PROTECTED AREAS NEEDS REGARDING THE DEVELOPMENT OF MANAGEMENT MEASURES FOR CONTROLLING CLASSICAL SWINE FEVER (CSF)

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Abstract. Romania is one of the European countries which have the richest mainland biodiversity. Biodiversity conservation is a challenge for the 21st century especially when it is necessary to ensure the health of species and habitats with a positive impact on the economy of countries. The biggest challenges are given by veterinary and phytosanitary measures that are to be implemented due to the outbreak of quarantine diseases and pests. This paper addresses the problem of classical swine fever (CSF) that appeared during 2005 and all national territory was under sanitary-veterinary quarantine. Recently, Romania has been under alert of infestation for African swine fever. The implementation of the current sanitary-veterinary action plan for monitoring and surveillance already has 10 years and associated costs are high. In our country conditions, the main vector of this disease of viral origin is wild boar (*Sus scrofa*). Being a country with a rich biodiversity, for the year 2016, it was approved the collection from the wild of 37,725 boar individuals throughout Romania. It is recorded a territorial overlap between the distribution of wild boar and outbreaks of classical swine fever. A major gap is recorded in protected areas in the implementation of phytosanitary quarantine measures having Sibiu County as a case study. Management plans adopted so far do not contain preventive measures to support the national plan for CSF quarantine. Thus, it should be adopted synergetic measures in the management plans of protected areas with those of the national plan for CSF controlling and eradication.

Keywords: classic swine fever, boars *Sus scrofa*, sanitary-veterinary quarantine, protected areas.

Rezumat. Necesităţile ariilor protejate de a dezvolta măsuri de management pentru controlul pestei porcine clasice (CSF). România este una dintre ţările Europene care prezintă cea mai bogată diversitate biologică pentru partea continentală. Conservarea biodiversităţii constituie o reală provocare pentru secolul XXI mai ales când este necesară asigurarea stării de sănătate a speciilor şi habitatelor cu impact pozitiv asupra economiei ţărilor. Cele mai mari provocări sunt date de măsurile fitosanitare şi sanitar-veterinare ce se impun a fi implementate datorită apariţiei unor boli şi dăunători de carantină. Această lucrare abordează problema pestei porcine clasice care a infestat România în 2005 provocând instalarea carantinei sanitar-veterinare pentru pesta porcină clasică (CSF). Recent România este în alertă pentru infestarea cu pestă porcină africană. Implementarea actualului plan sanitar-veterinar de monitorizare şi supraveghere are deja 10 ani, iar costurile asociate sunt mari. Principalul vector al acestei boli virale este porcul mistreţ (*Sus scrofa*) pentru condiţiile ţării noastre. Fiind o ţară cu o bogată biodiversitate, doar pentru anul 2016 s-a aprobat colectarea din sălbăticie a 37725 de porci mistreţi de pe întreg teritoriul României. Este înregistrată o suprapunere teritorială între distribuţia porcului mistreţ şi focarele de pestă porcină clasică. O deficienţă majoră este înregistrată în implementarea în ariile protejate a măsurilor de carantină fitosanitară având ca studiu de caz judeţul Sibiu. Nici un plan de management adoptat până în prezent nu conţine măsuri de prevenţie în susţinerea planului naţional de carantină CSF. Astfel, se impune adoptarea în planurile de management ale ariilor protejate a măsurilor sinergice de susţinere a planului naţional de carantină sanitar-veterinară pentru controlul şi eradicarea CSF.

Cuvinte cheie: pestă porcină clasică, mistreţ *Sus scrofa*, carantină sanitar-veterinară, arii protejate.

