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**DOCTOR OF VETERINARY MEDICINE  
FACULTY OF VETERINARY MEDICINE  
UNIVERSITI MALAYSIA KELANTAN**

**RESEARCH PROPOSAL FINAL YEAR PROJECT (DVT44603)**

**A RETROSPECTIVE STUDY ON PREVALENCE AND FACTORS OF  
EQUINE LAMENESS PRESENTED TO UNIVERSITY VETERINARY  
TEACHING HOSPITAL UNIVERSITI MALAYSIA KELANTAN  
(UVTHUMK) FROM THE YEAR 2019 -2021**

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## CERTIFICATION

This is to certify that we have read this research paper entitled '**Retrospective Study On Prevalence And Factors Of Equine Lameness Presented To University Veterinary Teaching Hospital University Malaysia Kelantan (UVTHUMK) From The Year 2019 To 2021**' by **Nur Anis Sabrina Binti Mohd Anas** and in our opinion it is in satisfactory in term of quality, scope and presentation as a partial fulfilment of the requirement for the course **DVT 55204 – Reseach Project**



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Allah s.w.t

Dr Mimi Armiladiana Binti Mohamad

Dr Mohammed Dauda Goni

HPVUMK staffs

My family

My husband

DVM 5 Class of 2025

**Thank You**

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## DEDICATIONS

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## ABSTRACT

An abstract of the research paper presented to the Faculty of Veterinary Medicine, Universiti Malaysia Kelantan, in partial requirement on the course DVT 55204 – Research Project

Equine lameness is a condition that is commonly found in horses in Malaysia. This retrospective study was done to determine the prevalence of equine lameness in horses in University Veterinary Teaching Hospital, Universiti Malaysia Kelantan, the diagnostic approach to evaluate the lameness in horses, and the risk factors that associated with equine lameness in University Veterinary Teaching Hospital, Universiti Malaysia Kelantan. Data was collected from University Veterinary Teaching Hospital, Universiti Malaysia Kelantan from the year 2019 to 2021. Cases from physical case file available was analysed for this retrospective study. Chi-square test was used to analysed the risk factors associated with the incidence of equine lameness in horses from the year 2019 to 2021. The overall prevalence of equine lameness in horses that was presented to University Veterinary Teaching Hospital, Universiti Malaysia Kelantan from the year 2019 to 2021 was 50.80%. The most common and efficient way to diagnose equine lameness in this study is through Lameness Scoring system where 68.25% of the cases were evaluated by using this scoring system. The risk factors such as sex, age, breed and the purpose of the horse are not considered as associated risk factors with equine lameness in horses.

Keyword: Equine lameness, Prevalence, Diagnostic Method, Risk Factors

## ABSTRAK

Abstrak daripada kertas penyelidikan dikemukakan kepada Fakulti Perubatan Veterinar, Universiti Malaysia Kelantan untuk memenuhi sebahagian daripada keperluan kursus DVT – 55204 – Projek Penyelidikan.

Ketempangan kuda adalah kondisi yang kebiasaannya dijumpai di kuda kuda di Malaysia. Kajian retrospektif ini dijalankan untuk menentukan kelaziman ketempangan pada kuda di Hospital Pengajar Veterinar Universiti Malaysia Kelantan, kaedah diagnosis yang digunakan untuk menilai ketempangan kuda, dan juga risiko yang dikaitkan dengan ketempangan kuda di Hospital Pengajar Veterinar Universiti Malaysia Kelantan. Data telah dikumpulkan daripada Hospital Pengajar Veterinar Universiti Malaysia Kelantan dari tahun 2019 hingga tahun 2021. Kes kes diperoleh daripada fail fizikal tersedia telah dianalisis untuk kajian retrospektif ini. Chi square analisis telah digunakan untuk menganalisis risiko yang diakitkan dengan ketempangan kuda dari tahun 2019 hingga tahun 2021. Kelaziman keseluruhan ketempangan kuda di Hospital Pengajar Veterinar Universiti Malaysia Kelantan dari tahun 2019 hingga tahun 2021 adalah 50.80%. kaedah yang paling biasa dan terbaik untuk mengdiagnosis ketempangan kuda adalah melalui Lameness Score system di mana 68.25% daripada kes yang direkodkan telah menjalani ujian tersebut. Untuk risiko seperti jantina, umur, baka dan tujuan kegunaan kuda semuanya tidak dikaitkan dengan kondisi ketempangan pada kuda.

Kata Kunci: Ketempangan Kuda, Kelaziman, Diagnosis, Risiko

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## 1.0 INTRODUCTION

Lameness is defined as an abnormal stance or gait caused by either a structural or a functional disorder of the locomotor system (Adams, 2016). The prevalence of lameness in horse can be due to several factors. Lameness is one the most common concern that has been occurring in sport and pleasure horse populations. (Dyson, 2002). Human has been using animal for transportation for many decades and about half of human population has dependent on the power of animal to travel and 90 million of it was equines. (Fekadu. et al, 2015). This animal was used for many kinds of purposes such as to pull cart, horseback riding, sports and dressage, hunting and travelling.

