UNIVERSITI PUTRA MALAYSIA

THE COSTS OF REARING A BUFFALO CALF FROM BIRTH UNTIL WEANING AGE AT BUFFALO BREEDING AND RESEARCH CENTRE, TELUPID, SABAH

MUHAMMAD HASIFSAFWAN BIN ISHAK

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MUHAMMAD HASIFSAFWAN BIN ISHAK

A **project** paper submitted to the

Faculty of Veterinary Medicine,

Universiti Putra Malaysia

In partial fulfillment of the requirement for the degree of

DOCTOR OF VETERINARY MEDICINE

Universiti Putra Malaysia

Serdang, Selangor Darul Ehsan

MARCH, 2016

It is hereby **certified** that we have read this project paper entitled "The Costs Of Rearing A Buffalo Calf From Birth Until Weaning Age At Buffalo Breeding And Research Centre, Telupid, Sabah" by Muhammad Hasifsafwan Bin Ishak and in our opinion it is satisfactory in terms of scope, quality and presentation as partial fulfillment of the requirement for the course VPD4901 – **Project**

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Dedicated to my parents,

Ishak Bin Omar, Zainon Binti Abas,

my siblings and my best friends.

ACKNOWLEDGEMENTS

First and foremost, I would love to take this opportunity to express my sincere gratitude to my supervisor, Dr. Norhariani Mohd Nor for her guidance and encouraging me throughout this interesting journey during the making of this project. She continually and convincingly conveyed a spirit of adventure with regards to research and excitement with regard to teaching. Without her assistance and dedicated involvement throughout the process, this project would have never been accomplished. I would like to thank you very much for your support and understanding over throughout this journey.

I would love to express the deepest appreciation to my co-supervisors Dr Punimin Abdullah and Dr. Hasliza Abu Hassim, for their persistent support and guidance throughout every step in the making of this project. Without their help, this project would never have been completed.

I am indebted to my course mates and friends who were always listening and giving me words of encouragement. To my beloved family for helping me survive all the stress and not letting me give up. Once again, thanks to all for your understanding, wisdom, patience, enthusiasm, encouragement and for pushing me farther than i thought I could go.

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ABSTRACT

An abstract of the project paper presented to the Faculty of Veterinary Medicine in partial fulfillment of the course VPD 4901-Project

THE COST OF REARING A BUFFALO CALF FROM BIRTH UNTIL WEANING AGE AT BUFFALO BREEDING AND RESEARCH CENTRE FARM, TELUPID SABAH

By

MUHAMMAD HASIFSAFWAN BIN ISHAK

March 2016

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Malaysia recently witnessed declining of its buffalo population at the rate of 1.2% per year which could be due to the lack of suitable land for extensive farming, lack of superior breeds, reproductive problems for example a low reproductive rate and poor calf rearing management. Calf rearing is important because it is the future replacement of the herd. Farmers may faces problem on maintaining farm sustainability probably because of they are not aware of rearing cost in the farm. Therefore, the objective of this study is to calculate the costs of rearing a buffalo calf from birth until weaning age.

The calculation of costs were done in Microsoft Excel (Microsoft Corporation, Redmond, WA). A buffalo farm (Buffalo Breeding and Research Centre Farm) at Telupid Sabah was visited by a veterinary student in January, 2016 to gather inputs for this study. Inputs were collected by using a questionnaire (asked to farm manager) and by using farm records in 2015. The inputs gathered were farm general and health management and costs component such as healthcare costs, labor costs and treatment costs.

The results of this study showed, on the extensive farm in 2015, there were 143 buffalo breeder and there were 133 buffalo calves born. The most common calf diseases in year 2015 were weight loss (15 cases), diarrhea (17 cases) and respiratory (3 cases). The age of weaning is three months. Calf management from birth until weaning was as followed; at birth, buffalo calf was identified with a tag and dewormed. The calf remained with their dam in the paddock until weaning and were given 0.5kg pellet per calf 3 weeks before weaning age. At weaning age, the calf was dewormed for second time. The calf was assumed not to eat grass before weaning age. The costs of rearing a calf only calculated the variable costs. The costs included feed costs (milk cost, pellet), id-tag, preventive treatment costs, labor costs (to feed calf). The cost of milk is calculated based on the current price of buffalo milk in the market (RM3.20). The cost of milk cost was calculated by taking the milk requirement per body weight for 90 consecutive days. This, taking account of the average daily gain of calf in the farm which is 0.6kg.Therefore, the costs of milk from birth until weaning is RM1,834.56.

The costs of pellet, id tag and preventive treatment were RM1.14 per kg, RM2 per animal and RM0.50 per animal, respectively. The cost of rearing a buffalo calf from birth until

weaning was RM1842.46. The highest cost was the feed costs (99.85%), in which milk cost contributed 99.57% to overall cost of feed cost. Using costs of diarrhea, weight loss and respiratory RM30.16, RM30.16 and RM1.46 per animal respectively, the total costs of treating the sick calves were RM969.44 per herd per year. This means, the costs of rearing buffalo calves were RM246,016.77 per herd per year, where treatment costs is 0.39% of the total rearing costs per herd per year.

This study revealed that the cost of rearing a calf is expensive due to milk cost that is the contributed to major contributor to the overall cost. The disease treatment only contributed 0.39% to the total cost of rearing per herd per year, however, the high prevalence of diseases could cause the farm to have high treatment costs. Hence, farmer needs to improve the herd health to reduce the overall total cost of rearing. The cost from milk cost can be reduce by reduce the age of weaning. However further research need to be done in future for the acceptable weaning age in the farm.

Keywords *distribution cost, Rearing Buffalo Calf*

ABSTRAK

Abstrak kerja projek ini dikemukakan kepada Fakulti Perubatan Veterinar dalam memenuhi kursus VPD 4910-Projek

KOS MEMELIHARA SEEKOR ANAK KERBAU DARI LAHIR SEHINGGA UMUR CERAI SUSU DI PUSAT TERNAKAN DAN PENYELIDIKAN KERBAU, TELUPID, SABAH

Oleh

MUHAMMAD HASIFSAFWAN BIN ISHAK

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Malaysia baru-baru ini menyaksikan perubahan yang luar biasa daripada populasi kerbau yang semakin berkurangan pada kadar 1.2% setiap tahun kerana kekurangan tanah yang sesuai untuk penternakan, kekurangan baka, masalah pembiakan dikaitkan dengan kadar pembiakan yang rendah, mudah mendapat penyakit endemik dan kadar ektraksi yang tinggi . Oleh yang demikian, kebanyakan penternak menghadapi masalah dalam menghasilkan keuntungan dan perolehan dalam penternakan disebabkan kurangnya pemahaman tentang taburan kos dalam menternak. Banyak input dalam usaha mengembangkan, mengekalkan dan mengantikan kelompok kerbau, namun kurangnya pemahaman mengenai perbelanjaan akan menjejaskan bukan sahaja taburan kos dalam

menternak anak kerbau dari lahir sehingga umur cerai susu, namun potensi ladang dalam potensi produksi dan kelansungan jangka panjang.

Sebuah ladang ternakan kerbau (Pusat ternakan dan penyelidikan Kerbau Telupid Sabah) telah dijadikan lokasi untkuk kajian ini oleh seorang pelajar jurusan Veterinar pada Januari 2016, untuk mengumpul data bagi kajian ini. Data-data yang dikumpul menggunakan buku soalan (yang ditanya pada Pengurus ladang) dan menggunakan rekod ladang pada tahun 2015. Data-data yang dikumpul adalah dari pengurusan kesihatan am ladang termasuk komponen kos seperti kos penjagaan kesihatan, kos makanan, kos kandang, dan kos buruh. Pengiraan kos telah menggunakan Microsoft Excel (Microsoft Corporation, Redmond, WA).

