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Characteristics of fallow deer reproduction and time of conception

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We investigated the reproduction of fallow deer in a lowland forest-cropland habitat. In the course of our eight-year-long investigation we have analysed the uterus of 261 culled females during individual hunts from December to February.

Our research was conducted in the DALERD South Plains Forestry Share Holding Company's Gyula Forestry Area, on an 8,250 hectare hunting ground. The study site is located on the Great Hungarian Plain, East of Békés County, at the Hungarian-Romanian border, with the following coordinates: N latitude 46° 38' 42.79" and 21° 16' 49.63" E longitude.

We investigated the relation between the age of the female and the twin conception and the birth rate of the population. We calculated the sex ratio at birth and monitored the survival. The investigation was performed for 8 years.

Estimation of embryonic ratio: we collected the uterus of females culled during the hunting season (X.01-I.31) and counted the number of embryos.

Estimation of the embryonic sex ratio: we detected the sex of the embryos in all cases when it was possible by visual perception.

Estimation of age: was done based on the lower jaw, in case of young animals teeth eruption and teeth change were considered, whilst in case of older animals the number of cement layers of the first molar was counted.

Estimation of the recruitment: we counted the number of the females and that of the offspring in the groups using video technology and photos. We gained support from the professional hunter staff of the territory and thus the monitoring was continuous during the whole research period. We calculated the summertime fawn losses from the offspring estimation done in September. The winter survival was calculated in end of February, taking into account the number of fawn culled during the hunts. The number of offspring raised till the next fawning was estimated in the end of April. The average number of observed females during one year was 646 (min. 507 and max 1126).

During the observations we distinguished the yearlings and females older than two years. The observations were performed in each month during the year. The conception rate was 0.989 (n=261) and we experienced twin-gestation two times (this was 0.77 % of the total sample). There was no significant difference between the conception rate of does (99%, n=182) and yearlings (96%, n=51). The conception rate of females older than 10 years was 87,5 % (n=24) but the difference compared to the younger ones was not significant. In the samples (n=163) where we were able to define the sex of the foetus, there were 98 males and 91 females during the 8 years.

The rate of conception of yearlings didn't differ significantly from that of youngs and old ones, but differed significantly from that of middle aged. The conception rate of young females didn't differ significantly from the middle aged ones, but differed significantly from the old ones. The conception rate of middle aged and old females differed significantly as well (**Table 1**).

	Yearling	Young (2-3 y)	Middle aged (4-9 y)	Old (10 y-)
Yearling (n=51)				
Young (n=47)	p=0,173620			
Middle aged (n=111)	p*=0,0313987	p=0,357562		
Aged (n=23)	p=0,152000	p*=0,010923	p*=0,000677	

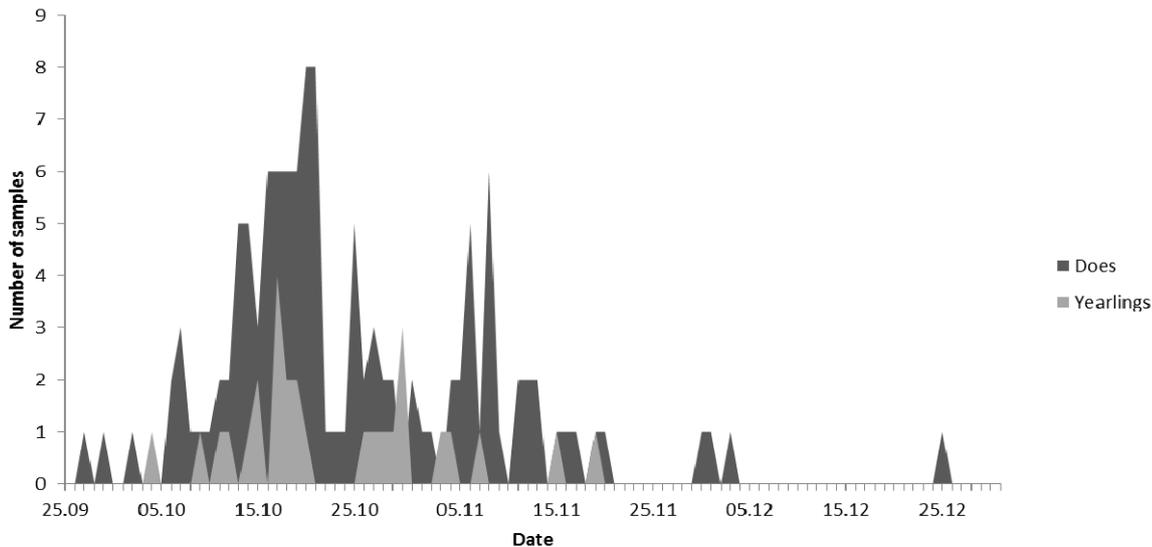
Table 1. Student's t-test regarding the measure of conception of age cohorts

The sex ratio (1.08:1) of the embryos did not differ significantly from 1:1, however there were differences between certain years. We determined the time of conception based on the established functions.

In order to determine the time of conception of different individuals, we examined the sex and body weight of embryos present in the uterus of dissected does and yearlings, killed during one year's hunting season on the latest possible dates. The first sample was taken on December 1, the last on February 18 (Table 1). Sample collection closer to fawning time ensured that we were able to analyze data with greater accuracy and certainty. We analyzed a total of 149 samples (120 does and 29 yearlings). We removed the reproductive organs (uterus and ovaries) from the sampled fallow deer females. We dissected the uterus and removed the embryo or embryos for analysis. We measured the body weight to within 0.1 gram for each embryo, after separation from the embryonic sac and water, and we recorded the sex of the embryos.

We determined conception times based on the established functions (**Figure 1**). Based on the 149 samples and the parameters measured (body weight and sex of embryos), the following results were obtained: most conceptions (72.5%) occurred in October, 24.2% occurred in November, 2% in December and only 1.3% occurred in September.

Figure 1. Calculated fertilization dates of does (n=120) and yearlings (n=29)



While the typical conception period of fallow deer in Europe is October, which is also supported by our observations, we also noted, similarly to other data, that conception can often occur as late as November. During the mating season the presence of mature, high ranking, older bucks can induce fertility in females; whereas, the absence of such males or even the larger representation of younger bucks can prolong the fertility period of females.

There were no significant differences found between mean fertilization dates of adult does and yearlings ($t = -0.72$ $p = 0.47$). The mean fertilization date of does (with a gestation period of 231.5 days) was October 25th (SD=13.82; n=120); whereas, for yearlings this date was October 24th (SD=12.97; n=29). Taking into consideration the outlying values (226-237 days) of some reported gestationals, we calculated the mean fertilization date for does to be between October 23 (SD=14.25, n=120) and 26 (SD=13.41, n=120), while for yearlings it was calculated to be between October 23 (SD=13.72, n=29) and 27 (SD=12.96, n=29).

The mortality after fawning up to June was nearly 20 %. The winter mortality together with harvest by hunting also caused significant losses (28 % of the remained fawns). Till the beginning of the next fawning period the recruitment was 0.38, but among the certain years there were significant differences.

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