Professional paper
Стручни рад
UDC 599.731:639.1.052(497.5)
DOI 10.7251/AGREN1903149G

University of Banjaluka, Faculty of Agriculture
Agro-knowledge Journal

The Fluctuation in Wild Boar Population in the Hunting Area in Eastern Croatia

Mirna Gavran[1], Maja Gregić[1], Zrinka Tolušić[1], Vesna Gantner[1]

[1]*University of Josip Juraj Strossmayer in Osijek, Faculty of Agrobiotechnical Sciences, Croatia*

Abstract

Considering the great importance of the wild boar population in Croatia, the objective of this study was to determine the fluctuations of all categories (offspring, young, middle-aged, and mature) of wild boar population in the hunting area in Eastern Croatia during the analyzed period from 2008 to 2018. Based on the conducted analysis, the following can be emphasized: the last recorded maximum of offspring (male, and female) was in 2013, the highest number of young (male, and female) was determined in 2018, the last recorded maximum of middle-aged (male, and female) was in 2014, and the last recorded maximum of mature (male, and female) was in 2013. Considering the situation in the hunting area in 1955, the number of wild boars redoubled in the last 10 years. Compared to 1995 and given the fact that the hunting area today has much more resources available and there is significant human activity that can recreate the wildlife population by releasing heads, there is a possibility that the number of wild boars could increase slowly in the coming years.

Key words: wild boar, population, variation, hunting area

Introduction

Over Europe, wild boar numbers grew in the 1960s–1970s however stabilized in the 1980s; recent data implies that the numbers and influence of wild boar have expanded steadily since the 1980s (Massei et al., 2014). They also live in central and south Asia, in North Africa, and as introductions in parts of North and South America and Australia.

Wild boar males can weigh more than 250 kg (550 lbs) in Europe and be as tall as 1 m (39 inches) at the shoulder. The summer coat is bristle and dark with a silver tinge, turning to a darker brown or black in winter, when a thick underfur also develops. The piglets are reddish-brown or ochre, with yellowish longitudinal stripes for the first four or five months. Wild boar lives in a group consisting of females and young of different ages, usually led by the oldest sow, with a definite hierarchy, established by strength and age. Animals from outside are not usually tolerated. Boars are even-toed ungulates, but, unlike deer and bovines, they are not ruminants. They are true omnivores, digesting their food with the aid of a voluminous single-chambered stomach, resting the while for long periods. Much of their food is gleaned from the soil, as evidenced by their shovel-like snouts.

According to Merta et al. (2015), breeding and existence of a wild boar population are formed by the quality and availability of the food supply, hiding and thermal cover, climate, climate conditions, large predators and hunting. Especially, age groups of wild boars differ in rates of survival and fertility. According to Darabuš and Jakelić (2002), we find it on the entire territory of the Republic of Croatia and on the islands (which is undesirable).

After the Second World War it was estimated that there were around 300 wild boars in Croatian hunting areas. Today there are over 10,000 wild boars in Croatia. Considering climatic disasters, wild boars are endangered mostly by dangerous frost without snow. When the land freezes, they cannot root, and rooting is an important way to find food. Climate is the natural limiting factor for the spread of wild boar, respectively low winter temperatures and a thick snow cover. In recent years we have witnessed gradual warming with milder winters. Because of severe climatic conditions, offspring can die. According to Olczak et al. (2015), wild pigs build stronger nests in difficult conditions. Also, resting habits and reproduction may be interrupted by high temperatures.

Their enemies are wolves and bears. Considering the great importance of the wild boar population in Croatia, the objective of this study was to determine the fluctuations of all categories (offspring, young, middle-aged, and mature) of wild boar population in the hunting area in Eastern Croatia during the analyzed period from 2008 to 2018.

Material and Methods

The study was conducted in the area of Kućanci, Osijek-Baranja County. According to Gavran d.o.o. (2019), the first written data on the hunting area originated in 1721 when Karlo VI donated Baron Prandau the land and woods south of the Drava River during the serving in the war against the Turks.