The clinical presentation of lameness can be shown during standing, walking and trotting. Lameness is not a disease but a clinical sign shown by the animal where it exhibits a manifestation of pain and mechanical restriction. This clinical sign eventually cause alteration in gait and walking stance or locomotor problems. (Adams, 2016). The degree of lameness is solely dependent on the severity of the factors causing the lameness. It could be a mild presentation of clinical sign that can only be noted during high intensity exercise or excessive labour and sometimes it could be seen during the horse is standing or walking. (Black et al., 2013). Foot pain was the most frequent type of lameness reported, which may reflect the prevalence of foot pain in the general horse population. (Murray et al., 2006).

The biomechanical function of the horse foot is mainly to accepts the load from the ground and distribute it evenly amongst the soft tissues and bones of the distal limbs. (Jennifer, 2019). In most lameness cases in Kelantan, the University Teaching Hospital Universiti Malaysia Kelantan is the most referred institution for treatments and professional advice. It is important for the veterinary institution to possess skilful professional equine veterinarian in charge as the public may seek an advice from time to time. The main horse activities in Kelantan includes bareback racing, endurance and breeding. The community also has keeping horses as their hobby and participating in many kinds of competition involving horses. The most popular activity here in Kelantan would be endurance competition where the horse and rider compete with other opponent in term of physical and mental fitness.

## 1.1 RESEARCH PROBLEM

There is no statistical data and lack of published analysis about the prevalence and factors of equine lameness in University Veterinary Teaching Hospital Universiti Malaysia Kelantan. The owner does not anticipate the actual cause of the causes of lameness that would lead to increase in the prevalence of the disease. Moreover, there has been a lot of report regarding the inability to use the horse for endurance and racing after showing clinical signs of lameness, which making it unprofitable to the owner. This is an overview of pilot project that was presented to University Veterinary Teaching Hospital Universiti Malaysia Kelantan to look at the risk factors of lameness in horse and its prevalence.



## **1.2 RESEARCH QUESTIONS**

- What is the prevalence of lameness in horses in University Veterinary Teaching Hospital Universiti Malaysia Kelantan?
- What are the risk factors of lameness in horses in University Veterinary Teaching Hospital Universiti Malaysia Kelantan?
- What is the diagnostic workup used to diagnose the lameness in horse at University Veterinary Teaching Hospital Universiti Malaysia Kelantan?

## **1.3 RESEARCH HYPOTHESIS**

- There is high prevalence of lameness in horse reported in University Veterinary Teaching Hospital Universiti Malaysia Kelantan.
- There is association between sex, breed, age, primary purpose of the horses and the purpose of horse stable with lameness in horse in Kelantan.
- Diagnostic workup used to diagnose lameness in horse is by using the lameness scoring method.

## **1.4 RESEARCH OBJECTIVES**

- To determine the prevalence of lameness in horse in University Veterinary Teaching Hospital Universiti Malaysia Kelantan.
- To determine the risk factors associated with lameness in horses in University Veterinary Teaching Hospital Universiti Malaysia Kelantan.
- To identify the diagnostic workup used to diagnose lameness in horse in University Veterinary Teaching Hospital Universiti Malaysia Kelantan.

## 2.0 LITERATURE REVIEW

### 2.1 HORSE FARMING AND ITS PURPOSE

Horse farming and breeding has been practiced since it was first domesticated about 5500 years ago. (T. Raudsepp, et al, 2019). Horses also has served human with many kind of purposes including agriculture, warfare and transportation, and some value horse as a companion pet. In modern times, horses farming has evolved as it interacts with humans in many different ways and most commonly use as leisure industry instead of agriculture and transportation.

Nowadays, human practice horse farming for tourism, horseback riding activity, endurance and also racing. Horse farming has also served a purpose as a breeding purpose in which human can selectively select the specific breed of horse that they want to rear. These horses were bred for its performance traits such as speed, endurance, strength and gait. Moreover, they were sometimes bred for their unique appearance such as its colour, size and conformation. (Hendricks, 2007).

In Kelantan, the most popular activities are endurance, outback racing and breeding. The endurance and outback racing competition would be held every year and has been attracting competitors from Kelantan and other neighbouring states such as Terengganu, Pahang and Kedah. Kelantan also popular with outshore racing horse competition that usually be held from time to time. Meanwhile, the endurance competition will usually be held depending on the weather since Kelantan is well known for its monsoon season.

The management of the stable is depending on the owners. The stable will usually have a farm manager and 2 farm workers. They are responsible for feeding, managing the horse shoe and also general management of the farm. The environment of the farm also depending on the area of the farm. The farm that is situated at the rural area may have other animals as well such as cattle, buffalo and poultry. Meanwhile, the professional horse breeder will usually has a designated stable for horses. The system that horse stable in Kelantan is usually open and airy. This is due to Malaysia is a tropical country which do not have four season climate change.

