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Design concept of horse arena in Malaysia – A case study

Nur Fadilah Darmansah¹, Sitti Diana Tamjehi², Abdul Wafi Razali², Nadia Zaini² and Sharifah NurFarhana Syed Sahimi²

¹Faculty of Biosciences and Medical Engineering, Universiti Teknologi Malaysia, Johor

²Dept of Quantity Surveying, Faculty of Engineering, Universiti Malaysia Sarawak

Abstract. One of the most important facilities required for any equine centre is horse arena. Horse arena is a place where horse doing the exercise. Its a dedicated riding space is useful for training purposes. Equine Center may include an outdoor arena, indoor arena, or both. This paper presents the findings from a case study on the arena design concept throughout Malaysia. A total of fortytwo (42) Equine Centre throughout the country were selected and visited in the study. The items studied include the types of arena, size of arena, material used for surface and fencing. The results indicated that about 79% of the arena used outdoor design, 31% of the arena had arena size of 20m x 60m ,56% used Polyvinyl Chloride (PVC) as the main material of fencing, and almost 74% used sand as types of surface in arena. Then for the indoor arena, the design concept of the roof structure was 79% used gable type of design with 81% used zinc as the roofing material. Generally, it can be said that the design concept of the horse arena in Malaysia depends on the owner needs, activities of the equine centre whether it is use for training or game.

1. Introduction

Arena is the horse doing the exercises and the performance [1]. There are two types of arenas, namely, indoor and outdoor arena. Many horse owners need an area in which to exercise their[2]. Other horse owners need a special area designated for training. A properly designed riding arena can benefit both cases. Specially designed arena or training facilities do not have to be elaborate, but they do need to have a good surface and be developed and constructed so that they are safe for the horse and rider to use [3]. A “perfect” arena surface should be cushioned to minimize concussion on horse legs, and yet be firm enough to provide traction, not too slick, not too dusty, not overly abrasive to horse hooves, resistant to freezing during cold weather, inexpensive to obtain, and easy to maintain [4]. Based on statistic 60% the horse using the arena everyday [5].

According to [6], identified various aspects of arena surfaces that were related to risk of injury in horses and that arena maintenance is important in reducing injury risk. Thus the design arena is very important and must be known. If the design of arena increasingly used for training horses but there is limited knowledge of their effect on performance and injury [7].

2. Horse arena

A horse arena is a significant element to be considered at the earliest planning stage, and it is essential for any horse owner to get it right [6]. The arena can be located outside where exercising or training can be done in the fresh open air, but an arena in a specially designed structure can allow horse training to take place even during inclement weather [3]. A fully enclosed or indoor arena allows



climate in the enclosed area to be controlled while open-walled areas allow for maximum ventilation [8].

There are several important components in the construction of arenas such as type and size of arena, types of fencing and surface material arena.

2.1 Type and size

Size of the riding arena depends on its intended use as well as on the training of horses for different activities [9]. According to [4], the United States Dressage Federation (USDF) and National Horse Show Association stipulate a regulation size the arena size as shown in Table 1.

Table 1. Size of Riding Arena.

Arena Type	Dimensions (feet)
Barrel racing	150 x 200
Calf roping	100 x 300
Dressage (Small)	66 x 132
Dressage (Standard)	66 x 198
Show (Small)	110 x 220
Show (Standard)	120 x 240
Steer Wrestling	100 x 300
Team Roping	150 x 300
Western Pleasure	100 x 200

2.2 Surfaces

Arena surface is selected by the owner and is dictated by the requirements of the owner with respect to the use of the horses. Each type of arena surface is different depending on its material and cost [2]. Therefore, before construction can commence, the arena surface must be known [9]. Table 2 briefly describes the type of surface arena.

Table 2. Type of Arena Surface Bath Gate Silica Sand, (2015); E. F. Wheeler (2006).

