my skills and my knowledge	2.3(2)	0	4.6(4)	24.1(21)	69.0(60)

Comparing all three independent variables, attitude was placed highest as the mean score is 4.20 placing it in the high range at 82.8% as depicted in Table 4.10 with

standard deviation of approximately 0.80. The findings proved that attitude plays a role in the acceptance or rejection of a technology and this is supported by a research from Meena et al. (2013). Attitude can be influenced by factors such as knowledge enhancement as it becomes favourable as the farmer understands the process and the importance of that particular technology (Gautam et al., 2015).

Table 4.11: Level of Attitude

Level	Frequency	Percent	Mean	SD
			4.20	0.80
Low (1-2.33)	4	4.6		
Moderate (2.34-3.66)	11	12.6		
High(3.67-5)	72	82.8		

4.5 The Relationship between the Factors and the Acceptance of ART among Ruminant Farmers in Kelantan.

As Table 4.10 depicts, there is a significant relationship between the dependent and independent variables which are perceived usefulness, perceived ease of use and attitude having positive *r* value at different strengths of 0.439, 0.285 and 0.420 respectively. PU is convinced to have a moderate strength relationship with $r = 0.439$ with the acceptance of ART. This was proven by Rezaei & Bagheri (2011) where in his study depicted that a useful technology for the animal husbandry activities would be more likely to be considered to be accepted. Farmers also weighs utility value of a technology a more important factor of adoption and acceptance of ART (Flett et al., 2004). In other words, usefulness is a highly sought out factor that determines the acceptance of a new technology. From the statements above, it can be seen that Kelantan farmers understands that ART brings a myriad of benefits if employed as part of the farms' operations thus the

reason for the strong relationship between perceived usefulness and acceptance of ART. Based on the significant and positive relationship between PU and acceptance of ART among ruminant farmers in Kelantan, H1 is failed to be rejected.

On the other hand, from the representation in Table 4.10, PEOU was proven to have the lowest strength of relationship towards the acceptance of ART with r = 0.285. Farmers not only evaluate the acceptance of a technology based on its usefulness, but also consider separately for its ease of use (Flett et al., 2004). Besides that, PEOU was found to be significant for farmers using a particular technology (Flett et al., 2004). ART, particularly artificial insemination is a technology that is easy to understand hence farmers believe that they can easily use this method of reproduction (Rezaei & Bagheri, 2011). However, between PU and PEOU, PU is found to be a more dominant factor for the acceptance of a certain technology as an individual would still accept technology despite it having low values on PEOU (Mcdonald et al., 2015). Thus, H2 is failed to be rejected since there is a positive relationship between perceived ease of use and acceptance of ART among ruminant farmers.

Besides that, referring to Table 4.10, it had been convinced that attitude has a moderate relationship strength at r = 0.420 with the acceptance of ART. One of the important determinant of acceptance of a new technology is attitude. This is supported by Meena et al. (2013) and Prokopy et al. (2008) whereby an acceptance correlates significantly and positively with attitude. Furthermore, attitude is a malleable factor whereby it can be influenced externally through education as an example as quoted by Singh et al. (2009). Thus, H3 is accepted as there is significant and positive relationship between attitude and the acceptance of ART among ruminant farmers in Kelantan.

The most significant findings is the relative strength of two different independent variables which are PU and attitude its relationship with the acceptance of ART. Based on

the non-significant difference of *r* value of PU and attitude, it can be said that these two variables plays equal vital roles in the acceptance of Kelantan ruminant farmers towards ART. In this study, PU and attitude was significantly strongly linked to acceptance of ART compared to PEoU. In hindsight, the prominence of these two variables made sense conceptually. For PU, farmers are more likely to accept a new technology based on the benefits that it could bring no matter the difficulties and these Kelantan ruminant farmers understands the advantages if they were to employ ART as part of the farms' operation. On the other hand, attitude is a factor that is malleable due to it being easily influenced. These influence can come from different aspects namely experience, education, income and also social media. As a result, it creates a favourable attitude towards the acceptance of ART. As for PEoU, despite being a factor for the acceptance of a technology, it is of less importance when compared with PU and attitude. Being an easy system is not a definite factor for acceptance if it does not bring any benefits to the table. However, based on the significant result above indicates that PEoU is still a factor that can influence farmers' acceptance of a new technology. The easier it is to operate a system, more effort can be used to master it.

