

Wild boar and infectious diseases: evaluation of the current risk to human and domestic animal health in Switzerland: A review

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Abstract

The Eurasian wild boar is widely distributed in Europe and hunting bags reveal a massive increase in the population. Since wild boar and domestic pigs are susceptible to the same pathogens and can infect each other, free-ranging wild boar populations are increasingly considered to be a threat to the pig industry. Switzerland has an outstanding veterinary health situation due to its official free-of-disease status for many diseases, and the role that wildlife could play as a source of infection for domestic animals is of particular concern. This article provides an overview of the current knowledge on wild boar health in Switzerland and discusses the health risk to domestic animals and humans currently posed by wild boar. It places the data in the context of the situation in neighbouring countries. The risk currently posed by wild boar within Switzerland is largely limited to swine brucellosis. The major threat coming from abroad originates from the expansion of African swine fever. To prevent pathogen introduction and transmission between wild boar and domestic pigs, it is essential to pursue efforts in 4 areas: disease surveillance in domestic pigs, biosecurity on pig farms, disease surveillance in wild boar, and sustainable wild boar management.

Keywords: health, pathogen, *Sus scrofa*, prevalence, Switzerland

Wildschweine und Infektionskrankheiten: Einschätzung des gegenwärtigen Risikos für die Gesundheit von Menschen und Haustieren in der Schweiz : Eine Übersicht

Das Wildschwein ist in Europa sehr verbreitet und nimmt gemäss Abschussstatistiken stark zu. Da Wild- und Hausschweine für die gleichen Krankheitserreger empfänglich sind und eine gegenseitige Ansteckung möglich ist, werden Wildschweine vermehrt als Bedrohung für die Schweineindustrie angesehen. Die Schweiz ist offiziell frei von verschiedenen Infektionskrankheiten und geniesst einen guten veterinärmedizinischen Status. Deshalb werden Wildtiere mit Besorgnis als mögliche Quelle von Infektionskrankheiten für Haustiere betrachtet. Dieser Artikel skizziert das aktuelle Wissen zur Gesundheit des Wildschweines in der Schweiz, vergleicht dieses mit dem angrenzenden Ausland und diskutiert Gesundheitsrisiken für Menschen und Haustiere. Das grösste vom Wildschwein ausgehende Risiko innerhalb der Schweiz besteht gegenwärtig in einer Übertragung der porzinen Brucellose. Die Hauptbedrohung aus dem Ausland kommt von der Ausbreitung der Afrikanischen Schweinepest. Um die Übertragung von Krankheitserregern zwischen Wild- und Hausschweinen zu verhindern, sind Anstrengung in vier Bereichen nötig: Krankheitsüberwachung bei Hausschweinen, Biosicherheit auf Schweinebetrieben, Krankheitsüberwachung bei Wildschweinen sowie angemessenes Wildschweinmanagement.

Schlüsselwörter: Gesundheit, Krankheitserreger, *Sus scrofa*, Prävalenz, Schweiz

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Introduction

The Eurasian wild boar (*Sus scrofa*) is widely distributed in most parts of Europe and hunting bags (i.e., the numbers of hunted wild boar) over the past 50 years have revealed a massive increase in the population with a current annual continental hunting bag of over 2.2 million wild boar (Massei et al., 2015). This trend is also valid for Switzerland, where available data on wild boar presence and abundance suggest both a geographical expansion and an increasing abundance of the species (Meier, 2015). Since wild boar and domestic pigs belong to the same species (*Sus scrofa*), they are susceptible to the same pathogens and can infect each other (Ruiz-Fons et al., 2006; Ruiz-Fons et al., 2008a). As a result, infected wild boar populations may represent a threat to the pig industry and to international trade. Known examples of diseases transmitted from wild boar to pigs are swine brucellosis and highly contagious viral diseases such as African and classical swine fever (Artois et al., 2002; Rossi et al., 2005; Ruiz-Fons et al., 2008a;

Gavier-Widén et al., 2015). Wild boar can also represent a source of infection for cattle, as it is known for bovine tuberculosis (Naranjo et al., 2008), as well as for domestic pets and other wildlife (Gortazar et al., 2007; Meng and Lindsay, 2009; Martin et al., 2011). For example, hunting dogs and wild carnivores have died of Aujeszky's disease virus "ADV" infection after contact with wild boar (Zanin et al., 1997; Cay and Letellier, 2009; Leschnik et al., 2012; Moreno et al., 2015). Finally, wild boar are a possible source of pathogens affecting humans (Meng and Lindsay, 2009; Ruiz-Fons, 2015), including hepatitis E virus (Li et al., 2005), *Leptospira* sp. (Jansen et al., 2007), *Trichinella* sp. (Faber et al., 2015) and bacteria known to cause foodborne diseases (Wacheck et al., 2010; Vieira-Pinto et al., 2011; Jay-Russell et al., 2012). Nevertheless, the wild boar does not always act as a pathogen reservoir: Its epidemiological role varies from dead-end over spill-over up to maintenance host (Martin et al., 2011) depending on a range of different factors such as the pathogen properties, the local wild boar density and management, and the sani-

