RESEARCH ARTICLE

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Questionnaire Study on Feeding Practices of Pace Horses in Aegean and Marmara Regions of Turkey

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Abstract

This sectional study aims to collect data about feeding practices for pace horses in the Aegean and Marmara regions of Turkey. For this purpose, a questionnaire consisting of 69 free text and multiple-choice questions was developed. The questionnaire was implemented on 29-31 August 2014 by personal interviews and was online on social media for ten months. The questionnaire comprised sections on breeder demographic information, farm condition, feeding habit, and nutritional disease. Fifty volunteer horse owners who had a total of 271 horses have participated in the study. Evaluation of the results focused on nutrition practices. Unfortunately, 46% of the respondents were not rasping their horses' teeth, and an important part of them was not using supplementary oil (78%) or feed additives (84%). Drinking water after exercise (74%) as well as rotten, mouldy, and bacterially contaminated feed (72%) were reported as the most important colic reason by the responders. Based on the results of our study, educational initiatives are needed to inform pace horse owners about appropriate nutrition and related diseases to increase the pace horse race performance.

Keywords: Horse breeding, management, nutrition, pace horse.

INTRODUCTION

In pacing, only two footstep sounds are heard while walking, and back and front feet move at the same time on the same side (Caglayan et al., 2010). Pace racing is known as "Rahvan" in Turkey. This pacing type is also used in the main part of endurance races, and recently, pace horse breeds have been stated to exist in the United States, United Kingdom, France, Germany, Spain, Italy, Iceland, Japan, Brasilia, Uzbekistan, Turkmenistan, and Kyrgyzstan (Yüceer et al., 2016). Pace horse racing culture moved from Middle Asia to Turkey and lived up to now (Ceylan, 2019). Güleç (2005, 2007) has mentioned the pace walking and the historical roots of the Turkish pace horses in his books. Pacing is comfortable for a rider, besides being slower than galloping (Emiroğlu and Yüksel, 2009). The horse could carry more weight in less time by pacing (Güleç, 2007). In the 1960s, the first modern pace horse race was arranged in Ödemiş/Izmir and then have become widespread around Turkey. Turkey Traditional Sports Federation, municipalities, and local authorities support and organize pace horse races in Turkey (Ceylan, 2019). According to the Turkey Traditional Sports Federation 2017 agenda, 75% of competitions were held in the Western and middle regions of Anatolia. But in the East part of Anatolia, Cirit (Javelin) horse is more common than the Turkish pace horse (Yıldırım and Yıldız, 2013).

There are very limited studies on pace horses in Turkey. A study examining the body characteristics and speed of the Turkish pace horses concluded that the pacing speed of the Turkish pace horses is slower compared to other horses that were bred in other countries (Caglayan et al., 2010). Another study was conducted on mutant doublesex and mab-3 related transcription factor (DMRT3) allele distribution of pacing horses in Turkey and reported that DMRT3 allele distribution is also common in Turkish pace horses (Özbeyaz et al., 2016).

The phenotypic characteristics of the Turkish pace horses were compared with Iranian, Afghan, and Bulgarian horses; and the wither and rump heights were found to be lowest in the East and Southeast part of Turkey, as compared to other horses (Yüceer, et al., 2016a). The genetic structure of the Turkish pace horse was compared with horses in the seven regions of Turkey in terms of microsatellite loci, and it concluded that they were different from Arabians and Thoroughbreds (Yüceer, et al., 2016b). Morphological properties and breeding conditions were also evaluated and it was found that the consumption of concentrated feed was 3-6 kg/day and 73.12% of the horse owners in Afyon province supported their horses with vitamin-mineral complexes and fruits (Akyol, 2017).

As a summary, a limited number of studies were conducted on pace horses in Turkey, and they mainly focused on genetics and morphologic properties of the pace horses in Turkey (Caglayan et al., 2010; Özbeyaz et al., 2016; Yüceer, et al., 2016a; Yüceer, et al., 2016b; Akyol, 2017;).

Besides, Caglayan et al. (2010) concluded that Turkish pace horses are slower than those in other countries. It was reported that daily digestible energy and crude protein intakes were positively correlated with the

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race performance of horses (Glade, 1983). Another study showed that there are gaps in welfare, nutrition, and nutritional disease aspects also in racehorses (Visser & Wijk-Jansen, 2012).

In the light of the previous literature, it was thought that evaluation of the feeding and management practices of the Turkish pace horse would provide one more step on the way to understanding and raising this breed in Turkey. Initially, this study aimed to gather information on basic feeding practices, feed supplement usage, and nutritional disease management of Turkish pace horses. Secondly, some other information, breeder demographics, and limited management practices were also noted.