## **2.2 LAMENESS IN HORSE**

Lameness in horse has been a well-known issue in horse owners for a long time and it is closely related to the utilization of the horse and its welfare. (AK. Feuser, et al, 2022). Musculoskeletal problem is one of the most common medical problem in equine veterinary medicine. (Nielsen T.D, et al, 2014). Lameness is termed as changes in gait of the horses during standing, walking or trotting usually caused by excessive pressure causing pain of the limbs or due to mechanical restriction. (AK. Feuser, et al, 2022). The noticeable signs of lameness of the limbs such as toe dragging, head nodding and abnormalities in conformation.

## **2.3 LAMENESS SCORE**

Lameness can range from mild to severe. There are 5 grades of lameness in horse according to the American Association of Equine Practitioners. The first grade is known as Grade 0. Grade 0 of lameness is not recognizable under any circumstance even if the limbs were manipulated. The abnormalities can only be seen when the lameness is apparent and obvious. The grade 1 lameness is difficult to observe and not consistently happen regardless of the circumstances. The grade 2 lameness is difficult to assess at a walk or trot in a straight line but will happen consistently enough to notice regardless of the circumstances. The grade 3 lameness is constantly observable during a trot under all circumstances. Meanwhile, the grade 4 lameness is obvious during a walk. Lastly, the grade 5 lameness score can be determine when the horse has inability to bear its own body weight, unable to move completely or when the lameness produces minimal weight bearing in motion or at rest.

## **3.0 MATERIALS AND METHODS**

### **3.1 STUDY AREA**

The study area is Kelantan which is located at the Northeastern Peninsula Malaysia. There are 11 districts total in Kelantan and Kota Bharu is the capital city. Kelantan is hot and humid most of the time but it has a monsoon season known as Northeastern Monsoon which is from November to March. The institution that was included in this study is University Veterinary Teaching Hospital Universiti Malaysia Kelantan.

### **3.2 STUDY DESIGN**

This study is the retrospective cohort study where the members of cohort has been experiencing lameness and were presented to University Veterinary Teaching Hospital Universiti Malaysia Kelantan.

### **3.3 STUDY POPULATION**

Horses that experienced lameness that were recorded in University Veterinary Teaching Hospital Universiti Malaysia Kelantan.

### **3.4 SELECTION CRITERIA**

#### **3.4.1 INCLUSION CRITERIA**

The inclusion criteria of this study are the horses that has been showing clinical signs of lameness and which had the data recorded in University Veterinary Teaching Hospital Universiti Malaysia Kelantan. The horses that shows clinical signs such as toe dragging and inability to move is included as well.

#### **3.4.2 EXCLUSION CRITERIA**

The exclusion criteria of this study is horses that has musculoskeletal genetic anomalies, lack of history of its primary purpose and also missing important data such as age, sex and breed.



### **3.5 SAMPLING TECHNIQUES**

The sampling technique used is the convenience sampling as the data is readily available and easily accessible.

### **3.6 SAMPLING PROCEDURE**

The data is collected from University Veterinary Teaching Hospital Universiti Malaysia Kelantan from the year 2019 to 2021.

### **3.7 DATA COLLECTION**

This study uses data collection form from the University Veterinary Teaching Hospital Universiti Malaysia Kelantan to obtain the patients details. The data was retrospectively taken from the patient case file at the teaching hospital from 1/1/2019 to 31/12/2021. The patients detail such as name, age, sex, breed, primary purpose of the horse and the purpose of the stable was collected. The horse is classified according to their breed, age and sex. According to the American Association of Equine Practitioner (AAEP), the age is classified by the teeth grading. Permanent upper corner incisor wider than tall (age 5 to 9 years), upper corner incisor square-shaped (age 10-14 years), upper corner incisor taller than wide (age 15 years or above). Upper central incisors taller and wider than middle (intermediate) viewed from labial surface (under 10 years old). Upper central incisors same size or slightly smaller than middle incisors (middle age; 10±15 years). Upper central incisors significantly narrower and shorter than middle incisors (older horse; usually older than 15 years). The horse breed is classified based on the morphology and anatomy of the horse body, the color and the size of the horse. Some of the common breed bred in Kelantan is Kuda Kacuk Kelantan, Argentine Polo, Arabian and Thoroughbred. The purpose of horse is classified into 4 types which is endurance, polo, leisure and breeding horse. Endurance horse is the horse that compete in endurance competition, meanwhile polo horse is used for polo competition. Leisure horse is horses that is used for mainly to attract tourist for leisure ride and breeding horse is used mainly for mating activity to produce offspring.

### **3.8 DATA ANALYSIS**

The collected data is keyed into Microsoft Excel and analysed using Statistical Package for Social Science 27.0. Categorical data is then summarized as frequency and percentage while numerical data is summarized as mean and standard deviation. Pearson's Chi Square test is used to determine the association between the categorical variables. Data is considered significant at  $p < 0.05$ .