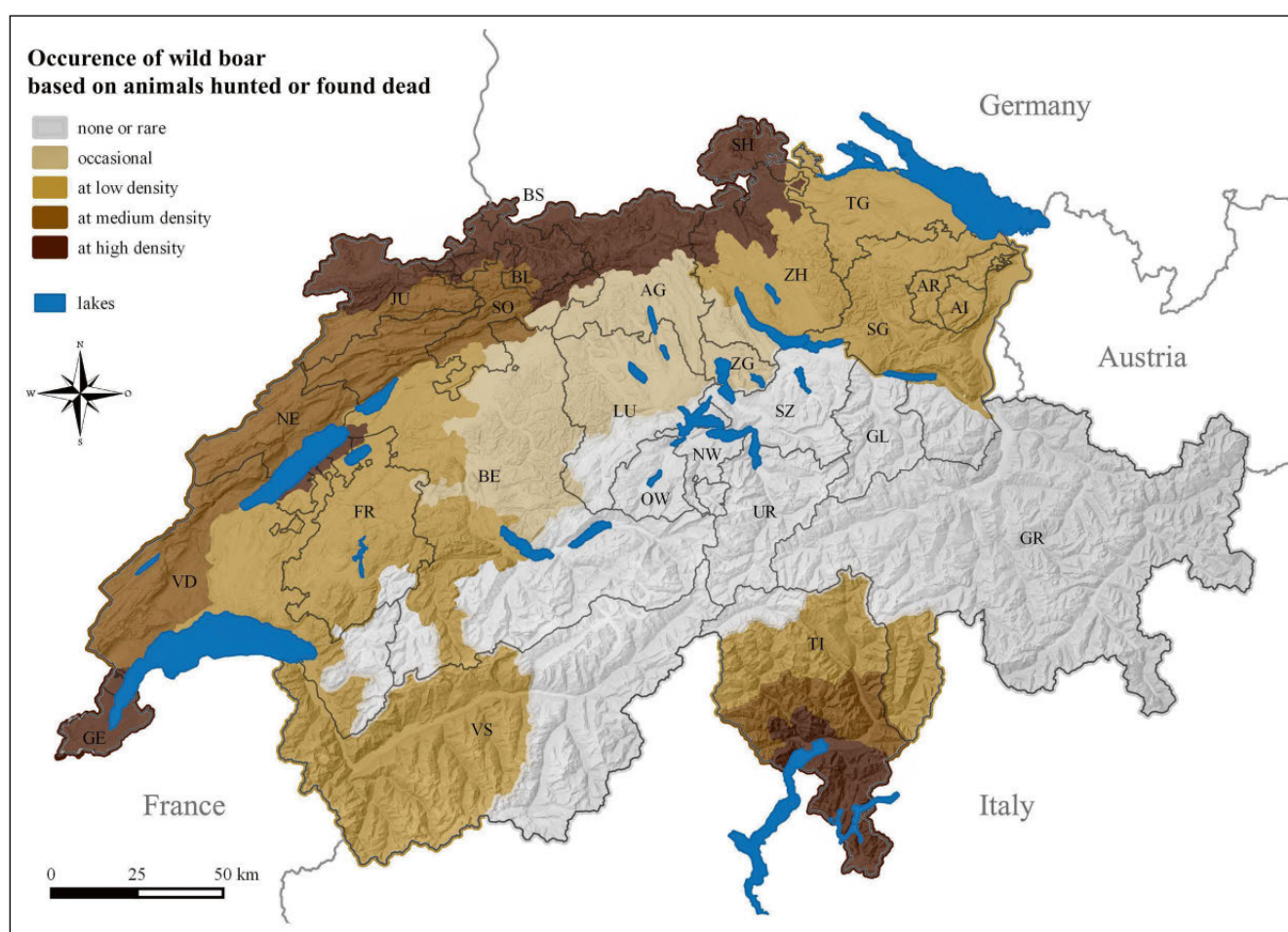


Figure 1: Map of Switzerland showing the occurrence of wild boar based on the records of wild boar found dead, culled and hunted (Meier 2015). Abbreviations: AG=Argovia, AI=Appenzell Innerrhoden, AR=Appenzell Ausererrhoden, BE=Bern, BL=Basel-Landschaft, BS=Basel-Stadt, FR=Fribourg, GE=Geneva, GL=Glarus, GR=Graubünden, JU=Jura, LU=Luzern, NE=Neuchâtel, NW=Nidwalden, OW=Obwalden, SG=St. Gallen, SH=Schaaffhausen, SO=Solothurn, SZ=Schwyz, TG=Thurgovia, TI=Ticino, UR=Uri, VD, Vaud, VS=Valais, ZG=Zug, ZH=Zurich).

tary status of the local domestic pig population (Artois et al., 2002; Gortazar et al., 2007; Ruiz-Fons et al., 2008a; Martin et al., 2011; Ruiz-Fons, 2015).

Switzerland has an outstanding veterinary health situation due to its official free-of-disease status for many infectious diseases, due to diverse eradication and control programmes, intensive surveillance and early warning systems or simply because some diseases have never been noticed in this country (Anonymus, 2014). Consequently, the role that local and immigrating wildlife could play as a source of infection for domestic animals is of particular concern. Importantly, the parallel expansion of wildlife populations and an increasing tendency towards green farming represent a growing risk of interactions between wildlife and domestic animals. Therefore, during the past decade the Federal Food Safety and Veterinary Office (FSVO) has actively promoted research on wild boar health, with the aim of documenting the presence or absence of selected pathogens in free-living populations and of elucidating the role of wild boar in the epidemiology of important diseases of domestic livestock. This article provides an overview of the current knowledge on wild boar health in Switzerland and discusses the health risk to domestic animals and humans currently posed by wild boar. It also places the available data in the context of the situation in neighbouring European countries.

Wild boar occurrence and management

There are two separate wild boar populations in Switzerland (41'284 km²): The northern population ranges from Geneva to St. Gallen, covering most parts of the Jura Mountains and the adjacent regions of the Swiss Midlands, and is continuous with the wild boar populations in neighbouring Germany and France (Fig. 1). The southern population is distributed in the southern parts of the canton Ticino and interacts with the northern Italian wild boar population. Based on the number of wild boar shot or found dead, the highest densities are found in the cantons of Geneva, Solothurn, Basel-Landschaft, Aargau, Zurich, Schaffhausen and Ticino. Over the past decades, an increase and spatial expansion of wild boar populations have been observed (Meier 2015), similarly to what has been reported from most other parts of Europe (Massei et al., 2015). Nevertheless, tentative comparisons with other countries based on animals shot or found dead suggest that wild boar abundance in Switzerland is currently among the lowest in Europe (Meier 2015). Between 2010 and 2016 the average national hunting bag in Switzerland has amounted to around 7'400 wild boar per year (range: 4'726-10'653 in 2011 and 2012, respectively) (Federal hunting statis-

tics, <https://www.bfs.admin.ch/bfs/de/home/statistiken/land-forstwirtschaft/jagd-fischerei-fischzucht/jagd.as-setdetail.3562756.html>).

Wild boar hunting is regulated by the national hunting law (<https://www.admin.ch/ch/d/sr/922.0>) and – with restrictions – permitted from March 1st to January 31st. The implementation of the law varies between cantons and depends mainly on the 3 hunting regimes currently applied in Switzerland: 1) the hunting ground system in the cantons of Aargau, Basel-Landschaft, Basel-Stadt, Luzern, St. Gallen, Schaffhausen, Solothurn, Thurgau and Zurich; 2) the hunting permit system in the rest of the country except for Geneva; 3) hunting prohibition in the canton of Geneva (Hebeisen et al. 2008), where professional game-wardens cull wild boar for population regulation. Nevertheless, in all cantons the goal is primarily to prevent damages and to control population growth, which is difficult to achieve through hunting and culling due to the wild boar life history (e.g. high reproduction rate) (Keuling et al., 2013). This differs greatly from the situation in other European countries, where fencing and supplementary feeding are widespread and foster artificially high population densities (Ruiz-Fons, 2008; Massei et al., 2015).

Health surveillance in wild boar

The national law stipulates that the hunters are responsible for the hygiene status of the meat from hunted wild boar and other game (concept of self-monitoring) and professional meat inspections are normally not required (Verordnung über das Schlachten und die Fleischkontrolle VSFK; <https://www.admin.ch/opc/de/classified-compilation/20051437/index.html>; and Verordnung des EDI über die Hygiene beim Schlachten VHyS; <https://www.admin.ch/opc/de/classified-compilation/20051438/index.html>). The only exception is the compulsory inspection of wild boar for *Trichinella* sp. when the carcass is not privately consumed (i.e. consumed by the hunter himself and/or close family members living in the same household; VSFK). Since 2014 hunters and game wardens have been requested to report to the veterinary authorities any outbreak of notifiable disease or the observation of lesions hinting at the occurrence of such a disease (Article 61 of the Tierseuchenverordnung, <https://www.admin.ch/opc/de/classified-compilation/19950206/index.html>). Like any other free-ranging wildlife species, dead wild boar or wild boar organs may be submitted free of charge to the Centre for Fish and Wildlife Health (FIWI) of the University of Bern for post-mortem investigation within the framework of the national scanning surveillance program for wildlife health (Ryser-Degiorgis and Segner, 2015). During the past decade, only a few wild boar per year have been

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submitted to the FIWI within the framework of this programme. However, Switzerland benefits from a particularly advantageous situation as it is one of the rare European countries with a comprehensive national wildlife surveillance programme in place and with a country-wide network of field partners able to recognize and report unusual disease events (Kuiken et al., 2011; Ryser-Degiorgis and Segner, 2015).

