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Is It a Good Idea to Train Fillies and Colts Separately?

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This study compared the physiological response to novel situations in sex-separated and sex-mixed groups of horses, as measured by heart rate (HR). The study evaluated the possibility of training horses in a mixed-sex system. The study included 41 Purebred Arabian 2\textsuperscript{1/2}-year-olds during their first walk on an automated horse walker. Four groups, divided by manner of care and training, consisted of 10 colts and 10 fillies kept in separate stables and trained in separate male or female groups and 12 colts and 9 fillies kept in the same stable and trained together. The study measured HR when horses were at rest before exercise, while moving from stable to walker, during 30 min of exercise on walker, while moving from walker to stable, and at rest after exercise. Mean HR scores recorded from training on the walker were higher in sex-mixed groups. Results obtained while horses were moving from stable to walker, then from walker to stable, were significantly higher in the sex-mixed groups. The study did not recommend training young horses in sex-mixed groups.

Equestrians and researchers continually strive for a clearer understanding of horse learning behavior and its implications for training (Hall, Goodwin, Heleski, Randle, & Waran, 2008; Heleski, Bauson, & Bello, 2008). Behavioral and memorizing processes in the horse are likely to influence equine athletic success or horse usefulness during and after the end of the horse’s sport or racing career (Murphy & Arkins, 2007).

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According to the Yerkes-Dodson law, the efficiency of the training process is dependent on the arousal of the nonhuman animal. The Yerkes-Dodson law was formed in the 1st decade of the 20th century; however, it is still a useful experimental foundation (Calabrese, 2008). It illustrates the stress-related biological processes that can be generalized to include multiple species. In agreement with this law, the performance increases with physiological and mental arousal—but only for simple tasks. For unfamiliar or difficult tasks, the relation between arousal and performance tends to be the opposite. When levels of arousal become too high, performance decreases. In addition, actively raising the arousal of the horse can significantly decrease performance. Horse training proceeds most effectively when the horses are calm during training (Christensen, Rundgren, & Olsson, 2006). Given that arousal usually is associated with an increase in heart rate (HR), the arousal status of the horse can be indexed by the HR recording. A common noninvasive technique used to estimate horse arousal is the telemetric measurement of HR (Jansen et al., 2009; Jezierski & Górecka, 2000; Visser et al., 2002).

It is well known that exposing a horse to a situation involving mental stress leads to HR increase (Jansen et al., 2009; Rietmann et al., 2004; Stewart, Foster, & Waas, 2003; Waran & Cuddeford, 1995). One of the most important factors that causes a significant HR increase in horses is social isolation (Jezierski & Górecka, 1999, 2000). Just the presence of a mirror as a surrogate companion decreases the stress-evoked behavioral reaction in horses (Kay & Hall, 2009).

Horses are a typical social species and show a preference for living in groups (Jezierski & Górecka, 2000). Training of naive horses involves many novel situations: transient social isolation, contact with new people, exercise on an automated horse walker, and work on a lunge or under the lead of a rider. Training in a group of familiar horses is preferred to reduce stress-involved arousal. Nowadays horses are generally kept in separate male or female stables. Nevertheless, mares and stallions are involved in a similar training routine and often take part in the same training sessions, competitions, or races. Our own observations indicate that caring for and training horses in separate male and female groups led to increased arousal or unrestrained behavior when they had contact with the opposite sex in paddocks or during training. The latest studies indicate that the composition of a horse herd of mares and geldings did not have any effect on aggression level or social interactions (Meisfjord Jørgensen, Borsheim, Mejdell, Søndergaard, & Bøe, 2009). However, the direct effect of training horses in sex-mixed groups in comparison to training them in sex-separated groups on their arousal status remains unknown.

The objective of this study was to see whether the presence of horses of the opposite sex affected HR scores that were registered during the novelty test and to see whether HR generally varied in horses exposed to mixed-sex housing in comparison to those in single-sex environments. Such results might have implications for changing the training of horses.
With this aim in mind, young Purebred Arabian horses were studied during their first walk on an automated horse walker. This walker is a device commonly used in a training program.

