

Trapping as an alternative method of eradicating classical swine fever in a wild boar population in Bulgaria

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Summary

Between August and November 2009, eight cases of classical swine fever (CSF) occurred in young wild boar in a 25-km² oak forest 3 km south of the river Danube in the north-eastern part of Bulgaria. The wild boar population within the affected area was estimated to be 156 animals, or approximately six boar per km². To control and eradicate the disease, and in addition to vaccination and hunting, trapping was used to reduce the boar population to below two animals per km². In total, 124 wild boar were removed from the infected area within three months. Of these, 119 were trapped.

In this paper, the authors present trapping as a successful tool to eradicate CSF from an area where hunting and vaccination alone might not be sufficient. Up to seven wild boar could be trapped in a single trap. Furthermore, the spread of CSF virus to the local domestic pig population and to wild boar in neighbouring areas was prevented. By decreasing the wild boar population to fewer than two animals per km², it was assumed that the virus would no longer circulate and the disease would fade out. In fact, no further CSF cases were diagnosed afterwards.

Under Bulgarian and similar conditions, trapping seems to be a more reliable method than hunting for reducing a wild boar population within a short period of time. Furthermore, trapping may be used alone or in combination with hunting, depending on the situation.

Keywords

Boar – Bulgaria – Classical swine fever – Control – Eradication – Hog cholera – *Sus scrofa* – Swine – Trapping – Wild boar.

Introduction

Classical swine fever (CSF), also known as hog cholera, is a devastating viral disease affecting domestic pigs and wild boar (*Sus scrofa*). The causative agent – the CSF virus (CSFV) – is an enveloped RNA virus belonging to the *Pestivirus* genus of the *Flaviviridae* family. Classical swine fever is notifiable to the World Organisation for Animal Health (OIE) and to the European Union.

In fact, wild boar may play a crucial role in the epidemiology of CSF since they can act as a reservoir for CSFV and as a possible source of infection for domestic pigs. Epidemiological links between CSFV infections in wild boar and domestic pigs have been repeatedly reported. Between 1993 and 1997, 80% of the 92 primary outbreaks of CSF in domestic pigs in Germany were located in geographic regions where CSF was endemic in wild boar. In 60% of these cases, a direct or indirect contact with infected wild boar or wild boar meat was established

(4, 9). Taking this into consideration, preventing and controlling CSF in wild boar is regarded as crucial if domestic pigs are to be protected from infection (7).

The main aims of controlling CSF in wild boar are to:

- reduce the risk of transmitting the disease to domestic pigs
- prevent the evolution of an endemic situation in the wild boar population
- reduce the duration of the endemic phase.

Since the source of infection of CSF in wild boar is often not easy to determine, investigating and preventing the disease from spreading can be difficult (2).

The persistence of CSFV depends on epidemiological and ecological factors, such as: the proportion of individuals that recover from infection, the occurrence of chronic infections, and the social structure and size of the population. In particular, CSFV may persist for several years among populations comprising more than 2,000 wild boar (3) or 2 animals per km². In smaller populations, infection seems to be self-limiting, with the virus disappearing within one year, whereas in larger populations, it tends to persist for years (8).

Intensified but indiscriminate hunting has never been shown to be particularly efficient, either in controlling or eradicating CSF, except in very small and geographically isolated populations. The main drawbacks arise from complex population dynamics and the age dependency of CSF epidemiology in wild boar populations, which normal hunting does not take into account. Thus, hunting alone is not sufficient to break the virus transmission chain. Instead it may even result in enhanced virus circulation (2, 3).

Oral vaccination, using baits containing the modified live C-strain vaccine, has proven to be very effective in reducing the number of susceptible individuals (5, 6, 10). In combination with natural immunity induced by the circulating field virus, vaccination decreases infection pressure and may reduce the basic rate of infection R_0 , i.e. $R_0 < 1$ or one infected individual infects fewer than one other individual. Under these epidemiological circumstances, CSFV is cleared from the population.