Interactions between wild boar and domestic pigs

The highest risk of interactions between outdoor pigs and wild boar was identified for the geographical area at the junction between the Jura Mountains (where wild boar occurrence is the highest) and the Swiss Midlands (where most outdoor piggeries are located) (Wu et al., 2011). Contacts between free-ranging wild boar and outdoor domestic pigs, which can be considered as a proxy for the risk of pathogen transmission, were doc-

umented by questionnaire surveys (Wu et al., 2012): 31% of the participating game wardens and 25% of the pig owners indicated to have observed or documented such interactions. Contacts were reported in all of the 17 Swiss cantons where wild boar were present at time of publication. Hybridization, which is the type of contact carrying the highest risk of pathogen transmission, was registered in 5% of the piggeries included in that study (Fig. 2). The following risk factors for contact were identified: a distance larger than 5 m between pig enclosures and piggery buildings, a large distance between pig enclosures and other houses (> 500 m), proximity of a forest (< 500 m), electric fences and fences lower than 60cm. In general, the risk was higher for piggeries with pasture than for those with concrete ground and the risk of hybridization was highest for the Mangalitzabreed (Wu et al., 2012). In a comparable survey in Corsica, 44% of the questionnaire respondents reported interactions linked with sexual attraction of wild boar by domestic sows (including sexual interactions and fights between wild and domestic boar) (Jori et al. 2017). Studies on pathogen occurrence in various countries show growing evidence that hybridization, both in pig and wild boar populations, poses an increased health risk (Rossi et al. 2008; Goedbloed et al. 2015; Jori et al. 2016).

Exposure of other domestic animals and humans to wild boar

The occurrence of interactions between wild boar and domestic animals other than pigs have not been investigated in Switzerland so far. Cattle on open pastures in areas with wild boar occurrence may potentially interact with wild boar and their pathogens, directly or indirectly (Richomme et al., 2010; Barasona et al., 2014), but physical contacts seem less likely than is the case for pigs, which may mate with wild boar. Besides ungulate species, hunting dogs regularly get in close contact with wild boar, licking at fresh carcasses and eating their meat (Muyllkens et al., 2006).

Humans may be exposed to wild boar pathogens via different pathways, including direct contact when handling live wild boar or carcasses and by consumption of raw or undercooked meat products from hunted wild boar, and indirect contact by intake of pathogens from contaminated water, food or the environment (Meng and Lindsay, 2009; Ruiz-Fons, 2015). Therefore the persons exposed to the highest risk include game wardens, hunters, butchers and other wildlife professionals (Ruiz-Fons, 2017; Mailles et al., 2017). In Switzerland, there are about 30'000 active hunters (<https://www.jagd-schweiz.ch/jagdpraxis/zahlen-und-fakten/>) not all of whom hunt wild boar. Considering the trend of wild



Figure 2: Hybrids domestic pig x wild boar (A-C) and pure domestic pigs of the Mangalitzabreed (D-F: juvenile animal, adult sow and boar). A and B: Two different phenotypes of hybrids of first generation (half wild boar, half Mangalitzabreed). C: Hybrids of second generation (1/4 wild boar, 3/4 Mangalitzabreed). (Picture A: Rosmarie Langjahr; Pictures C-F: Natacha Wu).

boar hunting bags, the number of consumed animals is expected to be steadily increasing.

Pathogens affecting pigs and other domestic animals

To date, only two pathogens relevant to domestic pigs have been documented to be highly prevalent in the wild boar population in Switzerland: *Brucella suis* and *Mycoplasma hyopneumoniae*.

Brucella suis, the bacterium causing **porcine brucellosis**, leads to reproductive disorders in pigs and mortality in hares (*Lepus europaeus*) whereas infection usually remains subclinical in wild boar (Godfroid, 2002). *B. suis* occasionally infects other domestic animals and humans but its zoonotic potential depends on the involved biovar. The seroprevalence of *B. suis* in wild boar in Switzerland has significantly increased from 2004 to 2010, reaching 35.8% (Köppel et al., 2007; Leuenberger et al., 2007; Wu et al., 2011). Shedding of bacteria (only *B. suis* biovar 2, which is characterized by a lower zoonotic potential than biovars 1 and 3) in urine and infections of the genital organs were documented in 6.7% and 25% of the investigated animals, respectively (Wu et al., 2011) in absence of associated lesions. Thus, despite the freedom-of-disease status of the domestic pig population, *B. suis* biovar 2 is widespread and maintained in the wild. In 2009, swine brucellosis was detected on two outdoor pig farms after the owner of one of these farms had borrowed a boar from the other to improve the reduced reproductive performance of his pig herd. This decreased pig reproduction had followed the birth of hybrid piglets (wild boar x Mangalitza pigs) subsequently to a temporary escape of pigs into the forest (Wu et al., 2012). Although strain analysis failed to reveal evidence for a spillover of *B. suis* from wild boar to pigs (Abril et al., 2011), field investigations nevertheless suggested that it may have been the case (Wu et al., 2012) and another source of infection for the pig farms was not found.

Mycoplasma hyopneumoniae, the agent of **enzootic pneumonia** (EP) in domestic pigs, was also shown to be widespread in the Swiss wild boar population (an estimated overall prevalence of 26% in nasal swabs). In contrast to brucellosis, wild boar infected with *M. hyopneumoniae* usually develop EP lesions although to date there is no indication of a potential health impact of the disease at the population level. Prevalence in wild boar shows notable variations among geographical regions, being highest where interactions with outdoor pigs are most likely. Identified risk factors for infection in wild boar include indeed the occurrence of EP outbreaks in domestic pigs, as well as young age and high wild boar

density (Batista Linhares et al., 2015). A parallel study based on genotyping of *M. hyopneumoniae* from pig lungs from EP outbreaks and lungs from wild boar from the close proximity of the affected pig farms confirmed that mutual transmission between domestic pigs and wild boar occurs. Moreover, the *M. hyopneumoniae* genotype found in one outbreak in pigs could not be detected in wild boar samples collected before the outbreak but it was frequently found afterwards, suggesting that wild boar were infected by pigs. Additionally, the mycoplasma load in wild boar was found to be much lower than in affected domestic pigs, implying that direct contact is necessary for transmission of *M. hyopneumoniae* from wild boar to pigs, whereas the high load of mycoplasma on an affected pig farm would be sufficient for aerial transmission (Kuhnert and Overesch, 2014). Overall, transmission of *M. hyopneumoniae* from domestic pigs to wild boar is more likely than the reverse.