INTRODUCTION

Biodiversity (i.e. genetic resources, species and habitats) is an asset that needs to be conserved and sustainably used based on the scope of the Convention on biological diversity (SMITH & MALTBY, 2003). Starting with 1932 Romania has continuously declared natural protected areas, a total surface that covers today 24.84% of its territory of which only the European ecological network Natura 2000 represents 17.84% (ANTONESCU et al., 2015). 302 management plans have been officially recognized at the government level up to March 2017, covering one third of the total of management plans that need to be published in the Official Gazette (***, 2017a). The major challenge in case of protected areas is to develop and implement management plans that effectively work for nature conservation and equally develop innovative economic chains in supporting nature by defining product stewardships that lead to sustainable development from local communities up to the national level (MIEMCZYK et al., 2016). Therefore, when management plans are to be developed local communities' knowledge, needs and traditions must be addressed, accessed and understood to make effective their implementation (HERNES & METZGER, 2017). In case of Romania, the process for developing management plans included relevant stakeholders but still, some major stakeholders are silent and already some gaps in the management process of coherently addressing risks can be addressed. Among these stakeholders, relevant from economic point of view are those related to phytosanitary and sanitary-veterinary authorities in direct connection with species that may act as vectors or reservoirs for pests and/or diseases. One of the first official record on classical swine fever (CSF) or hog cholera, based on historical records, happened in the beginning of the XIX century in the United States of America and Europe (HANSON, 1957; COLE et al., 1962; EDWARDS et al., 2000). Based on recent studies, oral vaccination on both domestic pigs and boars must be introduced considering that this disease of viral origin is highly contagious (i.e. a *Pestivirus* virus of the Flaviviridae family). Based on these authors, it is already known the composition of the virus (i.e. proteins and nucleic acid). Among these molecular components, E2 glycoprotein is considered as being the most immunogenic CSFV protein (RENSON et al., 2013). Also, these authors stated that this virus can periodically be reintroduced or activated by wild boar population living in close neighbouring

with livestock or due to movement of pigs. On the other hand, the global market demands on swine meat continues to remain in a steady position since 2005 up today pointing its market demand and economic importance against all issues related to quarantine diseases (WTO, 2016). One proposed measure, in countries where a large effective of wild boars exists, is to start their vaccination and to develop measures protecting householders where domestic pigs exist (ROSSI et al., 2010). This proposal is accepted by the today scientific community that established the importance of understanding the transmitting pathways of this zoonosis, from the livestock to wild animals and inversely, as well as the importance of applying measures in the border of target populations (MARTIN et al., 2011). Based on Rossi and collaborators' study, there is a net connectivity between the abundance of wild boar population and the infectious emerging and intensity of disease, and consequently they highly recommend oral vaccination based on bites for wild boars based on previous studies (ROSSI et al., 2005; 2010). The described project was implemented with the support of major stakeholders and proved in the end the efficiency of oral baits vaccines. The scope of this article is to discuss the current regulatory framework regarding the sanitary-veterinary action plan on monitoring and surveillance on CSF in Romania and to evaluate the connections between measures adopted for the national plan for controlling CSF and measures adopted in the current management plans for protected areas.

MATERIAL AND METHODS

This paper is developed based on an integrative approach regarding the SWOT analysis (strengths, weaknesses, opportunities, and threats) of the national sanitary-veterinary action plan on monitoring and surveillance on classical swine fever (CSF) and the current situation of management plans for protected areas with a specific focus on Sibiu for evaluating the existence of synergies between environmental protection measures and the national plan for controlling CSF.

RESULTS AND DISCUSSIONS

Romania established the first protected area in 1932 and recorded the incidence of CSF before the Second World War proved by a long series of regulatory acts such as The Law for Veterinary Health no. 840/1942, the Decree no. 167/1956 and another subsequent Low for Veterinary Health no. 60/1974 (INDRIE & MĂNZAT, 2009). However, the largest outbreaks related to CSF were recorded between 1993 and 1994, when it was officially recognized the infestation of boar meat exported by Romania. On the occasion, the world trade market policies imposed sanitary-veterinary measures at national level that close the export of pork meat (RIBBENS et al., 2004). Starting with this period, drastic measures were imposed for controlling CSF that went up to full vaccination of all domestic feral pigs and wild boars, ceasing the export of pork meat under the supervision of national sanitary-veterinary authority. This situation is positively correlated to the low economy of the country at the time, as well as to traditional way of breeding pigs such as demi-feral in certain region of the country (e.g. South, and South-East Romania), the movement and trade of domestic pigs on local markets and the abundance of boars. The entire regulatory framework for sanitary-veterinary control developed more after 2001 based on harmonizing policy of the country with that of the European Community and future European Union (INDRIE & MĂNZAT, 2009).

