

Analysis of the Current Situation of African Swine Fever Prevention and Control in France

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Abstract: French agriculture is extremely developed. It is the world's leading agricultural country and agricultural by-products exporters, of which the pig industry is the first meat industry of France. France is free from African swine fever (ASF) since 1974 in all suids. Following the outbreak of ASF in wild boar in Belgium in September 2018, in order to protect the French pig industry, the French authorities have continuously reinforced the prevention measures against ASF and to date, there have been no outbreaks of ASF. The practice of ASF prevention and control in France shows that publicizing and training the whole population on ASF prevention and control, raising biosecurity awareness, reinforcing biosecurity measures and implementing them effectively in production are the key to prevention and control. Secondly, a robust multi-participant surveillance network mobilizes all parties to achieve close monitoring/surveillance of outbreaks, timely notification of outbreaks and collection of epidemiological information. Finally, it is important to be proactive and preventive. After the outbreak of wild boar ASF in Belgium, the emergency plan was activated at the first time with the issuance of a Ministerial Order of 16 October 2018 on biosecurity measures applicable to farms in which suids are held, introduce temporary control measures on the border with Belgium, such as implementation of preventive zoning measures, fencing, depopulation of wild boars and carrying out enhanced active surveillance of domestic pigs and wild boars; and setting up Belgian-French-Luxembourg Task Force. At the same time, the French competent agency actively negotiated with China on the requirements for recognition of ASF zoning and compartmentalization, hoping that even if there are cases of ASF in France in the future, implementation of this zoning policy allows for trade to be maintained from ASF-free zones without having to discontinue the totality of French exports for concerned products.

Keywords: France, African Swine Fever, Zoning

1. Introduction

At a time when the world's epidemics are becoming increasingly complex, it is becoming increasingly difficult to establish and maintain a disease-free status throughout the country, especially those that are difficult to prevent their introduction through border control measures. For this reason, the World Organisation for Animal Health (WOAH) has developed the principles of zoning and compartmentalisation to Member Countries wishing to establish and maintain different subpopulations with specific health status within

their territory, in the hope of assisting Member Countries in the control and eradication of animal diseases and the facilitation of international trade.

French agriculture is extremely developed. It is the world's leading agricultural country and agricultural by-products exporters, of which the pig industry is the first meat industry of France. France is free from African swine fever (ASF) since 1974 in all suids. Faced with the hazard represented by the identification of cases of ASF in wild boars in Belgium (close to the border with France) in September 2018, the French health authorities worked in close cooperation with

the professional Hunters' Organizations and with the entire pig industry in order to design a strategy aimed at preventing the disease from entering the national territory. At the same time, in order to prevent a total suspension of all exports of pigs and pig products in the event of an ASF in France, France has been proactive in the zoning of ASF, actively negotiated with China on the "*Sino-French requirements for recognition of African swine fever zoning and compartmentalization*" and signed the protocol on 13, December 2021, which would allow France's ASF free zones to continue exporting swine and pork products to China. This paper analyses the current situation of ASF prevention and control in France, especially the zoning management adopted, aiming to provide reference for ASF prevention and control and zoning in other countries.

2. The French Pig Industry

France is the world's third largest agricultural exporter and the largest agricultural producer in the European Union (EU). According to the French Pig Inter-professional Organization (INAPORC), France exported 1,356,400 live pigs in 2019, and the value of export trade in live pigs and pork products reached €7,864 million [2].

In France, any person holding at least 2 fattening pigs or one breeding pig is considered as a pig farmer. All pig farmers are required to register with the authorities. Most farms are family-owned, with an average of 1,200 pigs per farm, and are relatively small. Over 85% of farms are involved in a farrow-to-finish system. According to the French Database for Pig Identification (BDPORC), there were 21,000 pig farms in France in 2018, of which 74.9% were located in the three regions of Brittany, Pays de la Loire, and Normandy in the north-west of France, and the Brittany region accounted for 58.3% of the country's total pig farms [3].

