UNIVERSITI PUTRA MALAYSIA

ASSSESMENT OF MATING BEHAVIOUR IN BUFFALO BULLS

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ASSSESMENT OF MATING BEHAVIOUR IN BUFFALO BULLS

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It is hereby certified that we have read this project paper entitled "Assessment of Mating Behaviour Parameters in Buffalo Bulls" by Muhammad Naim Bin Ahmad Diah and in our opinion; it is satisfactory in terms of scope, quality and presentation as partial fulfillment of the requirement for the course VPD4999 – Final Year Project

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Dedicated to my parents,

Ahmad Diah Bin Ngah Yahya, Jamaliah Binti Khamis,

my siblings and my best friends.

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ABSTRAK

Abstrak daripada kertas projek yang dikemukakan kepada Fakulti Perubatan Veterinar untuk memenuhi sebahagian daripada keperluan kursus VPD 4999 – Projek Ilmiah Tahun Akhir.

PENILAIAN TINGKAH LAKU MENGAWAN DALAM KERBAU JANTAN

Oleh

Muhammad Naim Bin Ahmad Diah

2016

Penyelia: Dr. Mohd Shahrom Salisi

Penyelia bersama: Prof. Dr. Abd Wahid Haron

Objektif kajian ini adalah untuk menentukan perbezaan tingkah laku mengawan antara kerbau jantan (*Bubalus bubalis*). Kajian ini telah dijalankan di Pusat Pembiakan dan Penyelidikan Kerbau, Jabatan Perkhidmatan Haiwan dan Perusahaan Ternak, Telupid, Sabah. Empat ekor kerbau jantan dan enam belas ekor kerbau betina yang tidak hamil telah dipilih untuk kajian ini. Kerbau-kerbau jantan dan betina telah dibahagikan kepada empat kumpulan dengan nisbah satu ekor jantan kepada empat ekor kerbau betina. Penyelarasan estrus telah dilakukan ke atas kerbau betina, kemudian dicampur dengan kerbau jantan di dalam padok. Pemerhatian ini dijalankan pada tiga sesi (pagi, tengah

hari dan malam) selama sembilan hari. Tingkah laku mengawan seperti libido, masa tindak balas dan minat seksual diperhatikan dan diskorkan. Sebanyak 10 pengawanan diperhatikan oleh semua empat kerbau jantan sepanjang tempoh pemerhatian. Hasil kajian menunjukkan bahawa skor tertinggi libido adalah 7 daripada 10 dan yang paling rendah adalah 3 daripada 10. Masa tindak balas hanya diperhatikan sekali iaitu 3.8 minit. Dalam minat seksual, tindak balas Flehmen dan menghidu dan menjilat kemaluan adalah yang tertinggi diperhatikan dengan 100% (10 daripada 10). Tingkah laku yang cenderung adalah 90% (9 daripada 10) dan tingkah laku merehatkan dagu diperhatikan sekali daripada 10 (10%). Daripada semua 10 pengawanan, sesi petang merupakan sesi tertinggi direkodkan dengan 5 kali daripada 10 (50%) diikuti oleh 4 kali pada waktu petang (40%) dan sekali pada waktu pagi (10%). Kajian ini menunjukkan bahawa kerbau jantan yang berbeza mempamerkan tingkah laku mengawan yang berbeza dan mengawan pada masa yang berbeza dengan reaksi Flehmen dan menghidu dan menjilat kemaluan merupakan yang tertinggi dalam kepentingan seksual.

Kata Kunci: Kerbau jantan, tingkah laku mengawan, libido, minat seksual, masa tindak balas

ABSTRACT

An abstract of the project paper presented to the Faculty of Veterinary Medicine in partial fulfilment of the course VPD 4999 – Final Year Project.