Further, during the First World War and immediately afterwards, poaching destroyed most of the wildlife funds. Also in 1938, wildlife funds were affected by very long and sharp winter. By the Second World War, game funds increased. During the Second World War no information on the state of hunting was recorded, which is understandable in terms of conditions. According to the inventory of 01 January 1955 (Gavran, 2019), 40 heads of wild boar population were determined. Following Gavran (2019) until 2005 the hunting area was managed by the Croatian Forests Ltd. Zagreb, and in 2005, the Đurđenica hunting area was divided into 5 new hunting areas, which have been given for concession or lease.

The Gavran d.o.o. Company became a concessionaire of the Kapelački lug hunting area, and has been managing 5738 hectares of hunting area. The contiguous Đurđenica hunting area of 3626 hectares is managed by the Prkos d.o.o. Company, which is a subsidiary company of Gavran d.o.o. and has a business co-operation contract with it, performing sales services of commercial hunting in that hunting area. These two hunting areas form a natural entity of 9364 hectares and the same deer game population resides throughout the area. Taking into consideration the organization of the hunting area, the hunting staff of the company Gavran d.o.o. repaired the existing hunting-technical and hunting-management facilities in the hunting area, and also built the new ones. The arable land in the hunting grounds is used for sowing game fields, primarily clover grass mixtures, in order to increase the hunting capacity of the hunting grounds and the number of wildlife in the hunting area. The main game species in the hunting ground are red deer, roe deer and wild boar.

The other game species found in the hunting area are badger, wildcat, pine marten, brown hare, fox, jackal, polecat, pheasant, woodcock, common wood pigeon, mallard, hooded crow, common magpie and jay. When it comes to the technical equipment of the hunting area, the following facilities are located there: food storage facilities, feeders for deer, roe deer and wild boar, salt pans and high checks.

According to Muže (2018), to select the method to be used in the hunting area, it is necessary to take into account the type of game being counted, the habits of life, the time when the game is the most active counting target, the required accuracy, cost, configuration and size of the terrain, as well as vegetation overgrowth. The larger the areas covered by numbering and the more numbering is done, the more data will be obtained and the management will be more efficient, regardless of the game.

In accordance to Pittiglio et al. (2018), the management and control of wild boar populations demand accurate and precise spatial information on species dispersion and abundance.

Their results proved that winter severity, temperature, and precipitation anomalies, as well as vegetation structure, are the main macroecological determinants of the wild boar distribution and abundance in northern and temperate latitudes, respectively as they affect population dynamics, particularly the survival of newborn piglets. Differently from earlier studies, slope and elevation were not meaningful predictors, implying that terrain is an important species determinant at the local scale but not at a regional scale.

When counting large animals, the number of heads is recorded by sex and age structure. According to Keuling et al. (2018), there are about eighteen methods for estimation of wild boar population abundance and density. Since counting wild boar on a large regional scale is unfeasible, estimations of density and abundance are reliable only at local scale in specific habitats. Three methods (camera trapping, drive counts, and distance sampling with thermography) were recommended to estimate wild boar density on a local scale. In particular camera, trapping is a method that can be conducted everywhere, irrespective of the habitat specificities and at any time to generate comparable data. Wild boar demographic data obtained by different methods cannot directly be combined by simple equations but spatial models are needed to determine the abundance and predicted densities that are reliable at larger scales. On a large spatial scale and to describe long-term trends, high-quality hunting data statistics (collected on a fine spatial scale) have the highest availability and potential comparability potential across Europe, and these can be used in predictive spatial modeling of wild boar relative abundance and density. There is a need for compiling and validating wild boar abundance data at different spatial scales: hunting bag data alone are not sufficient because a calibration with more accurate density estimation methods conducted at local scale is required. The latter is also required for evaluating predictive models for large-area sand converting predicted relative abundances into densities.

According to Enetwild (2018), there are about eighteen methods and the most suitable ones to estimate wild boar density on a local scale were recommended (Fig. 1).

During the last decades, with impacts on agriculture, livestock, and biodiversity, wild populations in Europe have raised. Consequently, variations in population management for wild boar are increasingly significant. Knowledge of the age structure of the population is essential to creating adequate management strategies. Although, the costs and efforts needed to estimate the age of wild boar, primarily in the oldest animals, is problematical for managers and researchers.

A new method to determine wild boar age based on simple dental measures (the external aperture of the pulp cavity, root length and crown length from primary and secondary incisors) is described. The proposed model is based on Boosted Regression Trees (BRT).