MATERIALS AND METHODS

Horses

This study was part of a larger project designed to investigate whether the training program did or did not cause mental stress in horses. The horses studied were brought to one of the training centers in Poland. There were 41 Purebred Arabian horses, who were 2.5 years old. All horses had been brought to this training center from their mother stud farms 3 days earlier. The horses studied came in groups of 15, 12, 9, and 5 from four different professional Purebred Arabian horse-breeding stud farms. At the home stud farms, the colts had been kept in one-horse stalls in separate male stables for about 1.5 years. The fillies had been kept in stalls in female stables for about 6 months. They had also been pastured in sex-segregated groups. All horses had been conditioned to being handled, to being led on a rope by their caretaker, and to being moved under the lead of a handler. However, none of the horses studied had been trained on an automated horse walker.

The horses were divided into four groups according to their sex and type of care and training. Ten colts were kept in a male stable and trained in a male-only group. There was also a stable in which 12 colts and 9 fillies were taken care of together. These 12 colts were tested in the presence of fillies. In a separate female stable, 10 fillies were trained in a female-only group. There were also 9 fillies, who were taken care of in the stable together with the colts from sex-mixed group and who were tested in the presence of colts. At the new training center, they were brought to the racing stable in one-horse stalls. The horses from neighboring stalls did not know each other. They were fed and cared for in a manner that was typical for racehorses. To exclude the influence of the human factor on horse response, the horses from each group were divided into three subgroups. Each of these subgroups was under the care of different caretaker. From the start, all caretakers were unfamiliar to the horses. As a result, each horse was cared for by only one of the three unfamiliar persons at this training center. These individuals had no knowledge of what was being tested.

No horse had clinical symptoms of any illness. The experiment was done in midwinter. None of the fillies showed symptoms of estrus during the study. The day of the study was also the 1st day of their race training schedule. The course of training accorded with the rules developed by the trainer preparing the studied group of horses for racing.
Novelty Test

The study lasted for 1 day. The day of the study was the horses’ 1st day of race training. On the day of the study, they were handled by the caretaker who had cared for them for the last 3 days. They were moved from the stable to the automated horse walker. Two identical walkers taking 6 horses each were used. The machines were located very near each other. The whole male group was tested together and then the whole female group was tested together. The horses from sex-mixed groups were tested together in two parts. On each automated walker, 5 to 6 horses were walked. These sex-mixed groups put on the walkers were a combination of 2 to 3 colts and 2 to 3 fillies for each walker. The horses were handled and ushered onto this device in a random order. Once on the automated walker, they walked without the presence of any caretakers. They walked on the horse walker with unfamiliar companions for about 30 min. The speed of the horse walker was kept constant. After their walking routine, the horses returned to their stalls. The ground on which the horses were tested was cleaned before the next group was tested; however, the cleaning did not ensure the control of olfactory cues.

A few days after the study, the trainer moved horses from the sex-mixed groups to separate male or female stables. Unfortunately, for this reason, continuing the study and observing, for example, work in sex-mixed groups was not possible.

The HR was measured during all phases mentioned earlier. Before the horses started the training session, an elastic belt with a transmitter for telemetric HR registration (POLAR OY ELECTRO, Finland) was put around the chest of each horse. After activation of the telemetric set, the horses were left alone in their stalls for about 5 min to achieve the HR resting values. Then the horses were prepared for their training session in the manner described earlier. For all subjects, HR was continuously measured in 5-s intervals until 5 min after they were returned to their stalls. To identify the beginning and end of each action, a person had to press the lap bottom of the telemeter on starting and terminating the following activity, thus identifying the area of analysis. The data were downloaded from the transmitter to a computer using interface. To analyze the obtained HR data, the Polar Precision Performance program was used.

Statistical Analysis

The results are presented as means with standard deviations (SD). Prior to the statistical analysis, a mean HR score per-minute test was taken. For each horse, the following five HR measures were used:
1. At rest before exercise;
2. While moving the horse from stable to automated horse walker;
3. During 30 min of exercise (30 measurements);
4. While moving the horse from the walker to the stable; and
5. At rest after exercise.

Comparisons between the groups of horses were done using one-way ANOVA and the student t test (Microsoft Excel 2003). The measured HR scores were compared for all steps of the study in colts in sex-mixed and sex-separated groups or from fillies in sex-mixed and sex-separated groups. The statistical significance was accepted at the level of $p \leq .05$.