Keputusan kajian mendapati, di ladang ektensif tersebut pada tahun 2015, sebanyak 143 induk kerbau dan 133 anak kerbau yang telah lahir. Masalah biasa yang dihadapi oleh anak kebau adalah masalah penurunan berat badan (15 kes), cirit-birit (17 kes) dan pernafasan (3 kes). Umur cerai susu anak kerbau adalah pada umur 3 bulan. Pengurusan anak kerbau dari lahir hingga cerai susu adalah seperti berikut; anak kerbau akan di tag dan diberi ubat cacing. Anak kerbau akan bersama ibu di dalam kandang sehingga cerai susu. Sebanyak 0.5kg palet akan diberikan 3 kali seminggu sebelum cerai susu. Kemudian, anak kerbau akan sekali lagi diberikan ubat cacing sebelum di cerai susu. Semua anak kerbau telah di anggap tidak memakan rumput sebelum umur cerai susu di dalam kajian ini. Kos menternak anak kerbau hanya mengambil kos manipulasi (berubah-ubah).

Kos yang terlibat adalah kos makanan (susu, palet), tag id, kos rawatan pencegahan, kos buruh. Kos susu dikira mengikut harga terkini susu kebau dipasaran (RM3.20). Kos susu di kira berdasarkan dengan mengambil faktor keperluan susu oleh anak kerbau dalam sehari untuk 90 hari. Kiraan ini juga mengambil kira purata kenaikan berat badan anak kerbau di ladang tersebut iaitu 0.6kg. Maka, kos susu dari lahir hingga cerai susu adalah RM1,834.56. Kos makanan palet, tag id, dan rawatan pencegahan masing-masing adalah RM1.14 per kg, RM2 per ekor, dan RM0.50 per ekor. Seterusnya, kos untuk menternak seekor anak kerbau dari lahir hingga umur cerai susu adalah RM1,824.46. Kos tertinggi datang daripada kos makanan (99.85%). Seterusnya, dengan menggunakan kos rawatan penyakit seperti cirit birit, penurunan berat badan, dan pernafasan dengan jumlah masing-masing adalah RM30.16, RM30.16, dan RM1.46 bagi setiap ekor anak kerbau, maka kos rawatan penyakit adalah RM969.44 bagi kelompok untuk setahun. Maka, jumlah untuk menternak anak kerbau bagi tahun 2015 adalah RM246,016.77 bagi kelompok kerbau. Kos rawatan menyumbang kepada 0.39% kepada jumlah kos bagi kelompok untuk setahun.

Kajian ini mendapati kos menternak seekor anak kerbau adalah mahal oleh kerana kewujudan kos susu yang mana menrupakan penyumbang utama kepada kos keseluruhan. Walaupun kos rawatan penyakit adalah rendah (0.39) kepada jumlah keseluruhan kos membela bagi kelompok kerbau, tetapi jika jumlah ternakan yang sakit meningkat akan menyebabkan kenaikan kos rawatan di dalam ladang. Kos susu dapat dikurangkan dengan mengurangkan umur cerai susu. Walaubagaimanapun, kajian selanjutnya perlu dijalankan bagi mengetahui umur yang sesuai jika cerai susu ingin di cepatkan.

Kata kunci *taburan kos, Memelihara Anak Kerbau*

CHAPTER 1

INTRODUCTION

This chapter begins with the presentation of background of the study on the costs of rearing a buffalo calf from birth until weaning age at Buffalo Breeding and Research Centre, Telupid, Sabah. Next, statement of the problem is discussed and the objectives and hypothesis of the research are stated. This chapter continues with the discussion on the significant of the study. This chapter ends with the presentation of the research limitation and chapter summary.

1.1 BACKGROUND OF STUDY

Buffalo have been use by the people in Sabah to assist them in farming. This can be seen in the oil palm farm which they use buffalo to carry the palm fruit. The other main function of buffalo in Sabah is to supply meat which similar to cattle meat in peninsular Malaysia. The increase in demand of buffalo meat is usually because of the culture and religion's celebration and festival such as Hari Raya Korban and Aqiqah. The Kadazan Tatani culture also uses buffalo as present from man to women in their wedding and engagement ceremony. Malaysia however, facing an issue which declining of buffalo meat at the rate of 1.2% per year (M. Wan Zahari, 2009). This issue is raised up because of several factors which affect buffalo production. According to Jainudeen and Wan Zahari in 2009, the factors were lack of superior breeds and reproductive problems for example a low

reproductive rate and poor calf rearing management. Poor calf rearing management is very concerning because the future breeder come from the calf rearing. The reared calves will become the replacement of female and male breeder in the farm. However the problem and importance of calf rearing is often overlooked by farmers. One of the problem that farmers often overlooked is the cost of rearing buffalo calf which eventually affecting their future breeder performance in the farm.

1.2 PROBLEM STATEMENT AND RESEARCH QUESTION

The lack of scientific study on costs of rearing buffalo calf and lack awareness on the costs in their farm causing calf rearing to become overlooked. This is supported by lack of study and research on buffalo calves as there is actually no literature being done on the cost of rearing buffalo calves. Next, it is difficult to calculate overall costs because the time period of costs calculation in this study is long which is from birth until weaning age. The other difficulty in doing the research is due to the cost component in rearing dairy calves are correlated with variation in growth (Mourits *et al,* 1997) and the uncertainty of the occurrence of the disease (Van Der Fels-Klerx *et al*, 2001). Hence the research question is "What is the total costs of rearing a buffalo calf?"

1.3 OBJECTIVE AND HYPOTHESIS

The section highlights the general objective and hypothesis of the present study. The general objective of this current study is to estimate the costs of rearing a buffalo calf from birth until weaning age. The study is going to search for related cost in rearing buffalo calf by taking account the direct and indirect cost in the farm related to the calf rearing. The cost that is correlated to the calf rearing also will be identified in the estimation of the cost. Research hypotheses were formulated based on general objective which is the increase of the cost to rear a buffalo calf from birth until weaning age will increase the overall cost in the farm.

1.4 SIGNIFICANT OF STUDY

This study will give insight on the cost of rearing a buffalo calf from birth until weaning age. Thus, this will give a good guide to farmer to focus and change on their practice and management in the farm accordingly. This will help them to support their decision on what cost should be focus to make the rearing cost more efficient. This study also will provide information on distribution of cost components on overall cost of rearing a buffalo calf from birth until weaning age. Moreover, there are limited studies in Malaysia and around the world that have investigated the costs of rearing a buffalo calf from birth until weaning age. Thurs, this study may fill the knowledge gap in understanding the costs of rearing a buffalo calf. The findings of the study also provided more information in this field based on scientific proven, which will enriched the knowledge on veterinarians field especially

studies in buffalo calf. This study is also significant for practitioners specifically the Department of Veterinary Services, Ministry of Agriculture in order to highlight the issues of cost of rearing a buffalo calf from birth until weaning age. In the future, it will help Veterinarians in supporting their decision making during consulting and advising farmer.