Type of floor surfaces	Description
Sand	<ul style="list-style-type: none"> • Typical material or ingredient used in arena • Inexpensive • Soft and forgiving material for a horse's legs • Easily displaced during exercise and training activities
Wood products	<ul style="list-style-type: none"> • Examples: sawdust and woodchips • Used to improve water retention in other surface materials • Help alleviate stiffness in the horse's muscles and joints.
Road base mix	<ul style="list-style-type: none"> • Another name of road base mix: screening, limestone dust, quarry waste and stone dust. • Excellent traction with many properties similar to sand. • Unforgiving to a horse's legs
Rubber shavings mixture	<ul style="list-style-type: none"> • Expensive • Make the best riding arena footing • Excessive stress on joints and bones from repeatedly trotting, jumping and performing on hard.
Soil	<ul style="list-style-type: none"> • Most soil types that do not contain a significant amount of sand will tend to compact

-
- A Suitable material for sub base.
 - Pure clay content soil to pack tightly and become impervious to drainage making them an especially good sub base.
-

2.3 Type of fencing

Based on previous study, shows that three types of material fencing using in arena. The types are wood, PVC and hollow metal [10] [11]. Table 3 is summary of types material using in fencing of arena.

Table 3. Types of material Arena Fencing Bath Gate Silica Sand(2015); Emlyn, (2006); E. F. Wheeler,(2006).

Material	Advantages	Disadvantages
Construction Materials for Fencing of Arena		
Hollow Metal	<ul style="list-style-type: none"> • Quick to build • Less expensive than wood • Fireproof • Minimal maintenance 	<ul style="list-style-type: none"> • Noisy during rain, hail, wind • Cold in winter, hot in summer (little insulating ability) • Can be damaged by kicking and rubbing
Wood	<ul style="list-style-type: none"> • More forgiving (less likely to cause injury) than metal or stone) 	<ul style="list-style-type: none"> • Material and labour are expensive • Wood must be treated to prevent chewing • Not fireproof
Polyvinyl Chloride (PVC)	<ul style="list-style-type: none"> • Quick to build • Less expensive than wood and Hollow Metal • Minimal maintenance • Highly visible • safety (preventing horses from colliding with the fence) 	<ul style="list-style-type: none"> • Not fireproof • Can be damaged by kicking and rubbing

3. Methodology

3.1 Location of study

A total of fortytwo (42) horse stables throughout the country were selected and visited in the study. The data collect include from the various types of operation or activities such as racing, breeding, sport and competition, education, leisure and livery.

3.2 Instruments

The survey form was used as an instrument to collect information about the arena in all of the selected stables. The information were collected through recording image or photos, videos and survey form. Among the elements or infrastructures considered are related to the size, material of fencing, types of material, appropriateness according to need, function, aesthetic values and also technologies used in arena construction.

4. Results and discussions

Based on the 42 Equine center that have been analyzed, only 39 equine center consist 93% in Malaysia provided arena for their centre. The following is an analysis of the results obtained in relation to the arena

4.1 Type of arena

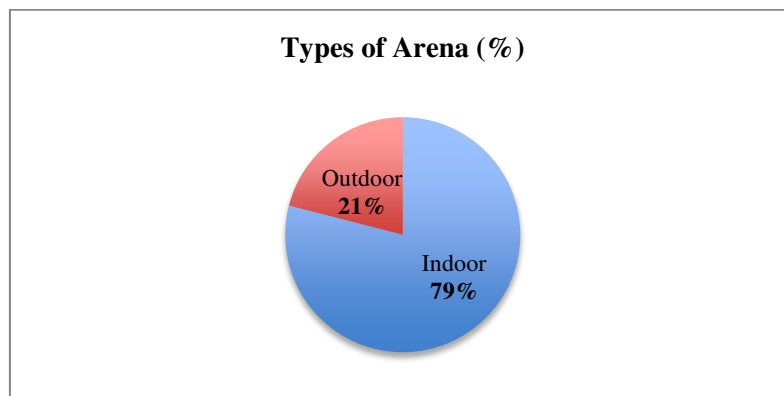


Figure 1. Type of Arena.

4.2 Size of arena

Figure 2 shows the six different sizes of arena. The biggest size of arena is 20.00 m x 60.00 m used in about 31% of the equine centres. Followed by 28% of equine centres used 30.48 m x 60.96 m size of arena. The other three different sizes of arena which are 20.12 m x 60.35 m, 18.30 m x 36.58 m and 91.44 m x 5.72 m were used by about 13% of the selected equine centres. While, only 2% of the equine centres used 40.00 m x 60.00 m size of arena.