Table 4.12: Relationship between the Factors and the Acceptance of ART among Ruminant Farmers in Kelantan

Construct	*r*	p
Perceived Usefulness	0.439	0.00
Perceived Ease of Use	0.285	0.08
Attitude	0.420	0.00

CHAPTER 5

CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

In conclusion, each and every hypotheses of this study were well supported. Based on the results, Kelantan ruminant farmers showed acceptance of assisted reproductive technologies (ART). Furthermore, the result obtained depicts attitude to have the highest mean level, followed closely by perceived usefulness (PU) and perceived ease of use (PEoU). Besides that, all three independent variable, PU, PEoU and attitude produced a positive significant relationship with the acceptance of ART among ruminant farmers in Kelantan. Based on the findings of this study, two out of three independent variables, which are attitude and PU showed a vital role in the acceptance of a new technology by the ruminant farmers in Kelantan. The farmers understands the multiple benefits that ART brings. Not only that, the attitude towards ART is a factor that is malleable and can be influenced by external factors. As for PEoU, despite having a lower strength of relationship with the acceptance of ART when compared with attitude and PU, it still is an influential factor and should not be dismissed. The easier the system, the more likely it is to be accepted.

5.2 Recommendations

However, different methods could be taken in order to increase the acceptance of ART. Government bodies such as the Department of Veterinary Services (DVS) and Malaysian Agricultural Research and Development Institute (MARDI) should come up with

extension programmes in order to expose these farmers on the advantages of using ART as a part of their farms. These extension programmes could be done in the form of workshops and seminars, teaching the proper method of performing ART such as artificial insemination (AI). Moreover, government bodies should be working together with agricultural based universities such as Universiti Malaysia Kelantan and Universiti Putra Malaysia to create a proper teaching module as these kinds of seminars and workshops are highly requested by the ruminant farmers in Kelantan.

Other than that, there is an urgency to increase the source of semen supply of ruminants and artificial inseminator in Malaysia. At this moment, there is a shortage of semen supply and artificial inseminator in Malaysia and the only way of acquiring this services is from the DVS. The government could either increase the supply or to create opportunities in the form of incentives and funds in order to create more external producer for such services.

This study should be continued in the future in order to see changes in the acceptance of ART among ruminant farmers of not only in Kelantan but throughout the whole of Malaysia as well. The Malaysian government has comes up with policies such as the National AgriFood Policy 2011-2020 (NAP) and Transformasi Nasional 50 (TN50) to create more ruminant farmers in Malaysia thus this will increase the acceptance of ART. There are countless limitations to this study such as time constrictions, lack of manpower and also language barrier. In the future, steps could be taken in order to reduce or inhibit these limitation in order to measure the acceptance of ART among ruminant farmers in Kelantan.

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APPENDIX A

BORANG KAJI SELIDIK PENERIMAAN TEKNOLOGI PEMBIAKAN DI KALANGAN PENTERNAK RUMINAN DI SEKITAR KELANTAN

PROJEK PENYELIDIKAN TAHUN AKHIR

(MOHAMAD SHAHEEN SHARUN F14B0458)

BAHAGIAN A: PROFIL RESPONDEN

1. Nama: _____

2. Umur: _____ tahun

3. Tahap pendidikan:

☐	Sekolah rendah
☐	SRP/PMR
☐	MCE/SPM
☐	STPM/Diploma
☐	Ijazah
☐	Lain-lain

4. Pengalaman perniagaan: _____ tahun

5. Jumlah ternakan lembu/kambing semasa: _____ ekor

6. Jumlah pendapatan setahun: RM_____

ARAHAN: BAGI SOALAN-SOALAN YANG MEMPUNYAI SKALA LIKERT, SILA NYATAKAN TAHAP PERSETUJUAN ANDA TERHADAP PERNYATAAN YANG DIBERI BERDASARKAN SKALA BERIKUT:

Skala	**1**	**2**	**3**	**4**	**5**
Tahap	**Sangat tidak setuju**	**Tidak setuju**	**Sederhana setuju**	**Setuju**	**Sangat setuju**

BAHAGIAN B: PENERIMAAN TEKNOLOGI PEMBIAKAN

1. Sumber maklumat tentang teknologi diperolehi daripada:
   (*Anda boleh √ lebih daripada **SATU** pilihan*)

☐	Rakan	☐	Kursus/bengkel/seminar
☐	Media sosial (Facebook, twitter, dll)	☐	Lain-lain.
☐	Pesaing perniagaan	☐	Nyatakan:_____

2. Tahap penerimaan teknologi pembiakan:

No.	Penyataan	Skala				
1	Saya tidak begitu tahu mengenai teknologi pembiakan.	1	2	3	4	5
2	Saya beranggapan teknologi pembiakan adalah sangat merumitkan.	1	2	3	4	5
3	Saya tidak mempunyai masa untuk mengambil tahu perkembangan teknologi pembiakan yang terbaru.	1	2	3	4	5
4	Saya beranggapan teknologi pembiakan bukanlah keutamaan dalam perusahaan saya.	1	2	3	4	5
5	Saya berpendapat tiada kepentingan untuk menggunakan teknologi pembiakan.	1	2	3	4	5
6	Saya beranggapan kos untuk menggunakan teknologi pembiakan terlalu tinggi.	1	2	3	4	5
7	Saya tidak didedahkan dengan kepentingan teknologi pembiakan.	1	2	3	4	5

3. Manfaat teknologi teknologi pembiakan yang diperolehi:

No.	Penyataan	Skala				
1	Meningkatkan pendapatan	1	2	3	4	5
2	Mengurangkan kos upah pekerja	1	2	3	4	5
3	Mengurangkan kos dengan mengurangkan jumlah menternak ruminan jantan	1	2	3	4	5
4	Dapat menghindari penyakit kelamin yang berjangkit di antara ruminan	1	2	3	4	5
5	Dapat mengurangkan risiko kecederaan di antara ruminan jantan yang besar dan ruminan betina yang kecil	1	2	3	4	5
6	Proses pembiakan menjadi lebih efisien dan efektif.	1	2	3	4	5
7	Meningkatkan mutu haiwan dari segi pertambahan berat badan dan jumlah susu yang dikeluarkan.	1	2	3	4	5

BAHAGIAN C: TANGGAPAN KEBERGUNAAN TERHADAP PENGGUNAAN TEKNOLOGI PEMBIAKAN

No.	Penyataan	Skala				
1	Saya yakin dapat mengatur proses pembiakan dan penternakan dengan menggunakan teknologi pembiakan.	1	2	3	4	5
2	Saya yakin teknologi pembiakan dapat meningkatkan prestasi lembu/kambing yang ada.	1	2	3	4	5
3	Saya percaya jumlah pendapatan dan pengeluaran akan semakin bertambah dengan penggunaan teknologi pembiakan.	1	2	3	4	5
4	Saya percaya teknologi i pembiakan dapat memudahkan proses pembiakan dan penternakan ruminan	1	2	3	4	5
5	Saya beranggapan teknologi pembiakan ini sangat berguna.	1	2	3	4	5