MATERIALS AND METHODS

This study was conducted by 50 volunteer horse owners who had a total of 271 horses. The Turkish questionnaire was designed with 69 questions, and it also has an English version that is available upon request. The sample size was calculated based on the number of horses due to a lack of breeder number information. The number of horses was taken as 10000 with 50 ± 6% result factor, 1 design effect, and 95% confidence interval, and the sample size was calculated as 260 by OpenEpi, V.3, open-source online software.

The questionnaire had four main sections: breeder information, farm conditions, feeding habits, and nutritional diseases. 40 of the 69 questions consisted of multiple-choice and yes/no questions, while 29 were free text questions (feeding materials, number of the animals, etc.). The breeder information section included questions about the breeding region, education level, total breeding experience, and the number of horses; the farm conditions section included stable conditions; the feeding material section included feed type, and all veterinary and feeding expenses. The detailed nutrition section contained questions about pasture usage, feeding times, rations, ration preparation technology, and feed additive usage habits. Nutritional diseases knowledge was one of the main points of this study. Thus, questions on anthelmintic medication use, probable colic causes, occurring frequency, foal developmental disorders, and the number of stillborn foals were posed to the horse owners.

Body Condition Score (BCS) systems are mainly used in food animals, and they are also commonly used for the determination of the fat content of the horse (Dugdale et al., 2012). One of the common BCSs is the classification ranged from poor (1) to extremely fat (9) (Henneke et al., 1983). Later, another classification method was designed based on the scoring of the body from very poor (0) to very fat (5) (Carroll and Huntington, 1988). For non-expert horse owners to easily understand and decide, this method was used via visualization of the BCS by figures (Wright et al., 1998) (Figure-1).

Face-to-face surveys were carried out on 29-31 August 2014 before the Gölcük Pace Horse Race. To reach the target sample size, the questionnaire was also available online in social media for ten months via web-based software (Google® Docs, California, USA). All survey data were exported to Excel® (Microsoft®, V.2010, Washington, USA) for further analyses. The answers from 50 horse owners who had a total of 271 horses (Aegean [62%], Marmara [38%]) were evaluated in the study. The frequency and percentage values were shown in the table and the chi-square test was conducted for statistical analysis by statistic software.

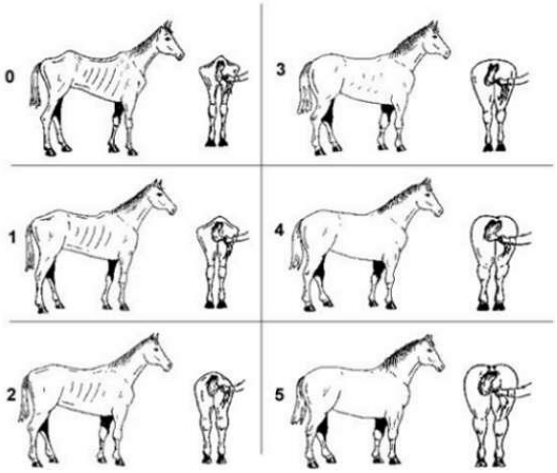

Figure 1. Body Condition Scoring visualization (Wright et al., 1998).

RESULTS

Firstly, the demographic characteristics of the breeders and the farm conditions were evaluated. 60% of the responders had more than 10 years of experience in pace horse breeding. The education level of most of the horse owners was high school or lower degree graduates. 72% of the horse barns contained 1-5 horses. Turkish pace horse owners mainly keep their horses in barns, not individual boxes.

Secondly, feeding practices and nutritional disease information were evaluated. A major source of energy was oats. The main daily ration contained alfalfa (55.5%), pasture (53.3%), and oat hay (35.5%). The feeding material used by the horse owners were shown in Table 1. According to the responders, the average concentrate feed consumption of an adult horse is ~50 kg/month. Figure-1 has been shown to the respondents and they decided their horse's body condition score was number two (26%), number three (50%), and number four (24%).

Commonly, the participants were feeding their horses two times (56%) a day. The soaking method was common (60%) in oat and barley treatment. A few responders stated that they used corn silage (10%) (Figure-2). While 53% of the responders reported pasture usage except for winter, 15% of them reported pasture usage in all seasons. 78% of the participants reported that they did not use supplementary oil and 84% of them reported they did not use feed additives. In contrast to these findings, it was stated that fruits were used very commonly (68%) as a feed additive. Probable colic reasons according to breeders shown in Table-2. The responders stated that they generally (62.2%) separated foal and mare after six months from birth.

Table 1. Feeding material preferences.