The finding shows various of arena in this country. The size of a riding arena depends on its intended use. Size 20 m x 60 m is a standard size of minimum for training horse in an arena. Mostly the owner will build minimum sizes which comply to a standard purpose to reduce the space requirement of an equine centre. In addition, many horse owners need an arena in which to exercise the horse, but have limited land for their horse to run in a pasture. Other horse owner need a special area designated for training. The small size, 20 m x 60 m, is the smallest arena that can be used for training or riding.

The main important to be considered in the design and construction of an arena in equine centre are the training types, strong and good surface and safe for the horse and rider the arena.

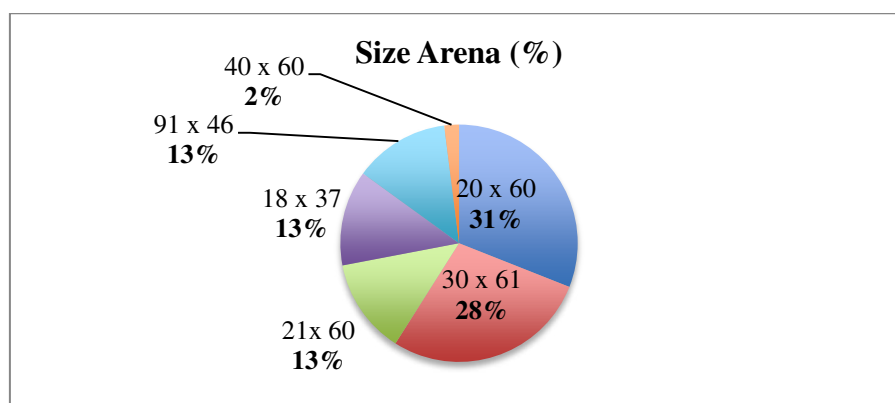


Figure 2. Size Arena.

4.3 Material of fencing arena

Main equine facilities arena require fencing material. Based on the results of the survey shown in Figure 3, there are three types of material to make fencing in arena and paddock. The first material is PVC and used by 56% for arena and 53% for paddock. Second material is wood fencing, 36% was used in arena and 35% in paddock. The third material of fencing is hollow metal fencing in which 12% was used in paddock and 8% in arena.

The consumption of Polyvinyl chloride (PVC) as the main material of fencing in arena and paddock is because it is less costly and easily available in the country. Other than that, PVC is widely used for fencing in current practice for horse arena and paddock and if the horse bumping into the fencing it does not hurt the horse, safer other materials. However, the use of PVC fencing requires maintenance frequently, if not then moss will multiply and cause to PVC fencing to be damaged.

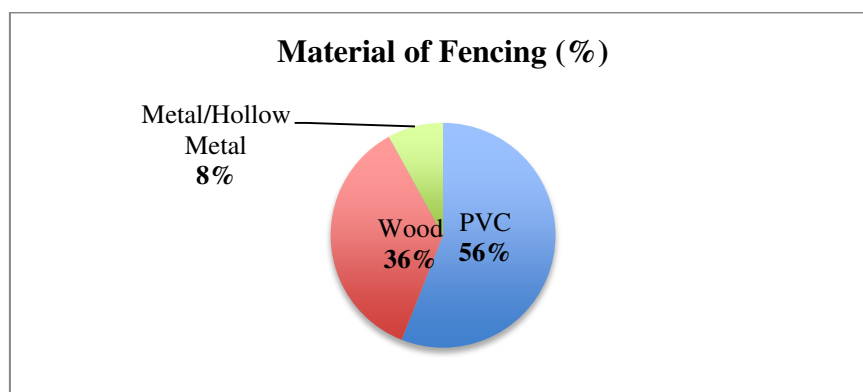


Figure 3. Material of Fencing.

4.4 Types of surface

Figure 3 shows the finding related to the types of surface using in arena. It shows that the highest is 74%. used sand. While, 21% using soil surface and the last type is sand mix rubber shaving used 5% in surface of arena.

Based on the finding (Figure 4), there are three types of surface in arena which are sand, soil and sand mix rubber shaving. The type of surfaces that is widely used in arena in this country is sand. It clearly points out that the most popular surface material is sand than soil and sand mix rubber shaving. The price for sand is costly than sand mix rubber shaving. The soil underutilized in this country is due to the surface is harsh and if it often rains then it will cause the surface arena become muddy and unusable for horse activities or training. Sand is the of surface material is very suitable for surface arena because the content of sand help the horse hooves do not get hurt and pain during training in a long period of time. Other than that, the sand is easy to be used due to the maintenance and the sand easy absorption of water during rain. This shows outdoor arena and paddock can be used for training during and after rain.