ASSESSMENT OF MATING BEHAVIOUR IN BUFFALO BULLS

By

Muhammad Naim Bin Ahmad Diah

2016

Supervisor: Dr. Mohd. Shahrom Salisi

Co-supervisor: Prof. Dr. Abd Wahid Haron

The objective of this study was to determine the mating behaviour differences among buffalo bulls (*Bubalus bubalis*). The study was conducted at Buffalo Breeding and Research Centre, Department of Veterinary Services and Animal Industry, Telupid, Sabah. Four buffalo bulls and sixteen non-pregnant buffalo cows were selected for this study. The bulls and cows were divided into four groups with the ratio of one bull to four cows. The cows were oestrous synchronized, then mixed with the bulls in the paddock. The observation was done at three sessions (morning, afternoon and evening) for nine days. The mating behaviour parameters such as libido, reaction time and sexual interest were observed and scored. A total of 10 mating were observed by all four bulls

throughout the observation period. The results showed that the highest score of libido was 7 out of 10 and the lowest was 3 out of 10. The reaction time was only observed once which was 3.8 minutes. In sexual interest, the Flehmen's reaction and sniffing and licking genitals were the highest observed with 100% (10 out of 10). Tending behaviour was 90% (9 out of 10) and chin-resting behaviour was observed once out of 10 (10%). Out of all 10 mating, the highest was in the afternoon with 5 times out of 10 (50%) followed by 4 times in the evening (40%) and once in the morning (10%). This study suggests that different buffalo bulls exhibited different mating behaviour and mate at different time with Flehmen's reaction and sniffing and licking genitals showed the highest in sexual interest.

Keywords: Buffalo bulls, mating behaviour, libido, sexual interest, reaction time

1.0 INTRODUCTION

1.1 Study Background

Buffaloes are important as a source of protein from the meat, milk, and also power supply as draught animals in many countries. According to Mudgal & Sethi (1989), buffaloes are classified into river and swamp types based on habitat and genetic constitution. Several breeds of river buffaloes such as Murrah, Nilli-Ravi and Surti are found in large numbers in India and Pakistan while swamp buffaloes have no recognized breeds as they are physically similar to each other. In 2004, the total population of buffaloes in Malaysia was 138, 098 heads and 95% of them are of swamp type (Abas Mazni et al., 2006). Abas Mazni et al. (2006) also stated that the total population of buffalo in Malaysia has a steady decrease from year 1970 to 2004. Thus, reproduction is one of the important factors in ensuring the increase of buffalo production in Malaysia.

The reproductive behaviour is the behaviour of animals and plays a paramount role in reproduction, affecting both the success of mating and survival of the young *(*Hafez, 1992*)*. According to Fayed (2001), male sexual behaviour in buffaloes is similar to cattle bull but less intense. The sexual behaviour of male buffaloes include libido, reaction time and sexual interest which can be classified as Flehmen's reaction, tending behaviour, chin-resting behaviour, and sniffing or licking genitals. Fayed (2001) explained that normal copulation includes events of the following behavioural elements, courtship, erection and protrusion, mounting, intromission, ejaculatory thrust and ejaculation, and dismounting.

The term “libido” is commonly used to describe the willingness and eagerness of a male to mount and attempt service of a female, while “mating behaviour” describes the performance of the male in the period immediately before, during and after service (Blockey, 1979; Chenoweth, 1981). Both libido and sexual behaviour are less obvious (intense) in buffaloes than in cattle sires, yet they are describable. The early response to the oestrous scent is the Flehmen response which is widespread and prominent in ungulates, including buffalo (Houpt et al., 1991).

This study aims to determine the mating behaviour behaviour differences among buffalo bulls (*Bubalus bubalis*).

1.2 Justification

It is quite difficult to detect male buffaloes mating behaviour unless a thorough observation is done. In Malaysia, there is lack of data and not much study has been done on this area. Therefore, this study was conducted to select buffalo bulls to be used for breeding by using mating behaviour of buffalo bulls.

1.3 Hypothesis

Mating behaviour is different among buffalo bulls.

1.4 Objective

To determine the mating behaviour differences among buffalo bulls (*Bubalus bubalis*).

