Open Access

Berl Münch Tierärztl Wochenschr
DOI 10.2376/0005-9366-18014

ISSN 0005-9366

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Eingegangen: 26.01.2018
Angenommen: 28.05.2018

Online first: 10.09.2018
http://vetline.de/open-access/158/3216/

Short communication / Kurzmitteilung

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Potential role of domestic pig carcasses disposed in the forest for the transmission of African swine fever

Mögliche Bedeutung von im Wald entsorgten Schweinekadavern als Überträger von Afrikanischer Schweinepest

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Summary

Aiming to answer the question whether domestic pig carcasses, infected with African swine fever (ASF) might be a source of infection for wild boar, three carcasses of healthy pigs have been disposed in the forest and monitored. The study was conducted in Lithuania. It was analyzed if wild boar behave equally towards domestic pig carcasses as in similar studies towards wild boar carcasses. In the study, direct carcass contacts were recorded only during one night. Generally, wild boar were more interested in the soil underneath and in vicinity of the carcasses. Wild boar behavior towards pig carcasses and towards wild boar carcasses appears similar. Direct contacts are rather seldom but potentially sufficient to transmit ASF. The limited contact and the rather high viral load that is needed to infect a susceptible wild boar may explain the relative slow progression of disease in the affected countries.

Keywords: Wild boar, scavenging, African swine fever

Zusammenfassung

Um die Frage zu beantworten, ob mit dem Virus der Afrikanischen Schweinepest infizierte Hausschweinkadaver eine Infektionsquelle für Wildschweine darstellen könnten, wurden drei Hausschweinkadaver gesunder Schweine im Wald ausgelegt. Die Studie wurde in Litauen durchgeführt. Es wurde untersucht, ob sich Wildschweine den Hausschweinekadavern gegenüber genauso verhalten wie zuvor in ähnlichen Studien gegenüber Wildschweinekadavern. In der Studie wurde nur in einer Nacht ein direkter Kontakt zu einem der Kadaver aufgezeichnet. Im Allgemeinen waren die Wildschweine mehr an dem Boden unter und um den Kadaver interessiert. Das Verhalten der Wildschweine gegenüber Hausschweinekadavern und Wildschweinekadavern scheint ähnlich zu sein. Die direkten Kontakte sind eher selten aber potentiell ausreichend, um ASP zu übertragen. Der seltene Kadaverkontakt sowie die für das Zustandekommen einer Infektion erforderliche recht hohe Virusdosis könnten eine Erklärung für das relativ langsame Fortschreiten der Krankheit in den betroffenen Ländern sein.

Schlüsselwörter: Wildschwein, Aasfresser, Afrikanische Schweinepest

Introduction, Material and Methods

African swine fever virus (ASFV) can persist at 4°C for over one year in blood, several months in boned meat and several years in frozen carcasses (McKercher et al. 1987, Mebus et al. 1993, Mebus et al. 1997). The virus also survives the process of putrefaction (European Food And Safety Authority 2015) and contaminated carcasses may remain infectious in fields or forests for weeks (Anonymous 2014, Depner et al. 2016, Oļševskis et al. 2016). Depending on the frequency, at which naive animals have contact with infected carcasses, the spread of ASFV through carcasses is considered to be more important than direct contact with live infectious animals (Anonymus 2014, European Food And Safety Authority 2015, FAO 2010, Guinat et al. 2016).

Probst et al. (2017) monitored the behavior of free ranging wild boar towards carcasses of their own conspecifics. The direct contact with wild boar carcasses consisted mostly in sniffing and poking on the carcass. However, scavenging was not observed. Considering the high tenacity of ASFV, it was concluded that all these types of contact may represent a risk for infection and that contaminated wild boar carcasses

FIGURE 1: *Picture of study side 3, showing wild boar piglets in the vicinity of a domestic pig carcass. Arrow marks the localisation of the carcass.*

might facilitate virus persistence for months or even years within a region, influencing significantly the course of an ASF epidemic. Following these conclusions, further questions arose concerning the potential role of domestic pig carcasses which might be illegally disposed in the forests.