Since cost of rearing a buffalo calf from birth until weaning age is a critical and crucial, the present study also important for intervention and prevention program planning by highlighting the predominance factors that may contribute to the a cost of rearing a buffalo calf from birth until weaning age. Based on this study, practitioners and policy maker may consider those dimensions when planning intervention and prevention program to enhance and empower potential protective factors and reduce possible risk factors of managers.

1.5 CHAPTER SUMMARY

This chapter begins with a brief introduction and background of the study. The significant of study were discussed to emphasize the important in conducting the study. Limitation is one of the obstacles faced during the period of study because of farmer uncertainty in their practice and also poor recording system. Lack of scientific study on buffalo farming also contributes to the difficulty in conducting the study.

CHAPTER 2

LITERATURE REVIEW

This chapter reviews past literatures regarding buffalo industruy in Malasia and its influencing factors. The reviews are grouped according to subtopics which are the world buffalo population trend and cost of rearing a buffalo calf.

2.1 BUFFALO INDUSTRY IN MALAYSIA

Currently buffalo has been used to supply meat to Sabah citizens, similar to cattle in peninsular Malaysia (Utusan online, 2014). The total population of buffalo is around 64,218 heads in Peninsular Malaysia, 52,369 in Sabah and 7,059 in Sarawak with buffalo and cattle meat self-sufficiency of 25.67% (DVS, 2013). According to previous study, buffalo industry has always not receiving proper attention by government as being reported by Mazni O. *et al* in 2004. However on this current year, Malaysia has witness change in buffalo industry trending as Malaysia currently seen potential in buffalo industry to supply meat for the country. This can be seen as more research on the buffalo production has been done especially in Buffalo Breeding and Research Centre in Telupid Sabah. According to Sabran M. in 2014 through Harian Metro, a colaboration between researchers from Universiti Putra Malaysia (UPM), Department of Veterinary Services and Animal Industry ,Ministry of Agriculture and Food Industry has been running until recently for a knowledge transfer program involving the community and local industry in

which they are focusing on the reproductive performance of the buffalo in the centre. Government also has seen the potential in buffalo to supply milk for the country. According to Shahrim. S. in 2010 through Berita Harian, Ministry of Agriculture and Food Industry has allocated 80 million ringgit to increase the country's dairy industry by importing 169 dairy buffaloes from Nilli Ravi, Pakistan.

2.2 THE WORLD BUFFALO POPULATION TREND

Recently, the world witness the potential of buffalo as protein source for global population (Wanapat .M, 2015). The growth of human population in the world has also been accompanied by unprecedented economic growth that has allowed increases in income and purchasing power, causing change in food preferences (Cruz, 2010). According to a review done by Wanapat .M in 2015, the world population of buffalo (Bubalus bubalis) has been estimated at over 140 million head (FAO, 1991). Of these, 97 percent are found in the Asia and Pacifi c region, mainly in India (75 million), China (21 million), Pakistan (14 million) and Thailand (6 million). According to FAO in 2010, Malaysia only contributed 0.072% to total buffalo population in the world while India dominated at 54.56% of total buffalo population.

2.3 COST OF REARING A BUFFALO CALF

Currently, there are no literatures being documented in rearing a buffalo calf from birth until weaning age. However similar studies have been done in dairy cattle farm which the

cost of rearing a dairy heifer from birth until weaning is calculated. Dairy cattle has been chosen as reference of this study as buffalo and domestic cattle belong to same family and are closely related on phylogenetic tree (Moaeenudin .M, 2014)*. According to Alana C. *et al* in 2015, a study on cost of rearing dairy heifer was done in 102 United Kingdom dairy farms in which each farm was visited and an extensive heifer rearing questionnaire was completed. According to the study, the mean cost of rearing from birth to weaning was £195.19 (pound sterling) per heifer with a mean daily cost of £3.14. According to the study, the highest contributor to the total cost was from feed cost which is colostrum, milk, starter and forage that make up 48.5% with milk feeding make up the greatest proportion of this at 37.3%. The next greatest contributor come from bedding and labor, contributed 12.3% and 11.2% respectively (Alana C. *et al*, 2015). The cost component of the cost in this study come from labor costs, calving management costs, colostrum management costs, prevention treatment costs, feed costs, drinking water and electricity costs, housing and bedding costs, disease and health treatment costs, vaccination costs, bulding, machienary and equipment depreciation costs.

CHAPTER 3

MATERIAL AND METHOD

This chapter presents a detail description of the research material and methodology including the factors that affecting in the data analysis. For example the understanding of the calf management in the farm that is considered when calculating the overall cost.

3.1 DETERMINISTIC MODEL TO ESTIMATE COSTS OF BUFFALO CALF REARING

In this study, the calculation of cost of rearing a buffalo calf from birth until weaning age by using Microsoft Excel®. The cost calculation is based on these particular inputs: Survey at Buffalo Breeding and Research Centre, Telupid, Sabah by using a questionnaire and Record Book & financial information of the farm. The descriptive analysis will reveal the type of inputs such as feed costs, treatment costs, common calf diseases, number of cases.

Assumption of the deterministic model for instance 10% of bodyweight was assumed to give the amount of milk fed to a calf per day (Donna M. *et al,*2006)

3.2 CALF MANAGEMENT

Before costs of rearing were calculated, understanding of the calf management in the farm is very important. In the Buffalo Breeding and Research Centre, Telupid, Sabah, calves

were manage extensively. All calves will be tagged with an identification (ID) tag after birth. The calf will be kept together with the dam from birth until weaning age in the paddock. As being recalled by the farmer, 0.5kg of pellet was given to the calf for three days a week, three weeks before weaning age. In the case of preventive medication, dewormer were given at the age after birth and at weaning age. However, no vaccination were done in this farm. In this study, the calf was assumed to not eat grass until weaning age. The weaning age practiced in this farm is at three months of age.

3.3 DATA COLLECTION

Data collection in this study used two materials which are survey questionnaire and record book. The data was collected from a government farm in Telupid, Sabah. Buffalo Breeding and Research Centre have been running with the aim to become the model for the farmer, providing consultation, expertise and training to farmer. This center also aims to produce high quality livestock especially female buffalo breeder.

3.3.1 Survey Questionnaire

Data were gathered by using self-administered questionnaire. The questionnaire is in English language. Before the questionnaire is distributed, the researcher explains about the nature and purpose of the study and assured the respondents of confidentiality to the farmer. The farmer were asked to respond to all question in the questionnaire based on their own understanding and experiences. It took about 1 hour to complete the

questionnaire because of some limitation. The questionnaire was return to the researcher after it has been filled. The data of the current study were collected over a period of January 2016. This questionnaire contains a few sections which are (The questionnaire can be referring at Appendix A):

1. Section A: General Information
2. Section B: Management Of Replacement Animal
3. Section C: Female Replacement
4. Section D: Male Replacement
5. Section E: Management Of Breeder Female Buffalo
6. Section F: Management Of Breeder Male Buffalo
7. Section G: Economic Evaluation Of The Farm

3.3.2 Record Book

Data from record book was reviewed by a researcher after the permission was given from a farmer. The record book exclude the financial information including birth, death, weaning, bodyweight and treatment. The description of the books is in table 3.1.

Table 3.1

Type of Record book and its descriptions

Type of record books	Description
Birth	Record on date of birth (calf), weight and breed
Death	Record on buffalo death, age, causes and date
Weaning	Record on weight on weaning, age and breed

Weighing	Record on weight of all buffalo in the farm
Calves	Records on deworming, age and weight
Treatment	Records only on deworming

3.4 INPUTS OF THE MODEL

The calculation and data analysis involve in collecting data of biological input and calculation of economical input.

