

The Effects of African Swine Fever Virus On Romanian Agriculture

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Abstract

Starting with July 31, 2017 - the first outbreaks of African swine fever virus or A.S.F.V in domestic pigs were reported in households in Satu Mare County was initially introduced with pork products purchased from Ukraine and introduced illegally in the country. In 2018, the swine fever virus Africans entered Romania with wild boars in the border area with Ukraine, initially in the households of Satu Mare County and later in Tulcea county, the Ceatalchioi area spreading with a fairly high speed, affecting the whole country. The disease has rapidly evolved in domestic pigs, mainly due to the uncontrolled movements of animals, meat, and pork products from the outbreak areas to the unaffected areas. In parallel, there have been cases of African swine fever virus in wild pigs. Due to the specific situation of Romania, with many pigs raised in households, with pigs raised in open systems; animals being free, the epidemic spread very quickly, with a significant impact on herds of pigs due to mortality and disease eradication measures, which require preventive euthanasia of the entire contaminated herd. This paper is planning to analyze the outcome of African swine fever virus onto Romania's economy and propose measures to stop the spread of the virus. One of the main objective is to provide the snapshot of Romanian economical situation regarding livestock, to highlight the importance of local farms and therefore its major impact on economy.

Key words: swine fever, pork, livestock, African swine

J.E.L. classification: Q12, Q13, Q14, H84

1. Introduction

A.S.F.V. (short for African swine fever virus) is a highly contagious disease with a lethal end produced by a virus very resistant to environmental conditions and in food (in frozen meat, it can last up to 3 years), affecting all categories of pigs, both domestic and wild. These biological features and the very high resistance have made the production of an effective vaccine impossible to achieve so far. However, several laboratories are now working to create a vaccine that is estimated to be released in 2023. The severity of this virus is mostly due to its impact on international and national commerce with pork meat and other related products; furthermore, this also has a significant impact on a microeconomic level, by its spread to small family farms that are raising pigs for consumption. (Danzetta M., et al., 2020)

Regarding the spread of this virus at this time, there are not enough studies on its spread through feed, water, insects, and rodents. One of the main proven vectors, excluding the classical ways of contamination, is the human factor. By non-compliance with biosecurity conditions (contact with healthy pigs at the same time as contact with other pigs or products or equipment that have come into contact with contaminated lots, transport of pigs to different locations without documents and without sanitary-veterinary checks (E.C., 2021a)

2. Theoretical background

African swine fever (A.S.F.), which is enzootic in many African countries, has entered the Italian island of Sardinia since 1978, but due to the geographical peculiarities of the area, the disease has not spread to the mainland. Since 2007, it has been evolving in the eastern Caucasus states, probably from Africa to Georgia, from where it spread to Russia, Ukraine, and Belarus. It has evolved in the past on the European continent, in Spain, Portugal, France, the Netherlands, and Italy. Since January 2014, the E.U. Member States has reported several thousand cases of wild boar and several dozen outbreaks: Lithuania, Latvia, Poland, and Estonia (E.F.S.A.,2021). 2020 was the year that European Food Safety Authority started to raise awareness over this disease.

The study conducted by Mačiulskis et al. (2020) states that after the first infection detected with wild boars, 86% percent of the territory in Lithuania was affected, and the diseases remained endemic within the wild boar population. However, the eradication of the diseases is somewhat tricky since of the long lifespan of Ornithodoros ticks and also the possibility to spread towards domestic pigs; furthermore, the infection of wildboars is another issue, as Gauderault N. et al. (2020) argues. The virus is transmitted by both indirect and direct contact between animals, via infected swine and its products. (Danzetta M., et al., 2020)

3. Research methodology

This paper is using data extraction analysis and interpretation. The considered period is 2018 until October 2021, in regard to all the information gathered. The research is also based on work field experience, courtesy of one of the authors. The data comparison observes the peaks and lows of the swine fever virus in Romania and its repercussions on the economy. The data will be combined with proposed measures in order to slow or to possibly clear the swine fever virus from Romanian territory.