## 4.0 RESULTS

### 4.1 DESCRIPTIVE CHARACTERISTIC OF THE STUDY SUBJECTS AND THE PREVALENCE OF LAMENESS IN HORSE AT HOSPITAL PENGAJAR VETERINAR UNIVERSITI MALAYSIA KELANTAN FROM YEAR 2019 TO 2021

Of the 63 cases included in this study, 39.68% (n=25) of the cases were male horse while 60.32% (n=38) of the cases were female horse. 22.22% (n=14) were age less than or equal to 5 years old, 55.56% (n= 35) were age less than or equal to 10 years old, 20.63% (n=13) were age less than or equal to 15 years old and 1.59% (n=1) was age less than or equal to 20 years old. For the breeds of the horse, 12.70% (n=8) of the cats were Kuda Kacuk Kelantan, 12.70% (n=8) were Argentine Polo, 33.33% (n=21) were Thoroughbred and 41.27% (n=26) were Arabian. For the purpose status of the horse, 73.02% (n=46) were purposely used for endurance, 9.52% (n=6) were polo horse, 11.11% (n=7) were used for leisure horse and 6.35% (n=4) were used for breeding purpose.

The overall total number of horses that were presented at the Hospital Pengajar Veterinar Universiti Malaysia Kelantan from year 2019 to 2021 was 283 horses. Out of 283 cases, 63 horses were evaluated by using the 5 grades of lameness score based on the clinical signs shown. The gait during trotting and walking were carefully observed. The total of positive case of equine lameness is 50.79% (n=32) meanwhile the total of negative case of equine lameness is 49.21% (n=31). The positive cases were evaluated based on the 5 grades of lameness in horse according to the American Association of Equine Practitioners. The condition is further diagnosed with radiography imaging to support the assessment. Some of the cases were not assessed by using radiography imaging due to other factors such as budget constraint and traumatic injury of soft tissue of the horse.

The overall total number of horses that were presented to Hospital Pengajar Veterinar Universiti Malaysia Kelantan from year 2019 to 2021 was 283 horses. The prevalence of lameness in horse was at the highest at year 2019 (50%) while the lowest was in year 2021 (18.75%) as shown in Figure 1. The overall prevalence for lameness in horse over the 3 years is 50.80%.

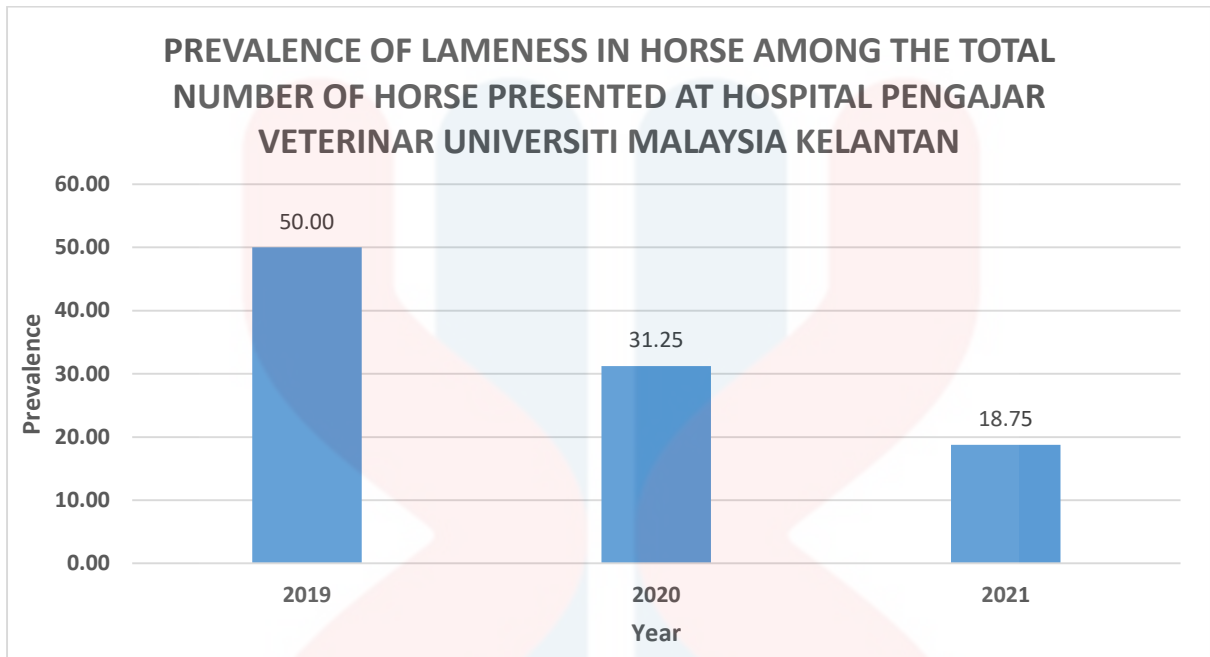


Figure 1: Bar graph shows the prevalence of lameness in horse presented at Hospital Pengajar Veterinar Universiti Malaysia Kelantan from year 2019 to 2021

#### 4.2 PREVALENCE OF LAMENESS IN HORSE AMONG THE TOTAL NUMBER OF HORSE PRESENTED AT HOSPITAL PENGAJAR UNIVERSITI MALAYSIA KELANTAN FROM YEAR 2019 TO 2021

Out of the 63 cases included in this study, the prevalence of lameness in horses among the total number of horse presented in the span of 3 years at Hospital Pengajar Veterinar Universiti Malaysia Kelantan was highest in 2020 (13.16%) while the lowest was in 2021 (7.23%) as shown in Figure 2.