3.4.1 Biological Input

The biological input were collected and calculated from the questionnaire and record book in the farm. Because of the limitation by a poor recording system, some of the data was recalled by the farm manager. The biological input as shown in Table 4.1.

Table 3.2

Biological input of the farm

Variables	Inputs
Number of calf born in 2015	133
Age of weaning (months)	3
Calf diseases (cases) Weight loss Diarrhea Respiratory	15 17 3
Labor for feeding (minutes/animal)	1
Pellet 0.5kg/animal/week	1.71
Average daily gain (kg/day)	0.6

Milk (requirement/day)	10% of B.W

Note. B.W = Body Weight

The number of cases of calf diseases were collected which is recalled by the farm manager and it is not recorded in any record book in the farm. The number of cases were recalled to be happened in the year 2015 by farm manager. Next, as for labor for feeding, we assume that the time taken for worker to feed the calf is only about 1 minute in which the pellet will be put in the feed through during feeding time. The average daily gain(ADG) for a calf is 0.6 kg per day is calculated by taking the average birth weight at 36kg and the average weaning weight at 90kg and divided by three month (age at weaning). The formula is as follow:

$$\frac{90kg - 36kg}{90days}$$

The calculation is expected to give inaccurate number of ADG, however because of the limitation faced during data collection, this method were chosen instead.

3.4.2 Economical Input

The economical input were calculated based on the biological data. The biological input directly affecting the economical input. The economical input as shown in Table 4.2. The

cost of milk was taken from the latest information accordance to the Star online in 2011. The food pellet cost were calculated by taking the price of ingredients that made up the food pellet. The ingredient and price was provided by the Jabatan Perkhidmatan Haiwan & Perusahaan Ternak, Sabah (JPHPT) in which the ingredients and price as stated in Appendix B. The treatment cost was calculated by taking account the drug used per animal for every treatment, the labor cost for each treatment and the time taken for each treatment.

Table 3.3

Economic Input for calculating costs of rearing a buffalo calf from birth until weaning age

Variables	**Costs (RM)**
Milk (price per liter)	3.20
Pellet (per kg)	1.14
Treatment costs (RM/animal)	
Weight loss[1]	30.16
Diarrhea[2]	30.16
Respiratory[3]	1.46
Labor costs (workers) (RM/hour)	4.73
ID Tag	2

1 Treatment cost is based on multivitamin injection and oral dewormer and labor costs

2 Treatment cost is based on multivitamin injection and oral dewormer and labor costs

3 Treatment cost is based on antibiotic (Amoxicillin 15%) and labor costs

The labor cost was only taking account the salary of the Assistant Veterinary Officer in the farm. The time taken for each treatment was only recalled by the farmer. The list of drugs used in those treatment in the farm as stated in Appendix C and the salary of the workers in the farm is in Appendix D.

CHAPTER 4

RESULTS

This chapter demonstrates the results of the study based on the objectives presented in Chapter 1. The findings of the study are presented in a major section which comprised of descriptive findings. In descriptive findings, costs of rearing a buffalo calf from birth until weaning age, are presented. In addition, total costs of rearing buffalo calves from birth until weaning age including treatment costs per herd in 2015 were also discussed.

4.1 COSTS OF REARING A BUFFALO CALF FROM BIRTH UNTIL WEANING AGE

The total overall cost of rearing a buffalo calf from birth until weaning age taking account both the biological and economical inputs in the farm for the year 2015. The result as shown in Table 4.3

Table 4.1

The costs of rearing a buffalo calf from birth until weaning age in year 2015

Variable	Costs (RM)
Feed costs	
Milk cost	1,834.56
Pellet cost	5.13
Labor costs	0.27
Preventive treatment costs	0.50

Id tag cost	2
Total costs	**1,842.46**

The milk cost was calculated by taking account the ADG of the calf in the farm to calculate the change of bodyweight for everyday for ninety day (three months), the milk requirement for each day (10% of B.W) and the current price for buffalo milk. The formula as follow

For milk cost for each day:

$$Curretn\ B.W(kg) \times Milk\ requirement\ each\ day(kg) \times Price\ of\ buffalo\ milk\ (liter)$$

The cost of milk for each day is calculated and sum up to obtained the total milk cost from birth until weaning age. The overall cost components made up the total cost of rearing a buffalo calf from birth until weaning age is RM 1,842.46. These calculation is with the exemption of diseases treatment in the farm which the calf is considered to be healthy. The distribution of cost component as shown in Figure 4.1

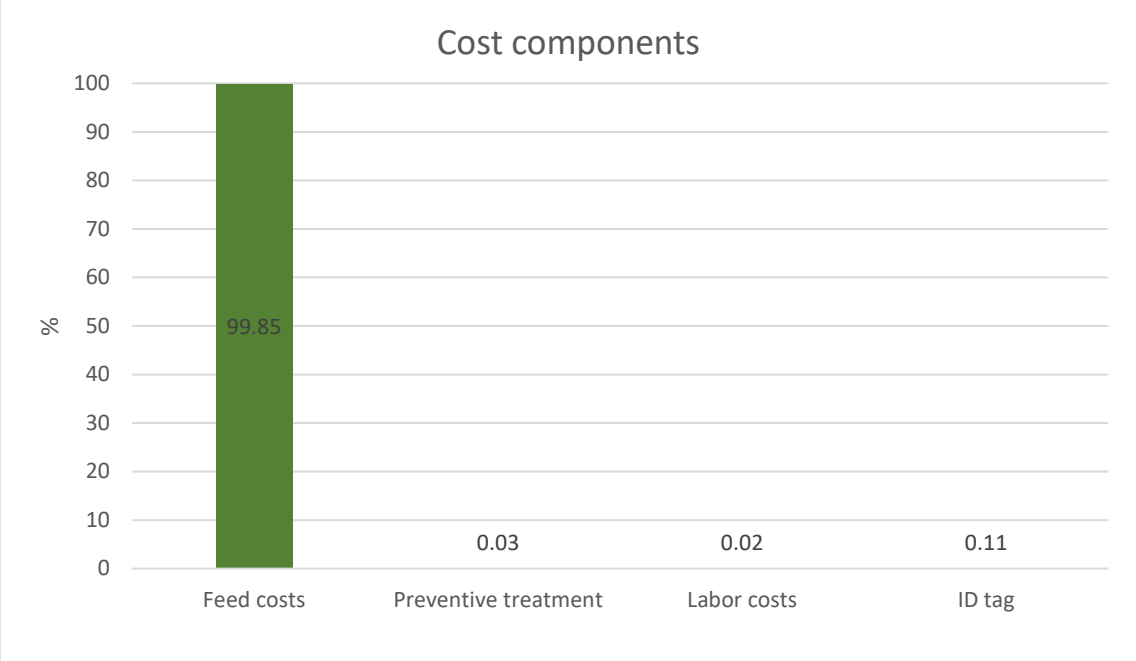

Figure 4.1. Distribution of cost components to overall cost of rearing a buffalo calf in year 2015.

The feed cost contributed as the greatest expense at 99.85%, followed by ID tag cost at 0.11%. Preventive treatment and labor cost at 0.03% and 0.02% respectively. The milk cost made up most of the feed costs at 99.57% while food pellet at 0.28% from overall feed costs.