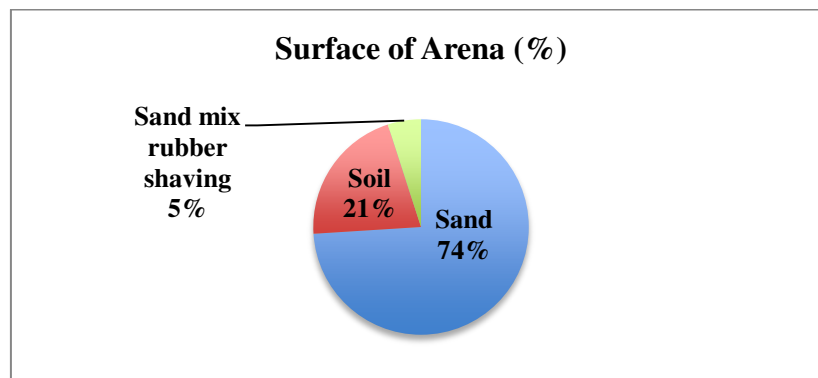


Figure 4. Surface of Arena.

5. Conclusion

Horse arena is a major investment for any horse owner and getting it right from the earliest planning stages is essential. Therefore, the construction of the horse arena should be focused, not only for cost savings such as in terms of maintenance, but also it is intended to maintain the safety of the horse. In conclusion the construction horse arena is based on the owner needs and also requirements arena for horse activities to be implemented in arena. Proposed construction of a horse arena in Malaysia as follows:

- Type of Arena is indoor arena
- Size of Arena is 20m x 60m
- Material of Fencing using Polyvinyl Chloride (PVC)
- Types of Surface is sand

6. Reference

- [1] Wheeler, E., Koenig, B., Harmon, J., Murphy, P., & Freeman, D. *Horse Facilities Handbook*. Retrieved from <http://www.amazon.com/Horse-Facilities-Handbook-EILEEN-WHEELER/dp/089373098X> (2005a).
- [2] Bath Gate Silica Sand. A guide to : Horse Arena Construction(2015).
- [3] Wheeler, E., Koenig, B., Harmon, J., Murphy, P., & Freeman, D. *Horse Facilities Handbook* (First). Iowa: MidWest Plan Service (2005b).
- [4] Wheeler, E. F. *Horse Stable and Riding Arena Design* (1st Edition). Iowa State: Blackwell Publishing (2006).
- [5] Club,P. *The Manual of Horsemanship* (14th Editi). United Kingdom: A Pony Club Publication (2013).
- [6] Tranquille, C. a, Walker, V. a, Hernlund, E., Egenvall, A., Roepstorff, L., Peterson, M. L., & Murray, R. C. Effect of Superficial Harrowing on Surface Properties of Sand with Rubber and waxed-sand with fibre Riding Arena Surfaces: A Preliminary Study. *Veterinary Journal*, 203(1), 59–64. <http://doi.org/10.1016/j.tvjl.2014.10.027>(2015).
- [7] Karen, E. *Policy Implementation as a Wicked Problem : A Study of the Horse- World*. Durham University (2013).
- [8] Murray, R. C., Walters, J. M., Snart, H., Dyson, S. J., & Parkin, T. D. H. Identification of Risk Factors for Lameness in Dressage Horses. *Veterinary Journal*, 184(1), 27–36. <http://doi.org/10.1016/j.tvjl.2009.03.020> (2010).
- [9] Glenn, A., & Vergara, H. A. Facility Planning for Large Equine Facilities in Urban and Rural Settings. *Computers and Electronics in Agriculture*, 130, 151–157. <http://doi.org/10.1016/j.compag.2016.11.002> (2016).
- [10] Mead, T. Horse Fencing and Fencing Materials: Considerations for when you are planning your (2011).

- [11] Emlyn, W. Riding Arena Footing Material Selection and Management. In *Horse Facilities* (pp. 1–12). Penn State (2006).