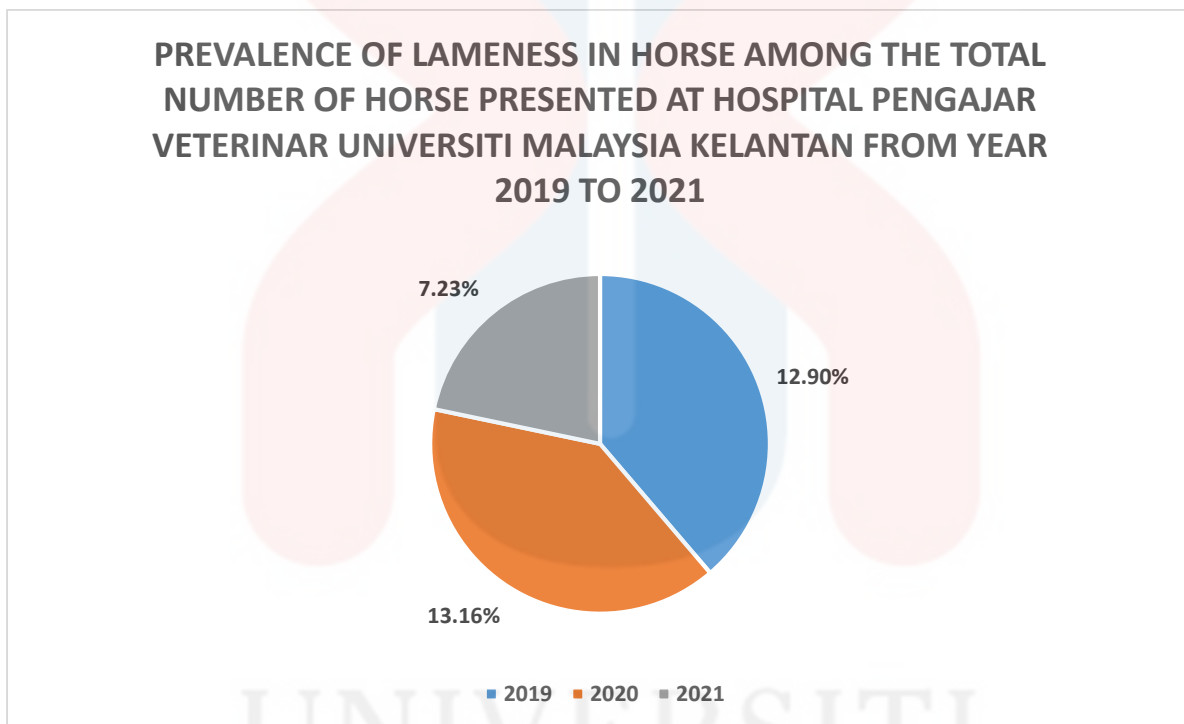


Figure 2: Pie chart representing the prevalence of lameness in horse among the total number of horse presented at Hospital Pengajar Veterinar Universiti Malaysia Kelantan from year 2019 to 2021

#### 4.3 DIAGNOSTIC METHODS USED TO DIAGNOSE LAMENESS IN HORSE AT HOSPITAL PENGAJAR UNIVERSITI MALAYSIA KELANTAN FROM YEAR 2019 TO 2021

There were 63 cases that were evaluated by using the 5 grades of lameness score or diagnostic imaging in the span of 3 years in Hospital Pengajar Veterinar Universiti Malaysia Kelantan. The percentage of cases that were evaluated with lameness score is 68.25% which is total of 43 cases while the percentage of cases that were evaluated with diagnostic imaging were 31.75% which is a total of 20 cases. Out of 43 cases that were evaluated with 5 grades of lameness score, 60.47% of the cases were positive for lameness which is total of 26 cases. Out of 20 cases that were evaluated with diagnostic imaging, 30% of the cases were diagnosed positive with lameness which is total of 6 cases.

Table 1: Diagnostics method used to diagnose lameness in horse in Hospital Pengajar Veterinar Universiti Malaysia Kelantan from year 2019 to 2021.

	Positive cases	Negative cases	Total cases
Cases evaluated with 5 grades of lameness scoring	26	17	43
Cases evaluated with Diagnostic Imaging	6	14	20

Diagnostic methods used to diagnose lameness in horse at Hospital Pengajar Veterinar  
Universiti Malaysia Kelantan from year 2019 to 2021.