4.2 TOTAL COSTS OF REARING BUFFALO CALVES FROM BIRTH UNTIL WEANING AGE INCLUDING TREATMENT COSTS PER HERD IN 2015

The total overall cost of rearing a buffalo calves from birth until weaning age at Buffalo Breeding and Research Centre, Telupid Sabah is calculated with taking account the

treatment cost of the diseases in the farm. The costs of rearing buffalo calves including treatment cost as shown in Table 4.4.

Table 4.2

Total costs of rearing buffalo calves from birth until weaning age including treatment costs per herd in 2015

Variables	Costs (RM)
Total costs of rearing 133 buffalo calves per herd (2015)	245,047.34
The costs of treating sick calves (2015)[1]	969.10
The total costs of rearing buffalo calves in 2015	246,016.77

4.3 CHAPTER SUMMARY

This chapter briefly discussing about the results gained from the study. The calculations of data were explained so that it gave a clear picture on how the result came out. The result briefly discussing on the cost of rearing a buffalo calf from birth until weaning age, the cost of rearing buffalo calves in 2015, total cost of rearing buffalo calves from birth until weaning age including treatment costs per herd in 2015, cost component and distribution of costs on overall cost.

CHAPTER 5

DISCUSSION

This chapter presents the overall discussion based on the objective and research questions. This is the first study that calculates costs of rearing buffalo calf in an extensive farm. Hence the study faced difficulty in finding reference in accordance to buffalo rearing.

Based on the result, it is shown that the most expensive cost come from the feed cost. The major contributor to overall feed cost came from milk cost (99.57%). In this study the milk is refer to the milk that is consumed by the calf from its dam form birth until weaning age. In our study, we consider milk to come with a price. Although milk costs could be considered free because the calf suck the milk from the dam, however, the milk have its value if the milk is sold to the consumer. But, because it is not sold to be given to calf, therefore there is revenue foregone to the milk. Hence, the cost is included in the rearing cost.

This farm did not have Veterinarian officer in-charge, hence the cost of treatment only taking account the labor cost of Assistant Veterinarian Officer. The labor costs could have been higher for treatment if we take VO labour costs. In our study case, we assume that the calf diseases occur before weaning age. According to previous study, the three most important disease problems in the young calf are septicemia, diarrhea and pneumonia. Calf diseases in dairy farms occur during the first three month of life due to lack of

immunity of calf (Svensson, C *et al*, 2005). More research needs to be done to know the incidence of buffalo calf diseases in the first 3 months of life.

The cost of treatment contributes 0.39% to the overall cost which is not high. This is also in accordance with other study on dairy farms that showed, treatment costs is one of the lowest costs in calf rearing (Mohd Nor *et al*., 2012). But a high prevalence of diseases still could cause the farm to have a higher treatment costs. Thus prevention of disease is necessary.

The study assumes average bodyweight of calf. This rough estimate might over or underestimate the true costs of rearing. This is because amount of feed a calf consumed can be influenced by breed and gender. On that farm, there are two types of breed which have different average bodyweight and growth rate. Other than that, the farm rear male and female calves together. In the future, taking into accounts the variations can make the estimation more accurate.

In this study, we did not include fixed costs because the fixed cost does not affect the overall cost of rearing a buffalo calf. This is due to the fixed cost is exist in the farm whether or not there is calves to be rear. For example the fixed cost can be seen in building the paddock.. Eventhough paddock is required to place those calves; however, the paddock is still needed to place the dam. The correlation between fixed cost to the cost of rearing buffalo calves is then hardly to be calculated together. Thus, the estimation of variable costs is enough because it will determine the only related cost for rearing a buffalo calf by ignoring the correlation of fixed cost to overall cost of rearing a buffalo calf.

In this study, the costs of treatment are low at the herd level. This is because, the costs only estimate the drugs and labour costs during treatment. The estimation did not take into account indirect costs such as bodyweight loss due to disease or long term effect of calf disease. Moreover, death is not included in the estimation, which could cause loss of resources of the farm. Including those types of variables would mean a more complicated model of the herd.

It is unfortunate as some of the data in this study is only being recalled by the farmer as there is no proper recording system such as the treatment record. This issue became an obstacle in analysis of the data as it is not accurate and exact. Other than that, this study did revealed the importance of estimating costs of rearing, not only calf rearing but the awareness should also applied along the cost of rearing until the calf sold as a breeder. However, further research need to be continue to give insight on the cost of rearing from birth until sold as breeder.

CHAPTER 6

CONCLUSION AND RECOMMENDATION

This chapter presents the conclusions and recommendation of the study. The first section conclusion the study. The second section highlights recommendation of the study.

6.1 CONCLUSION

This study revealed that the cost of rearing a calf from birth until weaning is expensive which is RM1,834.56 per calf. Although the treatment costs per herd is low, but with a higher disease prevalence in a herd, the treatment costs could be higher.

6.2 RECOMMENDATION

As a recommendation, the farm needs to improve their herd health quality, farm management and farm recording system. The herd health quality can be improve by providing a good fencing system to prevent the external vector such as dog to enter into the paddock and cause injury which causes the increase case of losing weight among the calves. The farm management should improve their recording system. It is important to have a good recording system so that it can give information on what happening in the farm. This for example, having a good treatment record that can enable the farm to monitor the prevalence of disease, use of drug to prevent resistance and reoccurrence of disease in the farm so that decision making in treatment can be easy.

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APPENDIX A :
SURVEY ON THE COSTS OF REARING BUFFALO CALVES FROM BIRTH UNTIL WEANING AGE

UNIVERSITI PUTRA MALAYSIA

BERILMU BERBAKTI

SURVEY ON THE COSTS OF REARING BUFFALO CALVES FROM BIRTH UNTIL WEANING AGE

Questionnaire instruction:

1. This questionnaire contain a few sections which is:

SECTION A: GENERAL INFORMATION

SECTION B: MANAGEMENT OF REPLACEMENT ANIMAL

SECTION C: FEMALE REPLACEMENT

SECTION D: MALE REPLACEMENT

SECTION E: MANAGEMENT OF BREEDER FEMALE BUFFALO

SECTION F: MANAGEMENT OF BREEDER MALE BUFFALO

SECTION G: ECONOMIC EVALUATION OF THE FARM

2. You are required to answer all questions given in this questionnaire.

3. To answer, please fill in the given answer space(s).

The author: Thank you for participating in this survey. Your cooperation is highly appreciated and we hope that this survey will benefit this farm.

Date:_____

SECTION A: GENERAL INFORMATION

General information of the farm

1. Year farm was established?_____
2. What are the mission/vision/goal of the farm?

_____
_____

Do farm have strategic, tactical and operational management?

a. Yes b. No

3. Who (owner, worker, veterinarians, other) make decision on
   Feed_____
   Reproduction_____
   Health_____
   Housing_____
   Labour_____
4. Do owner join any association related to buffalo farming?
   a. Yes b. No

Demographic of owner

1. Name: _____
2. Age: _____
3. Race: _____
4. Gender:_____
5. Date of birth:_____
6. Highest education: _____
7. Reason to start farming:

   _____

8. Why buffalo farming were chosen?

   _____

Demographic of worker

1. How many workers on the farm?
   Full-time:_____ Part-time:_____
2. On average for the year, how many hours per week does a full-time worker work?:_____
3. On average for the year, how many hours per week does a part-time worker work?:_____
4. Races number?
   a. Malay:_____ b. Chinese: _____c. Indian: _____ d. Bumiputera:_____
      Others: _____
5. The lowest education: _____