3. African Swine Fever Legislation and Administrative Guarantee System

3.1. Laws and Regulations

As one of the member states of the EU, France strictly follows the World Organisation for Animal Health (WOAH) *Terrestrial Animal Health Code* and relevant EU regulations in the area of animal health, animal welfare and food safety, including Regulation (EU) 2016/429 of the European Parliament and of the Council of 9 March 2016 on transmissible animal diseases and amending and repealing certain acts in the area of animal health ("Animal Health Law") [4]; Commission Delegated Regulation (EU) 2020/687 of 17 December 2019 supplementing Regulation (EU) 2016/429 of the European Parliament and the Council, as regards rules for the prevention and control of certain listed diseases [5]; Commission Implementing Regulation (EU) 2023/594 of 16 March 2023 laying down special disease control measures for African swine fever and repealing Implementing Regulation (EU) 2021/605 [6]; Commission Implementing Regulation

(EU) 2020/2235 of 16 December 2020 laying down rules for the application of Regulations (EU) 2016/429 and (EU) 2017/625 of the European Parliament and of the Council as regards model animal health certificates, model official certificates and model animal health/official certificates, for the entry into the Union and movements within the Union of consignments of certain categories of animals and goods [7]; Council Regulation (EC) No 1/2005 of 22 December 2004 on the protection of animals during transport and related operations and amending Directives 64/432/EEC and 93/119/EC and Regulation (EC) No 1255/97 [8]. On the basis of the framework of the EU regulation, the French government has developed a supporting decree for the prevention and control of ASF. In particular, following the outbreak of ASF in wild boar in Belgium, a ministerial decree was issued stipulating the preventive and surveillance measures to be taken in the preventive zones on the border with Belgium with respect to hunting, forestry activities and swine farms.

3.2. French Animal Health Services

The veterinary authorities in France are divided into three levels: national, regional and sub-regional. Their veterinary authorities are the General Directorate for Food (DGAL) within the Ministry of agriculture (MAA), Regional directorate for food, agriculture and forest (DRAAF), Sub-regional Directorate for the Protection of Populations (DDPP) or Sub-regional Directorate for Social Cohesion and for the Protection of Populations (DDCSPP), which can be shortened as DD(CS)PPs.

3.2.1. General Directorate for Food (DGAL)

The DGAL is in charge of primary production (animals and plants), animal health, animal welfare, veterinary pharmacy and food safety during the production of food of animal origin.

3.2.2. Regional Directorate for Food, Agriculture and Forest (DRAAF)

There are 13 regions in France, and the regional DRAAFs are responsible for coordinating work between local and national veterinary authorities.

3.2.3. DD(CS)PPs

There are 101 DD(CS)PPs in France, 31 of which are located near the coastline, mainly in each sub-regions and regional capital cities. As a specific executive agency, it is responsible for supervising the implementation of laws and regulations.

The national, regional and sub-regional authorities form a single chain of command, facilitating information exchanges. The national veterinary authority provides overall guidance to local veterinary authorities. This way, DD(CS)PPs are technically in direct and permanent contact with the DGAL.

3.2.4. Human Resources

The veterinary staff of the French MAA consists of 266 official veterinarians, 933 veterinary auxiliaries and 215 engineers in the field of animal health. DGAL, the

headquarters of the French animal health administration, has a total staff of 225 including 80 veterinarians of which 13 are specialized in animal health. There are 14,700 approved veterinarians throughout the country who are allowed to implement some official controls in the name of the French sanitary authorities.

3.3. French Agency for Food, Environmental and Occupational Health & Safety (ANSES)

The ANSES was created on 1 July 2010. It is a public administrative body with a multidisciplinary scientific and technical staff, reporting to various French Ministries: the Ministry of Health, the Environment, Agriculture, Labor and Consumer Affairs. ANSES undertakes surveillance, risk assessment, research and reference activities in a broad range of topics encompassing human health, animal health and welfare, and phytosanitation. There are nine research and reference laboratories located throughout France [9].

3.4. Official Services in Charge of the Wild Fauna

3.4.1. Ministry for Ecological Transition and Departmental Directorate of Territories (DDT)

The Ministry for Ecological Transition (at national level) and the DDT (at local level) are in charge of drawing up hunting plans and of managing damages to crops, in cooperation with the federations of hunters; they are also responsible for organizing annual meetings with the various stakeholders in order to formalize hunting plans at local scale.