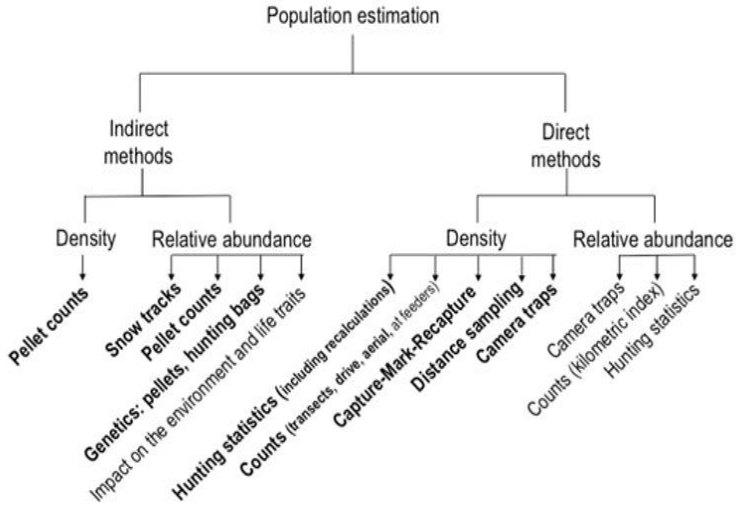
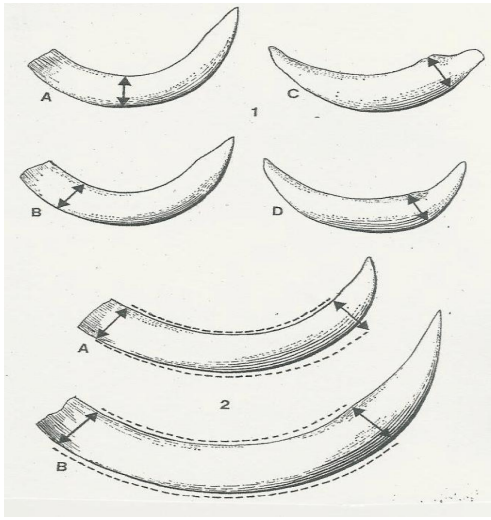


Fig. 1. Classification of available methods for estimating of wild boar density and relative abundance (Enetwild, 2018)

Outcomes give a final age estimation model that included all the explanatory variables proposed (dental measures) and showed a high percentage of estimated deviance (61%), obtained by cross-validation. (Gonçalves et al., 2016). Accordingly, Saez-Royuela et al. (1989) conclude that most studies have used aging procedures based on tooth eruption and replacement, but few have considered alternative methods to age boars. They compared ages obtained by counting incremental lines in tooth cement with 2 other methods: width of pulp cavity and analysis of eruption patterns of teeth.

It is possible to estimate the age of wild boar according to the incisors (tusks) as it is presented in the following Figure 2. Draft outline of the wild boar body is presented in Figure 3. Based on Gavran d.o.o. (2019a), the number of permanent game species and other animal species relevant to hunting management has been determined by observation, monitoring, counting and estimation. On the other hand, the number of seasonal and transient species is to be determined each year upon their arrival in the hunting area. The counting method was taken into account due to the sorted records in the hunting area and also acceptable results provided. The age and trophy structure of large game was determined in the same way.

According to Merta et al. (2015), wild boar population sex ratio and the age structure can be appropriately displayed by direct observations of the animals in their environments, presented that the sampling is well distributed over time and place.



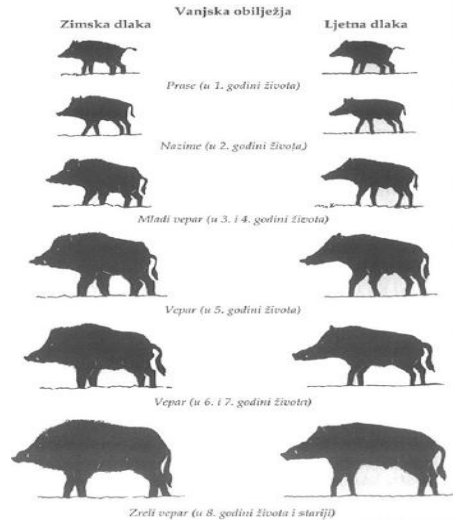


Fig. 2. (left) Estimating the age of wild boar according to the incisors (tusks): 1(female) - A-two-year-old, B-three-year-old, C, D-older than 4 years; 2 (male) - A-three-year-old, B-eight-year-old. Arrows indicate places of measurement for the calculation (Dvorak et al., 2014). Fig. 3. (right) Draft outline of the wild boar body (Sertić, 2008)

