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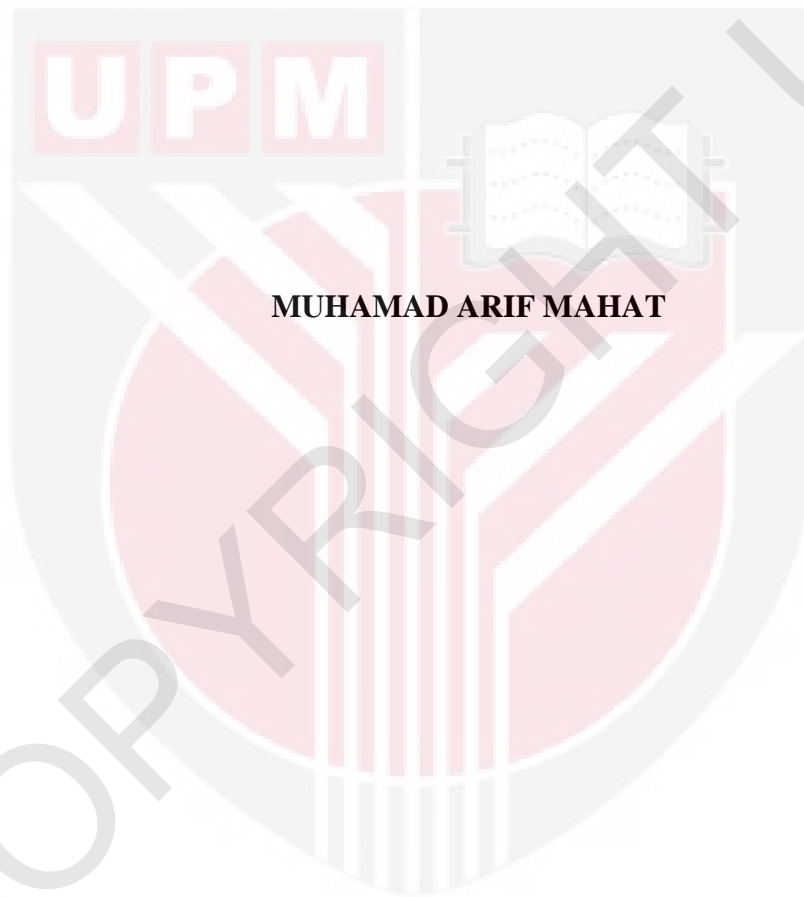
***ON-FARM EVALUATION OF BEEF CATTLE KEPT IN TAMAN
PERTANIAN UNIVERSITI, UNIVERSITI PUTRA MALAYSIA***

MUHAMAD ARIF MAHAT

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FPV 2015 1**

ON-FARM EVALUATION OF BEEF CATTLE KEPT IN TAMAN PERTANIAN

UNIVERSITI, UNIVERSITI PUTRA MALAYSIA



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FACULTY OF VETERINARY MEDICINE

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ON-FARM EVALUATION OF BEEF CATTLE KEPT IN TAMAN PERTANIAN

UNIVERSITI, UNIVERSITI PUTRA MALAYSIA

BY

MUHAMAD ARIF BIN MAHAT

A project paper submitted to the
Faculty of Veterinary Medicine, Universiti Putra Malaysia
in partial fulfilment of requirement for the
DEGREE OF DOCTOR OF VETERINARY MEDICINE

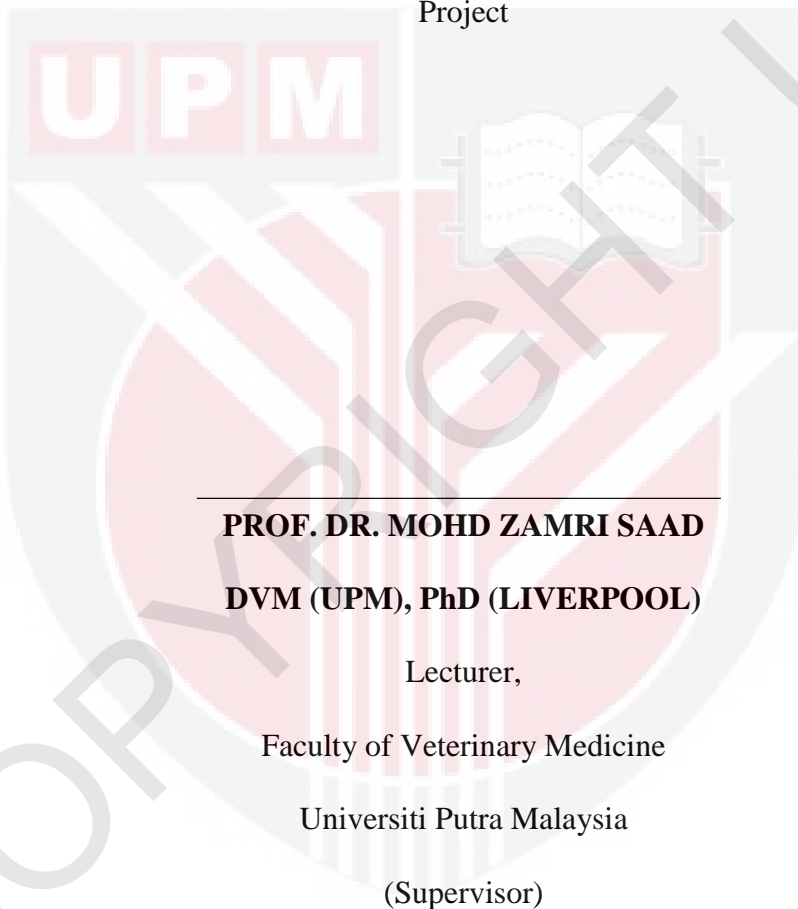
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Serdang, Selangor Darul Ehsan

March 2014

It is hereby certified that I have read this project paper entitled “On-Farm Evaluation of Beef Cattle Kept in Taman Pertanian Universiti, Universiti Putra Malaysia” by Muhamad Arif Bin Mahat and in my opinion, it is satisfactory in terms of scope, quality and presentation as partial fulfillment of the requirement for the course VPD 4901 –

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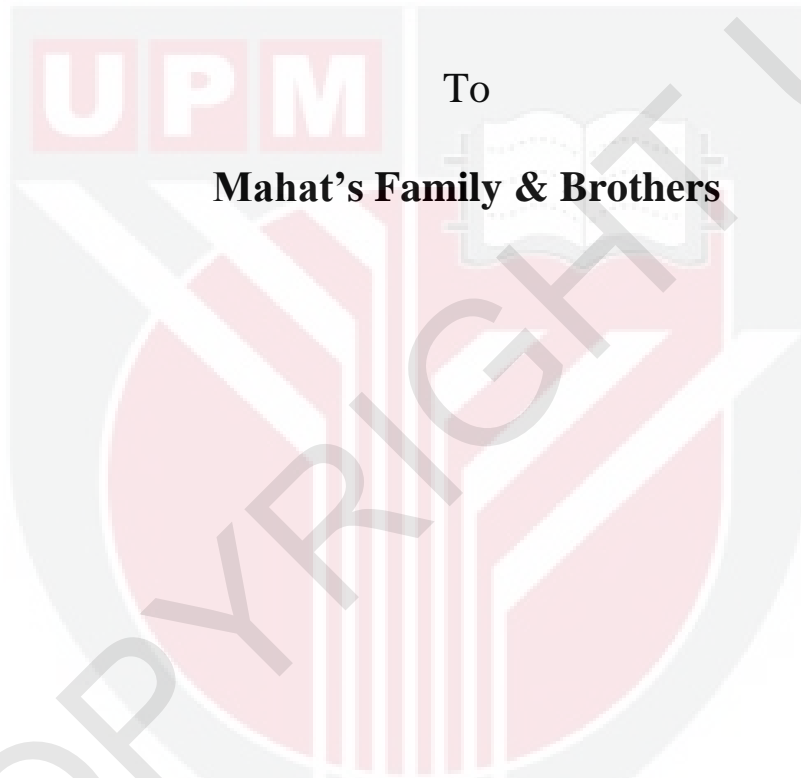
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In the name of Allah, The Most Benevolent, The Most Merciful



To

Mahat's Family & Brothers

On the authority of Abu Hurairah (may Allah be pleased with him) who said: The Messenger of Allah (peace be upon him) said: "Part of the perfection of one's Islam is his leaving that which does not concern him."