3.4.2. French Office for Biodiversity (OFB)

The OFB is a public agency under the umbrella of both ministries of Agriculture and Ecology Transition, and was created on 1 January 2020 by merging the French Agency of Biodiversity (AFB) and the National Office of Hunting and Wild Animals (ONCFS). It is responsible for the police related to the environment protection, such as wildlife, water resources, hunting, fishing etc.. In ASF context at the border with Belgium, OFB is in charge of wild boar destruction in addition of hunting; In addition, the OFB is responsible for wildlife diseases surveillance, such as ASF in wild boars, and for studying the biology and population dynamics of wildlife species [10].

4. Prevention and Control Measures of ASF

4.1. Identification and Traceability

According to the French decree, all pig farmers are required to register with the authorities. The registration information of each pig and the geographic information of the farm shall be entered into the BDPORC National Database. Pigs which are moved from one farm to another or to the slaughterhouse must be identified with the registration number of the farm from which it departs.

Each farm is identified with a unique 7-character Marking

Number, with the “FR” prefix for France, 2 digits standing for the official number of the Department of the farm, and 3 digits which identify the farm within the Department. For example: For a farm located in the Ile-et-Vilaine Department (Brittany), the Marking Number will be: FR35XXX. The marking number can be placed on a tattoo (Figure 1, Figure 2-left) or on a plastic ear tag (Figure 2-right). For breeding animals, which are individually identified, they carry the farm identification number (for example: FR35XXX) plus an individual identification number (Figure 2).



Figure 1. Identification of pigs (tattoo).



Figure 2. Identification of breeding pigs (left: tattoo, right: ear tag).

Every movement of pigs in France should be notified to the BDPORC National identification database within 7 days, and the removal order should be kept for 5 years by the owner and the breeder; For movement of pigs to France, if the animals come from EU-member states, they must be accompanied by the appropriate health certificate signed by an official veterinarian and the health certificate must be validated in TRACES; if come from third countries, they must be obtained an import permits, with an official veterinary health certificate from the exporting country and be submitted to a veterinary inspection at border checkpoints..

Pigs' identification information follows the meat and meat product at each processing step including slaughter, cutting and processing, thus enabling traceability from the point of sale to the source farm.

4.2. Biosecurity Measures

After the outbreak of ASF in wild boars in Belgium in September 2018, France has strengthened the prevention and control of ASF through a variety of measures, including: a) Banning swill feeding of pigs; b) Enhanced information and training was provided to all French pig farmers and to all technicians and staff working on pig farm; c) Formulate a biosecurity plan based on risk analysis; d) Issue a ministerial decree to regulate the construction and management of pig farms, stipulating that pig farms must be divided into to 3 distinctive zones: a zone for public access, a zone restricted to farm staff and a zone restricted to animal breeding, and making special provisions on the control of human and material flows

on pig farms, requiring them to formulate a pest control plans and procedures for rendering, etc; e) Compliance with the batch breeding principles which require managing the buildings according to the “all-in/all-out” principle for each developmental stage; f) Strict implementation of the “Good Hygiene Practice Guidelines”, whereby anyone who has been in contact with other farm animals must comply with a minimal period of 2 days (2 full nights) before they can access the animal breeding zone, and must shower, wear a comprehensive protective uniform, scrupulously comply with biosecurity procedures; g) Strengthen transport management by requiring transport vehicles to be transported and parked in strict accordance with the plan, to be cleaned and disinfected strictly, and not allowed outside the “buffer zone” which encompasses the animal delivery or collection zones, the manure tank zone, etc. Trucks cannot have contact with the animals kept in the breeding zone; h) Taking temporary control measures for high-risk areas along the border with Belgium.

4.3. Surveillance System

4.3.1. Compulsory Annual Veterinary Visit

A compulsory annual veterinary visit (since 2015) carried out in all pig holdings by an official/approved veterinarian. This measure strengthens the connection between pig farmers and veterinarians, facilitates official collection of data and health information, and is aware of the implementation of biosecurity measures, ensuring a capacity to react quickly in case of a crisis so as to prevent the disease from spreading.