4. Findings

In Romania, the effects of African swine fever virus have been felt since 2018, when the virus first entered a commercial pigfarm in Tulcea County, requiring the euthanasia of 35,000 pigs.

As a result, in the period 2018-2021, the Romanian authorities had to implement a series of measures recommended by the European Commission to combat African swine fever virus. The main recommended measures were to establish a legislative framework focusing on the sizing of pig farms under strict biosecurity rules on households and the control of pig movement. (M.A.D.R., 2018)

In the absence of implementing the recommended measures and due to poor management of the disease, uncontrolled movement of pigs and meat products in households, and deficient biosecurity conditions in households, the disease has spread to almost the entire country. As a result, Romania registered between July 31, 2017 - September 24, 2021, a total of 5,238 outbreaks in domestic pigs and approx. 5,874 cases in wild boars and approx. 1,263,981 domestic pigs, respectively 29.8% of the average population in the last five years. Out of the total of 5,238 outbreaks recorded between July 31, 2017 - September 24, 2021, in domestic pigs, approximately 122 outbreaks were recorded in commercial farms and type A farms, where most pigs were killed (approx. 1,105,147 pig heads in total, of which we estimate that approximately 81,000 breeding sows represent 60% of the breeding capacity of commercial farms), as it is shown in table 1 below.

Table no. 1 Situation of existing and dead/ethanized herds since 2018 until now

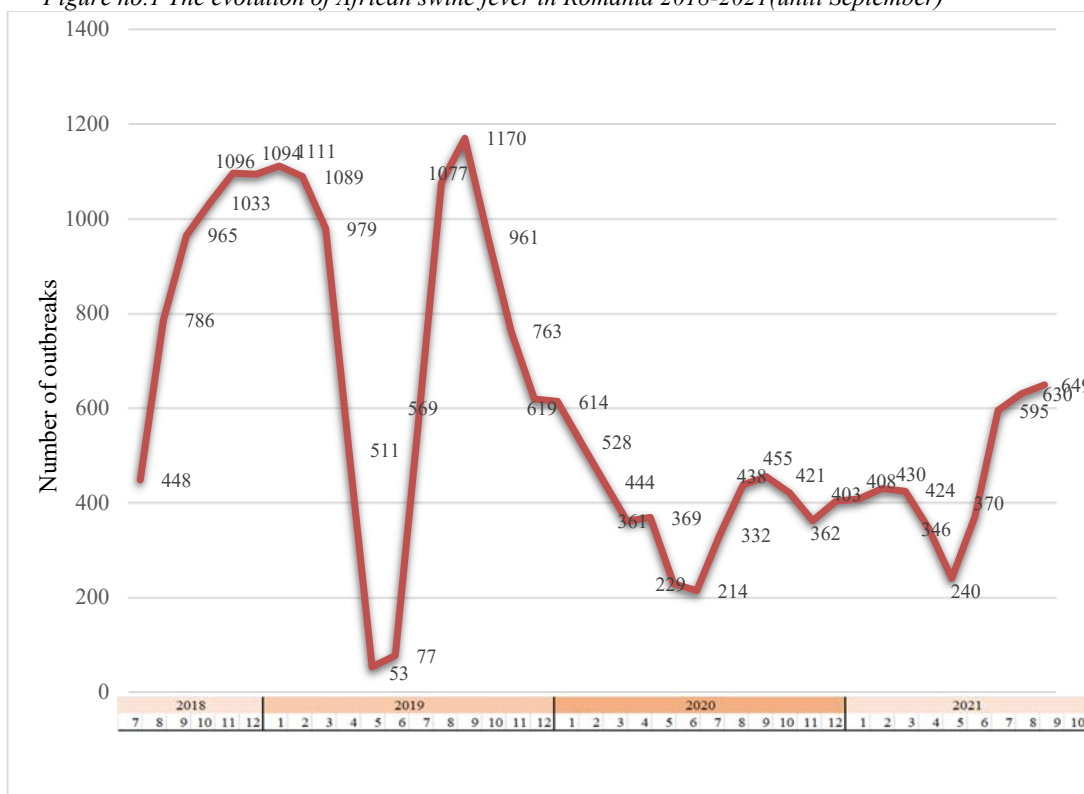
Total number of pigs (heads)	Total dead pigs		Households of the population			Commercial farms		
	Number 3=(5+8)	% col 3/2	Total dead pigs (heads)	of which		of which		
		0		dead (heads)	dead + killed + preemptive y slaughtered (heads)	Killed pigs + dead (heads)	Cremate d corpses (heads)	Buried corps (heads)
4.240.166	1.263.981	29.8%	158.834	0	158.834	1.105.147	0	1.105.147