6. The highest education: _____
7. Workers specialize in the farm?
   a. Yes b. No
8. How many supervisors? :_____

General Management system

1. What kind of recording system do the farm use?
   a. Computerize b. Not computerize c. Mix computerize and not

2. Do you have a person in charge to do recording?
   a. Yes b. No
3. Type of records
   a. Financial/Accounting records
   i. Cash flow ii. Income statement iii. Balance sheet iv. Others: _____
   b. Management recors
   i. Feed ii. Reproduction iii. Health
4. Management of the farm consists of (circle the answer):
   i. Male for breeding:_____
   ii. Female for breeding: _____
   iii. Calves (male/female) as replacement: _____
   iv. Male to sell (for meat): _____
   v. Male to sell (for breeding): _____
   vi. Female to sell (for meat): _____
   vii. Female to sell (for breeding): _____
   viii. Land (produce own feed): _____
   ix. Others: _____
5. Rank the most important management to the least important management (fill in the blank on Question 4).
6. Do you have pre-set targets for your management indicators? (example: Pregnancy rate)
   a. Yes b. No
7. How do you manage waste products?
   _____

8. Do you have written Nutrient Management Plan?
   i. Yes ii. No
9. Do you have Total Mixed Ration for feeding material?
   i. Yes ii. No
10. Do you have Farm Financial Consultant?
    i. Yes(state who)_____ ii. No
11. Do you have crop/nutrient Management Consultant?
    i. Yes(state who)_____ ii. No
12. What are the most valuable sources of information for managing your farm?

(rank your top 3 by writing the numbers 1, 2 and 3 next to the appropriate sources)

_____ Extension Agents _____ Veterinarian
_____ Formal Farmer Organisations/Networks _____ Feed Sales Representative
_____ Local Farmers _____ Consultants
_____ Publications _____
Other:_____

Production

1. Breed of buffaloes: _____
2. Does animal have their own unique ID?
   a. Yes b. No
3. Size of farm: _____
   i. Land size: _____ ii. Building size: _____ iii. Pasture size:_____
4. Type of management?
   i. Extensive ii. Intensive iii. Semi-intensive
5. Number of animals (and breed) on the farm
   Breeding: i. Female: _____ ii. Male: _____
   Replacement: i. Female calves: _____ ii. Male calves: _____
   To sell (breeding): i. Female: _____ ii. Male: _____
   To sell (meat): i. Female: _____ ii. Male: _____
6. Age of animals on the farm
   Breeding: i. Female: _____ ii. Male: _____
   Replacement: i. Female calves: _____ ii. Male calves: _____
   To sell (breeding) : i. Female: _____ ii. Male: _____
   To sell (meat): i. Female: _____ ii. Male: _____
7. Main product of the farm:
   a. Live animal
      i. Female as breeding
      ii. Male as breeding
   b. Slaughtered animal (calf/male/female)
   c. Added value products sold (circle)
      i. Yes (if yes please state)_____ ii. No
8. Number of animals sold per month (breeding)
   i. Female: _____
   ii. Male: _____
   iii. Calves: _____
9. Amount of product sold per month (meat)
   i. Female: _____kg
   ii. Male: _____kg

iii. Calves: _____kg

10. Does number of animal sold depend on (circle):
    a. Month
    b. Season
    c. Festive season (state on which festive has highest demand):_____
    d. Others: _____
11. Does amount of meat sold depend on:
    a. Month
    b. Season
    c. Festive season (state on which festive has highest demand):_____
    d. Others: _____

General Herd Health Management

1. General preventive measures taken in the farm? (Please state)
    a. Biosecurity:
    _____
    b. Vaccination:
    _____
    c. Anthelminthic:
    _____
    d. Colostrum management:
    _____
    e. Others:
    _____
2. Do you talk with advisor (e.g.: Veterinarian) about preventive herd health?
    a. Yes b. No
3. The most common health problems:
    a. _____( )
    b. _____( )
    c. _____( )
    d. _____( )
    Rank the problem above from important to least important (in the empty bracket)
4. Treatment
    a. How many veterinarians on farm: _____
    b. Workers do/continue treatment?
5. Who borne the preventive expenses?
    a. Government b. Farm
6. Who borne the treatment expenses?
    a. Government b. Farm
7. Common cause of culling (number per month):
    a. _____

b. _____
c. _____
d. _____

8. Number of animal cull per month
9. Breeding: i. Female:_____ ii. Male: _____
   Replacement: i. Female calves_____ ii. Male calves: _____
   Sold: i. Female: _____ ii. Male:_____

10. Are female buffalo scanned for pregnancy?
    i. Yes ii. No
11. Are heifers scanned for pregnancy?
    i. Yes ii. No
12. Who performs the pregnancy diagnosis?
    a. _____
    b. _____
13. Did you use any synchronization programmes on the cows and heifers?
    i. Yes ii. No

14. If yes please state the details:

_____

Specific management on the farm

SECTION B: MANAGEMENT OF REPLACEMENT ANIMAL

A. Management of replacement animals

General management

1. How many are born per year?
   Male:_____ Female:_____
2. What are their bodyweight? (average): Male:_____
   Female:_____
3. How female calves are chosen as
   a. Breeder in the farms:_____
   b. Breeder to give to farmers:_____
   c. For meat:_____
4. How male calves are chosen as:

d. Breeder in the farms:_____
e. Breeder to give to farmers:_____
f. For meat:_____

5. What is the weaning age ?
   _____
6. How many are raised per year for replacement in the farm?:_____
   a. Male:_____ ii. Female:_____
7. How many are raised per year to sell?:_____
8. What age did the buffalo sold as breeder?:
   i. Male:_____ ii. Female:_____
9. How many are raised per year to sell as meat?:_____
   Age at sold:_____
10. Colostrum management
    i. When do you fist give colostrum to the claf?:_____
    ii. How long do you give colostrum?:_____
11. Most common calves disease?:
    a. Diarrhea
    b. Respiratory diseases
    c. Loss weight
    d. Others:_____
12. Morbidity per month:_____
13. Mortality per month:_____

SECTION C: FEMALE REPLACEMENT

Female replacement

A. Feed

1.

Type of feed	Amount given	Price of feed

2. Does the bodyweight known?
   a. Yes (state)_____ b. No

3. Frequency of bodyweight scoring?
   _____
4. Body score (average): _____
5. First calving bodyweight:_____
6. First calving body score:_____
7. Do you have budget for feeding?
   a. Yes b. No
8. Do you practice grazing in the farm?
   a. Yes b. No

B. Reproduction

a. What is your source of replacement heifers?
   i. Farm bred
   ii. Purchased
   iii. Both
a. When start inseminate: _____
b. Who carried out artificial insemination?:_____
c. Bodyweight when start inseminate:_____
d. How many inseminations:_____
e. First calving age of replacement heifers:_____
f. Is heat detection carried out on farm?:
   i. Yes ii. No
g. If yes, how many times a day it is performed?
   _____
h. Are heat detection aids used?
   i. Yes ii. No
   If yes what aids are used?: _____

C. Cost involve in rearing calves:

a) Labour:

1. How many workers needed in managing the calves?
   _____
2. How many hours needed to manage each calves for each day? (average)
   _____
3. How many hours allocated per calve at the age of weaning?
   _____

b) Calving management

1. Bedding

Type of bedding	Price of bedding

2. Disinfectant

Type of disinfectant	Price of disinfectant	Frequency of use

3. How often the case of disposable dead calve/stillborn per month?

_____

c) Colostrum management

Type of colostrum	Price of colostrum	Frequency of use

d) Navel treatment, dehorning and ear tags

1. What kind of disinfectant use in routine navel treatment?
   a. _____( )
   b. _____( )
2. State the costs for each disinfectant in the empty bracket
3. Is the farm practice dehorning on calve?
   i. Yes ii. No
4. If yes, what kind of dehorning method that is used? (circle)
   a. Gas and electrical hot irons dehorning method
   b. Use of anaesthetic drugs (state):_____
   c. Others (state):