[Tirmidhi]

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CONTENTS

	Page
TITLE	i
CERTIFICATION	ii
DEDICATION	iii
ACKNOWLEDGEMENTS	iv
CONTENTS	v
LIST OF TABLES	vii
LIST OF FIGURES	vii
ABSTRACT	viii
ABSTRAK	x
1.0 INTRODUCTION	1
2.0 LITERATURE REVIEW	3
2.1 The beef industry in Malaysia.....	3
2.2 Breeds of beef cattle	4
2.2.1 <i>Kedah-Kelantan breed</i>	4
2.2.2 <i>Brangus</i>	4
2.3 Beef cattle performance indicators	5
2.3.1 <i>Health performance</i>	5
2.3.2 <i>Growth performance</i>	6
2.3.3 <i>Reproductive performance</i>	7
2.4 Geographical factors that influence farm performance.....	8
2.4.1 <i>Temperature</i>	8
2.4.2 <i>Rainfall</i>	8
2.4.3 <i>Wind Direction</i>	9
2.4.4 <i>Humidity</i>	9
2.4.5 <i>Altitude (topography)</i>	9
3.0 MATERIALS AND METHODS	10
3.1 Study area	10
3.2 The farm evaluation	11
3.2.1 <i>Data collection</i>	11

3.2.2	<i>Derivation of parameters</i>	11
3.3	Data processing.....	13
3.3.1	<i>Evaluation</i>	13
3.3.2	<i>Assumptions</i>	13
3.4	Hypotheses.....	14
4.0	RESULTS	15
4.1	Farm performances.....	15
4.1.1	<i>Health performance</i>	15
4.1.2	<i>Growth performance</i>	18
4.1.3	<i>Reproductive performance</i>	20
4.2	Risk factors.....	22
5.0	DISCUSSION	27
6.0	CONCLUSION	30
	REFERENCES	31
	APPENDICES	34



LIST OF TABLES

	Page
Table 1: Annual consumption of beef.....	1
Table 2: Scenario of Malaysian Beef Industry	3
Table 3: Problems faced by the beef cattle in the farm.....	16
Table 4: Bodyweights of Brangus x and KK x at selected age.....	19
Table 5: Average calving % for 2011-2014.....	21
Table 6: Age at first calving of Brangus x and KK x	21
Table 7: Calving interval of Brangus x and KK x	22

LIST OF FIGURES

	Page
Figure 1: Number of treatment cases between 2011 and 2014.....	15
Figure 2: Annual rate of mortality	17
Figure 3: Common causes of death of beef cattle at Taman Pertanian Universiti.....	18
Figure 4: Monthly growth pattern of KK x and Brangus x.....	19
Figure 5: Monthly ADG pattern for KK x and Brangus x	20
Figure 6: Annual calving rate	21
Figure 7: Average monthly rainfall in Serdang between 2011 and 2014	23
Figure 8: Rainfall vs Calving rate	24
Figure 9: Rainfall vs Number of treatment cases.....	25
Figure 10: Rainfall vs Mortality rate	25
Figure 11: Rainfall vs ADG	26



ABSTRACT

Abstract of the project paper presented to the Faculty of Veterinary Medicine in partial fulfilment of the requirement for VPD 4999 – Final Year Project

ON-FARM EVALUATION OF THE BEEF CATTLE AT TAMAN PERTANIAN UNIVERSITI, UNIVERSITI PUTRA MALAYSIA

By

Muhamad Arif Bin Mahat

January 2015

Supervisor: Professor Dr. Mohd Zamri Saad

Faculty: Veterinary Medicine

A farm evaluation was carried out on the Beef Cattle Unit, Ladang 16, Taman Pertanian Universiti, Universiti Putra Malaysia, Selangor from January 12 to February 13, 2015. The objectives were to evaluate the farm performance particularly the health and reproductive performances and to identify the associated risk factor.

This farm was built mainly for teaching purposes, public exhibition and as model for farmers. The study involved retrospective analyses of the records of beef cattle stock between 2011 and 2014. The total stock during that period was 516, which consisted of 300 Kedah-Kelantan crossed (KK x) and 216 Brangus crossed (Brangus x) cattle. The most common health problems were wound (47%), lameness (19%) and suspected haemoparasites (7%), mostly observed in Brangus. The average rate of

mortality was $6.52\% \pm 9.4\%$, and the highest was recorded in 2014 (20.5%) mostly due to lightning strike. Average daily gain (ADG) for Brangus was 0.39 ± 0.013 kg while for KK x was 0.33 ± 0.012 kg. The average calving interval for KK (426 ± 53 days; $n=7$) and Brangus (433 ± 37 days; $n=9$) showed non-significant difference ($p > 0.05$). The age at first calving, however, was markedly younger in KK (1249 ± 127 days) than Brangus (1373 ± 125 days). There was strong positive correlation between rainfall and relative humidity with monthly ADG ($p < 0.05$). Recommendations on various aspects to improve farm performance were given in the discussion.

Keywords: beef cattle, rainfall, farm performance, risk factor, Kedah-Kelantan, Brangus

ABSTRAK

Abstrak daripada kertas projek yang dikemukakan kepada Fakulti Perubatan Veterinar untuk memenuhi sebahagian daripada keperluan kursus VPD 4901 – Projek Ilmiah

Tahun Akhir

PENILAIAN PRESTASI LEMBU PEDAGING DI TAMAN PERTANIAN

UNIVERSITI, UNIVERSITI PUTRA MALAYSIA

OLEH

Muhamad Arif Bin Mahat

Januari 2015

Penyelia: Professor Dr. Mohd Zamri Saad

Fakulti: Perubatan Veterinar

Penilaian prestasi ladang telah dijalankan di Unit Lembu Pedaging, Ladang 16, Taman Pertanian Universiti, Universiti Putra Malaysia, Selangor dari 12 Januari sehingga 13 Februari, 2015. Objektif kajian ini adalah untuk menilai prestasi ladang terutamanya daripada segi kesihatan dan prestasi pembiakan dan untuk mengenal pasti faktor berisiko yang berkaitan.

Tujuan ladang ini dibina adalah untuk pengajaran, pameran awam dan sebagai model ladang contoh bagi penternak. Kajian ini melibatkan analisis retrospektif ke atas rekod prestasi lembu pedaging antara 2011 sehingga 2014. Jumlah lembu pedaging di ladang ini dalam tempoh tersebut adalah 516 iaitu 300 ekor kacukan Kedah-Kelantan

(KK x) dan 216 ekor kacukan Brangus campuran. Masalah utama kesihatan membabitkan luka (47%), ketempangan (19%) dan haemoparasit (7%). Purata kadar kematian adalah $6.52 \pm 9.4\%$, di mana kematian yang paling tinggi direkodkan pada tahun 2014 (20.5%) disebabkan oleh panahan petir. Purata kenaikan berat badan harian adalah 0.39 ± 0.12 kg bagi Brangus x dan 0.33 ± 0.012 kg bagi KK x. Purata jarak kelahiran bagi KK adalah 426 ± 53 hari ($n=7$) dan bagi Brangus pula adalah 439 ± 141.37 hari ($n=9$). Tiada perbezaan yang signifikan antara kedua baka bagi purata tempoh melahirkan anak ($p > 0.05$). Namun, KK menunjukkan bunting pertama pada umur yang lebih muda (1249 ± 127 hari) berbanding Brangus (1373 ± 125 hari). Taburan hujan menunjukkan perkaitan positif yang signifikan ($p < 0.05$) dengan ADG bulanan. Cadangan mengenai pelbagai aspek untuk meningkatkan prestasi ladang telah diberikan dalam perbincangan.

Kata kunci: lembu pedaging, taburan hujan, prestasi ladang, faktor berisiko, Kedah-Kelantan, Brangus

1.0 INTRODUCTION

Livestock sector plays an important role in the economy and agriculture of a country. Thus, healthy growth of the beef industry warrants major impact of ruminant subsector and also livestock sector as a whole (Tapsir et al., 2008).

Cattle population in Malaysia had showed slight decreasing trend from 860,491 in 2009 to 751,781 in 2013, contributing only 23% of the livestock population (DVS, 2013). Despite the decreasing trend of the cattle population, consumption of beef by Malaysian had increased from 149,256 metric tonnes in 2009 to 180,835 metric tonnes in 2013 (Table 1). To cope with the local demand, live cattle and beef were imported mainly from Australia and India, which causes negative balance of trade and preventing the growth of local beef industry (Tapsir et al., 2008). Therefore, there is need to improve the performance of beef cattle at local farms and eventually reducing the need of importation. One of the ways for improvement is via on-farm evaluation. On-farm evaluation covers the whole components of farm environment and factors that limit production in the system. The results of these evaluation improve our understandings on the farm situation, thus improvement can be made where possible.

Table 1: Annual consumption of beef

Years	2009	2010	2011	2012	2013
Consumption of beef	149,256	154,402	167,388	173,815	180,835

*Source: Department of Veterinary Service, 2014

Therefore, the objectives of this study are:

1. To measure the performance of beef cattle based on the farm records, particularly the health, growth and reproductive performances
2. To identify the risk factors that limit the performance of the beef cattle in the farm



2.0 LITERATURE REVIEW

2.1 The beef industry in Malaysia

As of year 2013, there has been an increased in the consumption of beef (cattle & buffalo) among Malaysians. However, the Malaysian beef industry is decreasing from year to year, particularly in term of population. Thus, the national output of beef is less than the local consumption. Overall, local beef production contributes only 29.5% self-sufficiency, which consequently lead to 72.4% import dependency ratio for beef products (Table 2) (DVS, 2014). The slow growth rate of local beef industry as compared to the growth in consumption has encouraged higher imports of cheaper beef from other parts of the world. This was obviously an unfavorable trend and if continuous, the long-term governments' objective to reduce import from food sector cannot be accomplished (Tapsir et al., 2008).