2.0 LITERATURE REVIEW

2.1 Buffaloes (*Bubalus bubalis*)

Buffaloes have been classified into river and swamp types based on habitat and genetic constitution where the swamp buffalo is a stocky animal that prefers a marshy environment and has 48 chromosomes while river buffalo is massive with curled horns, prefers clear water, and has 50 chromosomes (Mudgal & Sethi, 1989). In many countries, the domestic water buffalo (*Bubalus bubalis*), are important farm animals, since they are used for meat and milk production as well as a draught animal (Odyuo et al., 1995). According to Bongso & Mahadevan (1989), several breeds of the river buffalo that has been imported into Southeast Asia, predominantly present in India and Pakistan are Murrah, Nilli-Ravi and Surti. The swamp type indigenous to South and Southeast Asia does not have specific breeds and is used mainly for draught and meat (Bongso & Mahadevan, 1989). According to Barker (2014), swamp buffaloes are mostly phenotypically homogenous throughout their distribution which is physically similar to each other. Thus, there are no recognized breeds for swamp buffalo.

Kumar et al. (2004) explained that Murrah buffalo cows produce around 2000 kg of milk in a lactation and are widely used for cross breeding to upgrade local buffaloes in many parts of the country. Swamp buffaloes produce around 500 kg of milk in a lactation with average fat of 8.48 percent and are primarily reared for draught purpose (Kumar et al., 2004). Despite being fed with low quality roughage and often reared in

backyard, the buffaloes produce high quantities of energy rich milk with high content of fat and protein (Fayed, 2001).

The swamp buffalo, the largest distribution is found in the rice-growing countries of Southeast Asia, is not adaptable in comparisons to river buffalo as the ancestors were found only in swampy and marshy areas and in hot climates (Marai & Haeeb, 2010). It has been reported that swamp animals can plough with higher speed and work on average 86 to 122 days a year in the Philippines and Thailand (Ranjhan, 1987; Sethi, 2004). Sethi (2004) also stated that buffalo males of Murrah breed have efficient capacity especially for load pulling and ploughing in rice cultivation.

2.2 Mating Behaviour of Buffalo Bulls

The reproductive behaviour of animals plays a paramount role in reproduction, affecting both the success of mating and survival of the young (Hafez, 1992). Sexual behaviour of males and females, stimuli eliciting male sexual behaviours, sex drive (libido), patterns of female sexual behaviour and intensity of oestrus have been reviewed (Mloszewski, 1983; Estes, 1992; Hafez, 1992; Jainudeen and Hafez, 1992; Gordon, 1996; Albright and Arave, 1997 and Qureshi et al., 2000). According to Hafez (1992), variety of courtship patterns, display, motor activities and postures are directed to bring the male and female gametes together to ensure fertilization, pregnancy, and propagation of the species.

Male sexual behaviour in buffaloes is similar to cattle bull but less intense (Fayed, 2001). According to Jainudeen and Hafez (1992), libido is reduced during the

hotter period of the day, particularly in the swamp buffalo. Normal copulation encompasses sequence of the following behavioural elements, courtship, erection and protrusion, mounting, intromission, ejaculatory thrust and ejaculation, and dismounting (Fayed, 2001).

Tending behaviour is a common sexual behaviour displayed by buffalo bull during precopulatory period (courtship) (Fayed, 2001). Estes (1992) has stated that the bull will maintain close bodily contact and mingle around with female in oestrus and stay near her. Tending male may lose interest, other bulls that visually recognize the tending behaviour may come up and replace the first animal (Mloszewski, 1983). It is a behaviour often shown by the male while consorting with the female before and during oestrous (Fayed, 2001).

Sniffing and licking the female's genitalia are the most frequent patterns, suggesting an important function of chemical communication through olfaction (Fayed, 2001). The male smells the female's urine which contains pheromones (Fraser and Broom, 1990). According to Fayed (2001), there will also a present of tactile stimulation made by nuzzling and licking the perineal region of the female. The early response of the bull to the oestrus scent is "Flehmen" which is widespread and prominent in ungulate, including buffaloes (Houpt et al., 1993). This behaviour consists of a forward extended neck and muzzle, the upper lip curled up exposing the gums and teeth (Hafez, 1992) with constricted nares (Gordon, 1996) or closed nasal apertures (Sule et al., 2001) and the head is elevated (Jainudeen and Hafez, 1992).