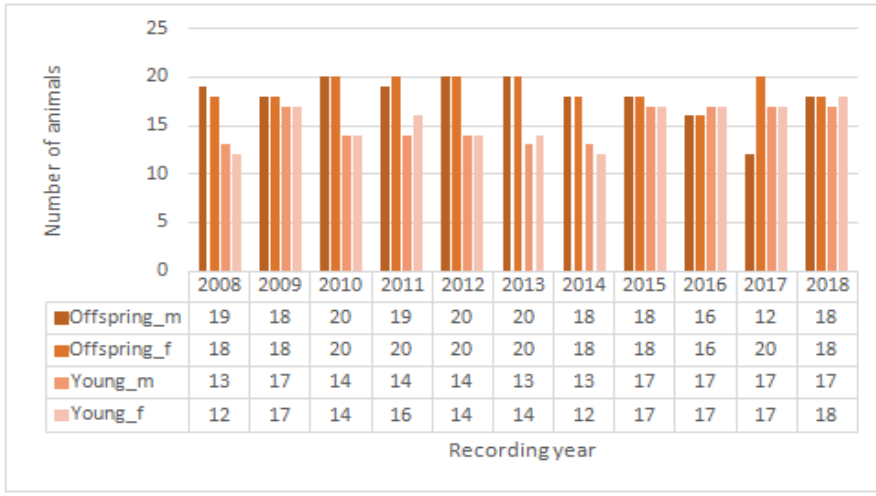
Results and Discussion

The variation in population size of wild boars regarding age categories (offspring, young, middle-aged, and mature boar) as well as sex (males and females) in the analyzed period 2008-2018 is presented in Graphs 1 and 2.

The smallest number of wild boar offspring, males and females, was recorded in 2016 and 2017. The smallest number of young females and males was recorded in 2008 and 2014. By the end of 2018 the largest number of young males and females was determined.

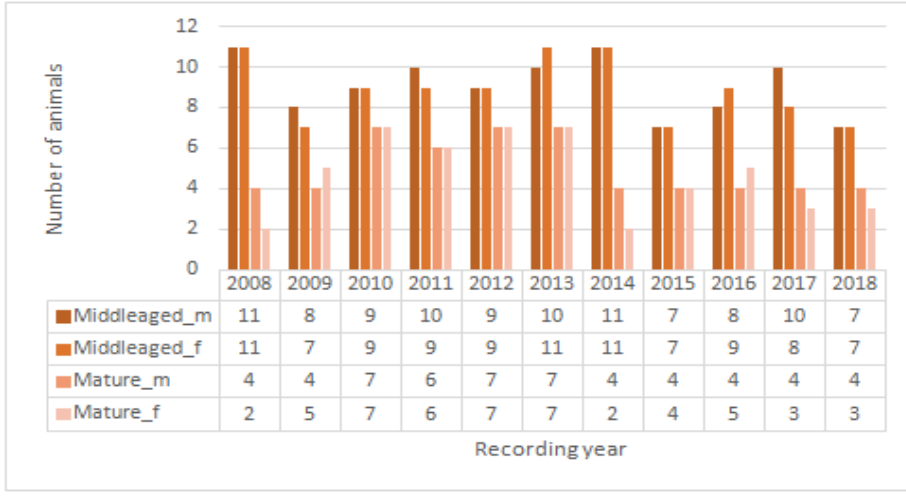
The number of middle-aged boar, males and females, was the lowest in 2015 and 2018, while the number of mature, females and males, was the lowest in 2008 and 2014.

According to Gavran (2019), in 1955 in all age categories, a total of 40 heads were determined. From 2008 to 2018, their number ranged from 89 to 102, which is several times greater compared to 1955.



Graph 1. The number of wild boar offspring and young (males and females) in 2008 – 2018 period

In accordance to Muže (2018), the actual number of game is determined by counting heads at the beginning of the hunting year and may be greater or lower than the prescribed fund. However, in order to manage the game fund economically, it is necessary to know it and to reduce it to the optimal state for the following reasons: maintaining the optimal number of game per unit area can be used to control damage.



