



## Research Article

# Reproductive Parameters of Trotter Breed Mares in Bulgaria: Duration of Covering and Duration of Gestation Period

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**Abstract** | The current study includes 34 purebred trotter mares and 292 gestations. Some of the mares are born in Bulgaria, and some are imported, as they represent four different trotter breeds – Standardbred, Orlov trotter, Russian and Italian trotter. The study refers to a period of 19 years, from 1997 to 2016. The aim of the recent study is to examine some reproductive traits of trotter mares – gestation length depending on foal gender and gestation length depending on the month of covering, and duration of covering estimated in days. We calculated duration of covering, length of gestation, gestation length in accordance with the foal gender (in days) and gestation length in accordance with the month of covering.

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**Key words** | Trotter mare, Reproduction, Gestation

## Introduction

Mares show seasonally polyoestrous activity highly influenced by the daylight duration and the ambient temperature. The duration of gestation period is known to be approximately 11 months. Some authors report that gestation length of mares varies from 330 to 345 days (Bos and Van der May, 1980; Marteniuk et al., 1998; Davies Morel et al., 2002; Pérez et al., 2003; Valera et al., 2006; Winter et al., 2007; Cilek, 2009; Satué et al., 2011b; Aoki et al., 2013). There are some differences in gestation length depending on the breed, climate, feeding and rearing conditions, and some other factors.

In Bulgaria, the breeding season begins in February and ends in June. The aim of the recent study is to

examine some reproductive traits of trotter mares gestation length depending on foal gender and gestation length depending on the month of covering, and duration of covering estimated in days.

The trotter horse population in Bulgaria increases significantly in the last decade, as it comes in third place after Thoroughbred and Arabian horse breeds. This, together with the fact that so far there is no study on the gestation length of trotter mares in Bulgaria motivated us to carry out this study.

## Materials and Methods

The study includes 34 purebred trotter mares and 292 gestations. The mares are bred in a private stud farm near Pazardzhik in Bulgaria. They all are DNA tested,

with approved identity and enrolled in the Studbook of the breed. Some of the animals are born in Bulgaria, and some of them are imported, as they represent four different trotter breeds – Standardbred, Orlov Trotter, Russian and Italian trotter. The information is collected from the zootechnical documentation of the farm, where the information for the breeding season is entered, including coverings followed by the result of that covering (barren, abortion, pregnancy and foaling with the date of foaling and sex of the foal). In the farm, as a breeding method is used only natural service, as the so-called “on blood” covering (8 - 10 days after foaling) is also used. The study covers a period of 19 years, from 1997 to 2016, and it contains following reproductive traits: duration of mares covering (in days), gestation length, gestation length depending on foal gender, and gestation length depending on the month of covering (in days).

The experiment was conducted according to National Committee for Ethics and Welfare for Animal approved by BFSa (Bulgarian Food Safety Agency). At the current study we did not use any drugs.

The data is statistically calculated with IBM SPSS Software program, version 21/Windows developer by IBM Corporation.

## Results and Discussion

The calculations made for the duration of covering for the trotter mares show a mean value of 2.55 days (Table 1), with a mean duration of estrous 6 – 8 days. Duration of the reproductive cycle of mares is known to be 18 - 28 days, every reproductive cycle ends up with estrous, which climax is ovulation of one and hardly ever more than one follicle. It is common practice in horse breeding in Bulgaria the so-called “on blood” covering i.e. first estrous after foaling or 8-10 days after foaling. Occasionally the heat of mares could last up to 14 days, which is within normal range. Having in mind that the ovulation of mares without reproductive disorders takes place 6 to 36 hours prior to the end of estrous it is considered that duration of covering is in a normal range. The mares are covered in 24 hours during estrous manifestation.

Davies Morel et al., 2002, report gestation length in mares between 335 and 345 days and mean value of  $344.1 \pm 0.49$  days. It is possible viable foals to be foaled between 320 and 360 days of pregnancy. Foals born

before 300 days of pregnancy are unviable (Rossdale, 1976), but on some occasions foals born before that day can survive and develop normally (Valera et al., 2006). According to Reilas et al., 2014, mean value for gestation length of mares is 331.7 days and Јакоза, 1958, report gestation length of Orlov trotter mares 334.9 days. Standardbred mares are with a mean duration of gestation period 349.1 days (Dicken et al., 2012). Marteniuk et al., 1998, report gestation length of Standardbred mares 302 – 383 days. Even though they believe that, this duration of gestation period is not long enough compared with other Standardbred mare gestation length in other countries - 343.1 days in Michigan (USA) (Marteniuk et al., 1998) and 349.1 days in New Zealand (Dicken et al., 2012). The gestation period duration of trotter mares in the recent study is close to that of Standardbred mares (Table 2).