RESULTS

The comparison of HR scores in Purebred Arabian colts studied in sex-mixed and sex-separated groups is presented in Figure 1. Neither the HR recorded at rest nor the HR recorded 5 min after the test differed significantly in sex-mixed and male groups (35.1 ± 0.99 vs. 34.0 ± 0.82 and 47.3 ± 2.19 vs. 45.3 ± 4.27, respectively). The HR scores for each step of the novelty test were higher in colts from the sex-mixed group than for those from the male group. The results amounted to 84.3 ± 3.00 versus 76.5 ± 6.87, $p \leq .01$ while moving the horses from the stable; 95.0 ± 3.19 versus 71.1 ± 3.57, $p \leq .001$ during exercising on an automated horse walker; and 81.1 ± 6.05 versus 74.4 ± 1.57, $p \leq .01$ while walking the horses back to their stall. Similar results were observed in analogous groups of fillies studied (Figure 2). The HR measured while moving the fillies from sex-mixed and sex-separated groups from the stable amounted to 82.1 ± 5.30 versus 60.5 ± 3.21, $p \leq .001$, 90.4 ± 5.32 versus 75.0 ± 4.00, $p \leq .01$ while exercising them on an automated horse walker and 81.4 ± 5.53 versus 69.8 ± 2.94, $p \leq .01$ while walking the fillies back to their stall, respectively. No differences were found while at rest (34.9 ± 1.13 vs. 35.8 ± 1.17) and 5 min after the test (45.9 ± 1.45 vs. 46.0 ± 1.56), respectively.

DISCUSSION

In this study, only the results achieved in horses of the same sex were compared. The problem of the influence of sex on HR reaction in horses is still under discussion. There is evidence in animals used in experiments that there exist subtle sex-related differences in nerve action. For example, the number of myelinated axons in the anastomosed nerve segment was significantly larger in female than in male rats (Kovacic, Sketelj, & Bajrovic, 2003). In addition,
the studies involving humans indicated that women show greater manifestations in response to pain than do men. (Burton, Birznieks, Spaak, Henderson, & Macefield, 2009; Gazerani, Andersen, & Arendt-Nielsen, 2007). Moreover, HR regulation is also subject to gender hormones. The direct influence of the sex steroid hormones on the process of HR regulation was discussed in a previous report (Kędzierski & Janczarek, 2009). All the facts mentioned earlier indicate that sex-related differences exist in HR regulation.

The horse’s first time on the automated horse walker was used as the novel stimuli test in this study. The use of the automated horse walker is recommended when training naive horses (Murphy, 2008). All groups of horses studied were examined in repetitive conditions. The physical activity, transient social isolation, the process of moving the horses from the stable, and exposure to a novel stimulus can affect HR; however, in this experiment, exposure to these factors was the same for all the horses. The one independent factor was the presence of other horses of the opposite sex or lack of other horses of the opposite sex. The results indicated that the HR response to novelty was dependent on sex
Colts and fillies who were cared for and trained in sex-separated groups had lower HR scores when faced with novel stimuli than colts and fillies kept and trained in sex-mixed groups.

The heightened arousal in sex-mixed groups requires an explanation, especially because horses are a very social species. This study noted a higher arousal level in sex-mixed groups than in sex-separated groups of colts or fillies. A similar interaction was observed in other domestic mammals (Colson et al., 2006). The presence of females in a group of piglets seemed to increase the aggressive behavior of the males and their emotional response. Under the influence of the excited presence of males, the females’ activation level also seemed to grow (Colson et al., 2006). It can be supposed that similar reactions can happen in horses. Just submitting a horse to a novelty test can increase the horse’s arousal (Christensen, Keeling, & Nielsen, 2005; McCall, Hall, McElhenney, & Cummins, 2006; Minero, Zucca, & Canali, 2006). The study of Christensen, Malmkvist, Nielsen, and Keeling (2008) indicated that the horses, when paired with a calm companion, showed less fear-related behavior and lower HR responses to the novelty test compared with horses tested with naive companions. The results of the present study showed that the presence of horses of the opposite sex was the additional factor that increased their...
arousal. In agreement with Yerkes-Dodson law, a high level of arousal does not promote an increase in performance during the training process. Arousal can also disturb the learning ability (Christensen et al., 2006). There were also the sex-related differences in equine learning skills measured during novelty testing (Murphy, Waldmann, & Arkins, 2004). First experiences are very important for horses, who are a species endowed with good, long-term memory (Hanggi & Ingersoll, 2009). Good memory in equines is the reason that the individual experiences of a horse have long-term consequences and lead to the formation of an emotional relationship with the horse’s environment. It also influences the psychophysiologic process of adaptation.

CONCLUSION

In conclusion, on the basis of the results of this study, training young, naive horses in sex-mixed groups is not recommended. Further studies are necessary to determine the best time to help the horses get used to being trained in groups that are nonseparated by sex.

REFERENCES