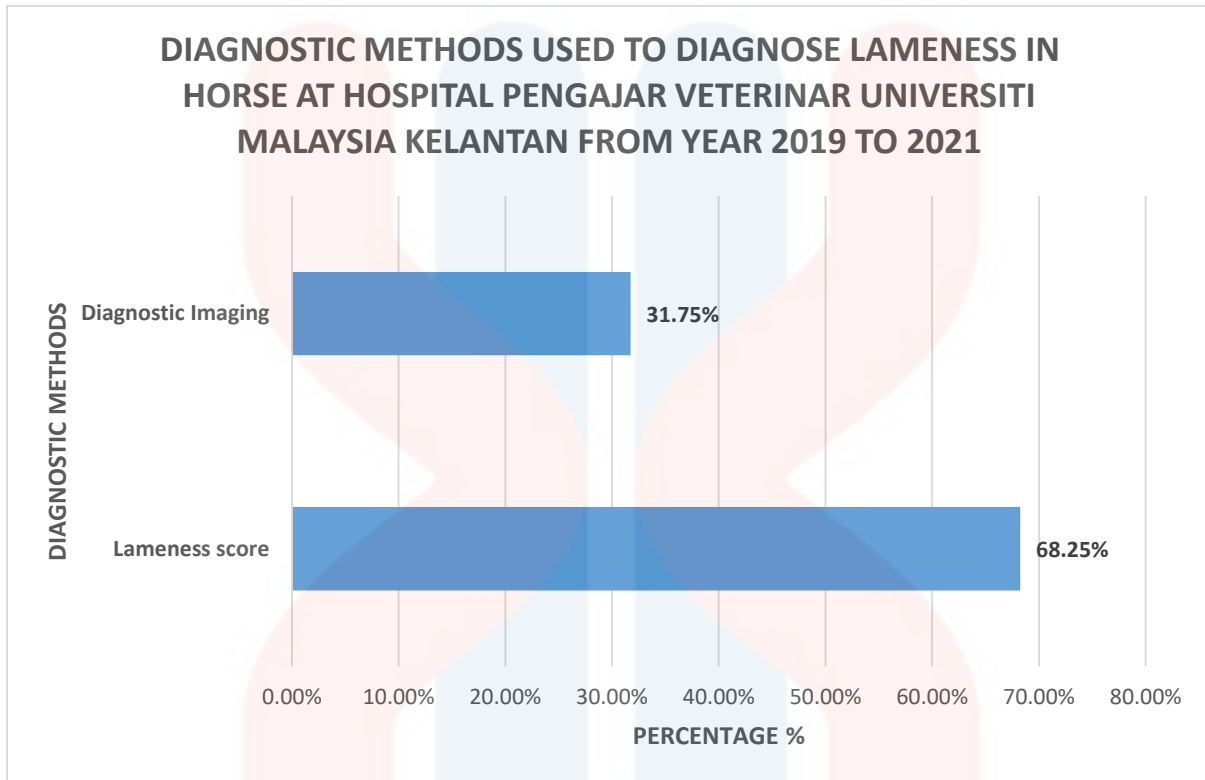


Figure 3: Bar graph represent the diagnostic method used to diagnose lameness in horse at Hospital Pengajar Veterinar Universiti Malaysia Kelantan from year 2019 to 2021

#### 4.4 RISK FACTORS ASSOCIATED WITH THE OCCURRENCE OF LAMENESS IN HORSE FROM THE YEAR 2019 TO 2021

The association between risk factors such as age, sex, breed and the purpose of the horse were calculated by using Chi square test. Table 2 shows the results of the independent variables such as sex, age, breed and the purpose of the horse are all not significant ( $p < 0.05$ ).

	Risk Factors	Prevalence	p-value	Significant
Sex	Male	39.68%	0.645	No
	Female	60.32%		
Age	≤ 5 years old	22.22%	0.779	No
	≤ 10 years old	55.56%		
	≤ 15 years old	20.63%		
	≤ 20 years old	1.59%		
Breed	Kuda Kacuk Kelantan	12.70%	0.264	No
	Argentine Polo	12.70%		
	Thoroughbred	33.33%		
	Arabian	41.27%		
Purpose	Endurance	73.02%	0.607	No
	Polo	9.52%		
	Leisure	11.11%		
	Breeding	6.35%		



## 5.0 DISCUSSIONS

The result showed that the overall prevalence of lameness in horse in this retrospective study was 50.80%. This value is slightly lower than the overall prevalence of another study of prevalence of horse lameness that was conducted by Universiti Putra Malaysia which 53.73% horses had metabolic disorders and 17.91% were eliminated during endurance competition due to lameness. However, this study is only conducted specifically for endurance horse during endurance competition was going on. This study recorded a much higher prevalence of horse lameness than the study done in endurance horse. This might be because of higher number of data that were collected and extended period of time that may have contribute to the significant number of percentage in prevalence of horse lameness in Kelantan. The location also could have play a significant role Hospital Pengajar Veterinar Universiti Malaysia Kelantan also attended many clinical cases in other region including horses from neighbouring state such as Terengganu and Pahang. Since Hospital Pengajar Veterinar Universiti Malaysia Kelantan has been very competent in treating sick and injured animals, therefore there would be a high probability of high number of case that the hospital might have received each year due to high number of patient was being treated at HPVUMK.