Sarcoptic mange, a skin condition caused by the burrowing mite *Sarcoptes scabiei*, has been detected in wild boar in several Swiss cantons (Haas et al., 2015). Serological investigations in several wild boar populations in Europe suggest that *S. scabiei* is endemic in most of them including those in Switzerland but that environmental changes may trigger the emergence of clinical cases and enhance parasitic spread (Haas et al., 2018). However, since sarcoptic mange also occurs in domestic pigs, the mites may be transmitted not only from wild boar to outdoor pigs but also from pigs to wild boar (Haas et al., 2015).

Several prevalence studies (antibody and/or antigen detection) suggest that the agents of **Aujeszky's disease** (AD) (Köppel et al., 2007; Leuenberger et al., 2007; Meier et al., 2015), **Classical Swine Fever** (CSF) (Köppel et al., 2007), **Porcine Reproductive and Respiratory Syndrome** (PRRS) (Wu et al., 2011) and **bovine tuberculosis** (Schöning et al., 2013; Beerli et al., 2014) do not circulate in wild boar in Switzerland, being either absent from the population or present at low prevalence only.

Pathogens relevant to human health

Hepatitis E is an emerging human viral disease transmitted via the faecal-oral route with a proposed main reservoir in domestic pigs and wild boar (Pavio et al., 2010). Antibodies to Hepatitis E virus (HEV) were found in only 12.5% of investigated wild boar from the Swiss Jura Mountains and adjacent Midlands compared to 58.1% in domestic pigs (Burri et al., 2014). **Toxoplasmosis**, caused by the protozoa *Toxoplasma gondii*, is a disease affecting animals and humans, which can be acquired by consumption of oocysts shed by definitive hosts (cats) in the environment or infected raw meat of

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intermediate hosts such as wild ungulates. Seroprevalence of *T. gondii* was found to be significantly lower in wild boar (6.7%) than in domestic pigs (23.3%), cattle (45.6%) and sheep (61.6%) (Berger-Schoch et al., 2011). Thus, both for HEV and *T. gondii*, the risk posed by wild boar is significantly lower than that by domestic livestock.

Investigations of wild boar from the canton of Geneva revealed the occurrence of a range of potential **pathogenic enteric bacteria** in tonsillar tissue including *Yersinia enterocolitica* (35%), *Y. pseudotuberculosis* (20%), *Salmonella* spp. (12%), Shiga toxin gene (stx)-positive *Escherichia coli* (9%) and *Listeria monocytogenes* (17%), while *Campylobacter* was not detected. Nevertheless, only *Y. enterocolitica* (5%) and *L. monocytogenes* (1%) were detected in faecal samples (Fredriksson-Ahomaa et al., 2009; Wa-

Table 1a: Compilation of epidemiological information on selected pathogens affecting wild boar (WB) and domestic pigs (DP).

*notifiable disease in Switzerland

Disease	Pathogen	Clinical significance in WB	Epidemiological role of WB	Infectious for domestic animals others than swine	Zoonoses: infection route to humans
CSF*	Pestivirus	high mortality	possible reservoir	no	–
ASF*	Asfivirus	high mortality	possible reservoir	no	–
AD	Aujeszky's disease virus (Suid Herpesvirus-1)	clinical disease rare	possible reservoir	fatal infections in most mammals	–
PRRS*	Porcine reproductive and respiratory syndrome virus	no impact suggested	no evidence for reservoir	no	–
Hepatitis E	Hepatitis E Virus	no	possible reservoir	possible	foodborne, close contact (excretions)
Brucellosis*	<i>Brucella suis</i>	clinical disease rare	possible reservoir	possible	close contact
bTB*	<i>Mycobacterium bovis</i> , <i>M. caprae</i>	same clinical signs as DP	possible reservoir	yes	close contact
EP*	<i>Mycoplasma hyopneumoniae</i>	same clinical signs as DP	unclear	no	–
Yersiniosis*	<i>Yersinia enterocolitica</i> , <i>Y. pseudotuberculosis</i>	negligible	unknown	possible	foodborne
STEC*	Shiga-toxin positive <i>Escherichia coli</i>	negligible	unknown	possible	foodborne
Salmonellosis*	<i>Salmonella</i> sp.	negligible	possible reservoir	possible	foodborne, peroral intake
Listeriosis*	<i>Listeria monocytogenes</i>	negligible	unknown	possible	foodborne
Campylobacteriosis*	<i>Campylobacter</i> sp.	negligible	unknown	negligible	foodborne
Trichinellosis*	<i>Trichinella spiralis</i> , <i>T. britovi</i>	no	possible reservoir	yes	foodborne
Toxoplasmosis*	<i>Toxoplasma gondi</i>	clinical disease rare	unknown	yes	peroral intake, foodborne pathogen
Sarcoptic mange	<i>Sarcoptes scabiei</i> sp.	high morbidity, low mortality	possible reservoir	interspecies transmission discussed	(improbable; physical contact)

Footnotes Table 1a-c

Abbreviations: AD = Aujeszky's disease, bTB = bovine tuberculosis, CFT = complement fixation test, CSF = Classical swine fever, ELISA = Enzyme linked immune sorbent assay, EP = Enzootic pneumonia, **IFAT**: immunofluorescence antibody test, MAT = Modified agglutination test, PCR = Polymerase chain reaction, PRRS = Porcine reproductive respiratory syndrome, RBT = Rose Bengal test, STEC = Shiga Toxin-Producing *Escherichia coli*, VIDAS® = Automated enzyme-linked fluorescent immunoassay (BioMérieux, Nuertingen, Germany)