BAHAGIAN D: TANGGAPAN MUDAH GUNA TERHADAP TEKNOLOGI PEMBIAKAN

No	Penyataan	Skala				
1	Saya beranggapan teknologi pembiakan mudah untuk difahami	1	2	3	4	5
2	Saya beranggapan teknologi teknologi pembiakan mudah untuk dipelajari	1	2	3	4	5
3	Saya berpendapat teknologi pembiakan mudah untuk dikendalikan	1	2	3	4	5
4	Saya berpendapat mudah untuk mahir dalam teknologi pembiakan.	1	2	3	4	5
5	Saya berpendapat teknologi pembiakan mudah untuk dipraktikkan.	1	2	3	4	5
6	Saya percaya bahawa saya akan menggunakan teknologi pembiakan dengan kerap di masa hadapan	1	2	3	4	5

BAHAGIAN E: SIKAP TERHADAP PENGGUNAAN TEKNOLOGI PEMBIAKAN

No	Penyataan	Skala				
1	Saya rasa ketinggalan jika tidak menggunakan mana-mana teknologi pembiakan.	1	2	3	4	5
2	Saya rasa lebih yakin apabila menggunakan teknologi pembiakan untuk membiak haiwan ruminan di perusahaan saya.	1	2	3	4	5
3	Saya rasa sangat selesa menggunakan teknologi pembiakan berbanding menggunakan proses pembiakan tradisional.	1	2	3	4	5
4	Saya akan menggalakkan komuniti setempat untuk menggunakan teknologi pembiakan.	1	2	3	4	5
5	Saya memerlukan dan mementingkan latihan dan kursus berkenaan teknologi pembiakan untuk memperkukuhkan lagi kemahiran dan ilmu yang saya ada.	1	2	3	4	5

BAHAGIAN F: LAIN-LAIN

1. Agensi yang memberi bantuan

No.	Nama Agensi	Pilih (√)	No.	Nama Agensi	Pilih (√)
1	MARDI		3	Swasta	
2	Jabatan Perkhidmatan Veterinar		4	Lain-lain Nyatakan:_____	

2. Jenis latihan/kursus yang pernah diterima daripada agensi?

No.	Jenis Latihan/Kursus	Pilih (√)
1	Kursus teknologi pembiakan	
2	Tidak pernah menerima latihan/kursus	
3	Lain-lain (Nyatakan):	

3. Bagaimana hubungan dengan agensi yang terlibat?

Biasa	Sederhana	Baik	Sangat Baik

BAHAGIAN H: LAIN-LAIN

1. Bagi pendapat saya, kelemahan teknologi secara umum adalah seperti berikut:

No	Penyataan	Skala				
1	Pengurusan kurang cekap	1	2	3	4	5
2	Tiada khidmat kepakaran	1	2	3	4	5
3	Kurang pengalaman	1	2	3	4	5

2. Sila nyatakan pandangan anda tentang kesan utama (positif & negatif) terhadap penggunaan teknologi pembiakan.

i. Positif

……
……
……
……

ii. Negatif

……
……
……
……

-TERIMA KASIH DI ATAS KERJASAMA ANDA-

APPENDIX B

Table B.1: Frequencies of the demographic profile

Umur

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	16.00	2	2.3	2.3	2.3
	18.00	3	3.4	3.4	5.7
	22.00	1	1.1	1.1	6.9
	23.00	3	3.4	3.4	10.3
	24.00	2	2.3	2.3	12.6
	25.00	1	1.1	1.1	13.8
	26.00	3	3.4	3.4	17.2
	27.00	2	2.3	2.3	19.5
	28.00	1	1.1	1.1	20.7
	29.00	3	3.4	3.4	24.1
	31.00	2	2.3	2.3	26.4
	32.00	4	4.6	4.6	31.0
	33.00	4	4.6	4.6	35.6
	35.00	2	2.3	2.3	37.9
	36.00	1	1.1	1.1	39.1
	37.00	2	2.3	2.3	41.4
	38.00	1	1.1	1.1	42.5
	39.00	4	4.6	4.6	47.1
	40.00	4	4.6	4.6	51.7
	41.00	2	2.3	2.3	54.0
	42.00	2	2.3	2.3	56.3
	43.00	2	2.3	2.3	58.6
	44.00	2	2.3	2.3	60.9
	45.00	1	1.1	1.1	62.1
	46.00	1	1.1	1.1	63.2
	47.00	2	2.3	2.3	65.5
	48.00	2	2.3	2.3	67.8
	49.00	2	2.3	2.3	70.1
	50.00	3	3.4	3.4	73.6