The yearly breakdown of cases revealed that in 2019, there was a 50% prevalence rate which was the highest among the 3 years. This is might be due to high number of cases that has been admitted from January to December of 2019. The total number of cases that has been recorded was 124 cases. Meanwhile, in year 2021, the lowest number of prevalence in horse lameness was being observed in this study. In 2021, only 18.75% prevalence of lameness in horse. This might be due to after effect of the global pandemic in 2019 and mid-2020, causing to decrease the income of most of people in Malaysia. As the income has been affected, the owner will become more selective towards the animal's needs and wellbeing. This is because of the cost of living and budget constraint as the Malaysia's Movement Restriction Order was applied to all states including Kelantan. Moreover, the overall cost of treatment for horse maybe slightly higher compared to other species of animals.

2021 saw the lowest prevalence of cases with a percentage of 17.85% with 83 cases was recorded. In addition, the lower prevalence in 2021 might be due to change of location of Hospital Pengajar Veterinar Universiti Malaysia Kelantan which was formerly known as Klinik Veterinar Universiti Malaysia Kelantan in mid-2019 that was used to be in Padang Tembak, Kota Bharu to Universiti Malaysia Kelantan, Bachok. This location has approximately 1-hour drive distance which might have cause the owner become reluctant to bring their horse for hospital visit as the journey would take longer and may cause injury and discomfort to the horse.

Out of 63 total cases that has been recorded in the span of 3 years in Hospital Pengajar Veterinar Universiti Malaysia Kelantan, 43 cases which is 68.25% of the total number of cases were evaluated by using lameness score while 20 of the cases which is 31.75% were evaluated by radiography imaging. Most of the number of cases that were evaluated by using lameness score was in 2019. This might be due to low demand of radiography imaging as it cost more compared to the lameness scoring. Moreover, the lameness scoring system is relatively more assessable and cost effective in comparison with radiography imaging. This is because, these techniques are universally used to assess lameness and the guide from American Association of Equine Practitioner (AAEP) for lameness score is readily accessible from the internet.

Hence, the owner may also use it as a guide if the gait is becoming very severe and need to be check by the skilful veterinarian. However, for radiography imaging, there are many techniques and positioning that was needed to be used to evaluate the cause of lameness. Hence, a skilful and experience technicians and veterinarian must conduct this technique in order for them to get an accurate result. Furthermore, the common way to detect lameness in horse is by using the lameness score according to the American Association of Equine Practitioner (AAEP) standard.

The lameness score is based on the gait of the horse during trotting and walking. The first grade is known as Grade 0. Grade 0 of lameness is not recognizable under any circumstance even if the limbs were manipulated. The grade 1 lameness is difficult to observe and not consistently happen regardless of the circumstances. The grade 2 lameness is difficult to assess at a walk or trot in a straight line but will happen consistently enough to notice regardless of the circumstances. The grade 3 lameness is constantly observable during a trot under all circumstances. Meanwhile, the grade 4 lameness is obvious during a walk. Lastly, the grade 5 lameness score can be determine when the horse has inability to bear its own body weight, unable to move completely or when the lameness produces minimal weight bearing in motion or at rest. The reason is due to the accuracy of the gait assessment.

Various risk factors were associated with lameness in horse in this retrospective study. They include sex, age, breed and purpose. From the analysis that was done, the results show that all of the risk factors has no significant association ( $P>0.05$ ).

Based on the analysed data, sex has no significant association with lameness in horse. Another study that was done in India has found out that occurrence and prevalence of lameness in horse was found higher in female horse (162/206, 78.65%) as compared to males (44/206, 21.35%). However, this might be bias as the study was conducted in breeding farm where most of the animals kept for breeding purpose was female compared to male. However, there is still dispute among the authors on whether the sex of the horse can contribute as a risk factors. Hence, more studies should be conducted in the future to produce a more conclusive answer. These findings corroborate with earlier studies by Himani et al., (2019), Koshiya (2018), Mistry et al., (2012) and Varshney (1997) also reported a high incidence of lameness in females. Whereas Cogger et al., (2008) found no difference in the relative occurrence of lameness between male and female groups in general.

Based on the analysis that was done, there was no significant association between age of the horse and occurrence of lameness in horse. A study that was done in India stated that the prevalence of lameness in horse is higher in less than or equal of 5 years old horse. This finding in this study is slightly different in comparison as the highest prevalence of lameness in horse is in less than or equal of 10 years old. However, the life stage of these two category is not too far from each other. Hence, it can be assumed to be in line with the study was done in India about the prevalence of lameness in horse. Cogger et al., (2008) and Mistry et al., (2012) reported a high incidence of lameness in a younger age group (less than 2 years) while Naeini and Niak (2005) reported more cases of six to eight years old horses (32.14%) affected with lameness, followed by four to six-years (22.62%), eight to ten-years (19.05%), two to four-years (16.67%) and more than ten-years (9.52 %) of horses.