References: ¹ Anonymus, 2014, ² Anonymus, 2015c, ³ Burri et al., 2014, ⁴ Wacheck et al., 2012, ⁵ Anonymus, 2013a, ⁶ Anonymus, 2013b, ⁷ Fredriksson-Ahomaa et al., 2007, ⁸ Kaufmann et al., 2006, ⁹ Sarno et al., 2012, ¹⁰ Berger-Schoch et al., 2011, ¹¹ Anonymus, 2015d, ¹² Anonymus, 2015a, ¹³ Anonymus, 2004b, ¹⁴ De Paz et al., 2015, ¹⁵ Zwettler et al., 2012, ¹⁶ Baechlein et al., 2010, ¹⁷ Rose and Pavio, 2014, ¹⁸ Martinelli et al., 2011, ¹⁹ Much et al., 2013, ²⁰ Grosse Beilage et al., 2009, ²¹ Fablet et al., 2012, ²² Villareal et al., 2010, ²³ von Altröck et al., 2007, ²⁴ Fondrevez et al., 2014, ²⁵ Ortiz Martínéz et al., 2011, ²⁶ Anonymus, 2015f, ²⁷ Anonymus, 2015g, ²⁸ Fredriksson-Ahomaa et al., 2009, ²⁹ Boscher et al., 2012, ³⁰ Prencipe et al., 2012, ³¹ Payot et al., 2004, ³² Pezzotti et al., 2003, ³³ Duscher et al., 2015, ³⁴ Anonymus, 2015b, ³⁵ Anonymus, 2015e, ³⁶ Hintersdorf, 2013, ³⁷ Tenter et al., 2000, ³⁸ Anonymus, 2004a, ³⁹ Damriyasa et al., 2004, ⁴⁰ Gualandi et al., 1994, ⁴¹ Schnyder et al., 2002, ⁴² Köppel et al., 2007, ⁴³ Meier et al., 2015, ⁴⁴ Wu et al., 2011, ⁴⁵ Schöning et al., 2013, ⁴⁶ Beerli et al., 2014, ⁴⁷ Batista Linhares et al., 2015, ⁴⁸ Fredriksson-Ahomaa et al., 2009, ⁴⁹ Wacheck et al., 2010, ⁵⁰ Frey et al., 2009a, ⁵¹ Berger-Schoch et al., 2011, ⁵² Haas et al., 2015, ⁵³ Leifer et al., 2010, ⁵⁴ Simon et al., 2013, ⁵⁵ Biagetti et al., 2001, ⁵⁶ Hammer et al., 2012, ⁵⁷ Sattler et al., 2012, ⁵⁸ Albina et al., 2000, ⁵⁹ Montagnaro et al., 2010b, ⁶⁰ Schielke et al., 2009, ⁶¹ Denzin and Borgwardt, 2013, ⁶² Carpentier et al., 2012, ⁶³ Caruso et al., 2015, ⁶⁴ Serracca et al., 2015, ⁶⁵ Bagó et al., 2011, ⁶⁶ Melzer et al., 2007, ⁶⁷ Payne et al., 2011, ⁶⁸ Bergagna et al., 2009, ⁶⁹ Zanella et al., 2008, ⁷⁰ Dondo et al., 2007, ⁷¹ Marois et al., 2007, ⁷² Chiari et al., 2014, ⁷³ Al Dahouk et al., 2005, ⁷⁴ Avagnina et al., 2012, ⁷⁵ Methner et al., 2010, ⁷⁶ Montagnaro et al., 2010a, ⁷⁷ Zottola et al., 2013, ⁷⁸ Atanassova et al., 2008, ⁷⁹ Decastelli et al., 2014, ⁸⁰ Pannwitz et al., 2010, 2012, ⁸¹ Gari-Toussaint et al., 2005, ⁸² Fichi et al., 2015, ⁸³ Edelhofer and Aspöck, 1996, ⁸⁴ Beral et al., 2012, ⁸⁶ Magnino et al., 2011, ⁸⁷ Rasero et al., 2010

check et al., 2010), suggesting that carriage in tonsils may not be a good indicator of the transmission risk and that shedding of these bacteria by wild boar is rare.

Trichinellosis is a serious, potentially fatal disease in humans which is acquired by the consumption of in-

fected meat, whereas infected animals do not display disease signs. *Trichinella* sp. has not been detected in any Suidae including numerous tested wild boar in Switzerland for decades but a seroprevalence of 0.2% was documented in wild boar, revealing a rare but occurring exposure to the parasite (Frey et al., 2009a).

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Table 1b: Situation of selected pathogens listed in table 1a in domestic pigs (DP) in Switzerland and its bordering countries Austria (A), Germany (D), France (F) and Italy (I)

Disease	DP: situation in CH	DP: situation in neighboring countries
CSF	free-from-disease ¹	free-from-disease ¹²
ASF	free-from-disease ¹	free-from-disease ¹²
AD	free-from-disease ¹	A: not present ¹² D, F, I: presence within last five years; now absent ¹²
PRRS	free-from-disease; sporadic outbreaks, last outbreak 2014 ^{1, 2}	widespread ^{12, 13, 14}
Hepatitis E	58.1% (ELISA, serum, 2006, 2011) ³ , 60% (ELISA, meat juice, 2011) ⁴	A: 5.8% (PCR, serum, liver, bial, mesenteric lymph nodes, faeces, kidney) ¹⁵ D: 49.8% (ELISA, serum, 2007/2008) ¹⁶ F: 65% (ELISA, serum, 2008/2009) ¹⁷ I (north): 50.2% (ELISA, serum, 2008) ¹⁸
Brucellosis	disease very rare ⁴ , three outbreaks in 2009 ²	A: last report in 2010 D: clinical disease occurs I: disease limited to areas F: clinical disease occurs ^{12, 19}
bTB	free-from-disease ¹	disease present in all countries ¹²
EP	free-from-disease ⁵ ; sporadic outbreaks (n= approx. 9/yr) ²	A: no data available D: 65% (ELISA, serum, 2003) ²⁰ F: 69.3 (PCR, lung, 2011) ²¹ I: 22% (PCR, nasal swabs, 2008/2009) ²²
Yersiniosis	<i>Y. enterocolitica</i> : 88% (PCR, tonsils, 2006) ⁶	A: no data available; D: <i>Y. enterocolitica</i> : 8.4% (culture, faeces, <2007) ²³ F: <i>Y. enterocolitica</i> : 13.7% (culture, tonsils, 2010) ²⁴ I: <i>Y. enterocolitica</i> : 32%, <i>Y. pseudotuberculosis</i> : 1%; (culture, tonsils, 2005/2007) ²⁵
STEC	O 157: 7.5%, STEC: 22% (PCR, faeces, 2004-2005) ⁷	A: no data available, D: 16.7% (culture, 2013) ²⁶ F: no data available I: no detection ²⁶
Salmonellosis	0.8% (PCR, tonsils, 2011) ⁸ ; 4% (ELISA, meat juice, 2011) ⁹ ; rare outbreaks ²	A: low; D: 7-18% (2013) ²⁷ F: no data available I: 0-89% (2013) ²⁷
Listeriosis	5.6% (culture, tonsils, 2011) ⁸	A: no data available D: 32% (culture, tonsils, 2004) ²⁸ F: 11%/14.5% (culture, faeces, 2008) ²⁹ I: 0.2% (culture, faeces, <2012) ³⁰
Campylobacteriosis	65% (culture, faecal swabs, 2013) ⁴	A: 50% (2008) ¹⁹ D: 62% (culture, faeces, 2004) ²⁸ F: 50.2% (culture, stomach, 1999) ³¹ Italy: 63.5% (culture, rectal swabs, 2000) ³²
Trichinellosis	free-from-disease ⁴	A: no cases ³³ D: rare cases ³⁴ F: rare cases ³⁵ I: rare case ¹²
Toxoplasmosis	23.3% (ELISA, meat juice, 2006-2008) ¹⁰	A: pathogen documented ¹⁹ , 20.6% (ELISA, Serum, 2001/2002) ³⁶ F: no data available, I: pathogen documented ³⁷
Sarcoptic mange	pathogen reported ¹¹	A: pathogen reported ³⁸ D: 19.1% (digestion method, scrapings, 1997) ³⁹ F: no data available I: pathogen reported ⁴⁰

Table 1c: Situation of selected pathogens listed in Table 1a in wild boar (WB) in Switzerland and its bordering countries Austria (A), Germany (D), France (F) and Italy (I)

