

## Sexual Behavior of Arabian Stallions as Affected by Age and Season of the Year under the Egyptian Environmental Conditions

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### ABSTRACT

In the present study, nine sexually matured Arabian stallions (5-15 years old) were used for recording the sexual behavior. The obtained results revealed that, time to the first mount and latency to mount (seconds) were insignificantly shorter in the Arabian stallions during summer season at 5 years old and were longer during winter season at 15 years of age. Latency to erection (seconds) was insignificantly the shortest during summer at 5 years old and the longest during autumn season at 10 and 15 years of age. Latency to ejaculate (seconds) of the Arabian stallion was insignificantly shorter at 5 years and 15 years old during spring and summer than winter and autumn seasons at 10 years. Number of mounts per ejaculation of the Arabian stallions was significantly ( $P<0.05$ ) less during spring and summer, while significantly ( $P<0.05$ ) bigger during winter and autumn seasons. On the other hand, Number of mount per ejaculate was insignificantly lower in the Arabian stallions at 5 years than at both 10 years and 15 years old.

**Keywords:** stallion, Sexual behavior, Season, Age

### INTRODUCTION

Assessment the sexual behavior of stallions is greatly important because it is connected to reproductive efficiency (Rua *et al.*, 2015). Evaluation of the reproductive behavior is an integral part of the examination for breeding potential or problems in the stallions. An understanding of the sequence of behaviors displayed by the stallion in preparation, during, and after mating is important for the diagnosis of disorders such as poor libido, erection, or ejaculation failure (Pycock *et al.*, 2006).

Farm animal reproduction is based on the desire and ability of animals to engage in sexual behavior (Katz and McDonald, 1992).

In stallions, two main stages might be noticed in sexual behavior; the first stage is that of sexual excitation (libido), and the second stage (copulation) begins with copulatory movements and finishes with ejaculation (Tischner *et al.*, 1974 and Houpt, 2011).

Sexual behavior was seen in 2- to 3-month-old colts, with full penile erection during resting, play fighting, or mutual grooming, but the age at the first successful copulation varied from 15 months to 3 years. Stallions exhibit libido throughout the year but show peak sexual behavior in the spring (Houpt, 2011).

Hurtgen (2009) reported that many factors influence libido and mating ability in stallions. These factors may be hereditary, environmental condition, or learned patterns and are highly influenced by management of stallions.

Stallions are considered to be "long-day breeders" because their reproductive capacity is maximized during the seasons in which the photoperiod is increased. The testicular measurements of stallions increase during spring and summer, which leads to an increase in sperm production, libido and plasma hormone concentrations of intestinal-cell stimulating hormone (ICSH), follicle stimulating hormone (FSH), testosterone, inhibin and prolactin (McKinnon *et al.*, 2011).

Clay and Clay (1992) and Pickett *et al.* (1989) reported that the reproductive activity of stallions is arranged by seasonality and photoperiods.

Libido in stallions is established during the year, although the sexual drive is the highest in spring and summer, while it is reduced in the winter or autumn, but is not totally ablated. Additionally, the sexual behavior abnormalities formed 10.42% in the Arabian stallions Waheed *et al.* (2015). Furthermore, McDonnell (2009) reported that the highest percentage of sexual behavior abnormalities (37%) was recorded during autumn season due to the short daylight.

McDonnell (2009) and Waheed *et al.* (2015) found that the sexual behavior parameters were short during summer in normal breeders.

In the Arabian stallion, Najjar *et al.* (2010) found that the number of mountings in the artificial vagina was higher in the young stallions (age <15 years) than in the old stallions (age = >15 years).

McDonnell (1992b) reported that probably the most popular pattern of behavioral dysfunction in stallions includes inadequate sexual interest and arousal. Many of the problems appear to be related to inexperience or to a history of active discouragement of sexual behavior during training or performance. The problems are most typically seen in young or in experienced stallions. Furthermore, a common cause for reduced or arrested libido in stallions is a mismanagement, especially overuse or repetitive abusive punishment for expression of sexual interest (Brinsko, 2011).

The influence of season on sexual behavior parameters is may be due to long periods of daylight in spring and summer and short daylight hours in autumn and winter McDonnell (2009) and Roser (2009).

There for the present study aimed to evaluate the sexual behavior of Arabian stallions at 5-15 years old during seasons of the year in Egypt.