Source: (combined data from A.N.S.V.S.A./D.S.U./D.S..V/City Council, E.C 2021b, 2021 and author's own calculation)

During this period, professional pig farms affected by the A.S.F.V. pandemic were forced to euthanize and bury (or incinerate) the entire herd of pigs, or if in an area 10 km around an A.S.F.V outbreak is a pig farm according to U.S. regulations. Applied in Romania, all deliveries are blocked for at least 60 days. These situations have led to a decrease in the number of pigs, economic losses of commercial farms, and a deficit of pork produced in Romania.

According to the centralized data for this whole period, at a national level, in the administrative-territorial area, there were outbreaks of African swine fever in 1,883 localities for domestic pigs and specific cases in 696 hunting funds for wild pigs within the administrative-territorial area of 41 counties of 5,238 outbreaks of A.S.F. to be observed in figure 1 below. At the level of the European Union, Romania is one of the countries most affected by the African swine fever virus.

Figure no.1 The evolution of African swine fever in Romania 2018-2021 (until September)



Source: (A.N.S.V.S.A. 2021, E.C. 2021b and author's own calculation)

The epidemic is severe; if no measures are taken to stop the disease, it can lead to the disappearance of the entire herd of pigs on the territory of a country.

The economic outcome

According to the E.C. (European Council) Regulation no. 349/2005 (E.C., 2005) establishing the rules on Community financing of emergency interventions and the control of certain animal diseases referred to in Council Decision 90/424 / E.E.C. (E.E.C., 1990) and GD 1214, 07.10.2009 (H.G., 2009) updated with GD 484 / 05.07.2018 (H.G., 2018) on the methodology for establishing and payment of compensation due to owners of animals slaughtered, killed or otherwise affected in order to rapidly eliminate outbreaks of communicable animal diseases; specific compensation is granted for the entire herd of pigs considered contaminated. The respective compensations shall be granted for both professional and non-professional holdings or for which compensations have been granted in accordance with certain conditions:

- Pigs should be registered in the National Animal Identification and Registration System.
- Following the epidemiological investigation carried out by the veterinary inspectors; it is found that all the biosecurity conditions imposed by the legislation in force for each type of holding have been met.

So far, 15,200 professional and non-professional farms have been compensated. The total value of the compensations paid on May 31, 2021, was 512,540,690 lei (approx. 102,508,138 Euro).

For a professional farm, these compensations cover only the market value of the pig herd at the date of the declaration of the outbreak, which was euthanized, excluding the pigs which died during that period. Expenses related to euthanasia, cleaning, disinfection, staffing, utilities, etc., during the sanitary vacuum period until repopulation is borne by the farmer. A specific situation for Romania that is very difficult to adapt to E.U. legislation (due to the many non-commercial or subsistence farms in the country) and which results in significant economic losses is the following: If an outbreak of A.S.F.V. is detected, quarantine is established within a radius of 10 km around the outbreak, the movement of pigs in that area will be prohibited; if there is a commercial farm in that area, deliveries will be prohibited for 30-40 days, after which they will be allowed only by directing them to a slaughterhouse that has the possibility of heat processing. The restrictions are going to be lifted after no more than 60 days, proving that the laboratory results are negative for the African swine fever virus. The checks will be done overall swineherds in the whole restricted area.