Table 2: Scenario of Malaysian Beef Industry

Parameters	Average (2009-2013)
Consumption of beef products	165,139 M.ton
Output of beef products	48,528.2 M.ton
Self-sufficiency	29.5 %
Import dependency ratio	72.4%

*Source: DVS, MOA 2014

2.2 Breeds of beef cattle

2.2.1 *Kedah-Kelantan breed*

Kedah-Kelantan (KK) cattle, which is the Malaysian Zebu cattle has firm body and can be recognized in several color coats including brown-black, brown and yellowish (Romaino et al., 2014). Kedah-Kelantan cattle are readily found in Malaysia as they are an indigenous species used in agricultural and commercialization practices in this country. Until 1999, the population contributed almost 30% of beef cattle reared in Malaysia (Yasir, 1999). Generally, they were managed either by rotational grazing, traditional tethering or feedlot system. The dressing percentage can reach 45%. They have good reproductive performance in the tropic and hot climate like Malaysia and quite resistant to many diseases (Yasir, 1999). Eventually, KK breed was attempted to be upgraded by crossbreeding with other high performance breeds such as Brahman and Nallore.

2.2.2 *Brangus*

In 1932, the US Department of Agriculture studied the performance of Brahman and Angus crossbred cattle. The crossbred is now standardized at 3/8 Brahman and 5/8 Angus blood and is known as Brangus (Esminger & Perry, 1997). Brangus cattle are black, thin hide with smooth, sleek coat of short hair. They have wide muzzled, polled and strong head. They also possess the Brahman influence, which have extra length of ear and looseness of hide. Brangus are heat tolerant with good beef production parameters (Bexter, 1998). The cows are good mothers and easily produce medium-

sized calves (Esminger & Perry, 1997) with high volume of milk, which is enough for calves to having high weaning weights. For bull, Red Brangus do well with most crossbreeding programs that result in maximum hybrid vigor (South Texas Red Brangus).

2.3 Beef cattle performance indicators

2.3.1 *Health performance*

Health is essentially governed by the interaction between the animals, environment and agent of disease. Effective disease control will involve restricting movement and encouraging the development of immunity to the principal disease in the area. Philips (2009) suggested that bringing a group of cattle intensively presents one of the most severe challenges to their health, as the contact between animals is increased by close proximity. However, the nutrition of intensive cattle usually is better than extensive, thus the ability to fight pathogen may greater in intensive cattle as the immune system functions best in well-nourished animal (Chandra, 1997). Sickness and death in young beef calves following introduction into the feedlot are major problems for the feedlot manager. The "shipping fever-complex" is the most frequently occurring syndrome and cause of death. Martin et. al (1981) found that most of the deaths in this complex were attributed to pneumonias, particularly fibrinous pneumonia and thromboembolic meningoencephalitis. The study also found that separating the new

purchasing groups of cattle according to breed of cattle on or after arrival of cattle was able to reduce mortality in this group of animal.

2.3.2 *Growth performance*

According to Saunder's Comprehensive Veterinary Dictionary 3rd Edition, growth is defined as the progressive increase in size of a living thing until reaches its point of complete physical development. In beef farmers view, growth is more likely define as an increase in saleable live weight until mature size. The growth of cattle demonstrates a focus on different tissues at different times with nervous tissue first, then bone, muscle and finally fat tissue. Thus, animals on a high plane of nutrition throughout their life end up with a higher fat content at a given live weight because they enter the fat growth stage earlier. Growth of cattle usually following sigmoidal shape. The growth slows down as the animal reaches mature weight, thus the feed conversion ratio increase as cattle become older. Therefore, it is important to slaughter cattle at an early age to achieve an efficient use of feed resources. Bulls have a low dressing percentage compared to cow because they have large heads relative to the rest of their bodies. Therefore, in practice, bulls usually slaughtered at a heavier weight than cow. Measuring growth by weighing cattle is the simplest method of determining growth performance though not really accurate due to the fluctuations in gut fill, which comprises up to 25% of total weight in the adult animal. The rapid passage of feed through the gastrointestinal tract is accompanied by a reduction in the animal's live weight (Philips, 2010).

2.3.3 Reproductive performance

Reproductive performance is the trait of importance in beef cattle enterprises, where the economic return is depend on number of calf produce. The best cows are clearly those that have their first calf at an early age and have minimum calving intervals, other than live a long period of time (Food and Agriculture Organization, FAO). First calving marks the beginning of a cow's productive life. According to International Livestock Research Institute (ILRI), the average age at first calving in *Bos indicus* cattle is about 44 months, compared with about 34 months in *Bos taurus* and *Bos indicus x Bos taurus* crosses in the tropics. Calving interval is the best index of a cattle herd's reproductive efficiency (ILRI). Calving interval can be divided into three periods: gestation, postpartum anoestrus (from calving to first oestrus) and the service period (first postpartum oestrus to conception). Gestation is the period from conception to parturition. Estimates of the gestation length among *Bos indicus* cattle average 279 days, while for *Bos taurus* is within the range of 273-292 days (Nogalski, 2012; Andersen and Plum, 1965). The length of the postpartum anoestrous and service periods is the part of the calving interval that can be shortened by improved herd management. It suggested to rebreed *Bos indicus* cow within 73 days after calving whereas rebreed *Bos taurus* cow within 83 days post calving to maintain a yearly calving interval. This differences in rebreeding period is due to the longer calving interval in Zebu cow by 10 days compared to *Bos taurus* (Randel, 2005).

2.4 Geographical factors that influence farm performance

There are several geographical parameters that need to be considered for fattening area (Yasir, 1999).

2.4.1 *Temperature*

Cattle are sensitive to drastic change in temperature. When temperature is high, feed intake may be lowered by up to 30% leading to slower growth rate and decreased production (Ensminger & Perry, 1997). Fluctuating temperatures affect the physical appearance of cow, which is also not suitable for production. In general, cattle are comfortable and easily grown in areas with temperature between 10 and 27°C.

2.4.2 *Rainfall*

Rainfall is usually correlated with the environmental temperature. The temperature is lower during rainy season, and rainfall affects the growth of green living in the grazing area. When rainfall is reduced, the grass becomes dry with low nutrient content. On a dry matter basis, the crude protein content of mature weathered grasses may be 3% or less (Ensminger & Perry, 1997). On the other hand, when the rainfall is high, the grazing area is contaminated with stagnant water and mud. Extensive precipitation and muddy conditions can depress feed intake up to 30% (Ensminger & Perry, 1997). Diseases, especially pneumonia can also easily spread during wet weather. Generally, the ideal location for fattening area is the area, which have rainfall within 800 to 1500mm annually.

2.4.3 *Wind Direction*

Wind is the main vector for various types of pathogen and diseases. Therefore, it is advisable to build the shelter opposite to the direction of the wind to prevent pathogen and disease infection in the farm. It is also advisable to plant trees to block wind direction.

2.4.4 *Humidity*

The appropriate level of relative humidity suitable for fattening activity is within 60 to 80%. High humidity area is able to promote the growth of parasite and pathogen, while low humidity (dry) can lead to dusty, dirty air which able to speed up the transmission of disease (Yasir, 1999)

2.4.5 *Altitude (topography)*

The altitude can directly affect the temperature, number of rainfall, humidity, water supply, and transport facilities of an area. If the fattening are located over the hill, it will increase transport cost and production costs. The ideal location for fattening area is close to the river as source of fresh drinking water for cattle as well as well for easier cleaning of cattle and pen.

3.0 MATERIALS AND METHODS

3.1 Study area

This study was carried out at the Beef Cattle Unit, Ladang 16, Taman Pertanian Universiti, Universiti Putra Malaysia. The farm consisted of 216 head of Brangus crossed (Brangus x) and 300 head of Kedah-Kelantan crossed (KK x) of various age. The farm practiced semi-intensive system, which included rotational grazing for adult breeders and feedlotting for calves. For rotational grazing, the farm allotted 7 grazing areas that capable of completing grazing period between 3 and 5 weeks per area. The grazing areas were planted Signal grass (*Brachiaria decumbens*), which were fairly maintained.

