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Effect of age on certain seminal parameters of Marwari horses

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Abstract

Seminal parameters are important indicators of the reproductive performance of male horses. Present experiment was performed to determine the relationship between age and certain seminal parameters of Marwari stallions. Total thirty six samples were collected from six horses using artificial vagina. Seminal parameters of Marwari horses were recorded immediately after the semen collection, including seminal pH, semen volume (total ejaculated, gel and gel free) and sperm concentration. All the seminal parameters considered in this study were found to exhibit a significant positive correlation with age, except seminal pH, which was not influenced by age.

Keywords: Age, correlation, Marwari stallions, reproductive performance, seminal parameters

Introduction

Semen analysis is an invaluable diagnostic technique used to evaluate the reproductive status of a male (Lodhi *et al.*, 2008) [6]. Artificial insemination using fresh, chilled, or cryopreserved semen is a prevailing method employed in the worldwide equestrian business for assisted reproduction. Therefore, the quality of semen plays a crucial role in determining the success of breeding programmes for horses (Magistrini *et al.*, 1996; Parlevliet and Colenbrander, 1999; Stradaoli *et al.*, 2004) [7-9]. The quality of semen is contingent upon several crucial husbandry elements, such as effective management, optimal healthcare and enough provision of nutrients to fulfil the requirements of reproductive stallions. Adverse environmental factors can impact the seminal parameters of horses (Arruda *et al.*, 2010; Freitas *et al.*, 2016) [1, 2]. Seminal analyses include macroscopic or gross evaluation, followed by microscopic evaluation of semen (Kumar, 2017) [4]. Seminal pH and seminal volume are part of the macroscopic/gross evaluation performed immediately after the semen collection, while sperm concentration is a part of the microscopic evaluation performed after the macroscopic/gross evaluation (Tejpal *et al.*, 2017; Kumar, 2019) [10, 5]. Seminal pH, seminal volume (total, gel free and gel volume) and sperm concentration are the seminal parameters considered in the present study to see their association with the age of Marwari stallions.

Materials and Methods

Animals

Table 1: Identification of horses with their age

| S. No. | Marwari Stallion (identification) | Age (months) |
|--------|-----------------------------------|--------------|
| 1. | Mohit | 140 |
| 2. | 139 | 86 |
| 3. | Dogger | 78 |
| 4. | 167 | 52 |
| 5. | 170 | 51 |
| 6. | 175 | 50 |

Six adult Marwari horses aged between 50 and 140 months being maintained at the Equine Production Campus, ICAR-National Research Centre on Equines, Bikaner, Rajasthan, India, under uniform and healthy conditions were used in this study (Table 1). Total 36 ejaculates were collected during the breeding season in the early morning before feeding. Samples were collected twice a week using Colorado model artificial vagina (AV) with a mare in oestrus as a dummy. Just after the collection of semen, certain seminal parameters for each horse were recorded.

Data Collection

Seminal parameters, including seminal pH and the total ejaculated volume of semen, were noted immediately after the collection of semen. Seminal pH was measured using a digital pH metre by dipping its probe into semen and noting the reading displayed on the screen. The total volume of ejaculated semen was recorded directly from the semen collection bottle. After gross evaluation, a sterile gauge was

used to filter each ejaculate into a 37 °C prewarmed graduated bottle to obtain semen devoid of gel. The volume of gel and the gel-free volume of semen were measured after filtration. The concentration of sperm in each semen sample was evaluated via a Neubauer counting chamber at 37 °C using 20 µl of a fresh gel-free semen sample and mixing with 980 µl of diluting fluid as per the method described earlier (Kumar, 2018) [3].

Analysis

Data on the seminal parameters of Marwari stallions were collected, arranged, summarized and statistically analysed for mean, standard error (SE), analysis of variance (ANOVA) and Duncan's new multiple range test (DNMRT) and finally subjected to correlation analysis with the age of the horses using IBM-SPSS Statistics Version 26.

Results and Discussion

Table 2: Correlation of seminal parameters of horses with their age

| | Age | Seminal pH | Total Ejaculated Semen Volume | Gel Free Semen Volume | Gel Volume of Semen | Sperm Concentration |
|-----|-----|------------|-------------------------------|-----------------------|---------------------|---------------------|
| Age | - | -0.127 | 0.737** | 0.676** | 0.652** | 0.509** |

Note: **Significant at the 0.01 level. *Significant at the 0.05 level

Table 2 shows the correlation of the age of Marwari stallions with seminal pH, total ejaculated volume, gel-free semen volume, gel volume of semen and sperm concentration. In the present study, a significant and positive correlation of age was seen with the total ejaculated semen volume ($p < 0.01$), gel-free semen volume ($p < 0.01$), gel volume of semen ($p < 0.01$) and sperm concentration ($p < 0.01$) while a non-significant correlation of age was found with seminal pH. No traceable literature is available regarding the correlation of age of Marwari stallions with seminal pH, total ejaculated volume, gel-free semen volume, gel volume of semen and sperm concentration.

Conclusion

Based on the study, it can be concluded that seminal parameters, including sperm concentration and semen volume (total ejaculated, gel and gel-free volume), are significantly and positively correlated with age, while seminal pH shows no correlation with the age of stallions.

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Conflicts of interest

The authors declare no conflicts of interest.

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