5. Results and discussions

A significant number of pig farming companies that have been affected either by direct contamination with the African swine fever virus and euthanasia of the entire herd of pigs or by quarantines blocking the activity have entered into a financial deadlock. At present, a large part of the farms directly affected by the African swine fever virus have remained in conservation, and they no longer have the financial support to reopen production. Moreover, some of the farms indirectly affected were forced to close their activities later.

In conclusion, according to the data from this period 2018 - 2021, we see a decrease in the total number of pigs produced in Romania, the trend remaining downward, as is shown in table 2 and figure 2. A considerable number of outbreaks, especially on professional farms or registered in August – September 2021

Table no. 2 Total number of pigs, sows, and piglets (thousand heads)

SPECIFICATION

Existing pig herds at 30.06.2021

*Different +/-
between*

2018	2019	2020	2021	2019	2020
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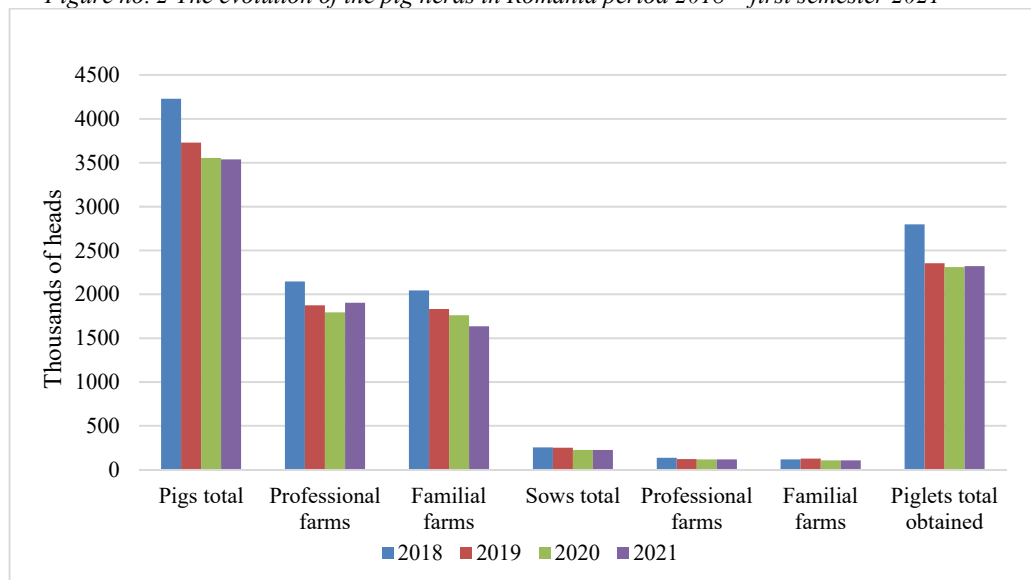
PIGS TOTAL - from which :	4.228	3.730	3.555	3.538	-192	-17
<i>Pig breeders, from which :</i>	4.228	3.730	3.555	3.538	-192	-17
<i>Professional farms</i>	2.184	1.847	1.794	1.903	56	109
<i>Familial farms</i>	2.044	1.883	1.761	1.635	-248	-126
SOWS TOTAL – from which:	255	251	225	226	-25	1
<i>Pig breeders, from which:</i>	255	251	225	226	-25	1
<i>Professional farms</i>	136	123	118	119	-4	1
<i>Familial farms</i>	119	128	107	107	-21	0
PIGLETS TOTAL OBTAINED	2.797	2.355	2.311	2.323	-32	12

Source: (A.N.S.V.S.A.,2021 and E.C. 2021b)

This particular situation affects the farm from an economic point of view, practically blocking the pig outputs and consequently the financial inputs; some of the issues that arise are:

- Additional feed costs due to impossibility of deliveries
- Impossibility to comply with contractual commitments
- Impossibility to comply with welfare conditions
- Overcrowding of the farm due to limited space
- Euthanizing animals due to lack of space
- Selling animals at a lower price due to excess weight

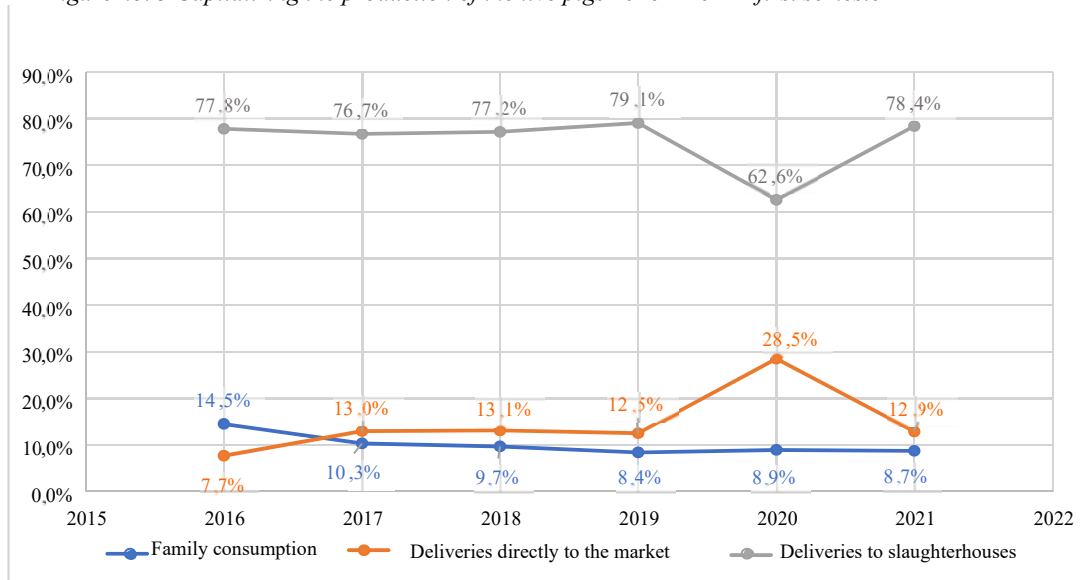
Figure no. 2 The evolution of the pig herds in Romania period 2018 – first semester 2021



Source: (M.A.D.R. operational information and Carcass classification commission 2021 and author’s own calculation)

Analyzing the existing data, we find a decrease in the last four years of pig herds in Romania, and this phenomenon is caused mainly by the impact of African Swine Fever in the pig breeding sector and the difficulty of reopening some farms affected by this epidemic. Starting with 2020, due to the decrease in the number of pigs in the country, deliveries of live pigs directly on the market have increased significantly following a return to normal in 2021, which in the evolution of swine fever over European pigs almost doubled compared to 2018 and 2019. At the same time, deliveries of live pigs to slaughterhouses fell sharply in 2020, with a return in the first quarter of 2021, the pork deficit was supplemented by imports. The segment that remained constant is the one represented by the family consumption of pork from one's own household, as can be seen in figure 3 below.

Figure no. 3 Capitalizing the production of the live pigs 2016 – 2021 - first semester



Source: (operating information M.A.D.R., 2021 and author's own calculation)