The breed of the horse has no significant association towards lameness in horse according to this study. This finding is not in line with the other study that was done in India where the most affected breed is Kathiawari breed (91/206, 44.17%) followed by Non-descript breed (69/206, 33.49%), Marwari breed (40/206, 19.41%), Thoroughbred (3/206, 1.45%) and Sindhi breed (3/206, 1.45%). However, based on the study, breed Kathiawari has higher incidence of lameness reported due to a higher population of Kathiawari breed in its native tract of Saurashtra region of Gujarat state, India. Meanwhile, according to this retrospective study, Arabian breed has the highest incidence of lameness in horse. This might be due to the owner favour of this breed in region of Kelantan.

Based on the analysis that was done, the purpose of the horse has no significant association with lameness in horse. The highest prevalence of lameness in this study is the horse used for endurance purpose. However, this is not in line with a study that was done in Universiti Putra Malaysia where, most of the horse that was eliminated from the race has low incidence of lameness (17.91%). Meanwhile, high number of horse that was eliminated from the competition was due to metabolic disease (53.73%). Hence, more study that need to be conducted in the near future to really determine whether there is any significant association between the purpose of the horse and incidence of lameness.

## 6.0 CONCLUSIONS AND RECOMMENDATIONS

In conclusion, the overall prevalence of lameness in horse in Hospital Pengajar Veterinar Universiti Malaysia Kelantan (HPVUMK) over 3 years is 50.80%. The most common method that was used to diagnose lameness in horses is by using lameness score from American Association of Equine Practitioner (AAEP), where the percentage of cases that was evaluated by using lameness score is 68.25%. The risk factors that were associated with lameness score in horse are sex, age, breed and purpose of the horse. Hence, this study will hopefully provide information for future researchers who are studying the prevalence of lameness in horse and also risk factors that were associated with it.

For the recommendation, more data should be taken in this study to ensure adequate data used for statistical study. The period of the research should be extended to observe the bigger picture of case distribution in horse lameness thus can also observe the case fluctuations throughout the years. The lack of data collected in this study is due to missing data from the institution (HPVUMK).

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**APPENDIX**

Appendix A.1: Cross Tabulation of Sex Against the Confirmed Cases

**Crosstab**

			RESULT		Total
			Positive	Negative	
GENDER	Male	Count	13	12	25
		Expected Count	13.9	11.1	25.0
		% within GENDER	52.0%	48.0%	100.0%
	Female	Count	22	16	38
		Expected Count	21.1	16.9	38.0
		% within GENDER	57.9%	42.1%	100.0%
Total	Count	35	28	63	
	Expected Count	35.0	28.0	63.0	
	% within GENDER	55.6%	44.4%	100.0%	

Appendix A.1: Cross Tabulation of Age Against the Confirmed Cases

**Crosstab**

			RESULT		Total
			Positive	Negative	
AGE	≤5 years	Count	6	7	13
		Expected Count	7.2	5.8	13.0
		% within AGE	46.2%	53.8%	100.0%
	≤10 years	Count	22	14	36
		Expected Count	20.0	16.0	36.0
		% within AGE	61.1%	38.9%	100.0%
	≤15 years	Count	6	6	12
		Expected Count	6.7	5.3	12.0
		% within AGE	50.0%	50.0%	100.0%
	≤20 years	Count	1	1	2
		Expected Count	1.1	.9	2.0
		% within AGE	50.0%	50.0%	100.0%
Total	Count	35	28	63	
	Expected Count	35.0	28.0	63.0	
	% within AGE	55.6%	44.4%	100.0%	



Appendix A.1: Cross Tabulation of Breed Against the Confirmed Cases

**Crosstab**

BREED		RESULT		
		Positive	Negative	Total
Kuda Kacuk Kelantan	Count	4	4	8
	Expected Count	4.4	3.6	8.0
	% within BREED	50.0%	50.0%	100.0%
Argentine Polo	Count	7	1	8
	Expected Count	4.4	3.6	8.0
	% within BREED	87.5%	12.5%	100.0%
Thoroughbred	Count	10	11	21
	Expected Count	11.7	9.3	21.0
	% within BREED	47.6%	52.4%	100.0%
Arabian	Count	14	12	26
	Expected Count	14.4	11.6	26.0
	% within BREED	53.8%	46.2%	100.0%
Total	Count	35	28	63
	Expected Count	35.0	28.0	63.0
	% within BREED	55.6%	44.4%	100.0%

Appendix A.1: Cross Tabulation of Purpose of the Horse Against the Confirmed Cases

**Crosstab**

PURPOSE		RESULT			
		Positive	Negative	Total	
PURPOSE	Endurance	Count	26	20	46
		Expected Count	25.6	20.4	46.0
		% within PURPOSE	56.5%	43.5%	100.0%
	Polo	Count	2	4	6
		Expected Count	3.3	2.7	6.0
		% within PURPOSE	33.3%	66.7%	100.0%
	Leisure	Count	4	3	7
		Expected Count	3.9	3.1	7.0
		% within PURPOSE	57.1%	42.9%	100.0%
	Breeding	Count	3	1	4
		Expected Count	2.2	1.8	4.0
		% within PURPOSE	75.0%	25.0%	100.0%
Total	Count	35	28	63	
	Expected Count	35.0	28.0	63.0	
	% within PURPOSE	55.6%	44.4%	100.0%	