According to Hill (1990), a tending bull tests the cow's readiness to stand and be served by licking and sniffing and when the female becomes established with oestrus, the "chin-resting behaviour" becomes more frequent. According to Fayed (2001), chin-resting behaviour usually appears before mounting as the bull positions himself at the back of the cow and raises his head, so that his chin and throat are in contact with the cow's rump. Oestrous cows respond to chin-resting pressure by standing to be mounted (Fayed, 2001).

Fayed (2001) stated that in mounting, the bull quickly shifts his weight to the hind legs, lifts his front parts which are shoulders and fore limbs off the ground and straddles the cow near the middle of her back. The force of muscular contractions during mounting is so strong that the bull's hind legs are often lifted completely off the ground (Albright and Arave, 1997). The copulatory mounting lasts only some tens of seconds in buffaloes (Pathak, 1992). Intromission is performed quickly, the ejaculatory thrust is given with maximum vigour and semen is ejaculated (Fayed, 2001). After ejaculation, the abdominal muscles then relax and the bull dismounts slowly; the penis is soon retracted into the prepuce (Hafez, 1992). Following ejaculation and dismounting, buffalo bulls show a refractory period, which is a state of sexual exhaustion (Fayed, 2001). A quick return to mounting behaviour is shown by males when they are given an opportunity to mate a new oestrous female (Hafez, 1992).

3.0 MATERIALS AND METHODS

3.1 Farm and Animals

The sexual behaviour study was carried out in the Buffalo Breeding and Research Center, Telupid, Department of Veterinary Services and Animal Industry Sabah, Malaysia. Four bulls aged 4 to 13 years old and sixteen cows and heifers (*Bubalus bubalis*) aged 2 to 10 years old were used in this study. The animals were fed with standard diet and water was allowed ad libitum. The farm practiced extensive farming system. Rectal examination of each cow and heifer was performed few weeks before the study was carried out and all of them were confirmed non-pregnant and was not mixed with any bulls since then. The cows and heifers were divided into four groups with one bull each group. Oestrus synchronization was done by using Bioestrovate® (cloprostenol), (500µg), injected intramuscularly, once on all four groups on four different dates. The groups of cows and heifers were then mixed with the bulls respectively with a ratio of one male to four females. The sexual behaviour observation was done for nine days per group.

3.2 Data collection

The sexual behavior of the bulls was categorized into three parameters which are libido, reaction time and sexual interest. The libido of each bull was recorded throughout the whole observation and the scoring was done based on the following:

Score	Description
0	Showed no sexual interest
1	Sexual interest shown only once
2	Positive sexual interest in the female more than once
3	Active pursuit of the female with persistent sexual interest
4	1 mount or mounting attempt, no service
5	2 mounts or mounting attempt, no service
6	More than 2 mounts/mounting attempts, no service
7	1 service followed by no further sexual interest
8	1 service followed by sexual interest including mounts/mounting attempts
9	2 services followed by no further sexual interest
10	2 services followed by sexual interest including mounts or further services

Table 3.1: Libido scoring used in this study (adopted from Chenoweth, Brinks & Nett, 1979)

The reaction time was recorded based on the time taken from introduction to female or approaching the female until first ejaculation or first service. Sexual interest was divided into four criteria which are Flehmen's reaction, chin-resting behaviour, tending behaviour and sniffing or licking genitals. All of these criteria were coded as 1.0 if present and 2.0 if absent. The observation was done on three sessions which were in the morning (0700 – 0900), afternoon (1100 – 1300) and evening (1600 - 1800). Each group was observed for duration of one hour.