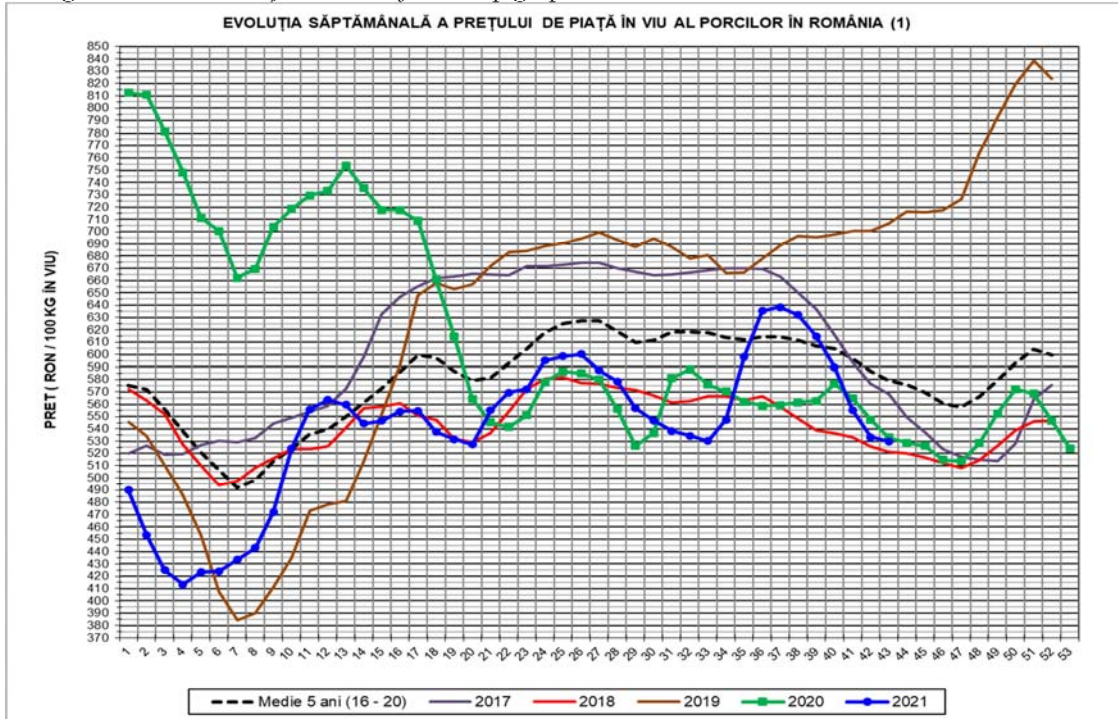
Starting with 2019 and until the first half of 2020, the live selling price of pigs was the highest in the last six years. Due to the significant impact of A.S.F.V. on pig production in several Asian countries, especially China, which is losing more than 50% of its pig population, the demand for pork in this country has been very high; practically, the demand would be 80% of the total pork production in the E.U.

China's demand will be partially covered by imports; the impact has led to a significant increase in prices due to limited supply of pork, constant market demand, coverage of the meat shortage in this country from the E.U., U.S.A., Brazil, etc. Germany being one of the leading exporters of in 2019, pork exported 1,020,000 tons of meat, of which 601,000 tons of meat to China; due to these volumes, the price of pork was set on the stock exchange of this country.

All this demand for pork from 2019 was also found in Romania, the offer being reduced due to the evolution of African swine fever virus determined the increase of prices by 45% compared to the average.

Since 2020, E.U. pork production has declined slightly due to the spread of the African swine fever virus to other countries, such as Poland and present-day Germany. China and several Asian countries have blocked imports from Germany, other E.U. exporters have managed to fill the gap by increasing their exports. Given the impact of the Covid-19 pandemic and the limitations imposed, prices that rose in 2019 began to fall towards the 5-year average as a result of declining food services. Since the middle of the year, its prices have stabilized with a slight upward trend due to the return of food services and rising world demand; but due to the decrease in E.U. export volumes to China, the price decreased to an average of 5 years as Figure no.4 shows.

