CLIMATIC INFLUENCE ON THE BREEDING BIOLOGY IN A WILD BOAR (*Sus scrofa*) POPULATION IN "PARCO NATURALE DELLE CAPANNE DI MARCAROLO" (AL)

[1]Ponzio P., [1]Scaglione F.E., De Amicis I.2, [1]Sferra C., [1]Dogliero A., [2]Sergiacomo M. [3]Delleani A., [1]Macchi E.
[1]Department of Veterinary Science - University of Study Turin, [2]Department of Clinic Veterinary Science, University of Study Teramo; [3]Practicioner.
patrizia.ponzio@unito.it

KEY WORDS: wild boar, breeding, climatic conditions, season.

ABSTRACT - Recently, in the Piedmont region an increasing in number of wild boar has been demonstrated, due to their environment and reproduction adaptability. Aim of this study is to evaluate the relationship between climate and reproductive changes in wild boar population of the natural park Capanne di Marcarolo (AL). In compliance with an animal containment programme 148 wild boars (*Sus scrofa)* (76 males and 72 females) were collected in the period 2007-2010. Gender, age and biometric measures were recorded and the entire genital apparatus (macroscopical evaluation and biometric analysis) and faecal samples (Testosterone [T] and progesterone [P_4]) have been collected and correlated to climatic parameters (temperature, humidity, brightness, rainfall, snowfall) Significative difference between [P_4] and winter and spring and summer has been recorded ($p<0.01$). A positive correlation between [P_4] and climatic parameters was found. In the male a positive correlation between biometric measure and [T].have been demonstrated. From the obtained data the male showed during the year a constant gametogenic activity, while the females are seasonal poliestral animals, with a negative photoperiod, just as expected for the species. The data obtained showed a significative correlation between reproductive and climatic parameters but the climatic changes currently, don't have conditioned reproductive seasonality for the high adaptability of this species.

INTRODUCTION - In the Piedmont region, in recent decades, a settlement and an increasing in number of wild boar has been demonstrated, due to their environment and reproduction adaptability (Pedrotti et al 2001). Animal containment programs have become necessary even in protected areas because of problems with the farming community (Vatore et al 2007).Climatic changes of the last century are causing variations in populations of several wild animals (Beniston M., 2005) and no data are available about the influence in reproduction of wild boar.
Aim of this study is to evaluate the relationship between climate and reproductive changes in wild boar population of the natural park Capanne di Marcarolo (AL).

MATERIALS AND METHODS - In compliance with an animal containment programme in the natural park Capanne di Marcarolo (AL) in the Piedmont Region (northwest Italy), 148 wild boars (*Sus scrofa)* (76 males and 72 females) were collected in the period 2007-2010.
Gender, age and biometric measures were recorded and the entire genital apparatus and faecal samples have been collected.

Macroscopical evaluation and biometric analysis of the testes and ovaries (detecting follicles, *corpora lutea* or *corpora hemorrhagica*) and of the uterus (detecting embryos or fetuses) have been performed.

Testosterone [T].and progesterone [P_4] concentration has been determined on faecal samples by enzyme immunoassay analysis, and meteorological data (temperature, humidity, brightness, rainfall, snowfall) from 2001 to 2010 have been recorded.

Statistical studies (Kruskal-Wallis test, Wilcoxon test, Pearson test and Spearman test) have been performed with GraphPad InStat 3.00 (GraphPad Software, San Diego California USA) in order to evaluate possible significant associations between reproductive characters and the other data collected.

RESULTS - Wild boars age and birth seasons have been determined by teeth eruption and consumption. According to the literature, births were observed at a higher concentration during spring and at a lower concentration in summer. However, it is necessary to take into account that animals aged over 36 months often show modified dental pattern due to multiple factors (e.g. dietary) (Fig. 1).

A statistically significant correlation between the age and weight (rho=0.60, p<0.0001), circumference (rho=0.61, p<0.0001) and major axis (rho=0.63, p<0.0001) of the testes was detected by Spearman test.