4.0 RESULTS

4.1 Libido Score

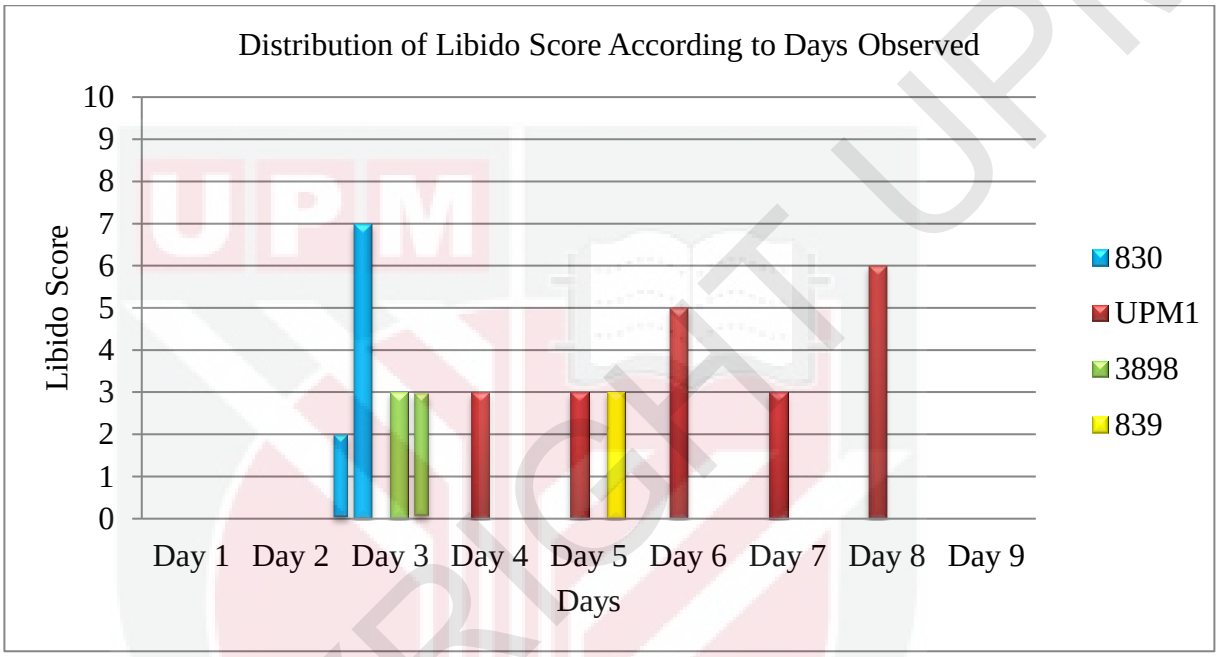

Figure 4.1: Distribution of libido score according to days observed

There is a variation of libido score distribution of all four bulls throughout the whole nine days observation as shown in Figure 4.1. The highest libido score observed was on Day 3 showed by bull 830 with the score of 7 out of 10 followed by score 6 by bull UPM1 on Day 8. Bull UPM1 also showed a libido score of 5 out of 10 on Day 6. A score of 3 out of 10 can be seen on Day 3, 4, 5 and 7 exhibited by bull 3898, UPM1, and 839. Another score of 5 out 10 was exhibited by bull UPM1 on Day 6 of the observation. The lowest score was by bull 830 on Day 3 but on different cow compared to the score of 7 out of 10 on the same day.

