



Original article

Influence of Maternal Age and Number of Fetuses (Single or Twins) on the Gestation Length of Ile-de-France Sheep

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Abstract

The aim of this study was to evaluate the factors maternal age and number of fetuses (single or twin) on the gestation length of Ile-de-France sheep. The study was carried out with pure bred Ile de France ewes from the breeding flock that was raised in experimental base (EB) of Institute of Animal Science (IAS) – Kostinbrod, Bulgaria. The study covered 830 records of ewes for the period 2008-2018. The ewes were at age between 2 to 8 years and gave birth to singles (n = 408) or twins (n = 422). The age distribution of ewes was as followed: 2 years of age: n = 65; 3 years of age: n = 133; 4 years of age: n = 169; 5 years of age: n = 147; 6 years of age: n = 137; 7 years of age: n = 105; 8 years of age: n = 74. The age of ewes was influenced significantly on the length of gestation ($P \leq 0.01$), whereas the number of fetuses and the interaction between the effects of age of ewes and number of fetuses did not. The average length of gestation for all cases was 150.59 days. It was observed a shorter duration of pregnancy in ewes at two years of age, compared to older sheep, as the differences were significant between 2 years of age and: 6 years of age ($P \leq 0.01$), 7 years of age ($P \leq 0.01$) and 8 years of age ($P \leq 0.05$). 3/4 or 77.21% of all pregnancies were between 149 and 153 days, with the largest share being at days 150 (18.55%) and 151 (18.19%).

Keywords: Ewes, Age, Fetuses, Gestation, Length.

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INTRODUCTION

It is well known that the length of gestation of sheep lasts an average of 150 days. Gestation length and lambing ease are directly related to the survival of newborns, reducing mortality, controlling and properly organizing the birth process, anticipating postpartum complications (Brown, 2007). Length of gestation is calculated as the interval from fertile service to parturition (Hafez, 1993). The duration of gestation is genetically determined, although it can be modified by maternal, fetal and environmental factors (Hafez, 1993).

Of the maternal factors, the breed has the strongest influence. Prolific and meat breeds have a shorter pregnancy duration - Finnish Landrace - 144 days and Romanovska - 145 days (Hafez, 1993), German mutton merino - 145/146 days (Kaufluss 2002), while merino breeds have longer duration - about 150 (Hafez, 1993; Kaufluss 2002). The impact of maternal age on pregnancy duration is controversial, some study reports impacts, but others not (Shrestha and Heaney, 1990). Of the fetal factors, the number of offspring, their sex and breed (if the father is of another breed) has the greatest influence. Bradford et al. (1972) concluded that the fetus accounts for at least two-thirds of the genetic variation in gestation period. Multiple fetus pregnancy are shorter than single fetus pregnancy (Shrestha and Heaney, 1990). Male lambs are usually born 1 to 5 days later (Tyankov et al., 2000) but the results are not always significant (Shrestha и Heaney, 1990).

Of the environmental factors, the strongest influence has the year, season of lambing and altitude (Prud'hon et al., 1970; Nivsarkar et al., 1981; Shreshta and Heaney, 1990; Tyankov et al., 2000).

The aim of this study was to evaluate the factors maternal age and number of fetuses (single or twins) on the gestation length of Ile-de-France sheep.

Materials and Methods

The study was carried out with pure bred Ile de France ewes from the breeding flock, that was raised in experimental base (EB) of Institute of Animal Science (IAS) – Kostinbrod, Bulgaria. The study covered 830 records of ewes for the period 2008-2018. The ewes were at age between 2 to 8 years and gave birth to singles (n = 408) or twins (n = 422). The age distribution of ewes was as followed: 2 years of age: n = 65; 3 years of age: n = 133; 4 years of age: n = 169; 5 years of age: n = 147; 6 years of age: n = 137; 7 years of age: n = 105; 8 years of age: n = 74. The ewes were inseminated artificially or naturally, by hand, according to a pre-prepared individual breeding plan. The first fertilization of all ewes was realized at 18-19 months of age. For all studied years, the breeding campaign were carried out during the months April-May. After the end of the breeding campaigns, the ewes were sheared and were transported to high mountain pastures and then returned back in September, before lambing, in the EB of IAS -Kostinbrod. The duration of pregnancy was calculated from the day of the first insemination to the day of lambing.

The two-way ANOVA was used for data analysis. The model compares the effect of two independent variables (age of ewes and number of born lambs) on the dependent variable (length of gestation). The comparison between the age of ewes was conducted with Tukey's Honest Significant Difference test. All data were calculated by IBM SPSS 19.

Results and Discussion

The age of ewes influenced significantly on the length of gestation ($P \leq 0.01$), whereas the number of fetuses and the interaction between the effects of age of ewes and number of fetuses did not (Table 1).

Table 1. Values of F-criteria for the effect of two independent variables and the interaction between them (age of ewes and number of born lambs) on the length of gestation

Source	df	F	Sig.
age	6	2.920	0.01
Number of fetuses	1	0.000	0.99
Age x number of fetuses	6	0.819	0.56

The average length of gestation for all cases was 150.59 days. It was observed a shorter duration of pregnancy in ewes at two years of age, compared to older sheep, as the differences were significant between 2 years of age and: 6 years of age ($P \leq 0.01$), 7 years of age ($P \leq 0.01$) and 8 years of age ($P \leq 0.05$) (Table 2).