Graph 2. The number of middle-aged and mature wild boars (males and females) in 2008 – 2018 period

In order to reduce them, a game fund should be reduced, especially the population of wild boar to a tolerable level. With too much wildlife, road accidents have been increasing and causing damage to vehicles and wildlife. The biggest and most expensive damages are: red deer, wild boar, roe deer and brown bear. Based on the number of wildlife, the number of required feeding sites and other hunting facilities is calculated. According to the number of game per unit of hunting area, the type and quantity of game feeding is calculated and the areas for processing and sowing cultures are determined. This improves habitat conditions and keeps game in the hunting area. Knowledge of wildlife number is the basis for determining growth and planning shootings. If the number of wild animals at the beginning of the season is higher than the prescribed stock, it is reduced to the prescribed parent fund by a reduction shoot. The shoot also corrects the relationship of gender and age structure in the desired direction.

The number estimation provides information on horizontal and vertical migrations of game, and with indicators such as perennial shootings, game damage gives information about the size and trend of the population, its stability, growth or decline. Maintaining optimal population density is one of the factors that depends on whether the disease will occur in the hunting area. Excessive density can be beneficial for the development and transmission of infectious diseases that can directly or indirectly threaten humans.

Accordingly, to Massei et al. (2014), recreational hunting is unsatisfactory to restrict wild boar population growth and the relative influence of hunting on wild boar mortality had decreased. Other factors, such as mild winters, reforestation, intensification of crop production, supplementary feeding and compensatory population responses of wild boar to hunting pressure might also describe population growth.

Accordingly, to Geisser and Reyer (2005) the weather conditions are acknowledged to be important factors for the dynamics of the population of many ungulate species. Besides, conditions of the environment affect the survival of offspring as well as a reproduction of mature animals.

In the population of wild boar, the variation of air temperature is necessary from the viewpoint of survival of the newborn piglets because they are usually born in the period between April and June. The newborn piglets are very susceptible to low temperatures and colds during the spring period. Moreover, during the first 2 years of life, the mortality of offspring can lead up to 90%. In the situation of increasing temperatures through the winter and spring mortality are likely to be decreased.

In accordance to Vetter et al. (2015), climate change is known to influence ecosystems globally, but understanding of its impact on big and widespread animals, and possibly population-specific responses is still rare.

Wild boar was used as a model species. Results show that population spreads across Europe are strongly associated with increasingly mild winters, yet with region-specific threshold temperatures for the onset of exponential growth. Additionally, found that the plentiful availability of important food resources, such as beechnuts, can overbalance the negative impacts of cold winters on population growth of wild boar. The availability of beechnuts is highly variable and highest in years of beech mast which increased in frequency since 1980. Climate change drives population growth of wild boar directly by relaxing the negative effect of cold winters on survival and reproduction, and indirectly by increasing food availability.

Conclusions

Based on the analysis of the fluctuations of all categories (offspring, young, middle-aged, and mature) of wild boar population in the hunting area in Eastern Croatia during the period from 2008 to 2018, following could be emphasized:

- The last recorded maximum of offspring (male and female) was in 2013,
- The highest number of young (male and female) was determined in 2018,
- The last recorded maximum of middle-aged (male and female) was in 2014,
- The last recorded maximum of mature (male and female) was in 2013.

Having researched the literature during the preparation of this paper, we can conclude that there are a number of different methods for counting and estimating game numbers. Selection methods depend on the resources available, the number of staff, the purpose of the count, species and specificity of habitat and game.

Considering the situation in the hunting area in 1955, the number of wild boar redoubled in the last 10 years. Compared to 1995 and given the fact that the hunting area today has much more resources available and there is significant human activity that can recreate the wildlife population by releasing heads, there is a possibility that the number of wild boars could increase slowly in the coming years.

References

Darabuš, S., & Jakelić, Z.I. (2002). *Osnove lovstva*. Hrvatski lovački savez, Zagreb.

Dvorak, J., Pihal, R., Kimler., J. & Drimaj, J. (2014). *Game Management*. Textbook. Department of Forest Protection and Wildlife Management, Faculty of Forestry and Wood Technology, Mendel University in Brno.