4.2 Mating Frequency

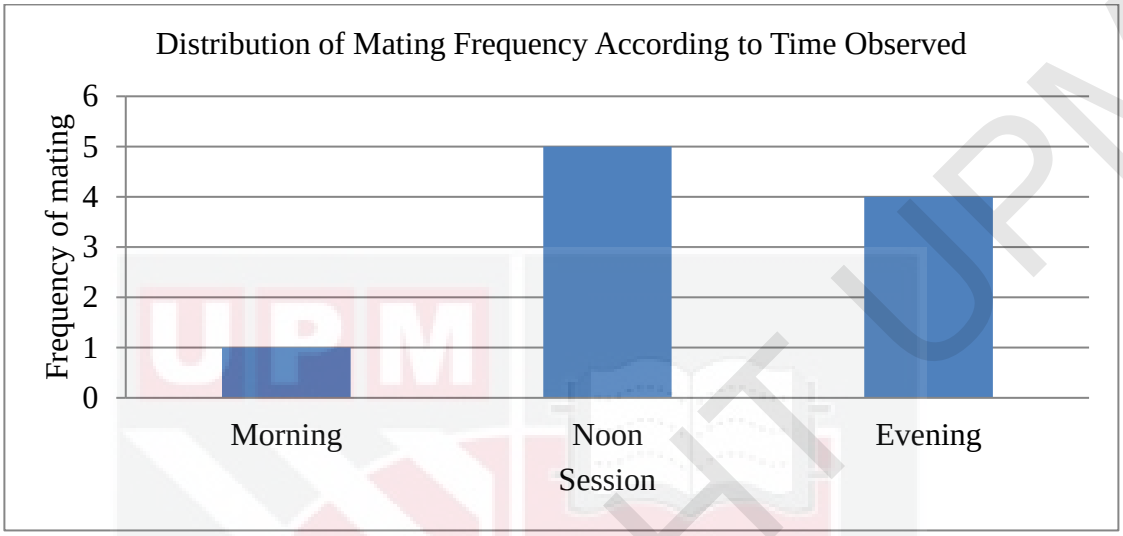

Figure 4.2: Distribution of mating frequency according to time observed

According to Figure 4.2, the highest mating frequency during the observation was during the noon session which is around 11:00 am to 1:00 pm with the number of 5 out of 10 mating observed. The mating frequency on evening session (between 4:00 pm to 6:00 pm) was 4 out of 10 and the lowest mating frequency was on morning session with only 1 out of 10 mating observed which is around 7:00 am to 9:00 am.

4.3 Distribution of Oestrous and Cows Serviced

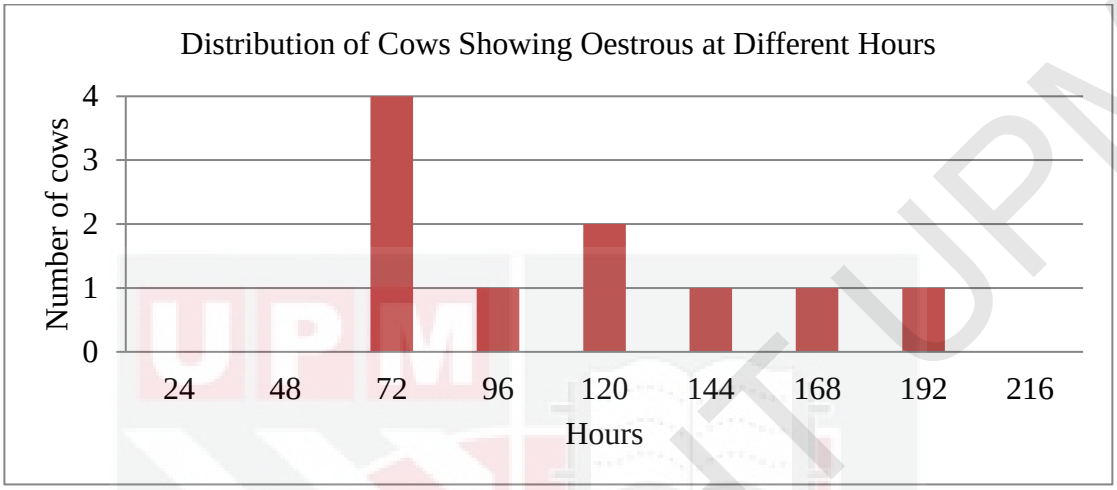

Figure 4.3: Distribution of cows showing oestrous at different hours

The highest number of cows manifested oestrous was at 72 hours post synchronization (Figure 4.3). After 96 hours, 144 hours, 168 hours and 192 hours post synchronized, there was only one cow showing oestrous at those hours respectively. At 120 hours post synchronized, there were two cows showing oestrous which is on fifth day of the observation.