Feed Material	Foal (n:42)		Non-Pregnant Mare (n:24)		Pregnant Mare (n:32)		Stallion (n:28)	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Fabric	5	11.90	2	8.30	6	18.70	5	17.80
Barley	9	21.40	3	12.50	10	31.20	2	7.14
Oat	19	45.20	15	62.50	21	65.60	7	25.00
Maize	1	2.30	-	-	-	-	-	-
Bitter Vetch	1	2.30	-	-	-	-	-	-
Tare	1	2.30	-	-	-	-	-	-
Bran	3	7.14	-	-	1	3.10	-	-
Corn	-	-	-	-	1	3.10	-	-
Pasture[1]	42	100.00	24	100.00	32	100.00	28	100.00
Premix[2]	4	9.50	-	-	1	3.10	-	-
Bagasse	1	2.30	-	-	-	-	-	-

Notes: 1. Alfalfa and oat hay are also included in the pasture. 2. Vitamin and Mineral Premix.

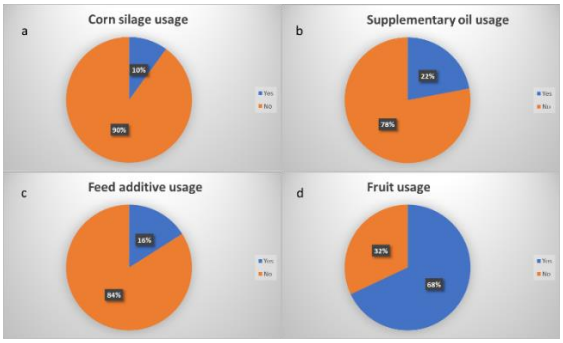

Figure 2. Corn silage (a), Supplementary oil (b), Feed additive (c), and (d) Fruit usage ratios.

Table 2. Probable colic reasons according to breeders.

Cause	Frequency n:50	Percent
Drinking water after exercise	37	74.00
Overfeeding	32	64.00
Gastro-intestinal system parasites	16	32.00
Rotten, moldy and bacterially contaminated feed	36	72.00
Feed contaminated with other animal's feces	1	2.00

DISCUSSION AND CONCLUSION

The demographic findings of the horse owners showed that most of the responders are not educated in higher levels but had experienced more than ten years in pace horse racing. Akyol (2017) also reported that in the Afyon region horse trainers have more than five years' experience on-pace horses.

Due to economic conditions, group housing is inevitable in this practice. It was also reported that group housing is common in Nordic countries (Hartmann et al., 2015) and group barns are common in rural areas and Arabian practices as an economical solution for the housing of the horses. Also, Akyol (2017) concluded barn and housing conditions should be enhanced according to our findings. For this purpose, pace horse associations and municipalities can act together and widespread the modern barn conditions for pace horses. These conditions also effected the weaving time of the foal. Usually weaning time accepted as six months in horses but, housing all the horses together results with the increased weaning time.

Face-to-face interviews showed that most breeders did not calculate daily ration in detail, thus monthly consumption can be calculated more effectively than daily consumption. Akyol (2017) found that concentrate feed of 3-6 kg/day was consumed by pace horses in Afyon, while Yıldırım and Yıldız (2013) recorded 6 kg/day concentrate feed consumption in Javelin horses in Erzurum. Our results were slightly lower than those in these two studies.

The major energy source component was founded as oats in the racehorse practice in Turkey (Demirel, 2006). Another research showed that oat and barley were started to be mixed recently in the nutrition of thoroughbreds in Turkey (Kaya-Karasu et al., 2018). In Turkish pace horse nutrition, the oat-based ration is preferred more than barley. Soaking oats and barley are common and important to get more nutritive material in the feed.

The responders mentioned that commercial feed use is not common due to economic conditions. Parallel to this, pasture is an irreplaceable source to decrease feed costs. In the western region of Turkey, except for two or three months of winter, horses can reach pasture sources. All responders used pasture as much as possible to meet forage needs. Consequently, pasture is a very good opportunity to decrease the main feed expenses. Grass hay can easily be used in all regions of Turkey, and it is cost-effective. So, another source for the forage is grass hay. Nevertheless, Demirel (2006) observed that pasture usage was rare in thoroughbred horses. Kaya-Karasu et al (2018) referred that the use of grass hay (meadow) was common in all of Europe, and parallelly, in Turkish thoroughbred racehorse practice, due to its high availability and cost-effectiveness. Demirel (2006) stated that 10% of silage was used in racehorse practice. This is nearly the same in our study. According to Demirel (2006), a high level of bacteria, moulds, and yeasts in silage was seen by the horse owners as a colic cause for thoroughbreds, which supported our findings on silage usage preferences of the horse owners.