Gavran (2019). O nama. Povijest. http://www.gavran.hr/ (7.3.2019)

Geisser, H., & Reyer, H.U. (2005). The influence of food and temperature on population density of wild boar Sus scrofa in the Thurgau (Switzerland). *Journal of Zoology*, 267(1), 89-96. doi:10.1017/S095283690500734X

Gonçalves, P. Risco, D., Fernández-Llario, P., Barquero-Pérez, O., Serrano, E., Hermoso-de-Mendoza, J., & Mateos, C. (2016). A new method for ageing wild boar using dental measures. *Ecological Indicators*, 62, 328-332.

Keuling, O., Sange, M., Acevedo, P., Podgorski, T., Smith, G., Scandura, M., Apollonio, M., Ferroglio, E., & Vicente, J. (2018). *Guidance on estimation of wild boar population abundance and density: methods,challenges,possibilities*. External scientific report.

Massei, G., Kindberg, J., Licoppe, A., Gačić, D., Šprem, N., Kamler, J., Baubet, E., Hohmann, U., Monaco, A., Ozoliņš, J., Cellina, S., Podgórski, T., Fonseca, C., Markov, N., Pokorny, B., Rosell, C., & Náhli, A. (2014). *Wild boar populations up, numbers of hunters down?* A review of trends and implications for Europe.

Merta, D., Bobek, B., Albrycht, M., & Furtek, J. (2015). The age structure and sex ratio in wild boar (Sus scrofa) populations as determined by observations of free-roaming populations and by harvests of collective hunts in southern Poland. *European Journal of Wildlife Research 61*, 167–170. doi:10.1007/s10344-014-0867-3.

Muže, S. (2018). Metode procjene brojnog stanja divljači. Završni rad. Veleučilište u Karlovcu.

Olczak, K., Nowicki, J. & Klocek, C. (2015). Pig behavior in relation to weather conditions – a review. *Annals of Animal Science*, 15(3), 601–610.

Pittiglio, C., Khomenko, S., & Beltran-Alcrudo, D. (2018). Wild boar mapping using population-density statistics: From polygons to high resolution raster maps. *PloS One, 13*(5), 1-19. https://doi.org/10.1371/journal.pone.0193295.

Sáez-Royuela, C., Gomariz, R.P., & Tellería, J.L. (1989). Age Determination of European Wild Boar. *Wildlife Society Bulletin*, 17(3), 326-329.

Sertić, D. (2008). Uzgoj krupne divljači i uređivanje lovišta. Veleučilište u Karlovcu.

Vetter, S.G., Ruf, T., Bieber, C., & Arnold, W. (2015). What Is a Mild Winter? Regional Differences in Within-Species Responses to Climate Change. *PLoS One*, *10*(7), 1-17.

Флуктуација популације дивљих свиња у ловиштима источне Хрватске

Мирна Гавран[1], Маја Грегић[1], Зринка Толушић[1], Весна Гантнер[1]

[1]*Универзитет Јосипа Јураја Штросмајера у Осијеку, Факултет агробиотехничких наука, Хрватска*

Сажетак

С обзиром на велики значај популације дивљих свиња у Хрватској, циљ овог истраживања било је утврђивање флуктуације свих категорија популације дивљих свиња (потомства, младих, средњих и одраслих јединки) у ловиштима у источној Хрватској током анализираног периода 2008-2018. На основу спроведене анализе, може се нагласити сљедеће: посљедњи забиљежени максимум потомства (мужјак и женка) констатован је у 2013. години, највећи број младих (мужјак и женка) констатован је у 2018. години, посљедњи забиљежени максимум јединки средњих година (мужјак и женка) био је у 2014. години, а посљедњи забиљежени максимум одраслих јединки (мужјака и женки) био је у 2013. години. С обзиром на ситуацију у ловишту 1955. године, број јединки дивљих свиња се удвостручио у посљедњих 10 година. У односу на 1995. годину, као и с обзиром на то да данас у ловишту постоји много више ресурса и значајна људска активност која може регенерисати популацију дивљих животиња ослобађањем јединки, постоји могућност да се број јединки дивљих свиња лагано повећа у наредним годинама.

Кључне ријечи: дивља свиња, популација, варијација, ловиште

Corresponding author: Mirna Gavran
E–mail: mgavran@fazos.hr

Received: April 4, 2019
Accepted: November 19, 2019