Control and eradication plan for CSF. The national competent authority responsible for implementing the control and eradication plan for CSF is the National Sanitary Veterinary and Food Safety Authority (NSVFSA) under the direct subordination of the Government that is working through county inspectorates and perform laboratory investigations in line with the provisions of the Order 67/2005 for sanitary-veterinary norms regarding the control of CSF transposing the provisions of Directive 2001/89/EC. The current European Union regulatory framework still refers to the Council Directive 82/894/EEC on the notification system and the Diagnostic Manual as it was adopted by the Commission Decision 2002/106/EC with further amendments (FRENTZEL et al., 2013). Before the accession to the European Union, in Romania, it was implemented starting with 2004, a nine months emergency plan, for controlling the eradication of CSF both for domestic pigs and boars (i.e. the 1st of January 2007). It was a hard decision considering restrictions imposed for forbidding the export of pork meat and full vaccination into all territories where this pest was recorded based on Commission Decision 2006/802 (***, 2006; LEIFER et al., 2009). The plan was approved later and prolonged up to the 31st of December 2007 based on Commission Decisions 2007/625/EC and 2007/870/EC (***, 2007). After one year, the quarantine was prolonged again up to June 2008 and followed by the Commission Decision 2008/855/EC repealing the Commission Decision 2006/805/EC and Commission Decision 2006/802/EC (***, 2008a; ***, 2008b). The latest decision was strict and expensive for Romania only mentioning the compulsory examination of thousands of biological samples by polymerase chain reaction diagnostic (Art. 3 c). The decision applied to all national territory and it is associated with the prohibition of pork meat export over the borders or movement of live animals. In 2013, another decision will be addressed based on Commission Decision 2013/764/EU (***, 2013a) to reinforce the control and eradication of CSF up to the 31st of January 2017. In the last report of self-evaluation to OIE (World Animal Health Information System), it is underlined that the last outbreak of CSF was recorded on the 9th of October 2007 and due to constant vaccination on pigs (stopped on the 30th of November 2009) and boars (stopped on the 31st of December 2011) supported by negative results obtained in certified laboratories proves the absence of CSF free circulation inside the country (***, 2013b).

Swine breeding for trade has a negative evolution that is highly dependent on issues related to sanitary veterinary monitoring and surveillance for CSF. Based on the last USDA reports, since 2010 it has been recorded a continuous falling by 7% of the swine in numbers (USDA, 2015: USDA, 2016) (Fig. 1).

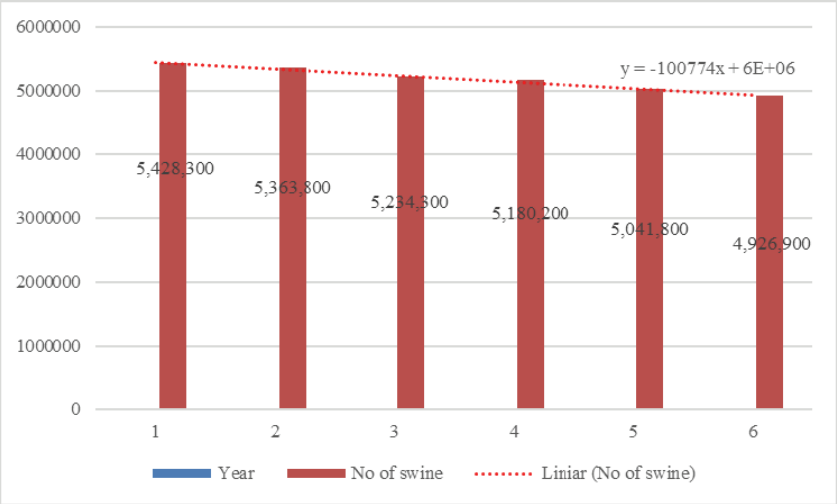

Figure 1. The negative trend of swine trade on the world market in the last 6 years starting with 2010 (1) to 2015 (6) based on USDA data published in 2015 and 2016 for Romania.