   _____

5. Who did the dehorning procedure?

   _____

6. Is the farm practice ear tagging?
   i. Yes ii. No

7. If yes, what type of ear tagging were used?

   _____

e) Milk feeding

1. What system the farm use in feeding milk to calve?
   a. Bucket
   b. Multi teat feeder
   c. Automatic milk feeder.
2. What type of milk fed to the calves?
   a. reconstituted milk replacer
   b. whole milk
   c. Others (state):

   _____

f) Dry feed

1. What type of dry feed introduced to the heifer calves?

   _____

2. What is the cost for the dry feed?

   _____

g) Drinking water and electricity

1. Approximately how many liter of water was given to calves until weaning age?
   _____ liter
2. How much electrical consumption for the calving pen?
   _____ (in ringgit)

h) Disease and Health treatments

1.

Common disease affecting calves	Drugs/medication/antibiotic used	Period and cost for each treatment	Rank the problem from important to least important

2. Common cause of culling (number per month?)
   a. _____
   b. _____
   c. _____

3. Prevention
   Type of prevention practice:
   a. _____
   b. _____
   c. _____
   d. _____

i) Parasite/worming

1. How often are calves wormed in their first grazing season?
   i. Once
   ii. Twice
   iii. Three times
   iv. More than three times: _____

2. What products are used?_____
3. When are they given?_____
4. Do you rotate the dewormers?:
   i. Yes ii. No

5. How do you determine parasite burden in calves?
   a. _____
   b. _____
   c. _____
6. Do you have worming control plan for calves?
   i. Yes ii. No
7. If yes, state on what is your control plan:
   _____

D. Rank of cost

1. Rank the most important costs (empty bracket):
   a. Cost of buying imported heifers ( )
   b. Feed costs ( )
   c. Health costs ( )
   d. Labour costs ( )
   e. Breeding costs ( )

2. List the costs components of the costs:
   a. Cost of buying imported heifers_____
   b. Feed_____
   c. Health costs_____
   d. Labour costs_____
   e. Breeding costs_____

3. Do you know how much are the costs per animal?:
   a. Costs of buying imported heifers:_____
   b. Feed costs:_____
   c. Health costs:_____
   d. Labour costs:_____
   e. Breeding costs:_____

SECTION D: MALE REPLACEMENT

Male replacement

A. Feed

1.

Type of feed	Amount given	Price of feed

2. Does the bodyweight known?
   a. Yes (state)_____ b. No
3. Frequency of bodyweight scoring?
   _____
4. Body score (average): _____
5. Age when sell for slaughter:_____
6. Age when sell as breeder:_____
7. Age to replace current bulls:_____
8. Do you have budget for feeding?
   a. Yes b. No
9. Do you practice grazing in the farm?
   a. Yes b. No

B. Reproduction

1. Semen evaluation was done?
   i. Yes ii. No
2. If yes, how did you do the semen evaluation?
   a. _____
   b. _____
   c. _____

C. Health

1. Most common health problems
   a. _____( )
   b. _____( )
   c. _____( )
   d. _____( )
2. Rank the problem above from important to least important (empty bracket)
3. Common cause of culling (number per month?)
   a. _____
   b. _____
   c. _____
4. Prevention
   Type of prevention practice:
   a. _____
   b. _____

c. _____
d. _____

5. Treatment
   Type of common treatment and drugs used and how long the treatment was done
   a. _____
   b. _____
   c. _____
   d. _____
6. Common cause of culling (number per month)
   a. _____
   b. _____
   c. _____
   d. _____

D. Rank of cost

4. Rank the most important costs (empty bracket):
   a. Feed costs ( )
   b. Health costs ( )
   c. Labour costs ( )
   d. Breeding costs ( )

5. List the costs components of the costs:
   a. Feed_____
   b. Health costs_____
   c. Labour costs_____
   d. Breeding costs_____

6. Do you know how much are the costs per animal?:
   a. Feed costs:_____
   b. Health costs:_____
   c. Labour costs:_____
   d. Breeding costs:_____

SECTION E: MANAGEMENT OF BREEDER FEMALE BUFFALO

B. Management of breeder female buffalo (for breeding)

i. Feeding

1.

Type of feed	Amount given	Price of feed

2. Do you have budget for feeding?
   b. Yes b. No
3. Do you practice grazing in the farm?
   b. Yes b. No
4. Does the bodyweight known?
   b. Yes (state)_____ b. No
5. Frequency of bodyweight scoring?
   _____
6. Body score (average): _____

ii. Reproduction

1. How many females were submitted for breeding in 2014/2015
   2014:_____ 2015:_____
   a. Number of pregnant cows:_____
2. How many of these were heifer?
   2014:_____ 2015:_____
3. How long female buffalo kept for breeding?
   _____ years
4. How many of these
5. Estrus detection rate?:_____
6. Conception rate:_____
7. Average calving interval:_____
8. Calving rate per animal per month: _____
   a. Number of pregnant breeding cows per month:_____
   b. Number of pregnant cows with live calf per month:_____
9. Pregnancy rate?:_____
   a. Number of cows inseminated:_____
   b. Number of cows pregnant per month:_____
10. What is your source of semen?

    a. Stock bull
    b. Artificial Insemination
    c. Both
11. How many females aborted in 2014/2015
    2014:_____ 2015:_____

12. Were samples sent to laboratory?:_____
13. What was identified as the cause of abortion?:
    a. _____
    b. _____
    c. _____
    d. _____
14. What control measures were subsequently put in place?
    _____
    _____

iii. Herd Health

1. Most common health problems
    i. _____( )
    ii. _____( )
    iii. _____( )
    iv. _____( )
2. Rank the problem above from important to least important (empty bracket)
3. Common cause of culling (number per month?)
    a. _____
    b. _____
    c. _____
4. Prevention
    Type of prevention practice:
    a. _____
    b. _____
    c. _____
    d. _____
5. Treatment
    Type of common treatment and drugs used and how long the treatment was done
    a. _____
    b. _____
    c. _____
    d. _____
6. Common cause of culling (number per month)
    b. _____
    c. _____
    d. _____
    e. _____

iv. Rank of cost

1. Rank the most important costs (empty bracket):

f. Cost of buying imported cows( )
g. Feed costs ( )
h. Health costs ( )
i. Labour costs ( )
j. Breeding costs ( )

2. List the costs components of the costs:
   a. Cost of buying imported cows_____
   b. Feed_____
   c. Health costs_____
   d. Labour costs_____
   e. Breeding costs_____

3. Do you know how much are the costs per animal?:
   a. Costs of buying imported cows:_____
   b. Feed costs:_____
   c. Health costs:_____
   d. Labour costs:_____
   e. Breeding costs:_____

SECTION F: MANAGEMENT OF BREEDER MALE BUFFALO

C. Management of breeder male buffalo (for breeding)

i. Feeding

1.