Table 4.1: Number of cows showing or approaching oestrous and number of cows serviced.

Bulls	Number of cows	Number of cows showing or approaching oestrous	Number of cows serviced
839	4	2 (50%)	1 (25%)
UPM1	4	3 (75%)	0 (0%)
830	4	1 (25%)	0 (0%)
3898	4	2 (50%)	0 (0%)

Table 4.1 showed the number of cows that have come to or approaching oestrous and also number of cows serviced. In a group of bull 839 and 3898, there were 2 cows each that have come to or approaching oestrous out of 4 cows with only 1 cow serviced out of 2 cows in oestrous in a group of bull 839. In a group of bull UPM1, there were r

highest cows that have come to or approaching oestrous with 3 out 4 cows and no cows were serviced during the observation. The lowest number of cows showing oestrous was in the group of bull 830 with only 1 cow out of 4 and no service observed. Unfortunately, the reaction time was only observed once which is on Bull 839 with the time of 3 minutes and 56 seconds.

4.4 Sexual Interest

Table 4.2: Results of sexual interest out of 10 mating observed

Bulls	Cows	Day	Flehmen's reaction	Chin-resting behaviour	Tending behaviour	Sniffing/licking genitals
839	3618	3	Present	Present	Present	Present
	3146	3	Present	Absent	Absent	Present
UPM1	183	4	Present	Absent	Present	Present
	3978	5	Present	Absent	Present	Present
	281	6	Present	Absent	Present	Present
	281	7	Present	Absent	Present	Present
	281	8	Present	Absent	Present	Present
830	3915	3	Present	Absent	Present	Present
3898		3	Present	Absent	Present	Present
3898		3	Present	Absent	Present	Present
		Total frequency	10 out of 10 (100%)	1 out of 10 (10%)	9 out of 10 (90%)	10 out of 10 (100%)

The table (4.2) shows the result of sexual interest exhibited by the bulls which are Flehmen's reaction, chin-resting behaviour, tending behaviour and sniffing or licking the genitals of the females. A total of 10 sexual interests were observed from all four bulls throughout the whole observation period. In Flehmen's reaction and sniffing or licking genitals, it was observed in all mating behaviour which is 10 out of 10 (100%). Tending behaviour was observed 9 times out of 10 (90%) while chin-resting behaviour was only observed 1 time out of 10 (10%).

5.0 DISCUSSION

In this study, the libido scores vary from all four bulls. Since the bulls were placed and assessed in pastures, it is consistent with Parkinson's (2004) statement which the subjective observation of the mating behaviour of bulls at pasture is not a very good indicator for the bulls' mating ability. According to Blockey (1978); Chenoweth et al. (1979), they have mentioned that much better indicators are the objective assessments provided by libido and service capacity tests. Therefore, in order to determine the bulls' mating ability, assessment of libido alone is not sufficient unless it is done together with the service capacity tests. However, the libido scores also depend on the receptive status of the buffalo cows. The low scores (2 and 3 out of 10) of the libido were mostly sexual interests and active pursuit exhibited by the bulls to buffalo cows which probably approaching oestrous and was not really in a state of oestrous. It is consistent with the scores of 5 and 6 out of 10 where there were just mounting attempts attempted by the bulls whilst the cows were not stood still and ran away. There was no repetition of service observed by the bulls as the highest libido score was 7 out of 10 with only one service followed by no further sexual interest. Nordin et al. (1988) has stated that it is quite difficult to detect male buffaloes mating behaviour unless a thorough observation is done. Since it is difficult to detect the mating behaviour and in order to get higher libido score from buffalo bulls, an intense and thorough observation must be done.

Reaction time is less in river buffalo bulls during peak breeding season (autumn, early winter) than in the low breeding season, or summer (Younis et al., 2003). In this

study, there was only one reaction time recorded which was from bull 839 with the time of 3 minutes and 50 seconds. This study was done in a tropical country with hot and humid weather throughout the whole year compared to Younis et al.'s statement which was referring to temperate countries with four different seasons. In addition, there was no data or record stating how less (in time) is the reaction time of the river buffalo bulls during autumn or early winter compared to summer. Therefore, from this study, there is not much that can be discussed about the reaction time of the buffalo bulls since only one reaction time that was successfully recorded and also not comparing to different climate conditions in Malaysia.