The feedlot system was applied mainly on calves, but post-partum, sick and quarantined animals were also subjected to feedlotting. Guinea grass (*Panicum maximum*) or Napier (*Pennisetum purpureum*) were cut and carry for the feedlot cattle under the intensive system. During rainy season, however, the farm practiced intensive system for all groups of cattle and was fed palm kernel cake (PKC) at the rate of 1kg/animal/day. Natural mating was used for breeding at the ratio of 1 male to 20 females (1:20) within the identified breeding seasons. Two breeding seasons were identified; April to May and October to November. Breeder cows were allowed to breed between April to May and those that failed to conceive were bred again between October and November. This was to prevent calving during rainy season between October and December that lead to environmental stress on dam and newborn calf.

Deworming and deticking were carried out every 4 months and vaccinations for foot and mouth disease (FMD) and haemorrhagic septicaemia (HS) were carried out every 6 months.

3.2 The farm evaluation

3.2.1 *Data collection*

Data were collected from farm records between 2011 and 2014 following ISO certification in 2011. Prior to 2011, the records were incomplete. Other than records, data were also collected through interview with the farm supervisors, especially on farm management, herd-health programme, feeding of the cattle and breeding protocol. Data on monthly rainfall, temperature and relative humidity between 2011 and 2014 were retrieved from the Department of Meteorology Malaysia. Field visits were made to gather information about the risk factors that could limit the farm performance.

3.2.2 *Derivation of parameters*

The farm performances were evaluated following determination of the parameters according to following the calculations:

Health parameters

1. Number of treatment cases
2. Number of health problems based on the number of problem in a treatment case. An individual animal may have more than one problems

3. Monthly mortality rate =
- $$\frac{\text{Number of deaths in the month}}{\text{Number of animals at end of the month}} \times 100$$
4. Annual rate of mortality =
- $$\frac{\text{Number of deaths in a year}}{\text{Number of cattle in December of that year}} \times 100$$

Growth performance parameters:

1. Birth weight (kg)
2. Monthly Body Weight (kg)
3. Monthly Average Daily Gain (ADG) (kg) =
$$\frac{\text{Bodyweight at } n+1 \text{ month} - \text{Bodyweight at } n \text{ month}}{30 \text{ days}}$$
4. Overall ADG (kg) =
$$\frac{\text{Total Monthly ADG}}{\text{Total number of ADG calculated (n)}}$$

Reproductive parameters:

1. Age at first calving =
$$\text{First calving date} - \text{Birth date}$$
2. Calving interval =
$$\text{Time between two successive calving}$$

3. Calving percentage per year =

$$\frac{\text{Number of calving per year}}{\text{Number of breeder cow in December of that year}} \times 100$$

4. Calves born per month percentage =

$$\frac{\text{Number of calves born in the month}}{\text{Total number of calves born in the year}} \times 100$$

3.3 Data processing

Data on performance were organized, summarized and analyzed by using Microsoft Excel 2013. T-test was used to test for the significant different of the performance while Pearson's correlation test was used to identify the significant correlation between risk factors and farm performance by using SPSS ver. 21. For this study, the data were considered significant when p is less than 0.05.

3.3.1 Evaluation

The results were compared with the standard obtained from the literature.

3.3.2 Assumptions

Three assumptions were made for this study:-

- i. All available data were accurate
- ii. The farm management model was accurate
- iii. The farm was in a sub-optimal production

3.4 Hypotheses

For the farm performance, the null hypothesis was there is no different on performance of the farm throughout the years.

For the risk factors study, the null hypothesis was there is no correlation between risk factors and farm performance.



4.0 RESULTS

4.1 Farm performances

The performance of the farm was divided into 3 parts, which were health, growth and reproductive performances. The performances were compared with performance of other farms found in literature review.

4.1.1 Health performance

The numbers of treatment case showed a reducing trend throughout the study years except in 2013, which increased significantly (Fig. 1). Most (110 cases) involved Brangus x compared to only 15 cases involving KK x. Out of 137 treatment cases analysed, the top three problems in this farm were wound and injury (64 cases or 47%), lameness (26 cases or 19%) and suspected haemoparasites (9 cases or 7%) (Table 3).

Figure 1: Number of treatment cases between 2011 and 2014

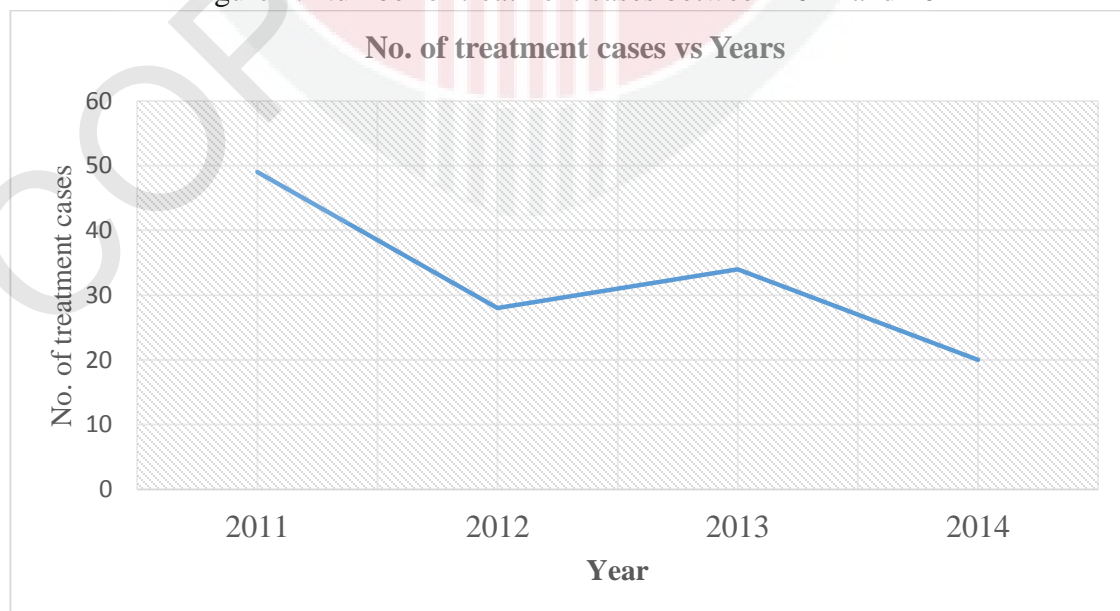


Table 3: Problems faced by the beef cattle in the farm

No.	Problems	Year				Total
		2011	2012	2013	2014	
1	Wound and injury (horn injury, lacerated wound, Maggot wound, abscess, swelling, hematoma, aural abscess)	25	14	14	11	64
2	Lameness	12	3	6	5	26
3	Suspected Haemoparasites	2	1	4	2	9
4	Otitis, otitis externa	0	5	1	1	7
5	Navel ill	1	0	2	2	5
6	Respiratory problem (URTI)	4	0	1	0	5
7	Diarrhea	2	1	1	0	4
8	Phosthitis	1	1	1	0	3
9	Stunted growth & Wasting disease	0	1	1	1	3
10	Prolapse (cervico-vaginal and vaginal prolapse)	0	1	1	0	2
11	Wart (papillomatosis)	0	1	1	0	2
12	Nervous sign	1	0	1	0	2
13	Abortion, retained placenta, metritis	0	0	1	0	1
14	Dystocia	1	0	0	0	1
15	Orchitis	0	0	1	0	1

16	Umbilical hernia	0	1	0	0	1
17	Dermatitis	1	0	0	0	1
Total		50	29	36	22	137

The average rate of mortality for the 4-year study period was $6.52 \pm 0.09\%$ (Fig. 2). The mortality was highest in 2014, which was 21% mainly due to an episode of indirect struck by lightning (Fig. 3).

