THE EXAMINATION OF POPULATION PARAMETERS OF ROE DEER LIVING ON PLAIN HABITAT

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ABSTRACT
The population growth depends basically on the quality of parents (genotype) and the environmental influences. The quality of parents in the case of wild animals, especially in the case of doe, is characterized by the most important biological features like age, body weight and body condition. The condition of doe represents the quality of the habitat, which may indirectly affect the population growth. At large wild ruminant species the reproductive success mainly depends on the body weight and the stored body fat. On the other hand roe deer does not store significant amount of fat in order to maximize its reproductive success (ANDERSEN et al., 2000). In this respect the body weight of doe, the quantity and quality of available feed is dominant, which establishes the reproductive performance of individuals. The average kidney fat index of roe deer shot in Nagyszénás is 1,90, in Hódmezővásárhely 1,45. The average body weight of roe deer dropped in Nagyszénás is also higher (20,59 kg) than of roe deer on the territory of Hódmezővásárhely (18,46 kg).

Key words: roe deer, *Capreolus capreolus*, body weight, kidney fat index, plain habitat.

INTRODUCTION

According to GAILLARD et al. (1992) the body weight does effect the reproduction of most wild ruminant species, and it seems that a certain age and body weight should be reached before the first successful reproduction. The number of possible successors is determined by the body weight regardless to the age of doe, while the realized population growth can be limited by the old age of doe and extreme weather conditions as well as by the increase of implantation losses. The rate of implantation losses is higher at young than at the middle age doe, but the highest is in the case of the old (above 8 years) age group. However, there are big differences between the stocks in this regard; the average loss is around 30%, which varies between 16,7% to 54,5% (MAJZINGER, 2006; 2008). FARKAS (1985) states that there is a definite correlation between the condition of the doe and the number of embryos, that means that 75% of doe in good condition had twin pregnancy, while in case of doe in bad condition the rate was only 53%. 14% of doe in good condition and 21% of doe in bad condition was empty. Therefore good condition increases fertility, at the same time studies have shown that it can vary according to habitat and years. Similar results were published by MONOSTORI (1999), according to which the increase of the population density resulted in the decrease of body weight and the decline of condition. Only little data can be found in the Hungarian scientific literature on wildlife biology about the body weight of the roe deer doe. MAROSÁN ET AL. (2002) investigated the correspondence between the roe deer does' certain body and skull measures and their age with mathematical statistic methods. The above mentioned investigation of these population parameters is the basis of a further parasitology study. The aim of research is the revealing of the possible correlation between the investigated population parameters and the bot fly larvae infection.

MATERIAL AND METHOD

Any method can be used to measure the condition, which takes the body's fat reserves into account. The total amount of fat is closely connected with the fat deposits in certain organs; it is enough to use them as indicators. Our large game species form fat reserves in several places in their bodies. The adipose tissue around the heart and coronary arteries should be taken into consideration. The measurement of the perirenal adipose tissue seems to be the best, because the fat layer is easily accessible and well-defined. If the animal is in good condition the kidney cannot be seen because of the surrounding fat. The fat-pad stretches to the pelvis covering the tenderloin (SUGÁR, 1983).

The basic data (body weight and condition) were collected from the roe deer stocks of Nagyszénás and Hódmezővásárhely, in the hunting season between October 2006 and January 2007. The samples were taken from the hunting area of the Petőfi Vadásztársaság (game management unit) of Nagyszénás (7096 hectares, forest cover less than 1%), and the Szakszervezeti Vadásztársaság (game management unit) of Hódmezővásárhely (12727 hectares, forest cover less than 1%). The estimated roe deer population of the territories involved in the examination is 900-1000 animals [OVA (HUNGARIAN GAME MANAGEMENT DATA BASE), 2009].

The body weight of doe is the eviscerated body (measured with head and legs); to determine the condition we have used the kidney fat index. To measure the kidney fat index we have used digital scales with 1 gram accuracy, with the method of CAUGHLEY and SINCLAIR (1994): BFI = fat weight around the kidney (g) / kidney weight (g). The comparison of body weights and kidney fat indexes were made between the populations of Nagyszénás and Hódmezővásárhely (*Table 1.*). While comparing the body weight (BW) and the kidney fat index (KFI) of the roe deer populations (doe) of the two habitats we have made a t-test. The aim of the study was to find out if there are significant differences between the body weight and the kidney fat index on the examined territories.