**Table 1:** Duration of covering of Trotter mares in Bulgaria (in days).

| Duration of covering (in days) |      |
|--------------------------------|------|
| Mean                           | 2.55 |
| Standard Error                 | 0.08 |
| St. Deviation                  | 1.35 |
| Sample Variance                | 1.83 |
| Minimum                        | 1    |
| Maximum                        | 14   |
| Count                          | 274  |

**Table 2:** Length of gestation of Trotter mares in Bulgaria (in days).

| Length of gestation/days |        |
|--------------------------|--------|
| Mean                     | 337.91 |
| Standard Error           | 0.60   |
| St. Deviation            | 8.51   |
| Sample Variance          | 72.50  |
| Minimum                  | 303    |
| Maximum                  | 365    |
| Count                    | 201    |

Davies Morel et al., 2002, reveal that mares pregnant with male foals have a longer gestation period ( $346.2 \pm 0.72$  days) than mares pregnant with female foals ( $342.4 \pm 0.65$  days). They also find out that the month of covering has a significant effect on duration of gestation period regardless of foal gender. So the mares covered in January have shorter gestation period than the mares covered in April. Those results correspond with the report of Јакоза, 1958, who notes that when

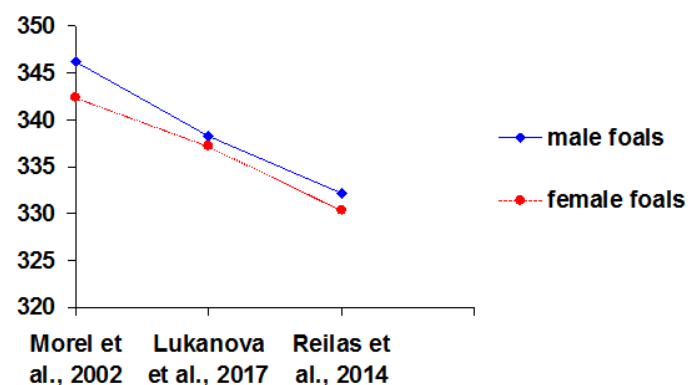
the foals of Orlov trotter breed are born in December, January and February mean duration of the gestation period of the mares is 322 days. When the foals are born in March and April the gestation length is 328 days, and with the foaling during May and June, the author observes the longest gestation period of 331 days.

Reilas et al., 2014, report that Standardbred mares covered in the January – March period have a shorter gestation compared to mares covered in April. In Bulgaria, shortest gestation period has mares covered in August and September (334.2 days) and longest gestation is observed in mares covered in March – 340 days (Table 3).

**Table 3:** Gestation length in accordance with the month of covering (in days).

| Month of covering | Total | Mean   | Std. Error | Std. Dev. | Min | Max |
|-------------------|-------|--------|------------|-----------|-----|-----|
| Jan/Feb           | 11    | 337.81 | 2.87       | 9.52      | 327 | 353 |
| March             | 35    | 340.01 | 1.37       | 8.12      | 328 | 365 |
| April/May         | 101   | 338.80 | 0.79       | 8.00      | 314 | 358 |
| June/July         | 26    | 335.5  | 1.30       | 6.64      | 324 | 355 |
| August/Sept       | 24    | 334.29 | 2.28       | 11.20     | 303 | 357 |

Dicken et al., 2012, proclaim the duration of female foal pregnancy of 347.8 days and male foal pregnancy duration of 350.3 days. Reilas et al., 2014, reaffirm that gestation period is longer with male foals (332.2 days) than with female foals (330.4 days). In the recent study we estimated a difference in gestation period duration with male and female foals (Table 4). Although the difference is slight, it is in favor of male foal gestation length, as with the results of the other authors (Reilas et al., 2014; Davies Morel et al., 2002) (Figure 1).



**Figure 1:** Gestation length in accordance with the foal gender compared to other authors (in days).

**Table 4:** Gestation length in accordance with the foal gender (in days).

|                                     | Mean   | Std. Error | Std. Dev. | Sample Variance | Min | Max | Count |
|-------------------------------------|--------|------------|-----------|-----------------|-----|-----|-------|
| Male foal gestation length / days   | 338.30 | 0.89       | 8.64      | 74.69           | 303 | 358 | 94    |
| Female foal gestation length / days | 337.28 | 0.78       | 8.05      | 64.82           | 314 | 357 | 107   |

According to Davies Morel et al., 2002, the age of the mare and/or the stallion, year of foaling and stud farm have no significant effect on gestation length. Despite that, other authors (Valera et al., 2006; Cilek, 2009) report some differences in duration of pregnancy influenced by the mare's age. They study mares of different age and estimate that young and older mares have longer gestation period than middle-aged mares.

## Conclusions and Recommendations

The duration of coverings of trotter mares has a mean value of  $2.49 \pm 1.09$  days, which is considered to be within the normal range for Bulgaria. Gestation length for the studied mares is  $337.9 \pm 8.5$  days. The gestation period of mares which are covered early (January – March) is longer than mares covered in August and September. We believe that the differences we have, comparing with the results of other authors are due to the geographical location (studied mares are bred in the Northern Hemisphere). Gestation length of mares with male foals ( $338.3 \pm 8.6$  days) is longer than gestation length of mares with female foals ( $337.2 \pm 8.5$  days).

## Author's Contribution

Nadejda Lukanova, Data collecting from the stud farm, tabulation of data, drafted article; Radka Vlaeva, Data calculation, manuscript preparation and Boriana Ivanova, Interpretation of data, drafted article.

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