	51.00	2	2.3	2.3	75.9
	53.00	2	2.3	2.3	78.2
	54.00	1	1.1	1.1	79.3
	55.00	4	4.6	4.6	83.9
	56.00	1	1.1	1.1	85.1
	57.00	1	1.1	1.1	86.2
	58.00	1	1.1	1.1	87.4
	60.00	2	2.3	2.3	89.7
	61.00	2	2.3	2.3	92.0
	63.00	1	1.1	1.1	93.1
	64.00	2	2.3	2.3	95.4
	66.00	1	1.1	1.1	96.6
	71.00	1	1.1	1.1	97.7
	74.00	1	1.1	1.1	98.9
	75.00	1	1.1	1.1	100.0
	Total	87	100.0	100.0	

Jantina

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	81	93.1	93.1	93.1
	Female	6	6.9	6.9	100.0
	Total	87	100.0	100.0	

TahapPendidikan

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Sekolah Rendah	9	10.3	10.3	10.3
	SRP/PMR	14	16.1	16.1	26.4
	SPM	27	31.0	31.0	57.5
	STPM/Diploma	10	11.5	11.5	69.0
	Ijazah	22	25.3	25.3	94.3
	Lain-lain	5	5.7	5.7	100.0
	Total	87	100.0	100.0	

PengalamanPerniagaan

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	.00	2	2.3	2.3	2.3
	1.00	14	16.1	16.1	18.4
	1.50	1	1.1	1.1	19.5
	2.00	11	12.6	12.6	32.2
	3.00	8	9.2	9.2	41.4
	4.00	5	5.7	5.7	47.1
	5.00	7	8.0	8.0	55.2
	7.00	3	3.4	3.4	58.6
	8.00	5	5.7	5.7	64.4
	10.00	8	9.2	9.2	73.6
	12.00	4	4.6	4.6	78.2
	14.00	1	1.1	1.1	79.3
	15.00	3	3.4	3.4	82.8
	20.00	8	9.2	9.2	92.0
	25.00	2	2.3	2.3	94.3
	30.00	2	2.3	2.3	96.6
	33.00	1	1.1	1.1	97.7
	40.00	1	1.1	1.1	98.9
	46.00	1	1.1	1.1	100.0
	Total	87	100.0	100.0	

Pendapatan

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	.00	17	19.5	19.5	19.5
	500.00	1	1.1	1.1	20.7
	600.00	3	3.4	3.4	24.1
	1000.00	6	6.9	6.9	31.0
	1200.00	3	3.4	3.4	34.5
	1500.00	1	1.1	1.1	35.6
	2000.00	2	2.3	2.3	37.9
	2500.00	4	4.6	4.6	42.5

	3000.00	5	5.7	5.7	48.3
	3500.00	1	1.1	1.1	49.4
	4000.00	3	3.4	3.4	52.9
	4500.00	1	1.1	1.1	54.0
	5000.00	8	9.2	9.2	63.2
	6000.00	3	3.4	3.4	66.7
	7000.00	4	4.6	4.6	71.3
	8000.00	5	5.7	5.7	77.0
	9000.00	1	1.1	1.1	78.2
	10000.00	3	3.4	3.4	81.6
	12000.00	4	4.6	4.6	86.2
	15000.00	2	2.3	2.3	88.5
	16000.00	1	1.1	1.1	89.7
	20000.00	6	6.9	6.9	96.6
	30000.00	2	2.3	2.3	98.9
	250000.00	1	1.1	1.1	100.0
	Total	87	100.0	100.0	