Table 1. The main statistical indicators of BW, KFI in Nagyszénás and Hódmezővásárhely

	Nagyszénás			Hódmezővásárhely		
	n	$\bar{x}$	S_x	**n**	$\bar{x}$	S_x
BW (kg)	30	20,59	±2,26	30	18,46	±2,11
KFI	30	1,90	±0,70	30	1,45	±0,60

Table 2. The statistical analysis of BW and KFI distribution

		Shapiro-Wilk		
		Statistic	**df**	**Sig.**
BW (kg)	**Nagyszénás**	0,962	29	0,347
	Hódmezővásárhely	0,975	29	0,681
KFI	**Nagyszénás**	0,978	29	0,758
	Hódmezővásárhely	0,936	29	0,073

Table 3. Independent sample t-test

	Levene test		t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
	F	**Sig.**					
BW (kg)	0,392	**0,913**	5,59	58	**0,000***	2,360	0,422
KFI	0,495	**0,484**	2,36	58	**0,010***	0,329	0,139

RESULTS

The average kidney fat index of roe deer shot in Nagyszénás is higher (1,90) than of roe deer examined in Hódmezővásárhely (1,45). The difference between the kidney fat indexes can be observed due to the favorable conditions offered by different habitats. The average body weight of roe deer dropped in Nagyszénás is also higher (20,59 kg) than of roe deer on the territory of Hódmezővásárhely (18,46 kg) (*Table 2.*). According to the obtained results in case of the eviscerated body weight (P=0,913) and the kidney fat index (P=0,484) we can state that the population variance parameters are homogeneous. Although both territories belong to small game areas of the Trans-Tiszanian Region, yet the average body weight and condition are statistically different (*Table 3.*) presumably the same can be observed regarding the reproductive performance. On the studied areas we have examined only the body weight and condition of doe dropped in fall and winter. Further studies could be carried out to analyze the relation between the condition, the body weight and the reproductive performance, and regarding the dropped roe bocks the body- and trophy weight.

CONCLUSIONS

Any method can be used to measure the condition, which takes the body's fat reserves into account. The most accurate method would be if we could measure all fat reserves of the body. Since the total amount of fat is closely connected with the fat deposits in certain organs, it is enough to use them as indicators. Our large game species form fat reserves in several places in their bodies. The measurement of the perirenal adipose tissue seems to be the best, because the fat layer is easily accessible and well-defined. According to domestic and foreign research results CSÁNYI (1990) states that a healthy adult doe in normal circumstances in one reproductive cycle is able to deliver and raise two offsprings. The poor population supporting capacity of the habitat and the overpopulation of the habitat leads to the decrease in the number of raised offsprings. Based on the genetic abilities of the species (2 offsprings/year) the decreasing number of fetuses and the quality of raised offsprings shows mainly the conditions of the environment and does not characterize the genetic value of the flock. However the role of the mother is also dominant as the environment effects the offsprings through her, but this by no means is an inherited effect. The most important biological parameters of doe are the body weight and the condition. Previous studies show that both are of decisive importance in respect of the stock's performance, which basically determine the dynamics of a population. The winter survival chances of the doe and kid greatly depend on the amount of accumulated reserves and their health status (MAJZINGER, 2006; 2007). According to the observations of HOLAND (1992) adult roe deer showed a definite annual cycle regarding both the body weight and the fat reserves. The quality and the quantity of the population depend, directly and indirectly, on the environmental factors. The adaptation to the changing circumstances always happens in order to optimize survival and the growth of population. The effects that influence the reproductive features prevail in the reproduction process at several points in different degree. The analysis of domestic and international literature highlights the complexity of the matter, on the differences by county and region and sometimes on the contradictions too. We can agree with MAROSÁN's (2009) statement that integrating the results of wildlife biological research into everyday practice is a considerable contribution to a sustainable and economical game management.

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