### MATERIALS AND METHODS

#### Animals:

The present study was performed in the El-Zahra Governmental stud, Ain Shams, Cairo, Egypt. Animals were housed in closed stables with open yard for exercise. They were fed on balanced ration consisted of barley and rice straw with green fodder according to (Ref). Sexual behavior parameters from 9 Arabian

stallions during Winter (December, January and February), Spring (March, April and May), Summer (June, July and August) and Autumn (September, October and November) were used in the present study. The animals were distributed into three groups: Group 1 (5 years old, n= 3), Group 2 (10 years old, n= 3) and Group 3 (15 years old, n=3)

#### **Sexual Behavior Parameters:**

Sexual behavior parameters of the Arabian stallions (seconds) studied were as follows: 1- Time to first mount (time between stallion first seeing the mare and first mount) 2- Latency to erection (interval between stallion first seeing the mare and full erection) 3- Latency to mount (period between stallion first seeing the mare and ejaculatory mount) 4- Latency to ejaculation (interval from intromission to first emission of semen) 5- Number of mounts per ejaculation

Data were statistically analyzed by two way analysis of variance using General Linear Model (GLM) procedure of SAS (2000) and Duncan's new multiple range test (Duncan, 1955) was used to detect differences among means percentage values were transformed to arcsine values before being statistically analyzed.

## **RESULTS AND DISCUSSION**

#### **Time to first mount (seconds):**

The mean values of time to first mount (seconds) in the Arabian stallions during the different seasons of the year and ages are presented in Table 1.

The effect of seasons of the year on time to first mount of the Arabian stallions was insignificant (Table 1). The longest seconds of time to first mount was recorded during winter and the lowest shortest seconds during summer. These results may be due to the increase of gonadotropic hormones and sexual hormones in breeding season (McKinnon, 2011). These results are in agreement with those reported by McDonnell (1992a). Waheed *et al.* (2015) also reported that the time to first mount was the shortest ( $P < .05$ ) time during summer, while the longest time value was in winter.

Concerning to age, the effect of the ages on time to first mount of the Arabian stallions (Table 1) showed insignificantly higher in stallion at 15 years than 5 years and 10 years. Similarly, Waheed (2001) found that in the normal breeder stallion, the short duration of time to first mount was recorded in old stallion 20-26 years compared to other groups (7, 10-12 and 13-16 years).

#### **Latency to erection (seconds):**

The mean values of Latency to erection (seconds) in the Arabian stallions during different seasons of the year and ages are presented in Table 1.

The effect of seasons of the year on latency to erection of the Arabian stallions (Table 1) was insignificantly higher during autumn and summer than winter and spring. The longest time of latency to erection was recorded during autumn and the shortest time was recorded during spring. In this study, the latency to erection ranged from  $71.83 \pm 1.83s$  to  $74.80 \pm 1.43s$ . Similar trends were reported in French studs ( $89 \pm 11$  seconds) compared to Arabian stallion

(Noe *et al.*, 2001) but it is higher than in Arabian stallion;  $49.45 \pm 3.78$  seconds (Waheed *et al.*, 2015). Moreover, McDonnell (1986) found that time to erection ranged from 0 – 500 sec; mean 67sec. However, in the Arabian stallions Waheed *et al.* (2015) found that the latency to erection was the shortest during summer ( $44.24 \pm 6.14$ ), while the highest value was recorded during autumn.

Concerning to age, the effect of ages on latency to erection of the Arabian stallions (Table1) was insignificantly shorter in group 1 (5 years old) than in group 2 (10 years old) and group 3 (15 years old). Waheed (2001) found that short time of Latency to erection was recorded in the old Arabian stallion (20-26 years) compared to other groups (7, 10-12 and 13-16 years old). Naden *et al.* (1990) found that the time to erection (min) was 3-4+ 10 in young group (at puberty) and 1-6+ 0-5 at 2 years.

#### **Latency to mount (seconds):**

The mean values of latency to mount (seconds) in the Arabian stallions during different seasons of the year and ages are presented in Table 1.

The effect of seasons of the year on latency to mount of the Arabian stallions (Table 1) was insignificantly higher during winter and autumn than in spring and summer. The longest time of latency to mount was recorded during winter and the shortest time was recorded during summer. These results may be due to the increase of gonadotropic hormones and sexual hormones in breeding season (McKinnon, 2011). Similarly, Waheed *et al.* (2015) found that the latency to mount was shorter during summer ( $60.52 \pm 7.22s$ ) than winter ( $114.60 \pm 21.13s$ ), spring ( $77.30 \pm 15.48s$ ) and autumn ( $85.18 \pm 15.35s$ ). Similar trends were reported by Rua *et al.* (2015).