Disease	WB: situation CH	WB: situation in in neighboring countries
CSF	Last outbreak 1998-2000 (eradicated) ⁴¹ , 0.0% (ELISA, serum, 2004/2005) ⁴²	A: no data available D: local outbreaks recorded ⁵³ F: local outbreaks recorded ⁵⁴ I: local outbreaks recorded ⁵⁵
ASF	No occurrence reported to date	A, D, F, I: no occurrence reported to date (except Sardinia)
AD	0.57% (ELISA, serum, 2008-2013) ⁴³	regional presence in all countries; low prevalences in neighboring regions in F and D ⁴³
PRRS	0.43% (ELISA, serum, 2008-2010) ⁴⁴	A: no data available D: 0.5% (ELISA, serum, 2008-2009) ⁵⁶ , 1.2% (ELISA, serum, <2012) ⁵⁷ F: 3.3% (ELISA, serum, 1993-1995) ⁵⁸ I (south): 37.7% (ELISA, serum, 2005-2006) ⁵⁹
Hepatitis E	12.5% (ELISA, serum, 2008-2012) ³	A: pathogen recorded ¹⁵ D: 14.9% (PCR, liver, <2009) ⁶⁰ , 33% (ELISA, serum, 2011) ⁶¹ F: 14% (ELISA, serum, 2000-2004) ⁶² I: 1.9-3.7% (PCR, liver, 2012-2013) ^{63,64}
Brucellosis	35.8% (RBT/ELISA, serum, 2008-2010) ⁴⁴ , 28.8% (PCR/culture, spleen, genital organs, blood, 2008-2010) ⁴⁴	A: pathogen recorded ⁶⁵ D: 0-28.5% (ELISA, serum, <2007) ⁶⁵ F: 1-80% (ELISA, serum, 2009-2010) ⁶⁶ I (north): 19.8% (RBT/CFT, serum, 2001-2007) ⁶⁷ , 10.8% (culture, spleen, genital organs, 2002-2007) ⁶⁸
bTB	3.6% (PCR(MTBC), lymph nodes/tonsils, 2009-2011) ⁴⁵ , 2.4% (ELISA, serum, 2008-2013) ⁴⁶	A: no data available D: no data available F (Normandie): 42% (culture, lung/lymph nodes, 2005-2006) ⁶⁹ I: pathogen recorded ⁷⁰
EP	26% (PCR, nasal swabs, 2011-2013) ⁴⁷	A: no data available D: no data available F: 58% (ELISA, serum, 2002-2003) ⁷¹ I: 30% (ELISA, serum, 2008-2013) ⁷²
Yersiniosis	65% (ELISA, tissue juice, 2007-2008), 44% (PCR, tonsils, 2007-2008), 5% (PCR, faeces, 2007-2008) ^{48,49}	A: no data available D: 62.6% (western blot, serum, 1995-1996) ⁷³ I: 15.4% (culture, muscle swabs, 2008-2010) ⁷⁴ F: no data available
STEC	9% (PCR, tonsils, 2007-2008), 0% (PCR, faeces, 2007-2008) ⁴⁹	A, D, F, I: no data available
Salmonellosis	12% (PCR, tonsils, 2007-2008), 0% (PCR, faeces, 2007-2008) ⁴⁹	A: no data available, D: pathogen reported ⁷⁵ I: 30.7% (ELISA, serum, 2005-2006) ⁷⁶ , 10.8% (culture, faeces, 2010-2012) ⁷⁷ F: no data available
Listeriosis	17% (VIDAS, tonsils, 2007-2008), 1% (culture, faeces, 2007-2008) ⁴⁹	A: no data available D: 5.5% (culture, meat punch, 2007) ⁷⁸ I: no data available F: no data available
Campylobacteriosis	0% (culture, VIDAS, tonsils, 2007-2008) ⁴⁹	A: no data available D: no data available I: 0% (culture, meat, <2014) ⁷⁹ F: no data available
Trichinellosis	0.2% (ELISA, meat juice, 2005-2007) ⁵⁰	A: no report but risk is present ³² D: pathogen occurs ⁸⁰ F: cases occur ⁸¹ I: cases occur ⁸²
Toxoplasmosis	6.7% (ELISA, meat juice, 2006-2008) ⁵¹	A: 19.3% (serum, 1990-1993) ⁸³ D: 25% (IFAT, serum, 1993-1994) ⁸⁴ F: 23% (MAT, serum, 2003-2004) ⁸⁵ , I: 33.3% (ELISA, serum, 2005-2009) ⁸⁶
Sarcoptic mange	cases reported ⁵²	A: no data available D: no data available F: pathogen recorded ⁸⁷ I: pathogen recorded ⁸⁷

Comparison with neighbouring countries

A comparison of prevalences for the above mentioned wild boar pathogens with the situation in the neighbouring countries Austria, Germany, France and Italy is challenging because publicly available data are incomplete for several pathogens and countries (Table 1a-c). Nevertheless, similarities between the situation in Switzerland and regions close to the Swiss border were found for several pathogens. All countries bordering Switzerland are officially free of CSF (Anonymus, 2015a). This disease had been locally endemic in wild boar for a decade in northeastern France (Rossi et al., 2011) but it was finally eliminated thanks to vaccination campaigns (Rossi et al., 2015). Reported seroprevalences are low for HEV, AD and PRRS virus (Table 1b-c). Cases of sarcopic mange and frequent exposure to *M. hyopneumoniae* have been recorded in other countries (Marois et al., 2007; Chiari et al., 2014; Haas et al. 2018). The rare prevalence studies available from bordering countries for bacteria associated with food-borne diseases yield data comparable to those collected in Switzerland (Table b-c).

Seroprevalence of *Toxoplasma gondii* in wild boar is apparently lowest in Switzerland (Table 1c), which also has a favourable situation regarding *Trichinella* sp., since occasional infections of wild boar have been documented in France (Gari-Toussaint et al., 2005), Germany (Faber et al., 2015) and Italy (Fichi et al., 2015). No data are available on the occurrence of bovine tuberculosis in wild boar in Austria and Germany but it is known that *M. caprae* circulates among red deer (*Cervus elaphus*) in the bordering parts of Austria (Fink et al., 2015), *M. bovis* has been found in wild boar in northwestern Italy (Dondo et al., 2007), and seropositive wild boar were detected in the French Jura (Richomme et al., 2013).

Exposure of wild boar to *Brucella suis* seems to occur more frequently in Switzerland than Germany and Italy (Melzer et al., 2007; Bergagna et al., 2009) but similarly to or less frequently than in the bordering regions of France (Payne et al., 2011). However, seroprevalences are generally increasing all over Europe. Medium to high prevalences were documented in Croatia, Czech Republic, Italy, Germany, Spain, Denmark and France (Garin-Bastuji and Delcuelleirrie, 2001; Godfroid, 2002; Vengust et al., 2006; Bergagna et al., 2009; Cvetnić et al., 2009; Montagnaro et al., 2010a; Muñoz et al., 2010; Payne et al., 2011). Besides one report of the highly zoonotic biovar 3 in Croatia (Cvetnić et al., 2009), only biovar 2, which is characterized by a low zoonotic risk, has been documented in European wild boar to date (Godfroid, 2002).