Common fruit used as a feed additive finding was parallel to the study by Akyol (2017) who was found the fruit usage as 72.12%. The responder's BCS preferences were as follows; 50% of them preferred BCS 3, 26% BCS 2, and 24% BCS 4 according to Carroll and Huntington (1988) and Wright et al. (1998) grading systems. It is concluded that in pace horse races horse owners prefer two- and three-degree BCS. Pace horse owners mentioned that lower body condition score is better than four and five-degree body condition score.

Colic is one of the very well-known and frightening diseases from the horse owner side. Thus, a part of the questionary focused on familiarities to the colic reasons. The answers showed that the horse owners are familiar with most of the colic reasons. It was found that 46.15% of low-quality hay samples from colic horses were contaminated with yeast and 30.76% of the low-quality hay samples were contaminated with bacteria, which were identified as a colic risk factor (Kaya & Iben, 2009). 72% of the respondents also stated that any contaminated feed will be a colic cause.

In addition, gastrointestinal parasites are one of the important colic reasons, but only 32% of responders defined it as a colic risk. Parallel to this finding, 30% of the responders did not deworm their horses, 58% of them deworm horses every 3-6 months and 12% of them deworm horses in more than six months. Rasping teeth is crucial for the dental care and feed utilization of the horse (Dixon and Dacre, 2005). 46% of the responders did not rasp their horses' teeth. Routine rasping is important for the treatment of wave mouth and shear mouth and is used to remove enamel points and hooks (Tremaine, 1997). Horse owners needed to encourage them to rasp their horse's teeth.

The importance of the feces control and probable feed contamination sources were not known by the responders. Contaminated feces can be the source of parasitic diseases. Strongyles remain an important concern among intestinal parasites, but it is successfully prevented with anthelmintic drugs such as pyrantel, ivermectin, and moxidectin (Tınar and Şinasi, 2015). It is known that some breeders are using dried feces as a mat for the barn floor. Horse owners should be informed about feces and their contamination causes. Removing feces from paddocks, the parasitological examination of feces in the pasture during the season, moxidectin treatment once in thirteen weeks, and ivermectin administration once in eight weeks have been recommended for prevention purposes in adult horses (Öge, 2005). Our findings showed that most of the horse owners (58%) were using deworming medication between 3-6 months. Kaya-Karasu et al. (2018) found that 57% of the racehorses were dewormed less than three months. Compared to our results in racehorses deworming is done more coherently than pace horse practice. According to our results, nearly 1/3 of the responders answered that colic can be caused by gastrointestinal parasites, which is supporting the deworming findings. In parallel with our findings, a questionnaire study showed that in Denmark, 71.9% of the responders know about selective anthelmintic therapy (Nielsen et al., 2014). In Turkey, horse owners should be informed more about anthelmintic, deworming therapy.

Usually, in this practice, horse owners do not prone to use oil or feed additives in the ration. The main reason for this is probably financial issues. Compared to the study by Demirel (2006), regular feed additive and oil usage is 90% in racehorses, and Kaya-Karasu et al. (2018) concluded that the rate of supplement use was 49% for mineral and vitamin complexes and 12% for oil supplement, and our result is lower than the results of the study by Demirel (2006) and Kaya-Karasu et al. (2018).

Caglayan et al. (2010) have reported that Turkish pace horses are slower than their opponents in the world. Ration modulations can provide better performance for Turkish pace horses. Nevertheless, feed costs are crucial for breeders. Previously, Demirel (2006) reported %90 vitamin and mineral mixture supplements, Kaya-Karasu et al. (2018) reported 49% feed supplement usage. Feed additive support was found to be lower than the results of other studies conducted on racehorses in Turkey (Demirel, 2006; Kaya-Karasu et al., 2018), due to financial reasons. Turkish pace horse owners use fruits as feed supplements instead of commercial products.

We had some limitations during the interviews, most of the responders did not want to answer the questions related to the foal developmental disorders, the number of stillborn foals, and special mixture additives before the race. This increased our missing data, so we had to discard a part of the data. The acquired information was not sufficient for a realistic evaluation of these topics, and they were not evaluated. On the other hand, the visual BCS question was answered easily. It is strongly recommended to use binary and visual questions for this group in further studies.

As a result, Pace horse races have distinctive characteristics in all countries. Even so, pace horse racing is unique and traditional. In accordance to protect this genetic resource, action plans should be performed with non-governmental organizations and governmental bodies. Nation-wide health assessments and training programs should be developed. Breeders can support the scientific guidance on the management topics and encourage them to develop, sustaining this culture for the next generations. Good management practices can move the Turkish pace horse to an international level and gain economic importance to this breed.

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Conflict of Interest
The authors declare that they have no competing interests.

Authorship contributions
Concept: E.D., T.B., Design: E.D., T.B, Data Collection or Processing: E.D., T.B, Analysis or Interpretation: E.D., T.B, Literature Search: E.D., T.B, Writing: E.D., T.B.

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