Based on this study, the sexual interest was further categorized into Flehmen's reaction, chin-resting behaviour, tending behaviour, and sniffing or licking the female's genitalia. The most prominent sexual interest shown by all four bulls were Flehmen's reaction and sniffing or licking the female's genitalia followed by tending behaviour and chin-resting behaviour. Houpt et al., (1993) has stated that Flehmen is the early response to the oestrous scent by the bull. This is consistent with this study where Flehmen was exhibited by all four bulls in oestrous cows or cows approaching oestrous. Another agreement can be explained according to Rajanarayanan and Archunan (2004), where the exhibition of flehmen behaviour is typical in buffalo reproduction observed from the study. Sniffing and licking the female's genitalia are the most frequent patterns, suggesting an important function of chemical communication through olfaction (Fayed, 2001). The bulls in this study exhibited this parameter of sexual interest in all mating which to detect the females which are in oestrous or approaching oestrous. According to

Fraser and Broom (1990), the pheromones from the cows were released in the urine and can be smelled by the bull. This signals the bull to identify which female is in receptivity. Dominic (1991); Aron (1979) has explained that the source of the chemical signals (pheromones) can be from urine, faeces, vaginal secretions and specialized scent glands. These sources are located mainly at the genitalia area of the females and in order to identify the female's receptivity, the bull has to sniff the genitalia and exhibit Flehmen's reaction if the pheromones are present. Therefore, it can be suggested that these two parameters of sexual interest will be exhibited by buffalo bulls in all mating in irder to identify females in oestrous or approaching oestrous. Tending behaviour was exhibited 90% from all mating observed. According to Estes (1992), the bull has to maintain close bodily contact and associates with the cow in oestrous while being near her. This will then contribute to temporary bond and will facilitate in repeated mating and ensuring optimum condition of fertilization (Fayed, 2001). Tending behaviour observed in this study was by all four bulls but not in all mating. However, it was observed from 9 out of 10 mating and suggesting that this parameter of sexual interest also plays an important role in pre-copulatory behaviour (courtship) in buffalo bull before the mating occurred. On the other hand, chin-resting behaviour was only observed once (10%) from all mating. According to Hill (1990), chin-resting behaviour will become more frequent once the female becomes well established and approaching oestrous contrary with this study where it was not observed as frequent as the other parameters of sexual interest. In fact, it was only observed once out of 10 mating. This suggests that chin-resting behaviour will not always exhibited by buffalo bulls during

mating and the probability of exhibition is lower compared to other parameters of sexual interest.

6.0 CONCLUSIONS AND RECOMMENDATIONS

In conclusion, mating behavior of buffalo bulls, the parameter of libido depends on the receptive status of the cows. Reaction time depends on full confrontation of male to female until ejaculation and sexual interests are the most prominent parameter exhibited by buffalo bulls. This study suggests that different buffalo bulls exhibited different mating behaviour with Flehmen's reaction and sniffing/licking genitals showed the highest in sexual interest and mate at different time.

Further study could be undertaken with prolong period of observation for each bull so that more focused assessment on individual bulls mating behaviour can be examined. Besides that, the observation at night and dawn time could also be done although the highest number of mating occurred in the afternoon from this study. In addition to the observation at night and dawn time, the use of camera trap with night vision is highly recommended to record the bulls mating behaviour. The use of smaller paddock or holding area for the study could also be helpful for better observation of the mating behaviour of the bulls.

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APPENDIX A

The buffalo bulls used in this study. Top left (Bull 839), top right (Bull UPM1), bottom left (Bull 3898) and bottom right (Bull 830).

APPENDIX B

The hormone used for oestrous synchronization; Bioestrovet® (Cloprostenol)

One of the groups of buffaloes placed in the paddock (pasture) for observation.