Romania also encounters losses in piglet reproduction system that lately proved not to reach market demands. The USDA considers this sector as undeveloped both for 2015 and 2016 (USDA, 2015: USDA, 2016). Due to these negative issues Romania imports on piglets increased during the last years originating from countries such as, Denmark, Germany, Hungary, Netherlands and Slovakia with a correlated positive trend. The pig export is insignificant and only for Eastern countries such as Republic of Moldova, Georgia and Albania. These figures are relevant when it is taken into considerations the actual agriculture contribution to the GDP of the country (Gross Domestic Product). Based on the last report of World Trade Organization, Romania is losing the export market in favour of importing (WTO, 2016). However, the trend in pigs breeding is negative also based on FAOSTAT data (***, 2017b) (Fig. 2). Based on Romania' authorities, at least 75% of the current swine population is held in individual households and under 25% are bred in large farms that may supply the export. The costs are high and as a comparison only Spain lost between 1997 and 2001 more than 108 million Euros in implementing a similar control plan (FERNÁNDEZ-CARRIÓN et al., 2016).

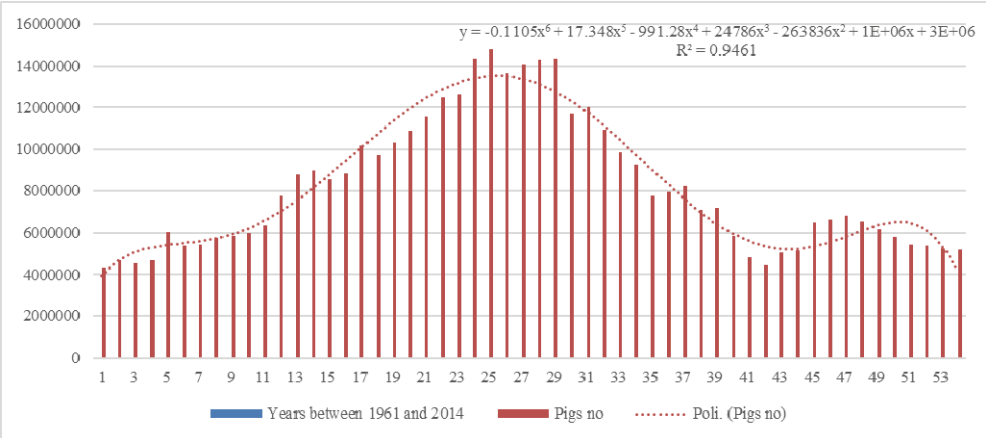

Figure 2. The evolution of pig breeding in the country based on FAO statistics data.
The today figures for pig no are half compared to 30 years ago, 1997 (position 25) and like 1966 (position 5).

Protected areas wild boars and domestic pigs. Romania entered the European Union with one of the biggest biodiversity in terms of genetic resources, species and habitats and it was underlined by different scientists that conflictual situations will occur between domestic situation and the EU regulatory framework (YOUNG et al., 2007). This was not the case only for Romania, but for all countries with low economic growth entering the EU. In such conditions, Romania considered as a European treasure for large carnivores (DORRESTEJIN et al., 2016), with huge implication in socio-economic issues was not properly prepared to face phytosanitary and sanitary-veterinary challenges that increase with biodiversity. As it is already known, all large carnivores rely for their life on herbivores and wild boars are among the favourite species for native large carnivores. On the other hand, rural population use to breed swine

in their households all over the Carpathians for centuries. At the same time, wild boars use to damage crops fields and to enter in contact with pigs (directly or indirectly) spread all over the country (Fig. 3). Based on the current plan for wild boar collecting from the wild only in Sibiu County were proposed 930 individuals to be collected from a surface of 5432 km^2 or 2.46% from the total of 37,725 specimens to be collected from the wild for all the country (2016). Maintaining a huge biological diversity is counterproductive for the trading products of animal or vegetal origin especially due to pests and diseases of quarantine interest. A constant connection between wild boars and pigs is established with a very long history with a negative impact on national economy.