Concerning to age, the effect of age on latency to mount of the Arabian stallions (Table 1) was insignificantly shorter in group 1 (5 years) than in group 2 (10 years) and in group 3 (15 years). Waheed (2001) found that in the Arabian stallion, the duration of Latency to mount was shorter in old stallion (20-26 years) than other groups (7, 10-12 and 13-16 years). Naden *et al.* (1990) found that the time to 1st mount was (4.4+ 11 min) at puberty and was ( $1.9 \pm 0.5$  min) at 2 years old.

#### **Latency to ejaculation (seconds):**

The mean values of latency to ejaculation (seconds) in the Arabian stallions during different seasons of the year and ages are presented in Table 1.

The effect of seasons of the year on latency to ejaculation of the Arabian stallions (Table 1) was significant ( $P < 0.05$ ). The shortest latency to ejaculation was recorded during spring and summer compared to winter and autumn. The highest ( $P < 0.05$ ) value of latency to ejaculation was recorded during autumn ( $24.76 \pm 0.47s$ ) and the lowest ( $P < 0.05$ ) value was during summer ( $16.59 \pm 0.82s$ ). These results indicate that the latency to ejaculation was shorter during breeding season (long periods of daylight) than non-breeding season (short daylight). These results may be attributed to the increase of gonadotropic hormones and sexual hormones in breeding season (McKinnon, 2011). These

results are in agreement with those of Waheed *et al.* (2015). Similar trends were reported by Emady (1999), Houpt (2011) and Rua *et al.* (2015).

With regard to age, the effect of age on latency to ejaculation of the Arabian stallions (Table 1) was insignificantly higher in group 2 (10 years) than group 1 (5 years) and group 3 (15 years). Similarly, Pozor and Tischner (1992) reported that the latency to ejaculatory mount was higher in young stallion (4-5 years) than in adult (6-10 years) and older (11-12 years). Waheed (2001) found also that the short duration of Latency to ejaculation was recorded in group A (<10- years) compared to other groups (10-12, 13-16 and 20-26 years) in the Arabian stallion.

**Number of mount per ejaculate:**

The mean values of the number of mounts per ejaculation in the Arabian stallions during different seasons of the year and ages are presented in Table 1.

The effect of seasons of the year on number of mount per ejaculate of the Arabian stallions (Table 1) was significant (P<0.05). The number of mounts per ejaculation was significantly (P<0.05) lower during spring and summer, while significantly (P<0.05) higher during winter and autumn seasons. Similarly, Waheed *et al.* (2015) found that in the Arabian stallions the number of mounts per ejaculate was shorter during

summer (1.14±0.06 seconds). The number of mount per ejaculation was 1.44 (Dowsett, 1979), 1.33 (Noe *et al.*, 2001) and 1.36 (Waheed, 2001). The effect of season on the number of mount per ejaculate may be due to the long daylight in spring and summer compared to short daylight in autumn and winter.

Regarding age, the effect of ages on number of mounts per ejaculation of the Arabian stallions (Table 1) was insignificant. The number of mounts per ejaculation was insignificantly lower in group 1 (5 years) than in both group 2 (10 years) and group 3 (15 years). Similar trend was reported by Najjar *et al.* (2010) who found that the number of mountings in the artificial vagina was higher in the young stallions (age< 15 years) than in the old stallions (age ≥15 years) (P < 0.05). These results are in agreement with those of Waheed *et al.* (2015) found also that the number of mount per ejaculation was smaller in group A (<10- years) than other groups (10-12, 13-16 and 20-26 years) in the Arabian stallions.

In conclusion, from the present results sexual behavior of the Arabian stallions was the best at 5 years of age during summer compared to 10 and 15 years of age during summer season under Egyptian environmental conditions.