The evaluation of the ovaries in 72 females revealed in 4 cases (5.5%) inactive ovaries, in 18 cases (25%) gravidic *corpora lutea* and in all other cases follicles and regressive *corpora lutea.*

It should be taken into account that gravidic *corpora lutea* have been found only in age class 5 and 6 confirming that only females with both physical and behavioural maturity can reproduce.
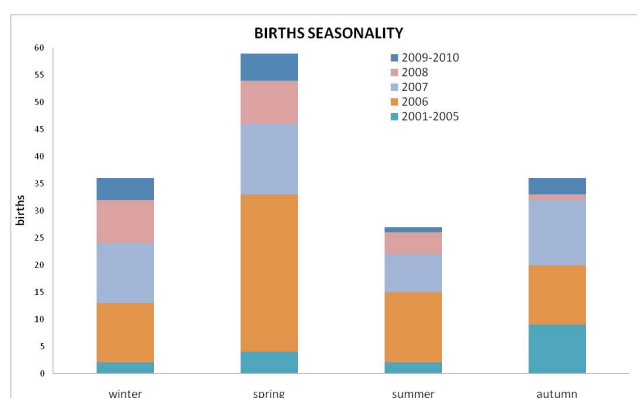

Figure 1: birth distribution in the different seasons in the period 2001-2010.

The immunoenzymatic tests performed on 72 female faecal samples revealed a [P_4] range between 0.28 and 290.77 ng/g showing very low levels in anestro (0.28±0.23 ng/g), low levels in proestrus (29,41±32,1 ng/g), diestrus (34,81±30,3ng/g) and metaestrus (35,47±35,4ng/g) and elevated levels in pregnancy (148.25 ± 86.5 ng/g). A statistically significant difference (Wilcoxon test p<0.01), in the level of P4 between winter and spring and summer has been recorded with a higher values in the cold season. A positive correlation between age (rho=0.47, p<0.0001) and [P_4] and body weight and [P_4] have been demonstrated (rho=0.45, p=0.0001).

A statistically significant correlation (KW test p=0.0013) between cold temperatures and reduced brightness and gravidic *corpora lutea*, as well as number of subjects in oestrus have been found.

A very significant negative correlation between temperature and [P$_4$] (rho= -0.52, p<0.0001) and between daylight hours and [P$_4$] (rho=-0.52, p<0.0001) have been showed.

In the 76 male faecal samples analyzed, a [T] range between 0.80 and 100.00 ng/g have been registered. No statistically significant associations between the level of testosterone and the different seasons have been found. A positive correlation between age of the subjects (rho=0.27, p=0.03), weight of testes (rho=0.27, p=0.045), major axis (rho=0.21, p=0.045), body weight (rho=0.24, p=0.03) and [T] have been demonstrated.

Positive correlations have been recorded between humidity (rho=0.34, p=0.004), rainfall (rho=0.38, p=0.0012), snowfall (rho=0.47, p<0.0001) and [P4], and between the same conditions and the number of gravidic *corpora lutea* (humidity KW test p=0.01, rainfall KW test p=0.0062 and snowfall KW test p=0.002) and animal in oestrus (humidity KW test p=0.0132, rainfall KW test p=0.037 and snowfall KW test p=0.0041).

DISCUSSIONS - In conclusion, a constant gametogenic activity is presen in males (Mauget, *et al*, 1987) in the investigated area, lacking a reproductive seasonality. On the contrary, females are seasonal poliestral animals, with a negative photoperiod, just as expected for the species (Fernandes et al 2005. Fonseca *et al,* 2004, Macchi *et al*, 2010). Therefore, climatic changes currently don't have conditioned reproductive seasonality of the species for the considered area.

Future goals are to confirm this trend taking into account a larger area, a biggest number of subjects and a longest period in order to highlight differences in climate changes and related reproductive adaptations.

REFERENCES - 1. Beniston M Mountain climates and climatic change: an overview of processes focusing on the European Alps. Pure and applied geophysics, 162: 1587-1606 (2005). 2. Fernandes-Llario P et al. Influence on the breeding biology of Wild boar in a Mediterranean eco system. Folia Zool 54: 204-248 (2005). 3.Fonseca C et al. Reproduction in the wild boar population of Portugal. Galemys. 16: 53-64. (2004). 4. Macchi E et al. Seasonality of reproduction in wild boar assessed by fecal and plasmatic steroids. Theriog 73: 1230-1237 (2010). 5. Gray RC et al.. Testosterone levels of boars at various ages. Journal of animal science, 33, n°1 (1971). 6. Mauget R et al. Seasonal changes in testis weight and testosterone concentration in the European wild boar. Anim Reprod Sci 13: 67-74. (1987). 7. Pedrotti L et al. Banca Dati Ungulati: status, distribuzione, consistenza, gestione, prelievo venatorio e potenzialità delle popolazioni di Ungulati in Italia. Biol. Cons. Fauna, 109: 1-132. (2001). 8. Vatore R *et al*. La gestione del cinghiale in Italia, con cenni su biologia e distribuzione. Il Naturalista Campano, 32: 1-42 (2007).