Table 2. Mean values of gestaitonal length according to age and type of pregnancy according to the number of fetuses (single or twins)

Age	Fetuses	n	Mean	Standard Deviation
2,00	1	40	149.73	2.28
	2	25	149.40	1.98
	Total	65	149.60	2.16
3,00	1	74	150.20	2.85
	2	59	150.73	2.08
	Total	133	150.44	2.54
4,00	1	79	150.71	2.37
	2	90	150.45	1.94
	Total	169	150.57	2.15
5,00	1	76	150.38	2.94
	2	71	150.75	2.13
	Total	147	150.56	2.58
6,00	1	58	151.15	2.36
	2	79	150.68	2.27
	Total	137	A**150.88	2.31
7,00	1	57	150.82	2.65
	2	48	151.10	1.99
	Total	105	B **150.95	2.36
8,00	1	24	150.87	2.15
	2	50	150.76	2.62
	Total	74	C*150.70	2.47
Total	1,00	408	150.55	2.61
	2,00	422	150.63	2.17
	Total	830	150.59	2.39

Note: ** - Significant at $P < 0.01$ (A – between 2- and 6-years old ewes; B – between 2- and 7 - years old ewes)

*- Significant differences at $P < 0,05$ (C - between 2- and 8-years old ewes)

According to Hafez (1993) the duration of pregnancy increases with the age of the dam. Musa et al. (2005) did not find a significant effect of maternal age on the duration of pregnancy in West African sheep. In a previous study with ewes from the Synthetic population Bulgarian milk (Metodiev, 2013), it wasn't found significant differences in pregnancy duration in sheep of different ages, but it was observed a tendency for shorter pregnancies in 2- and 3-year-old sheep, compared to 4 - and 5 – years of age.

The average duration of pregnancy in a single pregnancy was 150.50 and for a twin-pregnancy it was 150.63 days (Table 2). Our findings were in correspondence to Boshier et al. (1969) and Iyiola – Tunji et al. (2010), according to whom the length of gestation did not depend on whether the ewe was carrying a single lamb or twins. In a previous study (Metodiev, 2013) it wasn't found significant differences in pregnancy duration depending on the type of pregnancy (single or twin). On the other side

it was the conclusions of Shrestha and Heaney (1990) and Fogarthy et al. (2005) that the length of gestation depends on single or multiple lambs' pregnancy. Fogarthy et al. (2005) found out that type of birth had a significant effect on gestation length, as gestation length for ewes with single lambs was 0.3 days longer than for those with twin lambs, which was 0.3 days longer than those with triplets.

The distribution of the number of ewes with different gestation length for the studied period was presented in Figure 1.

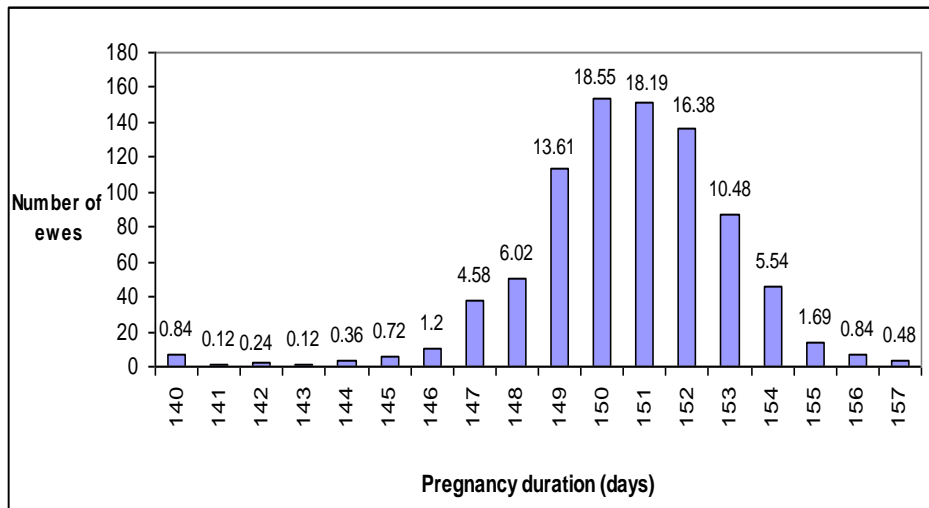


Figure 1. Distribution of the number of ewes with different gestation length for the studied period (Note – the values above the columns were their percentage representation)

3/4 or 77.21% of all pregnancies were between 149 and 153 days, with the largest share being at days 150 (18.55%) and 151 (18.19%). Pregnancies ≤ 145 days or ≥ 156 days were less than 1%. In a previous study (Metodiev, 2013), 3/4 or 75.9% of all durations were between 147 and 151 days, with the largest share being at day 150 - 19.5%. Although these are two separate studies and the average duration was the same – approx. 150 days, it could be seen the effect of breed (Ile de France vs. Synthetic population Bulgarian milk) on the gestational length.

Conclusions

The age of ewes influenced significantly on length of gestation ($P \leq 0.01$), whereas the number of fetuses and the interaction between the effects of age of ewes and number of fetuses did not. 3/4 or 77.21% of all pregnancies were between 0.149 and 0.153, with the largest share being at days 150 (18.55%) and 151 (18.19%).

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