Between August and November 2009, Bulgaria experienced several cases of CSF in wild boar in a forested area close to the river Danube, in the Silistra region. To control and eradicate the disease, and in addition to vaccination and hunting, trapping was used to reduce the wild boar population. Thus, trapping may be used as an additional tool to successfully eradicate CSF from an area when hunting and vaccination alone might not be sufficient.

Materials and methods

The affected area was a 25-km² oak forest, situated 3 km south of the river Danube in the north-eastern part of Bulgaria. It is surrounded by crops (mainly maize). Both the oak forest and the maize fields are a very suitable habitat for wild boar. The wild boar population within the affected area during that period was estimated at 156 animals, or about six animals per km².

This area belongs to the vaccination belt, running some 40 km along the Bulgarian border with Serbia, Romania and the former Yugoslav Republic of Macedonia, in which oral vaccination against CSF has been conducted since 2005. In 2009, the overall seroprevalence in that region was 86%. In September 2009, CSFV was detected in a four-month-old boar, which was found dead, and in three five-month-old boars caught during hunting. However, no clinical signs of the disease were observed in the field.

The Bulgarian Veterinary Service immediately began a control and eradication programme, aimed at reducing the wild boar population by trapping and increasing herd immunity with an additional vaccination campaign.

Trapping was chosen as an additional tool, and an alternative to hunting, to reduce the wild boar population to below two animals per km² in a short period. Six wild boar traps were constructed and distributed in various places in the forest. The traps had an average size of 3 m × 10 m × 3 m and were made out of wood and wire fencing. Maize was provided in and around the traps to attract the animals. Figure 1 shows two wild boar traps, with and without animals inside.

The geographical location where the CSFV-positive animals were found is shown in Figure 2.

All the wild boar that were hunted, trapped or found dead were sampled and examined for CSF, according to the European Commission Diagnostic Manual (1). Table 1 shows the test results of wild boar in different age groups.

Results and discussion

Wild boar obviously cannot be managed in the same way as domestic pigs, i.e. using exhaustive culling or a conventional vaccination strategy, since individual handling is impossible, and wild boar populations are highly dynamic (that is, are constantly producing new susceptible offspring). However, hunting and vaccination can be used to halt transmission by reducing the number of susceptible animals. Nevertheless, inadequate hunting or inappropriate vaccine strategies may boost CSF persistence.



Fig. 1
Wild boar traps, shown with boar and without

In addition to hunting and vaccination, the Bulgarian Veterinary Service used trapping to effectively reduce the wild boar population in the area affected. The principal goal was to stop the perpetuation of the virus by reducing the number of susceptible individuals in the infected area.

In total, 124 wild boar were removed from the infected area within three months. Of these, 119 animals were

Table I
Wild boar from the Silistra region of Bulgaria infected with classical swine fever, by age group (reporting period: 28 August 2009 to 31 January 2010)

Age of wild boar	No. of wild boar trapped	No. of wild boar hunted	No. testing positive by PCR
0 to 6 months	24 (20%)	5	8*
6 to 12 months	70 (59%)		
12 to 24 months	17 (14%)		
Over 24 months	8 (7%)		
Total	119	5	8

PCR: polymerase chain reaction
*4 trapped, 3 hunted, 1 found dead

trapped, four were shot and one was found dead. Table I shows the results of trapping in the various age categories of the boar. As a result of these measures, the wild boar population decreased considerably. It was estimated that only about 32 wild boar were left. By reducing the wild boar population to below two animals per km², it was assumed that virus perpetuation would not continue and the disease would fade out, and indeed, no further CSF cases were diagnosed.

Trapping proved to be a very efficient control measure. Up to seven wild boar could be trapped in one trap. Conventional hunting alone would not have led to such a decrease of animals in such a short time. Hunting with dogs was not an option because it was feared that viraemic animals could escape from the infected area and spread the virus.