**Table 1. Effect of the different seasons of the year and ages on sexual behavior of the Arabian stallions**

Sexual behavior	Season of year															
	Winter Age(year)			Mean	Spring Age(year)			Mean	Summer Age(year)			Means	Autumn Age(year)			Mean
	5	10	15		5	10	15		5	10	15		5	10	15	
Time to first mount (Second)	77.11±2.18	78.23±2.15	80.18±1.92	78.50±1.24	75.16±3.12	76.25±2.82	78.87±3.08	76.56±2.16	77.13±2.11	75.18±2.18	74.36±1.98	75.55±2.11	76.22±1.92	75.18±2.01	78.81±1.78	76.53±1.84
Latency to erection (Second)	72.18±1.72	74.12±2.03	72.20±1.29	72.83±2.18	73.14±1.72	70.19±1.49	72.16±1.52	71.83±1.83	72.41±1.94	73.16±1.87	74.28±1.64	73.28±1.22	73.13±1.52	75.17±1.48	76.10±1.62	74.80±1.43
Latency to mount (Second)	121.15±3.29	123.2±3.27	120.61±3.16	121.65±3.63	118.19±3.22	120.23±3.25	119.17±3.14	119.19±3.78	118.61±2.19	116.47±2.11	120.92±2.37	118.66±1.87	119.53±2.74	120.23±2.35	121.28±2.18	120.34±2.13
Latency to ejaculation (Second)	19.16±0.89	19.04±0.74	20.15±0.86	19.45 <sup>b</sup> ±0.91	17.42±0.74	18.12±0.93	17.15±0.48	17.56 <sup>c</sup> ±0.18	15.75±0.76	16.91±0.67	17.84±0.78	16.59 <sup>cd</sup> ±0.82	24.81±0.64	26.32±0.58	23.16±0.62	24.76 <sup>a</sup> ±0.47
Number of mounts per ejaculation	1.98±0.03	1.92±0.06	1.81±0.08	1.90 <sup>a</sup> ±0.04	1.32±0.04	1.55±0.05	1.86±0.08	1.38 <sup>c</sup> ±0.10	1.03±0.06	1.06±0.08	1.02±0.06	1.05 <sup>d</sup> ±0.08	1.62±0.09	1.63±0.06	1.66±0.07	1.63 <sup>b</sup> ±0.06

a-d: Means with the different superscripts in the same row, differ significantly(P<0.05).

**REFERENCES**

Brinsko, S.P., Blanchard, T.L., Varner, D.D., Schumacher, J., Love, C.C. and Hinrichs, K. (2011). Manual of Equine Reproduction, 3rd Ed. China. St Louis, Mosby, p p. 176–206.

Clay, C.M. and Clay, J.N. (1992). Endocrine and testicular changes associated with season, artificial photoperiod, and the peri-pubertal period in stallions. In: Blanchard, T.L., Varner, D.D., Turner, A.S. (Eds.), Stallion Management: The Veterinary Clinics of North American, Equine Practice, Saunders, Philadelphia, pp. 31–56.

Dowsett, K. (1979). Collection and evaluation of stallion semen. Australian Advances in Veterinary Science. 2(2): 35-38.

Duncan, D.B. (1955). Multiple range and multiple F tests. Biometrics, 11(1): 1-42.

Emady, M.S.N. (1999). Semen characteristics, sexual behavior and variation of serum testosterone concentrations in Caspian ponies. Iranian Agric. Res., 18:71–9.

Houpt, K. A. (2011). Domestic animal behavior for veterinarians and animal scientists. 5th ed. New Delhi: John Wiley & Sons, Inc.; pp. 37–43.

Hurtgen JP (2009). Breeding management of the warmblood stallion. In: Samper JC, editor. Equine breeding management and artificial insemination. Missouri: Saunders Elsevier; p. 83–8.

Katz, L., and McDonald, T. (1992). Sexual behavior of farm animals. Theriogenology, 38(2):239-253.