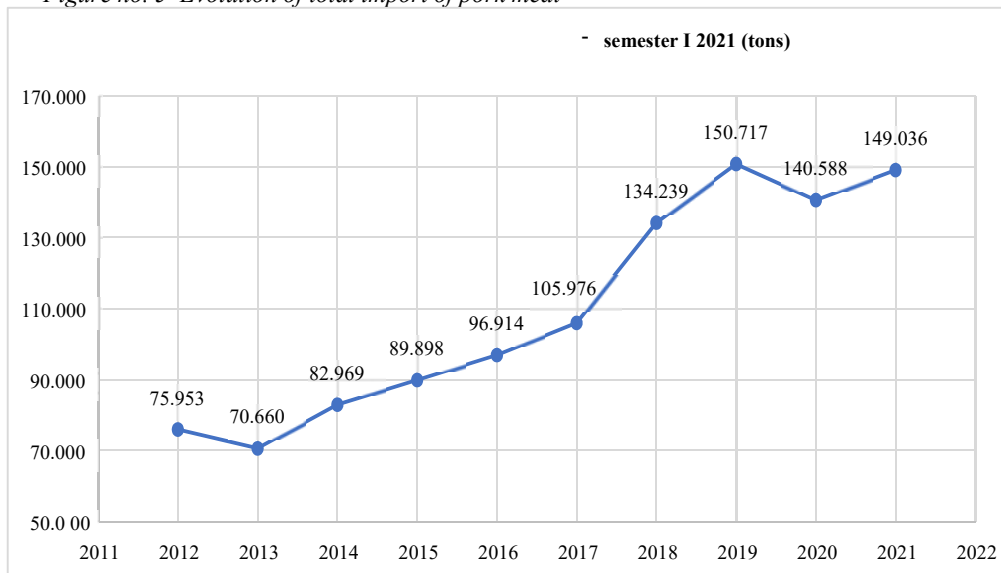
Figure no. 4 The weekly evolution of the live pigs' price



Source: (Carcass Classification Commission, 2021)

Regarding pork imports, they increased every year, registering an increase of about 110 thousand tons per year, compared to 2016, the year before the African Swine Virus., accentuating the imbalance of the trade balance by about 220 million euros/year, shown in figure no.5 below.

Figure no. 5 Evolution of total import of pork meat



Source: (M.A.D.R. operative data 2021, and author's own calculation)

6. Conclusions

Considering the presented above, we notice a drastic decrease in the pig herds on the Romanian territory, the meat deficit on the market was supplemented by imports from intra-community trade, producing an imbalance of the financial balance.

The duration in which a commercial pig farm will produce the first salable product from the moment of insemination of the sows can be at least nine months for 30 kg piglets and one year for slaughter pigs (110 kg). The calculated financial loss of a farm of 6,000 sows from the moment the outbreak is declared until the delivery of the first piglets is approximately 2,000,000 euros.

Many commercial farms that were directly or indirectly affected by the S.A.F. virus remained permanently closed.

Although substantial investments for the implementation of increased biosecurity measures were made by most commercial farms both from their own resources and through financing with P.N.D.R. (National program for rural development) funds through sub-measure 5.1; due to insufficient studies on the mode of transmission, the virus has managed to enter farms verified and listed as meeting all biosecurity conditions. Epidemiological investigations carried out by the authorities after the outbreak was declared did not find any gaps where the virus would have managed to enter the farm, at least through the means known so far.

In order to control this epidemic, the involvement of the authorities through concrete measures such as:

- Publication of the A.N.S.V.S.A. (National Sanitary Veterinary and Food Safety Authority) Order for the approval of the Veterinary Sanitary Norm regarding the biosecurity conditions in pig farms according to the requests of the European Commission - E.U.V.E.T. (European Veterinary Emergency Team)
- Carrying out a national program for informing and educating the population about the causes, evolution, and individual and community losses in case of African swine fever virus, prevention measures, consequences, and sanctions for breeders who violate the legal provisions (M.A.D.R., 2018)
- Issuance of an A.N.S.V.S.A. (Romanian national sanitary- veterinary association) Order on how to verify compliance with biosecurity conditions and how to control the movement of pigs on farms
- Streamlining the passive wildlife surveillance program to ensure that the African swine fever virus is detected at an early stage. In the absence of the correct implementation of this program, the detection of the disease delays and, consequently, the implementation of control measures, increasing the risk of subsequent spread to domestic pigs, especially in non-professional holdings, which happened in 2018.
- Application of the biosecurity requirements provided by the National Committee for Special Emergency Situations in the national plan to eradicate African swine fever virus in wild pigs in Romania. Outbreaks of African swine fever virus generated in households by the transmission of African swine fever virus from wild boars produce severe effects for commercial farms that are restricted in the movement of livestock for long periods of time and record significant financial losses, impossible to recover
- The application of effective, proportionate, and dissuasive sanctions, in particular for deviations from the rules on the identification/registration of pigs and the rules on the movement of pigs. Creation of "green" and/or "green areas" corridors so that commercial holdings can operate and avoid bankruptcy and the application of measures to stimulate peasant / non-commercial households to temporarily give up pig production.