Figure 2: Annual rate of mortality

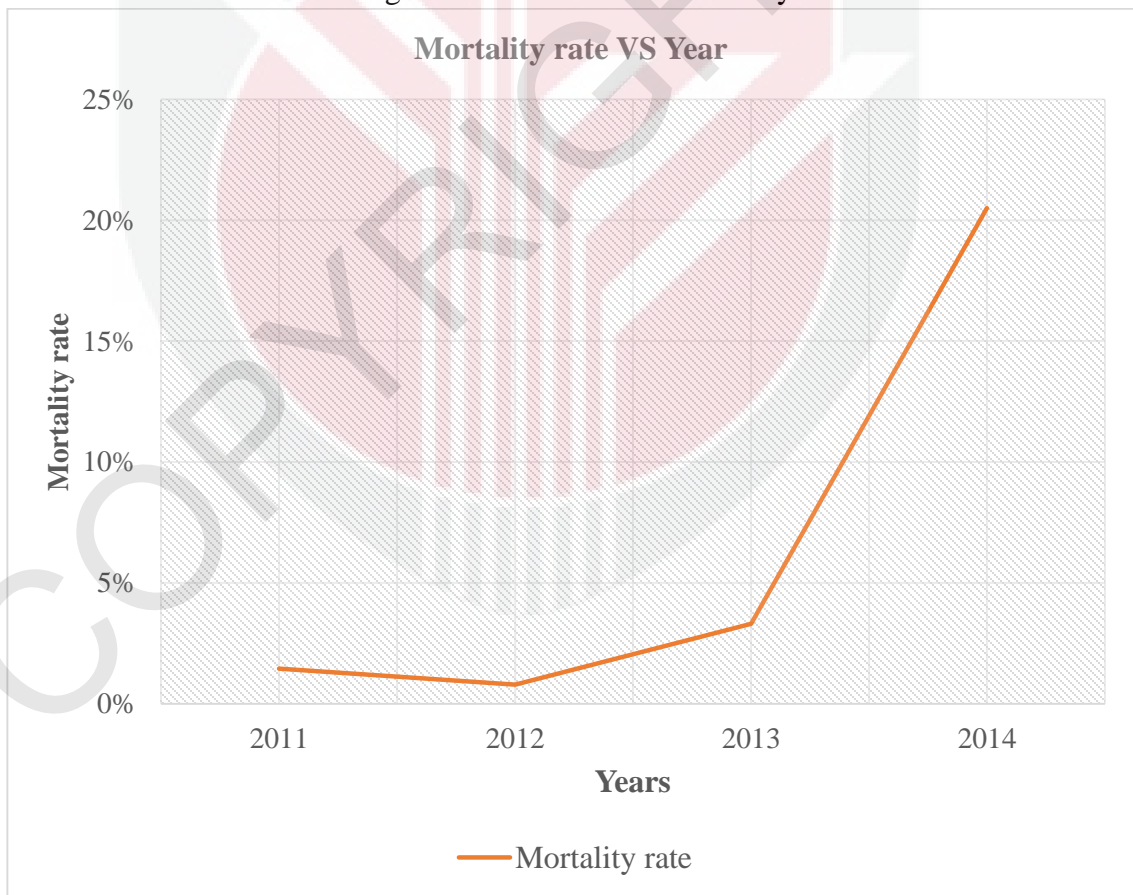
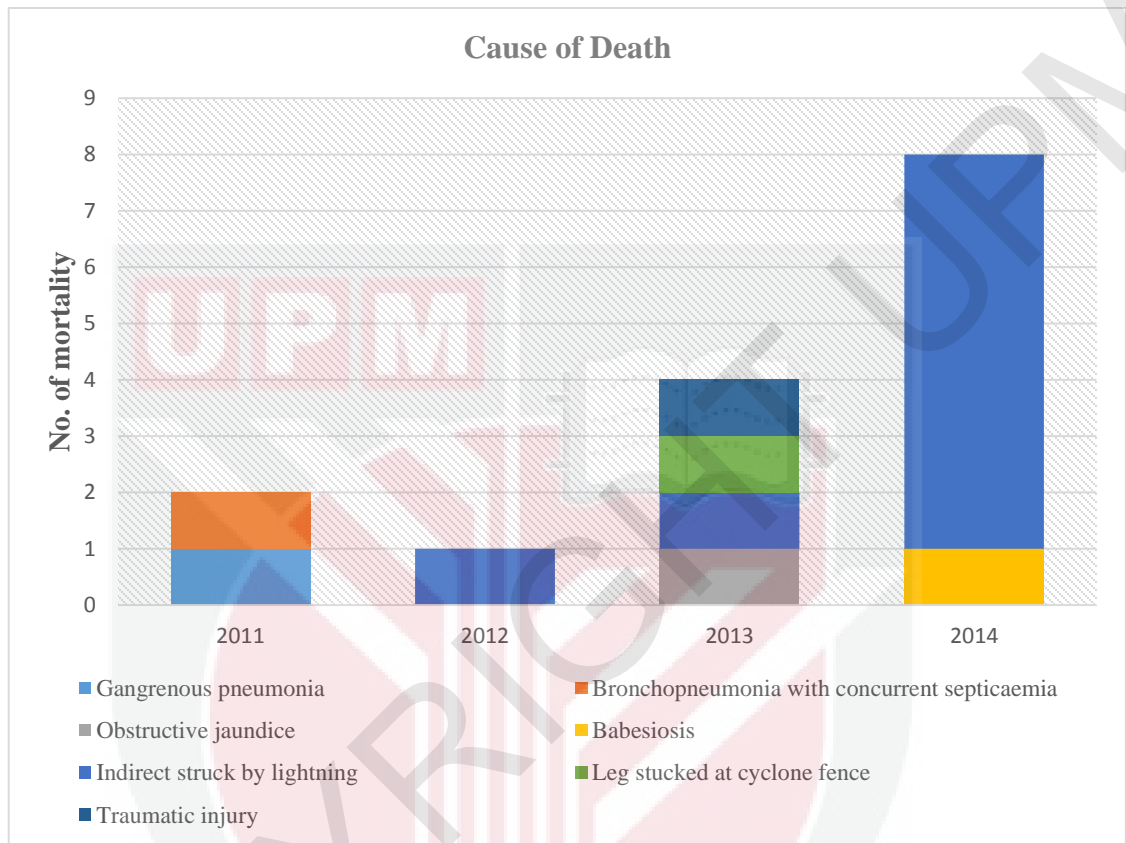


Figure 3: Common causes of death of beef cattle at Taman Pertanian Universiti



4.1.2 Growth performance

The monthly bodyweight patterns were similar for both Brangus x and KK x before 11th months old. However, the growth of more than 12th months was significantly ($p < 0.05$) better in Brangus x than the KK x (Fig. 4) except at 18th, 20th, 21st and 23rd months (Table 4). Similarly, the average daily gains (ADG) by Brangus x were significantly ($p < 0.05$) higher than the KK x from 1 to 10 months except for the 5th and 6th months (Fig. 5). After 11 months, the differences were no significant ($p > 0.05$). Highest ADG for KK x was between 4 and 5 months old, while the highest ADG for Brangus x was between 1 and 2 months old.

Figure 4: Monthly growth pattern of KK x and Brangus x

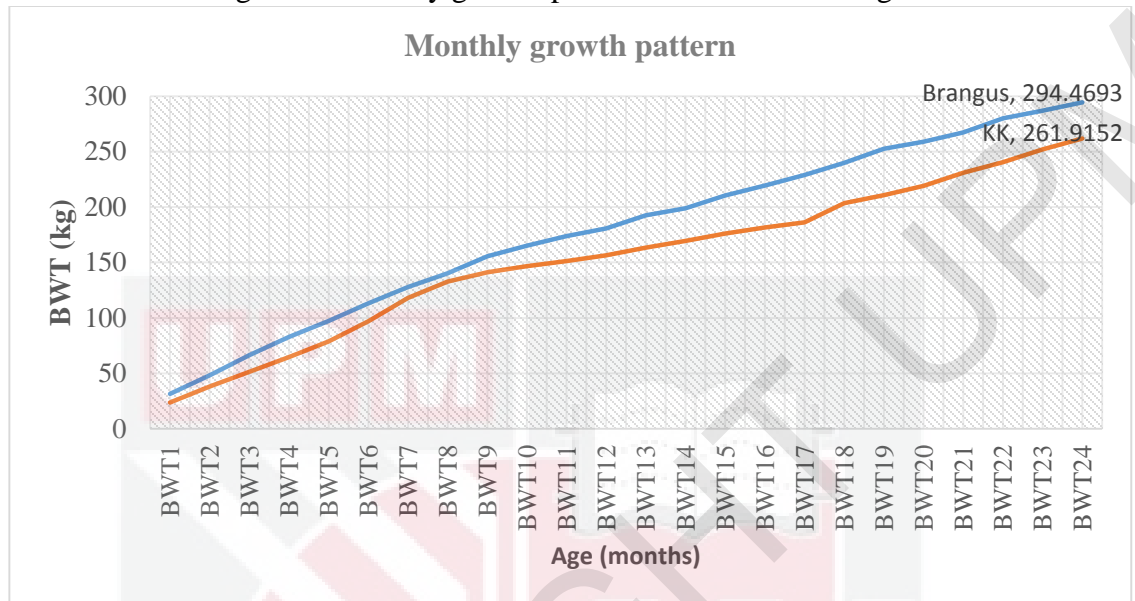
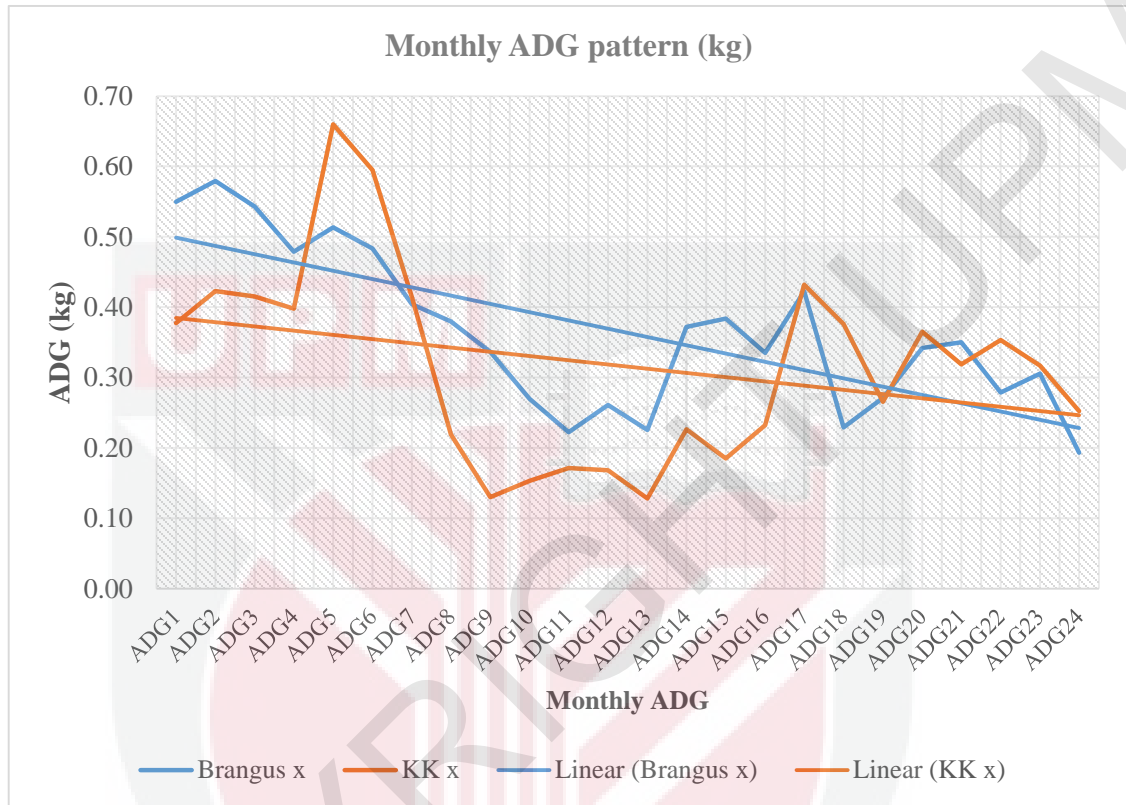