Type of feed	Amount given	Price of feed

2. Do you have budget for feeding?
   c. Yes b. No
3. Do you practice grazing in the farm?
   c. Yes b. No
4. Does the bodyweight known?
   c. Yes (state)_____ b. No

5. Frequency of bodyweight scoring?
   _____
6. Body score (average): _____

ii. Reproduction

1. How long male buffalo kept for breeding?
   _____ years
2. How breeding was done (state):_____
3. State why you practice that breeding method:
   _____
   ____
4. Did semen evaluation was done?
   a. Yes b. No
5. What is your source of semen?
   a. Stock bull
   b. Artificial Insemination
   c. Both
5. If you use stock bulls, then how many do you have?:_____
6. What is the usual source of your stock bull?
   a._____
   b. _____
   c. _____
7. Do you test the semen of the bull at purchase?
   i. Yes ii. No
8. What do you test the semen for?
   a. _____
   b. _____
9. How do you know your bull is working in the breeding season?
   a. Scanning carried out during the breeding season
   b. By recording services and not having cows return to heat
   c. I don't

iii. Herd Health

1. Most common health problems
   v. _____( )
   vi. _____( )
   vii. _____( )
   viii. _____( )
2. Rank the problem above from important to least important (empty bracket)
3. Common cause of culling (number per month?)
   d. _____
   e. _____
   f. _____
4. Prevention
   Type of prevention practice:

e. _____
f. _____
g. _____
h. _____

5. Treatment
   Type of common treatment and drugs used and how long the treatment was done
   e. _____
   f. _____
   g. _____
   h. _____
6. Common cause of culling (number per month)
   f. _____
   g. _____
   h. _____
   i. _____

iv. Rank of cost

1. Rank the most important costs (empty bracket):
   a. Cost of buying imported bulls ( )
   b. Feed costs ( )
   c. Health costs ( )
   d. Labour costs ( )
   e. Breeding costs ( )

2. List the costs components of the costs:
   a. Cost of buying imported bulls_____
   b. Feed_____
   c. Health costs_____
   d. Labour costs_____
   e. Breeding costs_____

3. Do you know how much are the costs per animal?:
   f. Costs of buying imported bulls:_____
   g. Feed costs:_____

h. Health costs:_____
i. Labour costs:_____
j. Breeding costs:_____

D. Management of female (for farmers) and male for selling (meat)

1. Age when selling animals
   Male:_____
   Female:_____
2. Bodyweight when selling animals:
   Male:_____
   Female:_____
3. How they are choose:
   a. Female (for farmers):_____
   b. Male (for slaughter):_____

SECTION G: ECONOMIC EVALUATION OF THE FARM

Economic evaluation of the farm (current)

Cost in the farm

1. Rank most important cost in the farm
   a. Feed:_____
   b. Reproduction:_____
   c. Health (drug, vaccine):_____
   d. Labor:_____
   e. Housing:_____
   f. Land (pasture):_____
2. What price most changing during the last year?
   i. Feed

ii. Labor
iii. Drugs
iv. Vaccines
v. Others:_____

Revenue in the farm

1. Do you know the costs price for:
   i. Calves as replacement (Yes/No)
   ii. Sold heifer (breeding) (Yes/No)
   iii. Sold heifer (meat) (Yes/No)
   iv. Sold male (breeding) (Yes/No)
   v. Sold male (meat) (Yes/No)
2. What is the price:
   i. Calves as replacement (Yes/No)_____/animal
   ii. Sold heifer (breeding) (Yes/No)_____/animal
   iii. Sold heifer (meat) (Yes/No)_____/kg
   iv. Sold male (breeding) (Yes/No)_____/animal
   v. Sold male (meat) (Yes/No)_____/kg
3. Does price of product sold differ according to (circle):
   i. Month
   ii. Season
   iii. Festive season: (state on which festive has highest demand):_____
   iv. Others:
   _____

Decision on Herd Health Management (alternatives to improve production/productivity)

1. What kind of production do you like to improve? (circle)
   a. Quantity of animal produced
   b. Quality of animal produced
   c. Both

2. Breeding:
   a. What kind of breeding program do you like to improve?
   _____
   ____
   b. What kind of breeding indicator do you like to improve?
   Male:_____
   Female:_____
3. Feeding:
   a. What kind of feeding program/indicator do you like to improve?
   _____
4. Sustainability:
   a. Do you have goals to achieve economics/environmental sustainability?

i. Yes ii. No

5. Preventive measures:
   a. What kind of preventive measures program do you like to improve?
      _____
6. Others:
   a. Other herd health management that you like to support to improve production?
      _____

Owner's perception

Costs

1. Do you know the costs to produce:
   i. Calves as replacement (Yes/No)
   ii. Sold heifer (breeding) (Yes/No)
   iii. Sold heifer (meat) (Yes/No)
   iv. Sold male (breeding) (Yes/No)
   v. Sold male (meat) (Yes/No)

Benefits

List decision that do you think can benefit the farm?

a. _____
b. _____
c. _____
d. _____

Workers

a. Do your workers have enough knowledge about the farm?
b. How much are they paid per hour
   i. _____
   ii. _____
   iii. _____
   iv. _____
   v. _____

Veterinarians

a. Do veterinarians explains about herd health management with the higher management?

b. Do veterinarians explains about herd health management with the lower management?
c. What aspects does the veterinarian discuss?:
   i. _____
   ii. _____
   iii. _____

Animal health services

1. Do management satisfied with the services given by animal health service provider?
   i. Yes ii. No
2. What are the aspects that animal health service provider can improve?
   a. _____
   b. _____

APPENDIX B: PELLET INGREDIENTS AND PRICE

Feed material	Weight	Price per kg (RM)	Price/Weight (RM)
Maize grain	**200**	**1.35**	**270**
Wheat pollard	**40**	**1**	**40**
Soya Bean Meal	**27**	**2.2**	**59.4**
Palm Kernel Cake	**200**	**0.7**	**140**
Limestone	**10**	**0.35**	**3.5**
Salt	**3**	**2.5**	**7.5**
Molasses	**20**	**2.5**	**50**
Cattle premix	**1**	**2**	**2**

APPENDIX C: LIST OF DRUGS THAT IS USE FOR TREATMENT IN A CALF

DRUGS	VOLUME	PRICE (RM)

Dufamec 0.5% pour on	**500ml**	**153**
Hamtofos (B12)	**100ml**	**58**
Pink eye spray	**1 bottle**	**58**
Nopstress	**1 packet**	**15**
Zinaprin injection	**1 bottle**	**48**
Duramycin 300 mg L.A injection	**100ml**	**48**
Multivitamin injection	**100ml**	**364.67**
Tolfen 8% L.A injection	**100ml**	**58**
Gusanex spray	**1 tin**	**50**
Marbovitryl 250 injection	**100ml**	**58**
Ivermectin 1% Injection	**100ml**	**98**
Fortified VitB injection	**100ml**	**25**
Donferos (iron) + B12 injection	**100ml**	**29**
E.M liquid	**1 bottle**	**98**
Amoxycillin 15%	**100ml**	**38**
Taktic 5L/ Teknik (Amitraz 12.3%)	**4 liter**	**580**
Baytril 5%	**1 bottle**	**98**
Ivermectin 80 drench	**1 liter**	**125**
Nova Fenben 10%	**1 liter**	**80**

***Drugs that is use for treatment in calf is Multivitamin, Amoxycillin 15% and Fenben 10%**

APPENDIX D: SALARY OF FARM WORKERS

Position	Bil.	Salary (RM) per month
AVO (farm manager)	1	4281.07
Farm worker	3	1282.43
Driver	1	1404