The laboratory data showed that only young animals, those aged less than six months, were confirmed as being CSFV-positive. The most logical explanation for this finding is that this age group had not been protected by vaccination, since the most recent vaccination campaign had been conducted in February and March 2009.

Nevertheless, the question of the origin of the virus remained open. Three hypotheses were discussed:

- the migration of infected wild boar from another infected area
- undetected virus persistence over the years
- virus introduction by humans (catering wastes, other sources).

Migration of infected wild boar from other infected areas was considered to be very unlikely, since no infected area was known to exist at that time, either in Bulgaria or in neighbouring countries. The second hypothesis of undetected virus persistence was also considered improbable. During the previous hunting season

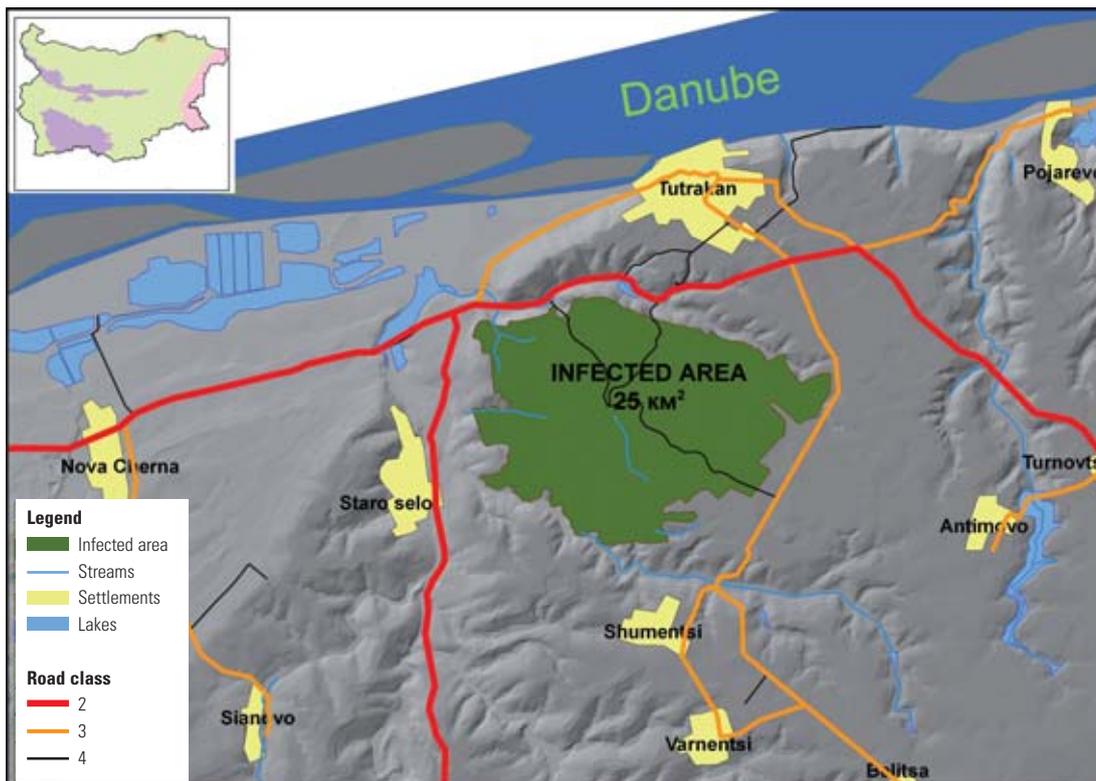


Fig. 2
Area of Silistra, in north-eastern Bulgaria, where eight cases of classical swine fever were found in wild boar

(2008–2009), 84 wild boar from the infected area had been tested and all were diagnosed as negative for the virus. Furthermore, there were no confirmed or suspected outbreaks of CSF among domestic pigs in that area. The last outbreak of CSF in domestic pigs in Bulgaria occurred at the beginning of 2008, in the Kjustendil region, which is in the western part of the country, about 380 km away from the Silistra region.