4.3.2. Robust Multi-Participant Surveillance Network

(i). ANSES

As a French risk assessment agency, ANSES can be requested to provide “on the spot” scientific assessment whenever new situations or epidemic data arise. It allows a real-time adaptation of management measures to the on going/upcoming risk level. At the same time, it uses the national reference laboratories it owns to confirm and interpret surveillance/test results, and provide scientific and technical support to other laboratories, surveillance platforms and surveillance networks in the country.

(ii). Epidemiological Surveillance Platform for Animal Health (PESA)

In order to facilitate the coordination and implementation of animal health surveillance policies, ANSES and DGAL and other departments jointly created PESA in October 2011, and currently has 11 members [11]. The platform monitors 20 animal diseases, including ASF. In 2013, it developed and operated an animal health information system, which publishes weekly surveillance bulletin on the platform’s website to provide timely information and updates on international health surveillance [12].

(iii). French Wildlife Monitoring Network (SAGIR)

The SAGIR network was established in 1986, which brings together hunters, representatives from the ONCFS and from departmental veterinary laboratories. It carries out passive

surveillance of wildlife diseases and determines the causes by detecting and collecting dead or dying terrestrial mammals and wild birds. Such surveillance action relies on a cooperation between the ONCFS and the Departmental Federation of Hunters (FDC). The network is managed and leaded by the ONCFS alongside the FDC [13]. After the outbreak of wild boar ASF in Belgium, France required all hunters to undergo ASF prevention and control awareness training before hunting. There are currently 400 trainers in France, and about 60,000 trained hunters act as sentinels for the wild boar ASF [10].

4.4. Veterinary Laboratories

There are two approved laboratories for the ASF routine diagnostic: LDA67 (Bas-Rhin) and LDA72 (Sarthe) [14]. Virus screening by PCR is carried out in the laboratory upon receipt of samples diagnosed as suspected ASF, which is completed in less than 24 hours. If results are non negative or dubious, they are sent for confirmation to the National reference laboratory (NRL)—the Ploufragan/Plouzané Laboratory, located in Brittany. The NRL belongs to ANSES, which is a biosafety level 3 laboratory, accredited by the Comité Français d’Accreditation (COFRAC) and ISO/IEC 17025. The NRL is the only laboratory in France responsible for ASF confirmation, and is also the only laboratory in capacity to conduct a differential diagnostic between Classical swine fever (CSF) and ASF.

4.5. Temporary Control Measures on the Border with Belgium

4.5.1. Set up a Preventive Zone

After the outbreak of wild boar ASF in Belgium, the French authorities decided to set up a preventive zone on the border with Belgium, which was not mandatory according to EU regulations but was part of the French strategy to prevent the introduction of ASF. The zone contains 2 sections, Reinforced observation zone (ROZ) and Observation zone (OZ). ROZ is set along the border with Belgium, with the following measures: Electric fences along the border, enhanced clinical surveillance and biosecurity assessment (field visits) for all holdings in the zone, temporary prohibition of hunting and large game releases, active collection of dead boars and sampling for ASF test. OZ is set surrounding the ROZ, with the following measures: Enhanced biosecurity and passive surveillance for all holdings in the zone, awareness-raising campaigns on biosecurity for hunters. To further mitigate the risk of introduction of ASF, farmers in the preventive zone were asked to progressively terminate their activity. By the end of May 2019, the area had been reduced from approximately 60 pig farms in September 2018 to 4.

In January 2019, after an ASF case was confirmed in two wild boars hunted out of the infected and fenced area in Belgium, France again reinforced the preventive and control measures on the border with Belgium following a risk analysis as follow: a) The ROZ were progressively replaced by white zone (WZ); b) Construction of fences preventing wild boar

from entering the OZ and devices restricting wild boar movement throughout the WZ or parts of it; c) Implementation “zero wild boars” programme in the preventive zone.