Table 4: Bodyweights of Brangus x and KK x at selected age

Age	Sex	Brangus x			KK x		
		Mean (kg)	SD	N	Mean (kg)	SD	N
Birth weight	Male	25.79 ^a	4.57	45	29.71 ^b	10.62	33
	Female	27.78 ^a	7.28	32	26.33 ^b	7.95	30
Prewean (7 m.o.*)	Male	120.04 ^a	26.91	47	117.82 ^a	28.89	42
	Female	120.67 ^a	24.17	36	118.56 ^a	26.17	36
1 year old	Male	173.6 ^a	35.48	35	161.23 ^b	26.79	39
	Female	177.04 ^a	31.6	26	160.22 ^b	31.77	35
2 year old	Male	295.88 ^a	36.83	19	251.91 ^b	41.92	17
	Female	291.13 ^a	39.96	8	272.54 ^b	32.16	16

*m.o. - months old; ab – significant difference ($p < 0.05$); aa, bb – no significant difference ($p > 0.05$)

Figure 5: Monthly ADG pattern for KK x and Brangus x



4.1.3 Reproductive performance

The calving rate revealed increasing pattern throughout the study period except in 2014 (Figure 6). The average calving percentage per year was 71.3%; 84% for KK x and 57.8% for Brangus x (Table 5). When compared between Brangus x and KK x, KK x was found to perform better since the first calving age was younger (1249 ± 127 days for KK x and 1373 ± 125 days for Brangus x) and the overall calving interval was shorter at 369 ± 32 days for KK x compared with 437 ± 40 days for Brangus x (Table 6-7).

Figure 6: Annual calving rate

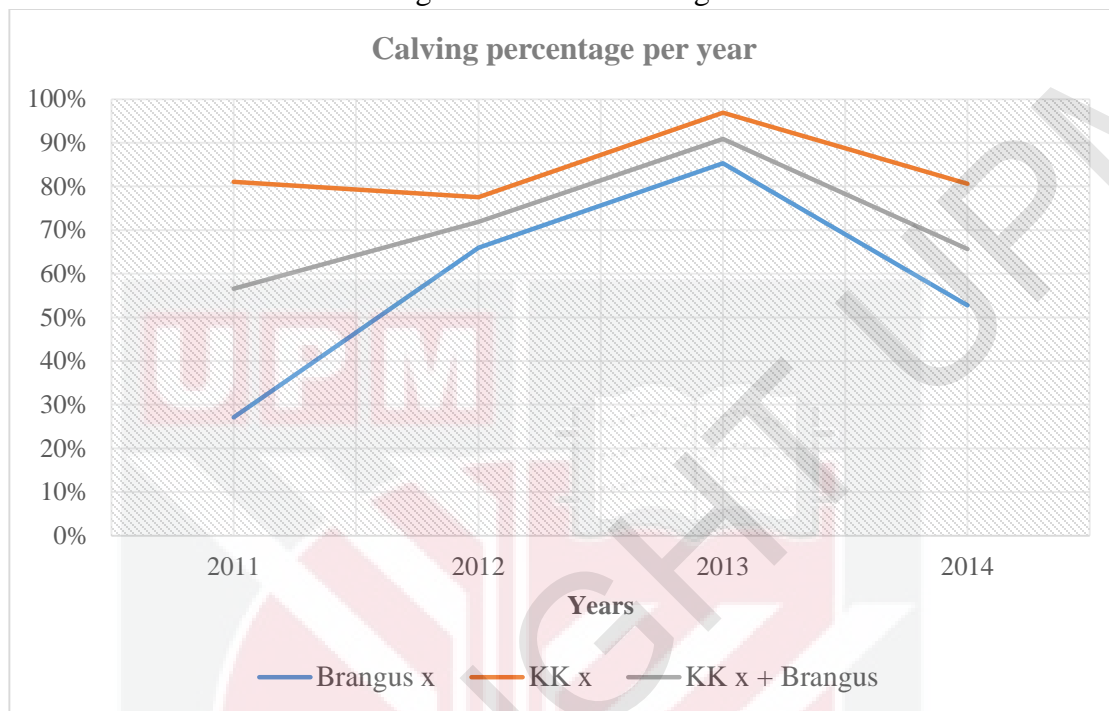


Table 5: Average calving % for 2011-2014

Breed	Brangus x	KK x	Overall
Average calving% per year	57.8%	84.0%	71.3%

Table 6: Age at first calving of Brangus x and KK x

Breed	Brangus x (n=9)	KK x (n=7)
Age at 1 st calving (days)	1373±125 ^a	1249±127 ^a
Mean±SEM		

Table 7: Calving interval of Brangus x and KK x

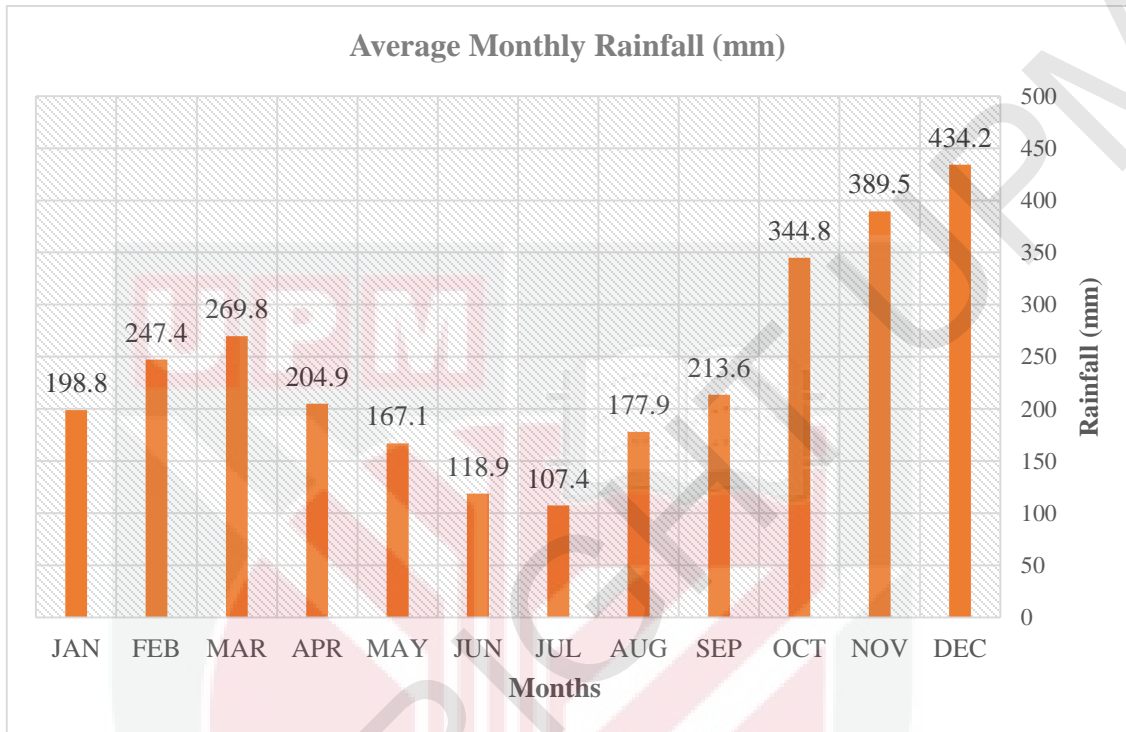
Calving interval	Brangus X			KK X		
	Mean (days)	SEM	N	Mean (days)	SEM	N
1st (between 1 st and 2 nd calving)	432 ^a	32	9	400 ^a	32	6
2nd (between 2 nd and 3 rd calving)	463 ^a	131	3	305 ^a	65	3
Average	437 ^a	40	12	369 ^a	32	9

aa – no significant different ($p>0.05$)