Since an illegal landfill was found near to the infected area, close to the forest in which the CSFV-positive wild boar were found, it may be speculated that human activities, e.g. the disposal of catering wastes, were the source of virus introduction. However, there is, as yet, no clear evidence and insufficient epidemiological data to prove that this was indeed the route of virus entry into the wild boar population.

The authors conclude that the strategy implemented by the Bulgarian Veterinary Service, of using traps to eradicate CSF from a wild boar population, was effective. Furthermore, this strategy also prevented the spread of CSFV to the domestic pig population and to the wild boar of neighbouring areas. Under Bulgarian conditions, trapping appeared to be a more reliable method than hunting for reducing a wild boar population within a short period of time. Such an approach could be used as an additional tool to vaccination and hunting, when attempting to control CSF. Trapping may be used alone, or in combination with hunting, depending on the situation.

Recours au piégeage en tant que méthode alternative d'éradication de la peste porcine classique dans une population de sangliers sauvages en Bulgarie

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Résumé

Entre août et novembre 2009, huit cas de peste porcine classique ont été signalés chez des jeunes sangliers sauvages vivant dans une forêt de chênes d'une superficie de 25 km² située à 3 km au sud du Danube, dans le nord-est de la Bulgarie. La population de sangliers sauvages vivant dans la zone affectée a été estimée à 156 animaux, soit environ six sangliers par kilomètre carré. Pour maîtriser et éradiquer la maladie, le piégeage a été utilisé en complément de la vaccination et de la chasse afin de ramener la population de sangliers à moins de deux animaux par kilomètre carré ; ces mesures ont permis d'éliminer 124 sangliers sauvages de la zone atteinte en une période de trois mois. Parmi ces sangliers, 119 ont été capturés par piégeage.

Les auteurs décrivent le piégeage comme une pratique efficace pour éradiquer la peste porcine classique dans une zone où la chasse et la vaccination seules s'avèrent insuffisantes pour atteindre cet objectif. Un seul dispositif de piégeage permet de capturer jusqu'à sept sangliers sauvages. En outre, cette mesure a empêché le virus de la peste porcine classique de se propager aux populations locales de porcs domestiques ainsi qu'aux populations de sangliers sauvages des zones environnantes. L'hypothèse de départ était qu'en ramenant la population de sangliers sauvages à moins de deux animaux par kilomètre carré, le virus ne pourrait plus circuler et la maladie finirait par disparaître. Effectivement, aucun cas supplémentaire de peste porcine classique n'a été diagnostiqué par la suite.

Dans le contexte bulgare ainsi que dans d'autres régions présentant une situation similaire, le piégeage semble une méthode plus efficace que la chasse pour réduire les populations de sangliers sauvages dans un laps de temps limité. De plus, en fonction des situations, le piégeage peut être pratiqué isolément ou en complément de la chasse.

Mots-clés

Bulgarie – Choléra du porc (*hog cholera*) – Contrôle – Éradication – Peste porcine classique – Piégeage – Porc – Sanglier – Sanglier sauvage – *Sus scrofa*.



Uso de trampas como método alternativo de erradicación de la peste porcina clásica en una población de jabalíes salvajes de Bulgaria

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Resumen

Entre agosto y noviembre de 2009 se detectaron ocho casos de peste porcina clásica (PPC) en jabalíes jóvenes de un robledal de 25 km² situado 3 km al sur del Danubio, en la región nororiental de Bulgaria. Se calculó que la población de jabalíes en el área afectada era de 156 ejemplares, lo que supone

aproximadamente seis jabalíes por km². Para controlar y erradicar la enfermedad, además de la vacunación y la caza, se colocaron trampas con el fin de reducir la población a menos de dos ejemplares por km². En tres meses se extrajeron de la zona infectada un total de 124 jabalíes, de los que 119 fueron capturados con trampas.