Other pathogens documented in Europe

Further infectious agents relevant to pig or human health have been identified in other, more distant European countries. Currently, the most important one is the virus of **African Swine Fever** (ASF), which has emerged in Georgia in 2007 and has shown a dramatic geographical spread in the past years. In 2014 ASF reached the European Union, with confirmed outbreaks in Estonia, Latvia, Lithuania and Poland. In 2017 local outbreaks were recorded in Rumania, the Czech Republic and further west within Poland. These last outbreaks occurred far from the epidemic front, showing that the virus can make unpredictable “jumps”, whether man-made or not (Schulz et al. 2017, Roberts and Gale 2017). Wild boar have originally become infected via spillovers from pigs (Anonymus, 2015g). Although they rapidly die of the disease after infection (Blome et al. 2012), meanwhile the virus has become maintained in wild boar in certain areas, which represents a serious risk to both wild boar and pig health (Woźniakowski et al., 2015; Bellini et al., 2016). However, the major driver of ASF emergence remains the movement of infected animals or meat products by humans as well as the lack of biosecurity on pig farms (Bellini et al., 2016; Roberts and Gale, 2017) and the disease is expected to further spread towards western and northern Europe in the next future.

Several studies have revealed high seroprevalences of *Leptospira* sp. in European wild boar and warn about the potential increasing risk of transmission to humans due to the growing wild boar population and the habitat expansion of wild boar to more urban areas (Deutz et al., 2002; Jansen et al., 2007; Meng and Lindsay, 2009; Vale-Gonçalves et al., 2014). **Japanese encephalitis virus** (JEV) and **Influenza A** virus are two other zoonotic agents for which wild boar can be a host (Vittecoq et al., 2012; Ruiz-Fons, 2017).

The risk arising from wild boar as a possible source of other swine pathogens such as **porcine parvovirus** (PPV), **porcine circovirus-2** (PCV-2) and **transmissible gastroenteritis virus** (TGEV) is considered to be low because these pathogens are more widespread in domestic pigs than in wild boar in Europe (Vengust et al., 2006; Ruiz-Fons et al., 2008a; Sedlak et al., 2008; Kaden et al., 2009). In Switzerland, PCV-2 and PPV occur in domestic pigs (Handke et al., 2012) but pigs are officially free from TGE virus (http://www.blv.admin.ch/ge-sundheit_tiere/01065/01456/01477/index.html?lang=de).

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Discussion

The health status of the wild boar population in Switzerland can be qualified as good. CSF and ASF are not present and exposure to ADV, PRRS virus, mycobacteria of the *Mycobacterium tuberculosis* complex and *Trichinella* sp. is rare. Thus, wild boar do not represent a significant source of infection with these pathogens for animals and humans. This is in accordance with the condition of the domestic pig population, which is officially free of these diseases. Nevertheless, the occurrence of *Trichinella* sp. in wild carnivores (Frey et al., 2009b) indicates its presence in the environment. Wild boar may occasionally become infected by *T. britovi*, e.g. through scavenging on dead foxes, and subsequently become a possible source of human infection (Gari-Toussaint et al., 2005), justifying the further testing of wild boar meat for *Trichinella* sp. prior to consumption.

First data on the occurrence of bacteria potentially causing foodborne infections in humans indicate their occurrence in wild boar tonsils but these tissues are not consumed and faecal shedding appears to be rare. Since investigations were performed in only one canton, no information is currently available on the distribution of these pathogens at the country level. Comparison with data on domestic animals suggests a higher occurrence of *Listeria* sp. and *Salmonella* sp. but a lower occurrence of *Yersinia* sp., stx-positive *E. coli* (9%) and *Campylobacter* in wild boar than in pigs (Table 1b). Similarly, the risk of infection with *T. gondii* and HEV through contacts with wild boar is lower than via domestic animals, both because prevalence is lower in wild boar than in pigs and because less wild boar meat than pork is consumed.

The situation of *M. hyopneumoniae* is more concerning because the infection is moderately prevalent in wild boar from some Swiss regions. However, recent studies revealed that pigs are a more likely source of infection than wild boar (Batista-Linhares et al., 2015; Kuhnert and Oeveresch, 2015). Insufficient sanitation on affected farms and subsequent animal transport of symptomless infected pigs could explain disease recurrence in pigs but a long-term surveillance program including strain genotyping in both pigs and wild boar would be necessary to definitely elucidate the epidemiological role of wild boar (Oeveresch and Kuhnert, 2017). Currently, the pathogen of highest concern at the wild boar-livestock interface in Switzerland is *B. suis* biovar 2. First, wild boar obviously maintain the pathogen in the wild, representing a potential source of infection for domestic animals and for humans (Mailles et al., 2017), and prevalence even shows an increasing trend. Second, this situation is opposite to that in domestic pigs, which are officially free of brucellosis. Third, close interactions between wild boar and pigs including hybridisation have

been documented, demonstrating that a transmission of *B. suis* (which is mainly transmitted through mating) from wild boar to pigs is possible under Swiss conditions (Wu et al., 2011; Wu et al., 2012). This is in agreement with the situation in France and Denmark, where transmission of *B. suis* from wild boar to outdoor pigs has occurred (Rossi et al., 2008). Nevertheless, considering the prevalence in wild boar and the fact that no outbreak has been documented in pigs for the past 8 years, the risk of transmission in the field appears to be low.

Risk represented by wild boar crossing the Swiss border

Wild animals do not respect political borders and it is of concern that animals moving from regions beyond the border may introduce pathogens into the Swiss territory. As an example, in the late 1990s wild boar migrating from Italy were considered to have been the most likely source of the last outbreak of CSF in Switzerland (Schnyder et al., 2002). Currently, the health situation of wild boar in the bordering regions of Austria, France, Germany and Italy (Table 1c) is similar to that in Switzerland. Bovine tuberculosis and PRRS were both reported from bordering regions, however, it is questionable whether *M. bovis* is maintained in the wild boar population in northern Italy (Dondo et al., 2007). Also, the occurrence of the PRRS virus has not yet been reported in wild boar close to the Swiss border and to date there is no indication that PRRS virus is maintained in free-ranging wild boar populations in any region of Europe (Ruiz-Fons et al., 2008a; Hammer et al., 2012; Fabisiak et al., 2013; Rodríguez-Prieto et al., 2013; Štukelj et al., 2014).

More distant regions of Europe are characterized by a very different disease pattern. On the Iberian Peninsula, for instance, several harmful pathogens such as *M. bovis* and *M. caprae* (Naranjo et al., 2008) are widespread and maintained in the wild boar population (Ruiz-Fons et al., 2008a). Similarly, antibodies to ADV are highly prevalent in many regions of Europe (Meier et al., 2015). Management practices like fencing and supplemental feeding (typically resulting in overabundance and aggregation) as well as translocations are driving factors for pathogen transmission and introduction, respectively, and contribute to the spread of pathogens such as *M. bovis/caprae*, CSF virus and ADV in the wild (Gortazar et al., 2006; Gortazar et al., 2007; Ruiz-Fons et al., 2008b; Schöning et al., 2013). In contrast to many other European countries, such management practices do not exist in Switzerland (Blatter, 2013; Schöning et al., 2013).