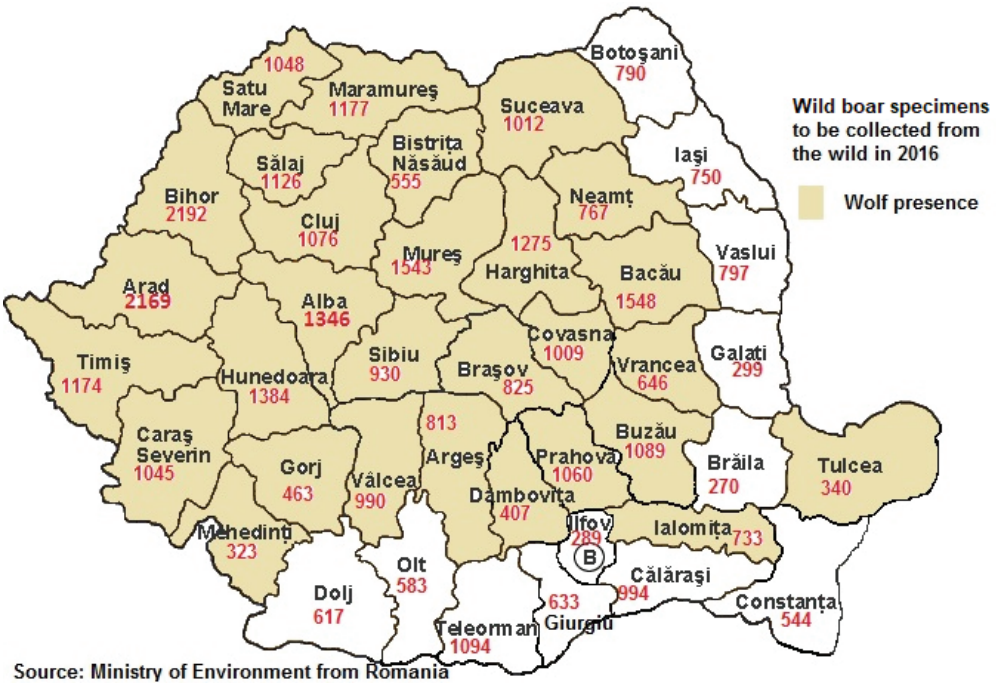

Figure 3. The map of wild boar specimens to be collected from the wild for 2016 based on the Ministry of Environment public data (original).

In Sibiu County, protected areas cover more than 50% of the total territory and include in more than half small rural communities. Only into this territory 9 Sites of Community Importance and 4 Sites of Avifauna Importance are officially recognized. Of these 9 SCIs, wolfs and bears live in three of them, such as: ROSCI0085 Frumoasa, ROSCI0122 Munţii Făgăraş and ROSCI0227 Sighişoara - Târnava Mare. For all these protected areas, there have been officially adopted management plans in 2016. In case of the management plan of ROSCI0122 Munţii Făgăraş wild boars are a constant presence in the site (***, 2016a; b). In Sibiu County are couples of administrative units that covers the management of the site such as: Arpaşu de Jos 36%, Avrig 25%, Boiţa <1%, Cârţişoara 64%, Porumbacu de Jos 42%, Racoviţa 24%, Turnu Roşu 51% but no synergic measures are in place for the management of sanitary-veterinary plan controlling the spread of CSF. Based on the management plan of ROSCI0227 Sighişoara - Târnava Mare, the impact of wild boars on rural communities is high and still no measure is in place for reducing the impact of spreading of any pests from the wild population in the domestic pigs and inversely (***, 2016c). It is the only management plan rising attention on the importance of connecting the sanitary-veterinary offices on issues related to diseases and pest control and eradication of national importance. In this area, it is well known the case of CSF infestation for more than 400 domestic pigs that have been slaughtered by the sanitary-veterinary inspectorates associated with losses of more than 4500 Euros for rural communities in 2014. In the management plan of ROSCI0085 Frumoasa, it is recognized the abundance of wild boars and other ungulates in the site, but no synergic management measures of sanitary-veterinary interest are in place (***, 2016d).