A juicio de los autores, la colocación de trampas puede constituir un método eficaz para erradicar la PPC de una zona donde el recurso exclusivo a la caza y la vacunación quizá no baste para ello. Con una sola trampa se podían capturar hasta siete jabalíes. Además, se evitó que el virus de la PPC se propagara a la población local de cerdos domésticos y a los jabalíes de zonas aledañas. Los autores partían de la premisa de que, al reducir la población de jabalíes a menos de dos ejemplares por km², el virus dejaría de circular y la enfermedad acabaría desapareciendo, y en efecto a partir de ahí no se diagnosticó ningún caso más de PPC.

En las condiciones reinantes en Bulgaria y otras zonas parecidas, la colocación de trampas parece constituir un método más fiable que la caza para lograr reducir en poco tiempo una población de jabalíes. Además, según las circunstancias, se puede utilizar de forma exclusiva o combinada con la caza.

Palabras clave

Bulgaria – Cerdo – Cólera porcina – Colocación de trampas – Control – Erradicación – Jabalí – Jabalí salvaje – Peste porcina clásica – *Sus scrofa*.



References

1. European Commission (2002). – Commission decision approving a Diagnostic Manual establishing diagnostic procedures, sampling methods and criteria for evaluation of the laboratory tests for the confirmation of classical swine fever. *Off. J. Eur. Union*, **L39**, 71.
2. European Commission (EC) (2010). – Document SANCO/7032/2010. Guidelines on surveillance/monitoring, control and eradication of classical swine fever in wild boar. EC, Brussels. Available at: http://ec.europa.eu/food/animal/diseases/controlmeasures/docs/sanco_7032_2010_en.pdf (accessed on 19 September 2011).
3. European Food Safety Authority (EFSA) (2009). – Control and eradication of classic swine fever in wild boar. Scientific opinion of the panel on animal health and welfare of the European Food Safety Authority. *EFSA J.*, **932**, 1–18.
4. Fritzemeier J., Teuffert J., Greiser-Wilke I., Staubach C.H., Schlüter H. & Moennig V. (2000). – Epidemiology of classical swine fever in Germany in the 1990s. *Vet. Microbiol.*, **77** (1–2), 29–41.
5. Kaden V., Lange E., Fischer U. & Strebelow G. (2000). – Oral immunisation of wild boar against classical swine fever: evaluation of the first field study in Germany. *Vet. Microbiol.*, **73** (2–3), 239–252.
6. Kaden V., Renner C., Rothe A., Lange E., Hänel A. & Gossgger K. (2003). – Evaluation of the oral immunisation of wild boar against classical swine fever in Baden-Württemberg. *Berl. Münch. tierärztl. Wochenschr.*, **116** (9–10), 362–367.
7. Laddomada A. (1998). – Incidence and control of classical swine fever in wild boar. *In Proc. OIE Symposium on classical swine fever (hog cholera)*, 9–10 July, Birmingham, United Kingdom. World Organisation for Animal Health, Paris.
8. Rossi S., Fromont E., Pontier D., Crucière C., Hars J., Barrat J., Pacholek X. & Artois M. (2005). – Incidence and persistence of classical swine fever in free-ranging wild boar (*Sus scrofa*). *Epidemiol. Infect.*, **133** (3), 559–568.
9. Teuffert J., Schlüter H. & Kramer M. (1997). – Europäische Schweinepest. Übersicht zur internationalen (Europa) und nationalen Schweinepestsituation – ermittelte Einschleppung sursachen und Verschleppungsrisiken. *Dtsch. Tierärztebl.*, **11**, 1078–1080.
10. Von Rügen S., Staubach C., Kaden K., Hess R.G., Blicke J., Kühne S., Sonnenburg S., Fröhlich A., Teuffert J. & Moennig V. (2008). – Retrospective analysis of the oral immunisation of wild boar populations against classical swine fever virus (CSFV) in region Eifel of Rhineland-Palatinate. *Vet. Microbiol.*, **132** (1–2), 29–38.