Currently, the disease of highest concern that occurs in more distant regions is ASF. Not only could the disease spread further within wild boar populations, but the

recent experiences in Europe have shown that it could appear any time anywhere in either pigs or wild boar, as the major issue for spreading the virus seems to be human activities (Bellini et al., 2016; Roberts and Gale, 2017).

Lack of data on domestic pigs

Domestic pigs are much more numerous and have a much higher economic importance than wild boar. Surprisingly, in contrast to the literature on wild boar health, internationally available data on the health situation in domestic pigs (such as prevalence or risk factor studies) are often either missing or else difficult to find. Frequently, the only available sources of information are reports or notices from the European Food Safety Authority (EFSA) or the World Organisation for Animal Health (OIE) in which local circumstances and detailed backgrounds are usually not mentioned or updated information on disease occurrence is missing. This is an important issue, because it is essential to obtain background information, prevalence studies and new insights on the situation in livestock to identify key players in the epidemiology of transmissible diseases at the wildlife-livestock interface (Boadella et al., 2011). It is evident that wildlife can act as a reservoir for a wide range of pathogens and that a number of wild species pose a high risk for domestic animal health and economics (Gortazar et al., 2007; Meng and Lindsay, 2009; Ruiz-Fons, 2015). However, it has to be considered that initial infection of wild populations can come from domestic animals (spillover), potentially resulting in maintenance in the wild and subsequent transmission back to domestic livestock (spillback). For instance, bovine tuberculosis was in most cases first introduced from infected cattle to susceptible wild populations before wildlife reservoirs developed (Palmer, 2007), and ASF in Europe affected domestic pigs first (Rowlands et al., 2008).

Three major issues when assessing the epidemiological role of wild boar

First, it is essential to keep in mind that infections at the wild-domestic interface can be bi-directional and that biosecurity measures are not only indicated to prevent pathogen transmission from wild boar to domestic pigs (e.g. porcine brucellosis) but also to prevent infection of wild boar by domestic animals and a potential subsequent reservoir establishment in the wild (e.g. bovine tuberculosis, ASF). Since eradication of pathogens from wildlife populations are impossible or involve a huge effort (Gortazar et al., 2015) and sampling procedures and control measures are much more practicable in domestic animals, prevention should start in domestic animals. This includes adequate health surveillance in domestic pigs, early warning strategies and prevention of contacts between wild boar and domestic pigs (Wu et al., 2012).

Second, the epidemiological role of wild boar can vary from spillover to reservoir host depending, inter alia, on the density of the host population and on animal aggregation. Aggregation is the main risk factor for maintenance of bovine tuberculosis in wildlife (Schöning et al., 2013). High densities and aggregation are positively correlated with high (sero-)prevalences of ADV, CSF virus, PCV-2 and the incidence of multi-pathogen infections in wild boar (Gortazar et al., 2006), and suspected to play a role in the spread and maintenance of ASF virus in Eastern Europe (Bellini et al., 2016). Therefore, it is essential to pursue an adequate wild boar management including control of population growth and minimizing aggregation (feeding bans, no fencing).

Third, it is important to be cautious when interpreting diagnostic results in wild boar. Pathogen detection does not necessarily mean excretion (Wacheck et al., 2010; Kuhnert and Overesch, 2014; Batista Linhares et al., 2015), and depending on the infection dynamics in the host, targeted investigations on hunted animals may not be appropriate for surveillance purposes. For example, early detection of ASF requires the investigation of sick or dead animals (Gavier-Widén et al., 2015). It is essential to be aware of the pathogen features, host-specific characteristics and the local epidemiological situation to carefully evaluate the choice of the diagnostic tools according to the question to be addressed and to interpret the results in a meaningful way (Schulz et al., 2017).

Conclusion

Wild boar and pigs in Switzerland benefit from an outstanding health status. To preserve it, it is essential to pursue efforts in four areas: 1) disease surveillance in domestic pigs, especially in the case of importations; 2) biosecurity on pig farms; 3) disease surveillance in wild boar, including general surveillance (i.e. the investigation of dead and potentially sick animals) and targeted investigations where appropriate; 4) sustainable wild boar management, preventing excessive densities and aggregation. Overall, collaboration among hunters, game wardens, hunting authorities, swine farmers, veterinarians, food and veterinary administrations, and wildlife scientists is essential.

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Sangliers et maladies infectieuses: estimation des risques actuels pour la santé humaine et animale en Suisse

Le Sanglier est très répandu en Europe et les statistiques de chasse indiquent que sa population est en forte augmentation. Puisque le Sanglier et le Porc domestique sont sensibles aux mêmes agents pathogènes et qu'une infection réciproque est possible, les sangliers sont de plus en plus considérés comme une menace pour la production porcine. La Suisse est officiellement indemne de diverses maladies infectieuses et jouit d'un bon statut Sanitaire vétérinaire. C'est pourquoi on s'inquiète que les animaux sauvages puissent représenter une source d'infection pour les animaux domestiques. Le présent article résume les connaissances actuelles sur la santé des sangliers en Suisse, compare la situation avec celle des pays voisins et discute des risques sanitaires pour l'Homme et les animaux domestiques. Le risque sanitaire actuellement posé par le Sanglier au sein de la Suisse est largement limité à la brucellose porcine. La menace principale venant de l'étranger provient de l'expansion de la peste porcine africaine. Afin de prévenir l'introduction de pathogènes et leur transmission entre les sangliers et les porcs domestiques, il est essentiel de poursuivre les efforts dans 4 domaines: la surveillance des maladies chez les porcs domestiques, la biosécurité dans les élevages porcins, la surveillance des maladies chez les sangliers et la gestion raisonnable des sangliers.

Cinghiali e malattie infettive: valutazione dei rischi attuali per la salute degli uomini e degli animali domestici in Svizzera: panoramica

Il cinghiale è molto comune in Europa e secondo le statistiche è fortemente in aumento. Nell'industria suina, il cinghiale è visto come una minaccia per i suini essendo entrambi soggetti al contagio da parte degli stessi agenti patogeni. La Svizzera è ufficialmente indenne da varie malattie infettive e vanta di buone condizioni in medicina veterinaria. Per questo gli animali selvatici sono visti con preoccupazione come una potenziale fonte di malattie infettive per gli animali domestici. Questo articolo abbozza le conoscenze attuali sulla stato di salute dei cinghiali in Svizzera, compara i risultati con quelli dei Paesi adiacenti e discute i rischi per la salute per gli esseri umani e gli animali domestici. Il rischio sanitario legato al cinghiale in Svizzera è attualmente limitato alla brucellosi suina. La minaccia principale proveniente dall'esterno è invece legata all'espansione delle peste suina africana. Al fine di prevenire l'introduzione di agenti patogeni nel territorio elvetico e la loro trasmissione tra cinghiali e suini domestici, è necessario impegnarsi su 4 fronti: la sorveglianza delle malattie nel maiale domestico, la biosicurezza all'interno degli allevamenti di suini, la sorveglianza delle malattie nel cinghiale e la gestione sostenibile del cinghiale.

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