The aim of our study was to monitor the behavior of wild boar towards domestic pig carcasses. Therefore we disposed three domestic pig carcasses of different age and gender (two females and one male, three to seven months old) on three study sites (S1, S2, S3) in two hunting grounds with an estimated wild boar population of 30 to 50 animals in each. The study was conducted in Vilnius County in Lithuania between 4 March and 14 June, 2017. The pig carcasses were placed close to baiting places or trails of wild boar directly on the forest ground, so that terrestrial and avian scavengers had unrestricted access. The study sites were monitored by wildlife cameras (Suntek HC300M Digital Scouting Camera, China) which were installed on trees at a height of 0.5 to 1.5 m in distances of 2 to 4 m to the pig carcass. On S1 the wildlife camera was set up to take photos and videos once every 10 minutes of movement and on S2 and S3 the camera made one photo and a short video (90 s) every 5 minutes. Date, time, and temperature were recorded automatically on each picture. At S2 and S3 additional wildlife cameras monitored the surrounding area, which was not directly in focus of the main camera. During weekly visits the surroundings were also inspected for fresh wild boar tracks.

Monitoring was stopped when all edible biomass of the carcass had been consumed or taken away by scavengers. Images that showed wild boar having direct contact with the carcass or its remnants were analyzed in detail to determine the type of contacts (sniffing, poking, moving bones aside to get access to the soil underneath, etc.). We considered touching a carcass with the snout or rout the soil in the close vicinity to the carcass as direct contact, and feeding on carrion as scavenging.

Results and Discussion

A total of 936 pictures and 499 short video sequences were obtained at the three study sites. The monitoring results are summarized in Table 1.

At S1 the sampling effort was shortest due to three stray dogs, which found the carcass on day four and scavenged it within ten days. All study sites were approached by wild boar. Fresh tracks or additional photo-trapping demonstrated that animals were present several times a week in the vicinity of the sites, even if they did not come close enough to enter the scope of the cameras. The first wild boar visits were recorded on day 10 at S1, on day 30 at S2 and on day 38 at S3. Direct contacts were recorded only on S3, during one night on day 38 when six piglets (< 2 month old) sniffed and poked on the carcass. They were also rolling on the soft soil close to the carcass. Adult wild boar had no direct carcass contact; they were only observing the piglets.

All visits were recorded during night time. The animals approached the sites solitary (adult or young pigs), as part of small groups, or as part of large groups with up to 30 animals (mainly sows with piglets). The minimum distance kept to the carcass ranged between 30 cm and 2 m. The average time wild boar spent at the site ranged from 0.5 minutes to 5 minutes which might be an additional indication for not intending to scavenge.

At S3 four distinct wild boar groups were observed during eleven nights: one adult male 4-5 years old, two animals approx. 2 years old, seven animals approx. 2 years old and four sows together with 24 piglets and two young animals approx. 1 year old (Figure 1).

The wild boar which approached the sites were apparently more interested in the soil surrounding and underneath the carcasses than in the carcasses themselves. The smell as well as the maggots, insects and small rodents living in that soil might have attracted them.

TABLE 1: *Monitoring results at the three study sites*

Study site	Monitorig period	Photos	Video sequences	Results
S1	14 days (4 – 17 March 2017)	230	230	Site visited by wild boar but no direct contact with carcass
S2	39 days (4 March – 18 April 2017)	406	89	Site visited by wild boar but no direct contact with carcass
S3	42 days (4 May – 14 June 2017)	300	180	Site visited by wild boar, six piglets had direct contact with carcass during one night

Our results are very similar with those described by Probst et al. (2017) and indicate that under favorable feed conditions and mild climate scavenging on domestic pig carcasses seems not to occur. However, such a study should be repeated in places where due to climate or hard seasonal conditions wild boar feed is limited.

Obviously, we cannot determine whether the observed contacts would have been intensive enough to transmit ASF. Probably several contacts are needed until infection takes place. Potentially contaminated soil with bones, blood or other body fluids might also be a source of infection (Blome 2016). Despite putrefaction, ASFV may remain infectious in bone marrow for a long time (Penrith and Vosloo 2009). In any case, the viral load in soil underneath and in the vicinity of an ASF contaminated carcass should be further investigated. The limited contacts observed in our study and the rather high viral load that is needed to infect a susceptible wild boar may explain the relative slow progression of disease in the affected countries.