- McDonnell, S. (1986). Reproductive behavior of the stallion. The Vet Clin of North Amer. Equine Pract, 2(3): 535-555.
- McDonnell, S.M. (1992a). Normal and abnormal sexual behavior. The Vet clin of North Amer. Equine Pract, 8(1), 71.
- McDonnell, S. M. (1992b). "Sexual behavior dysfunction in stallions." Current Therapy in Equine Medicine, 3: 668-671.
- McDonnell, S.M. (2009). Stallion sexual behavior. In: Samper JC, editor. Equine Breeding Management and Artificial Insemination, Missouri, Saunders, Elsevier Inc.; pp. 41-46.
- McKinnon, A.O., Squires, E.L., Vaala, W.E. and Varner, D.D., (2011). Equine Reproduction, second edition. Wiley-Blackwell, Ames, IA.
- Naden, J., Amann, R. and Squires, E. (1990). Testicular growth, hormone concentrations, seminal characteristics and sexual behavior in stallions. J. Rep. Fertil., 88(1): 167-176.
- Najjar, A., Benaoun, B., Ezzaouia, M., Ben Maâtoug, A., Magistrini, M. and Ben Mrad, M. (2010). Determination of semen and sexual behavior parameters of Arabian stallions to be selected for an artificial insemination program under Tunisian conditions. American-Eurasian Journal of Agricultural and Environmental Science, 8(2): 173-177.
- Noe, P., Bernabé, J., Rampin, O., Vidament, M., Dumas, T., Palmer, E., and Magistrini, M. (2001). Sexual behavior of stallions during in-hand natural service and semen collection: an observation in French studs. Anim. Rep. Sci., 68(3): 161-169.
- Pickett, B.W., Amann, R.P., McKinnon, A.O., Squires, E.L., and Voss, J.L., (1989). Management of the stallion for maximum reproductive efficiency. II. Colorado State Univ, Anim. Reprod. Lab., Bull., 5: 59-65.
- Pozor, M.A. and Tischner, M. (1992). The stability of the pattern of copulatory behavior in stallions. Proc. 12th Int. Congr. Anim. Reprod. and A.I., Netherlands., 4: pp. 1912-1914.
- Pycock, J., Samper, J. C. and McKinnon, A. O. (2006). Current Therapy in Equine Reproduction, Elsevier Health Sciences.
- Roser, J.F. (2009). Reproductive endocrinology of the stallion. In: Samper JC, editor. Equine breeding management and artificial insemination. Missouri: Saunders, Elsevier Inc. pp. 17-31.
- Rua, M. A. S., Quirino, C. R., Bastos, R., Junior, A. B., Santoro, P. N., da Silva Ribeiro, M., Matos, L. F. and Barreto, M. A. P. (2015). Evaluation of the sexual behavior and testosterone concentrations of Mangalarga Marchador stallions. Applied Animal Behaviour Science, 171: 101-107.
- SAS (2000) User's Guide. Version 8, Statistical Analysis System, SAS Institute, Cary, NC.
- Tischner, M., Kosiniak, K., and Bielański, W. (1974). Analysis of the pattern of ejaculation in stallions. J. Reprod. Fertil., 41(2): 329-335.
- Waheed, M. M. (2001). Sexual behavior, semen characteristics and processing in the Arabian horse. Ph.D Thesis, Faculty of Veterinary Medicine, Cairo University, Cairo, Egypt.
- Waheed, M. M., Ghoneim, I. M., and Abdou, M. S. (2015). Sexual Behavior and Hormonal Profiles in Arabian Stallions. Journal of Equine Veterinary Science, 35(6): 499-504.

تأثير العمر ومواسم السنة على السلوك الجنسي في الخيول العربية تحت ظروف البيئة المصرية  
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في هذه الدراسة تم استخدام تسعة من ذكور الخيول العربية الناضجة جنسيا والتي تتراوح اعمارها من 5 الى 15 سنة لدراسة السلوك الجنسي لها. أظهرت النتائج عدم وجود تأثير معنوي على كل من زمن أول وثبة وزمن وثبة القذف في ذكور الخيول العربية والتي سجلت أقل زمن خلال فصل الصيف للمجموعة العمرية 5 سنوات في حين سجلت أطول زمن خلال فصل الشتاء للمجموعة العمرية 15 سنة. كذلك أظهرت النتائج عدم وجود تأثير معنوي على زمن الإنتصاب حيث كان أقل زمن خلال فصل الصيف للمجموعة العمرية 5 سنوات بينما سجلت أطول زمن خلال فصل الخريف للمجاميع العمرية 10، 15 سنة. كذلك لا يوجد تأثير معنوي على زمن القذف والتي سجلت أقل زمن للمجاميع العمرية 5 و 15 سنة أثناء فصلى الربيع والصيف مقارنة بفصلى الشتاء والخريف للمجموعة العمرية 10 سنوات. أظهرت النتائج أيضا وجود تأثير معنوي (على مستوى  $0.05 \geq$ ) على عدد الوثبات لكل قذفة والتي كانت أقل ما يمكن خلال فصلى الربيع والصيف بينما كانت أكبر خلال فصلى الشتاء والخريف، من ناحية أخرى لم يكن هناك تأثير معنوي للعمر على عدد الوثبات لكل قذفة والتي كانت أقل مع المجموعة العمرية 5 سنوات مقارنة بمجموعتي 10، 15 سنة.