Table B.2: Level of Acceptance of ART among ruminant farmers in Kelantan

Acceptance_CAT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.00	29	33.3	33.3	33.3
	2.00	45	51.7	51.7	85.1
	3.00	13	14.9	14.9	100.0
	Total	87	100.0	100.0	

Table B.3: Level of perceived usefulness

Usefulness_CAT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.00	3	3.4	3.4	3.4
	2.00	10	11.5	11.5	14.9
	3.00	74	85.1	85.1	100.0
	Total	87	100.0	100.0	

Table B.4: Level of perceived ease of use

Ease_CAT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.00	6	6.9	6.9	6.9
	2.00	28	32.2	32.2	39.1
	3.00	53	60.9	60.9	100.0
	Total	87	100.0	100.0	

Table B.5: Level of Attitude

Attitude_CAT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.00	4	4.6	4.6	4.6
	2.00	11	12.6	12.6	17.2
	3.00	72	82.8	82.8	100.0
	Total	87	100.0	100.0	

Table B.6: Correlation between acceptance and perceived usefulness

Correlations

		Acceptance_Mean	Usefulness
Acceptance_Mean	Pearson Correlation	1	.439**
	Sig. (2-tailed)		.000
	N	87	87
Usefulness	Pearson Correlation	.439**	1
	Sig. (2-tailed)	.000	
	N	87	87

**. Correlation is significant at the 0.01 level (2-tailed).

Table B.7: Correlation between acceptance and perceived ease of use

Correlations

		Acceptance_Mean	Attitude
Acceptance_Mean	Pearson Correlation	1	.420**
	Sig. (2-tailed)		.000
	N	87	87

Attitude	Pearson Correlation	.420**	1
	Sig. (2-tailed)	.000	
	N	87	87

**. Correlation is significant at the 0.01 level (2-tailed).

Table B.8: Correlation between acceptance and attitude

Correlations

		Acceptance_Mean	Attitude
Acceptance_Mean	Pearson Correlation	1	.420**
	Sig. (2-tailed)		.000
	N	87	87
Attitude	Pearson Correlation	.420**	1
	Sig. (2-tailed)	.000	
	N	87	87

**. Correlation is significant at the 0.01 level (2-tailed).

Table B.9: Test of normality

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Acceptance	.060	87	.200*	.979	87	.177

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

APPENDIX C

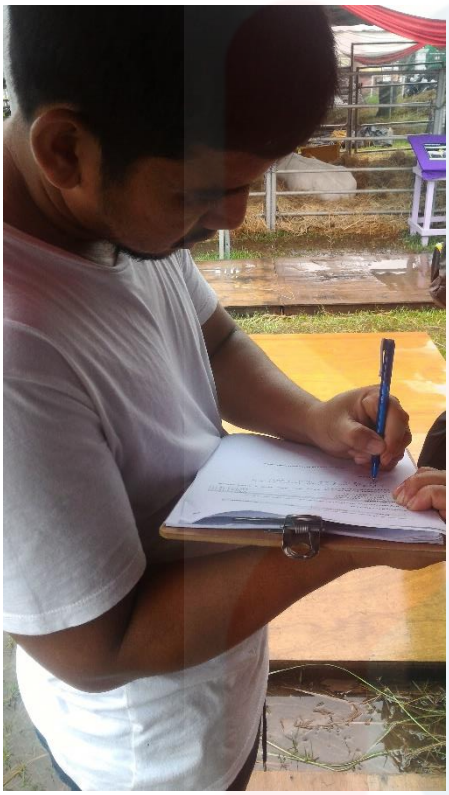

Figure C.1: A respondent answering the survey questionnaire at the Festival Hari Peladang, Penternak dan Nelayan Kebangsaan 2017

Figure C.2: Respondents answering the questionnaire during the artificial insemination workshop in Universiti Malaysia Kelantan, Jeli Campus

Figure C.3: Respondents from Bachok, Kelantan