4.2 Risk factors

Figure 7 shows the average monthly rainfall during the study period between 2011 and 2014. Generally, there was no significant ($p>0.05$) correlation between the rainfall and the numbers of treatment cases ($r=0.31$, $p=0.17$), the rate of mortality ($r=0.18$, $p=0.43$) and the monthly rate of calving for both breeds (Brangus x: $r=-0.25$, $p=0.25$; KK x: $r=-0.34$, $p=0.125$) (Figures 8-10). Only the monthly ADG for both breeds showed significant ($p<0.05$) correlation with the rainfall (Figure 11).

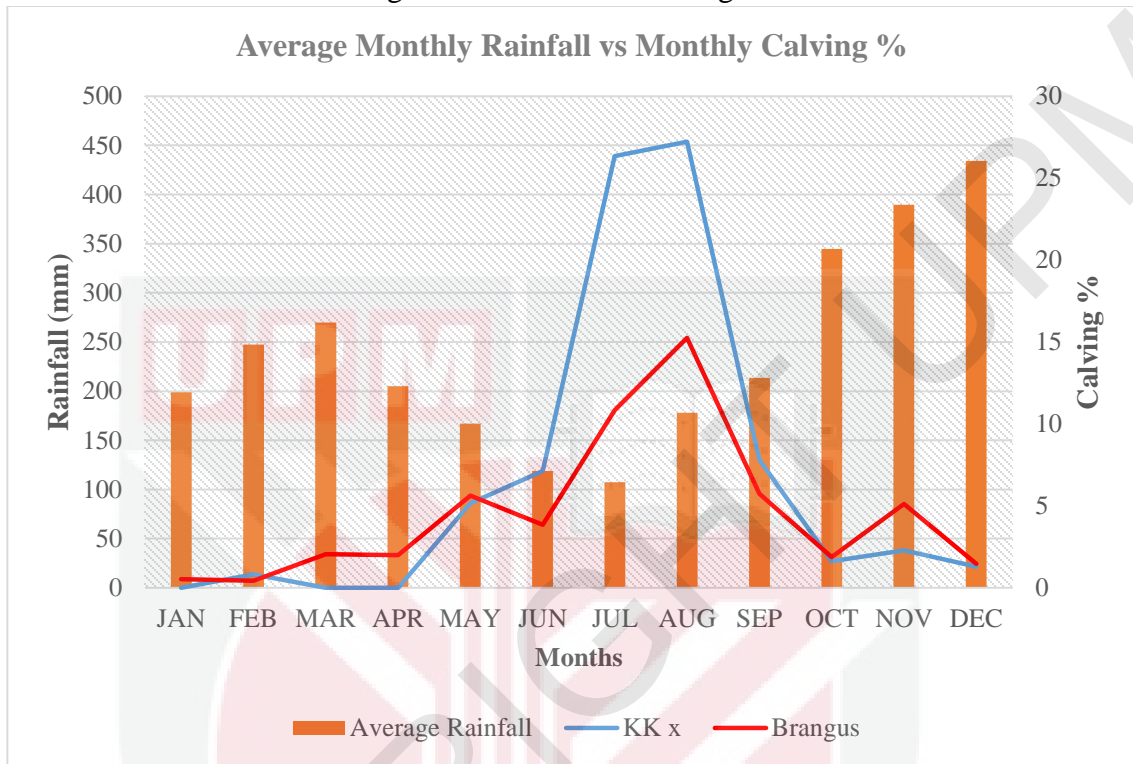
Figure 7: Average monthly rainfall in Serdang between 2011 and 2014



Station: PUSAT PERTANIAN SERDANG
Latitude: 3° 00' N
Longitude: 101° 42' E
Elevation: 44 mm

*Courtesy of Malaysian Meteorological
Department (MMD)

Figure 8: Rainfall vs Calving rate



Breed	Brangus x	KK x
Pearson correlation (R)	- 0.254	- 0.337
Sig. (p)	0.254	0.125
N	22	22