(i). Fencing

The construction of the WZ fences began on 20 January, 2019 and was completed on 5 April, ending up with a 1.5-meter-high, 50-cm-depth in the ground and 112-km-long fence corridor, all along the Belgium border. The fence extended over 3 departments in France: Ardennes, Meuse and Meurthe-et-Moselle.

With the continuous adjustment of the ASF infected area boundaries in Belgium, France extended the fence in the north of the Ardennes by 20 km [15] and, according to the ministerial decree of 10 December 2019, included the corresponding area in the OZ. As of 30 October 2019, the 132-km-long fence has been completed, including the electronic fence on the border with Belgium [16], which will be maintained until the end of 2020.

(ii). Wild Boars Depopulation

The France made efforts to depopulation of wild boars by intensive hunting (at least 150% increased shooting / normal hunting plan) in the OZ and to achieve “zero wild boar” objective in the WZ. Wild boar are hunted in 3 ways. a) Hunting patrols: Starting in September 2018, each hunting ground (targeted municipalities at the border with the infected area) will be patrolled at least once a week, with one to two hunters per patrol. b) Systematic scanning of forest: from February 2019 in the most at-risk places. When a new case of wild boar ASF is diagnosed in Belgium, if a radius of 5-7 km centred on the outbreak crosses the French-Belgian border, the preventive zone covering French territory will be systematic scanning; If the range does not cross the Franco-Belgian border, no further systematic scanning is carried out in the next 6 weeks. c) Dog detection: Starting in February 2019, 2 professionals teams including 3 to 6 dog handlers and 3 to 6 dogs for 5 to 8 days per month at the border of forest, close to river, wetlands, scrubby pastures, thorn areas, etc. When needed, army forces can provide support by providing night vision goggles and helicopter tracking. A subsidy of 30 euros per hunter is awarded for each patrol, and 100 euros per wild boar killed is awarded to hunters as a compensation. According to SAGIR, a total of 925 wild boars were hunted in the WZ from 1 June 2019 to 1 May 2020 and border boar activity has been significantly controlled.

4.5.2. Surveillance

France carried out 24-hour real-time surveillance of wild boars by SAGIR. From 18 February 2019, as part of active surveillance, 20% of shot wild boars are being analyzed for ASF. From 1 June 2019 to 1 May 2020, 179 shot wild boar were tested, all negative. From 16 September 2018 to 6 April 2020, a total 555 wild boar corpses were reported, of which 520 were tested for ASF and all were negative [8].

4.6. Belgian-French-Luxembourg Task Force

After the outbreak of ASF in wild boars in Belgium in

September 2018, a cross-border coordination team (“task force”) with representatives from Belgium and Luxembourg was immediately set up to share epidemiological data including ASF test results (Pos & Neg), cadavers location, searching efforts, number of killed animals, etc. every 48 h and coordinate management measures such as fencing, wild boar depopulation, and harmonisation of forest access. Regular phone calls and meetings were held to share experiences in collection center, trapping, night shots, models, etc. [5].

5. Conclusion

The practice of ASF prevention and control in France shows that publicizing and training the whole population on ASF prevention and control, raising biosecurity awareness, reinforcing biosecurity measures and implementing them effectively in production are the key to prevention and control. Secondly, a robust multi-participant surveillance network mobilizes all parties from central to local, from official to approved veterinarians, from associations to pig farmers and hunters to achieve close monitoring/surveillance of outbreaks, timely notification of outbreaks and collection of epidemiological information. Finally, it is important to be proactive and preventive. After the outbreak of wild boar ASF in Belgium, the emergency plan was activated at the first time, fences were built on the border with Belgium, and preventive zones were set up according to the risk level; multi-bilateral international communication and cooperation were carried out, and a transboundary task force was established to pay close attention to the situation of the wild boar ASF epidemic in Belgium, and to actively consult with China on the *Requirements for recognition of African swine fever zoning and compartmentalization* with a view to reducing the catastrophic impact on the French pig industry in the event of an ASF outbreak. These experiences have good reference significance for ASF prevention and control and zoning construction in other countries.

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Conflict of Interest

The authors declare no conflicts of interest.

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