We also assume that if one animal acquires infection, the other members of the social group would subsequently become infected. In our observational study only wild boar piglets had close carcass contact while adult animals were avoiding the carcasses. Piglets of a social group might be the first ones getting infected. This findings support the ones described by Nurmoja et al. (2017), that the probability to detect an ASFV genome- or antibody-positive animal was higher in young wild boar.

Taking into account the long time during which ASFV may remain infectious in a protein-rich environment, sporadic late contacts may be as important as contacts with fresh carcasses with respect to the risk of ASF transmission. The contact may happen by curiosity or in the context of rooting in the immediate surrounding.

Acknowledgements

The authors wish to thank Dr Klaus Depner, Dr. Anja Globig and Dr. Katja Schulz for a critical review of the manuscript.

Conflict of interest

The authors declare that they have no competing interests.

Ethical approval

Not applicable

Funding

This article is based upon work from COST Action (ASF-STOP CA15116), supported by COST (European Cooperation in Science and Technology).

Authors contribution

MM, PB,VJ and GP designed and conducted the study, MM drafted the manuscript.

References

Anonymous (2016): Conclusions from the Ministerial Conference on African swine fever. http://data.consilium.europa.eu/doc/document/ST-14251-2016-INIT/en/pdf.

Anonymus (2014): Disease Control Strategy for African and Classical Swine Fever in Great Britain. DEFRA. Ref: PB14203.

Blome S (2016): Classical and African swine fever: State-of-the-art diagnostics and control measures. Habilitation Freie Universität Berlin.

Depner KR, Blome S, Staubach C, Probst C, Globig A, Dietze K, Sauter-Louis C, Conraths FJ (2016): Die Afrikanische Schweinepest - eine Habitatseuche mit häufig niedriger Kontagiosität. Der praktische Tierarzt 97: 536–544.

European Food And Safety Authority (2015): Scientific opinion on African swine fever. EFSA J 13(7): 4163.

FAO (2010): FAO takes a close look at the pig Sector in Eastern Europe to better understand the threats of African Swine fever. EMPRES Watch.

Guinat C, Gogin A, Blome S, Keil GM, Pollin R, Pfeiffer DU, Dixon L (2016): Transmission routes of African swine fever virus to domestic pigs: current knowledge and future research directions. The veterinary record 178: 262–267.

McKercher PD, Yedloutschnig RJ, Callis JJ, Murphy R, Panina GF, Civardi A, Bugnetti M, Foni E, Laddomada A, Scarano C, Scatozza F (1987): Survival viruses in prosciutto-di-parma (parma ham). Can Inst Food SciTechnol J 20: 267–272.

Mebus C, Arias M, Pineda JM, Tapiador J, House C, SanchezVizcaino JM (1997): Survival of several porcine viruses in different Spanish dry-cured meat products. Food Chem 59: 555–559.

Mebus CA, House C, Gonzalvo FR, Pineda JM, Tapiador J, Pire JJ, Bergada J, Yedloutschnig RJ, Sahu S, Becerra V, Sanchezvizcaino JM (1993): Survival Of Foot-And-Mouth-Disease, African Swine Fever, And Hog-Cholera Viruses In Spanish Serrano Cured Hams And Iberian Cured Hams, Shoulders And Loins. Food Microbiol 10: 133–143.

Nurmoja I, Schulz K, Staubach C, Sauter-Louis C, Depner K, Conraths FJ, Viltrop A (2017): Development of African swine fever epidemic among wild boar in Estonia - two different areas in the epidemiological focus. Sci Rep 7: 12562.

Oļševskis E, Guberti V, Serzants M, Westergaard J, Gallardo C, Rodze I, Depner K (2016): African swine fever virus introduction into the EU in 2014: Experience of Latvia. ResVet Sci 105: 28–30.

Penrith ML, Vosloo W (2009): Review of African swine fever: transmission, spread and control. J S Afr Vet Assoc 80: 58–62.

Pietschmann J, Guinat C, Beer M, Pronin V, Tauscher K, Petrov A, Keil G, Blome S (2015): Course and transmission characteristics of oral low-dose infection of domestic pigs and European wild boar with a Caucasian African swine fever virus isolate. Arch Virol 160: 1657–1667.

Probst C, Globig A, Knoll B, Conraths FJ, Depner K (2017): Behaviour of free ranging wild boar towards their dead fellows: potential implications for the transmission of African swine fever. Royal Soc Open Sci 4.

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