Based on the sanitary-veterinary authority from Sibiu County report, in 2014, there were taken 445 samples of wild boar meat for sanitary-veterinary analysis in official laboratories that were tested based on the Decision 2007/870/EC (***, 2014). Officials recognize the movement of boars down to the villages it is emphasized the hunting management importance and proved the constant contact between wild boars and the habitat of pigs in rural communities. On one hand, in 2014, in Sibiu County, there were slaughtered for self-consuming during the winter season over 11,000 pigs of a total of almost 28,000. A third part of these pigs are breed by householders (i.e. around 10,000 pigs). On the other hand, only in 2014, there were collected 229 samples from pigs bred in householders and 26,378 samples from large farms. This proves the large market demands for swine meat as well as the negative economic impact of veterinary quarantine imposed from national to local level.

Currently, it is implemented all over the country, including inside protected areas, the Operational Guidelines regarding the CSF control in case of sanitary-veterinary quarantine and published in 2014 based on the Directive 80/217/EC. New cases arose at the border with neighbouring countries such as those related to the African CSF that may enter through Ukraine or Bulgaria (COSTARD et al., 2013) and will emphasize again the weaknesses of the management plans inside protected areas. However, starting with 2015, it was published a guideline for CSF in case of boar hunting (***, 2015) and it is the first time when it is stated that infested boar bodies should not be released in protected areas.

Developing new management measures inside protected areas that need to be synergic with that imposed by the national plan for controlling CSF will further support facing these challenges for the future. Among these measures, it is relevant to be declared "free zones" of this disease inside protected areas (PLUIMERS et al., 1999), to be coupled with the boars collecting from the wild in case it is needed such as: the proved occurrence of the short migration of boars into domestic pigs' habitats, in case of new outbreaks in the borders of protected areas that need to be associated on a case by case basis on the vaccination of wild boar population. Such measures are in line with the recommendations regarding the need to maintain the healthy status of species and habitats (HERMAN et al., 2005; DUDLEY, 2008). Installing prophylaxis measures is relevant in all protected areas and related to this, it is relevant to closely communicate to local communities about the incidence of quarantine measures on their own economy, change attitude and develop guidelines for breeding pigs in households and finding financial solutions in preventing rather than in controlling and eradicating.

CONCLUSIONS

Implementing at the national level a quarantine action plan followed by a monitoring and surveillance action plan in case of CSF has dramatic costs reflected on the domestic pig breeding and meat trade as a commodity. Applying vaccination is only related with the effect of outbreak based on the diagnostic of the disease and may be implemented only based on a national plan run by the veterinary authorities. Currently, the management plans for protected areas do not include prediction studies regarding the trend of wild boars, conflictual situation and synergetic measures to support sanitary-veterinary authorities in case of quarantine diseases. Such a gap reveals the major stakeholders' lack of knowledge related to these issues of major economic importance. Developing and declaring free zones of CSF must be a future step in applying prophylaxis measures against CSF and not only, inside and in the boarders of protected areas as well as for pig farms. Householders breeding pigs and relevant stakeholders closely working with need to be informed and aware of the safety measures imposed for breeding, trading and movement of pigs and piglets in order to avoid contamination.

ACKNOWLEGMENTS

This study was supported by the Research Center for Agricultural Sciences and Environmental Protection of the University Lucian Blaga from Sibiu for 2014-2020.

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Received: March 30, 2017
Accepted: June 12, 2017