Figure 9: Rainfall vs Number of treatment cases

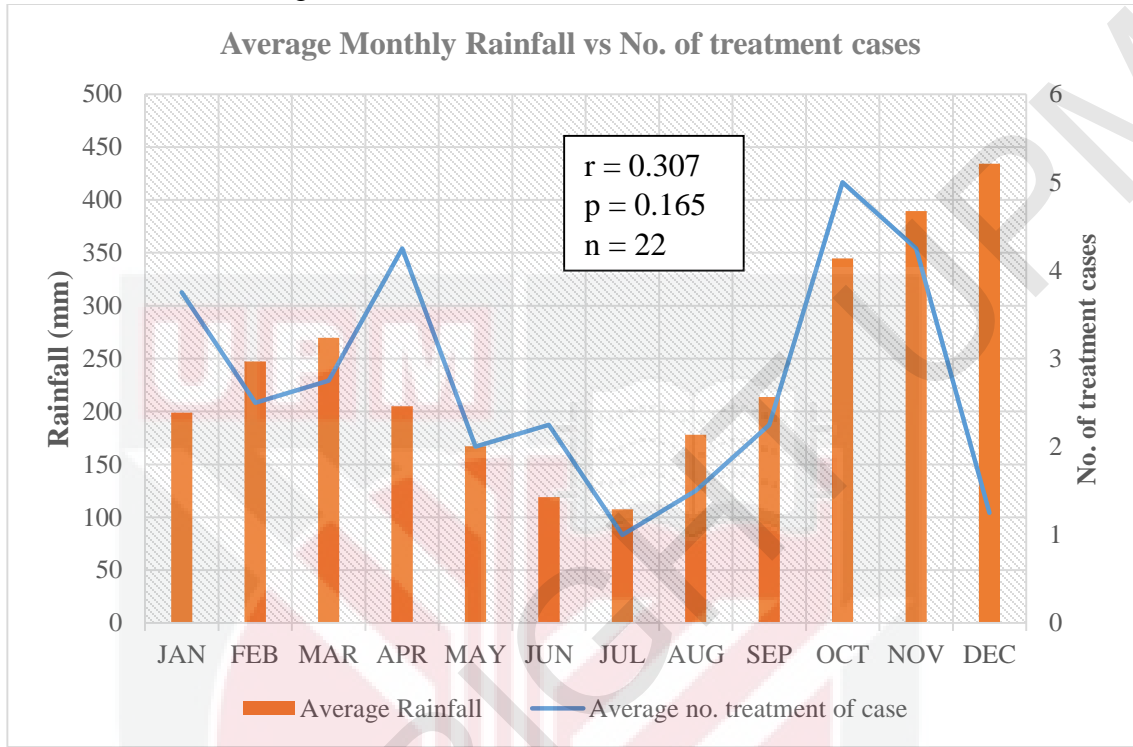


Figure 10: Rainfall vs Mortality rate

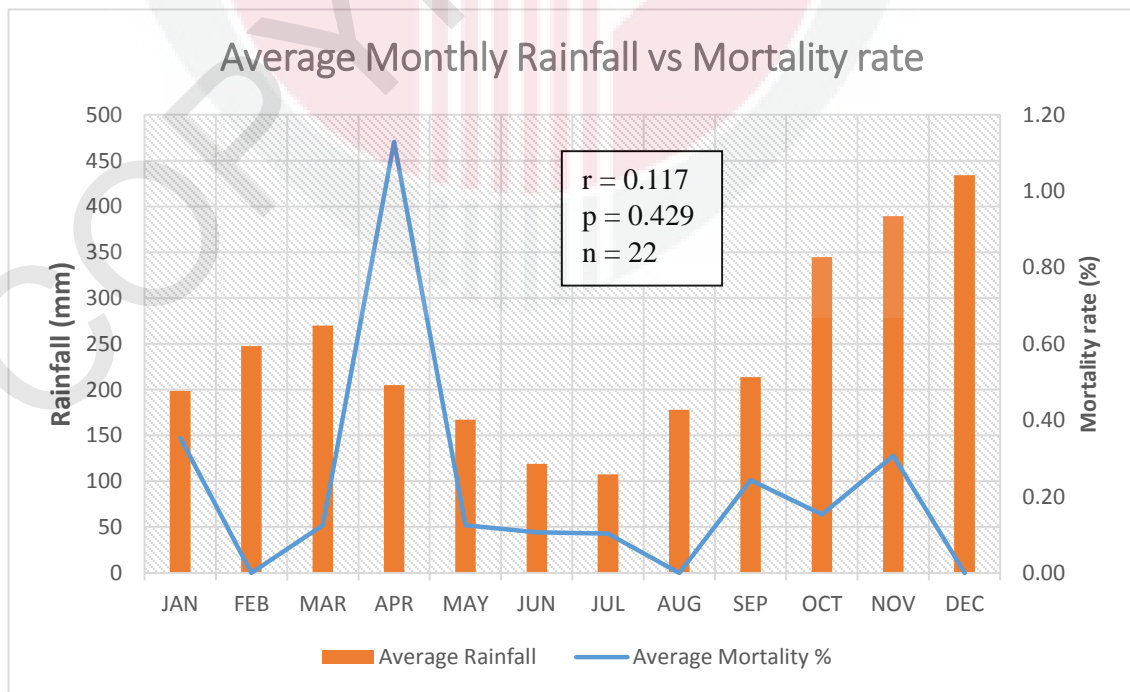
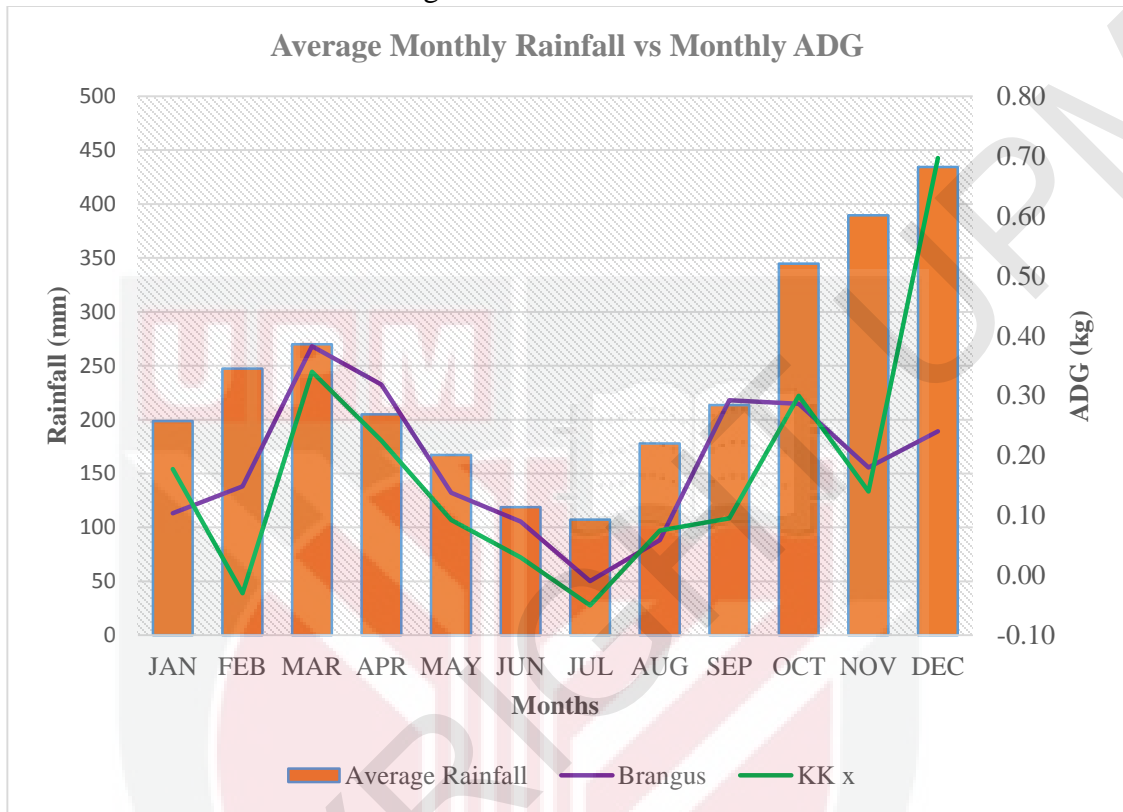


Figure 11: Rainfall vs ADG



Breed	Brangus x	KK x
Pearson correlation (R)	0.481	0.561
Sig. (p)	0.023*	0.007*
N	22	22

*significant correlation (p<0.05)

5.0 DISCUSSION

This study revealed that most treatment cases involved Brangus x, which is consistent with previous study by Yasir (1999) who concluded that Kedah-Kelantan is resistant to many diseases with less health problems. This is because they have adapted well with the local environment compared to Brangus.

The major health problem with the beef cattle at Taman Pertanian Universiti was the wound and injury that contributed to 48% of the total treatment cases. Bulls in the farm usually get wounded following bullfight, which is considered normal behaviour for intact males due to the presence of testosterone (Price, 2008). To reduce fighting, extra bulls should be removed from the breeding herd and managed in feedlot system. They are only allowed to roam during breeding season. Furthermore, bulls of similar age groups should be kept together to allow socialization and establish the pecking order in the herd (Dairy Australia). Wounds were also observed to involve calves, mainly from ear tagging. The problem can be prevented by proper treatment and hygiene of the farm (Jackson & Cockcroft, 2002).

The annual mortality rate for this farm was within the acceptable level of below 10% except in 2014 (21%), due to unforeseen circumstance of lightning strike that instantly killed 7 animals. A study revealed lightning as the second leading cause of weather-related death in the world (Ritenour et al., 2008). The incidence occurred in April, which is one of the lightning strikes in this country. The other peak is in

November (Pakiam et al., 1981). A flash-to-thunder interval of less than 30 seconds places personnel at risk for lightning strike (Ritenour et al., 2008).

The overall growth performance of KK x in this farm was better than reported elsewhere in the literatures (Yasir, 1999) while Brangus x performed lesser except for birth weight (Paterson, 1981; Nesar et al., 2012). This might be due to the variations in climate since the previous literatures mostly based on temperate climate. The environmental stressors in tropical environment are able to mask the actual performance of temperate breeds (Burrow, 2012). Although the growth performance of Brangus in this farm was lesser than literature, they performed significantly better ($p < 0.05$) than KK in the first 17 months. This is consistent with previous study, which concluded that Brangus has good beef performance and heat tolerance that suit the tropical climate (Baxter, 1999).

The overall calving rate in this farm was slightly lower than 80%. This is due to the older age at first calving for KK, which were 1249 ± 127 days in this study compared to 1023 ± 143 days in other study (Ng, 1987). The calving interval of KK showed no significant difference with other study (Johari, 1993) but longer interval for Brangus with 437 ± 40 days in this study compared to 402 ± 96 described by Paterson (1981). The most possible reason for the longer calving interval is due to breeding management since the farm practiced seasonal breeding to prevent the cow from calving during rainy season. When the period from calving until breeding commenced is long, the calving interval is also longer (Drennan, 2006). Other possible cause of less calving rate is due to inadequate nutrition before and after calving. The cattle on the farm were fed on grass

at all-time except during rainy season. Furthermore, it is difficult to determine either cows on pasture are receiving adequate energy to permit good reproductive performance. Therefore, cows that were given concentrate produced more calves than those given none (Richardson, 1975). However, the reproductive performance in this farm can still be improved through the practice of flushing to increase the energy level. Although KK showed lower growth performance, they showed better reproductive performance than Brangus. This is consistent with literatures, which state that KK has better reproductive performance in tropic and hot weather (Yasir, 1999).

This study revealed that rainfall has significantly positive correlation with monthly ADG. This is in contrast to the previous study by Shae & Hadrich (2012) who showed decreased ADG by 0.36 kg for every additional 25.4 mm of rainfall. The most possible reason for the increase in ADG in this study was the feeding management of the farm where the cattle were given supplemented palm kernel cake during the rainy season. This is consistent with a previous study by Franklin (2011) who concluded that the increased in the level of concentrate supplementation was able to improve the performance of cattle growing on pastures during the dry-rainy transition season.

6.0 CONCLUSION

This study revealed that the top 3 health problems were wound (47%), lameness (19%) and suspected haemoparasites (7%). However, the number of treatment case showed decreasing trend throughout the study years. The mortality rate was at acceptable level of less than 10%. The calving rate was relatively high but the calving interval was slightly longer for Brangus. However, the growth performance of KK was better than literatures while Brangus performed poorer. Eventually, the growth and body weight of Brangus were much better than the KK but KK showed better reproductive performance than the Brangus.

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APPENDICES

Pictures above shows some of the grazing area. Most of the pen have water source which is from river, and also big tree function as shedding.



Pictures on left shows the new coming animal in quarantine yard.