7. References

- Carcass Classification Commission, 2021. *Comisia de clasificare a carcaselor [Carcass Classification Commission]*. [online] Available at : < www.cceurop.ro > [Accessed 22, November 2021]
- European Council, 2021a. *African swine fever, European Council*. [online] Available at:<https://ec.europa.eu/food/animals/animal-diseases/diseases-and-control-measures/african-swine-fever_ro> [Accessed 25, November 2021]

- European Council, 2005. *E.C. 349/2005* [online] Available at : < <https://eur-lex.europa.eu/legal-content/RO/TXT/PDF/?uri=CELEX:02005R0349-20080822&from=GA>>
- European Council, 1990. *COUNCIL DECISION of 26 June 1990 on expenditure in the veterinary field (90/424/EEC)* [online] Available at: < <https://eur-lex.europa.eu/legal-content/GA/TXT/?uri=celex:31990D0424>> [Accessed 25, November 2021]
- European Council, 2021b. *Production by country, European Council* [online] Available at : < https://ec.europa.eu/info/food-farming-fisheries/farming/facts-and-figures/markets/production/production-country_en> [Accessed 25, November 2021]
- European Food Safety Authority, 2021. *African swine fever* [online] Available at: <<https://www.efsa.europa.eu/en/topics/topic/african-swine-fever>> [Accessed 25, November 2021]
- Gaudreault Natasha N., Madden Daniel W., Wilson William C., Trujillo Jessie D., Richt Juergen A., 2020. African Swine Fever Virus: An Emerging D.N.A. Arbovirus, *Frontiers in Veterinary Science*, Volume 7, 2020 pp.215, DOI=10.3389/fvets.2020.00215 ISSN=2297-1769 [online] Available at: <<https://www.frontiersin.org/article/10.3389/fvets.2020.00215>> [Accessed 15, November 2021]
- Maria Luisa Danzetta, Maria Luisa Marenzoni, Simona Iannetti, Paolo Tizzani, Paolo Calistri and Francesco Feliziani, 2020. African Swine Fever: Lessons to Learn From Past Eradication Experiences. A Systematic Review, *Frontiers in Veterinary Science*, 09 June 2020 | <https://doi.org/10.3389/fvets.2020.00296> [online] Available at: <https://www.frontiersin.org/articles/10.3389/fvets.2020.00296/full> [Accessed 25, November 2021]
- Ministry of Agriculture and Rural Development - M.A.D.R., 2018. *Measures against African swine fever virus*, [online] Available at: <<https://www.madr.ro/docs/agricultura/PPA-procedura.pdf>> [Accessed 25, November 2021]
- Ministry of Agriculture and Rural Development - M.A.D.R., 2021. *Swine* [online] Available at: <<https://www.madr.ro/cresterea-animalelor/porcine.html>> [Accessed 11, November 2021]
- Mačiulskis, Petras, Marius Masiulis, Gediminas Pridotkas, Jūratė Buitkuvienė, Vaclovas Jurgelevičius, Ingrida Jacevičienė, Rūta Zagrabskaitė, Laura Zani, and Simona Pilevičienė. 2020. "The African Swine Fever Epidemic in Wild Boar (*Sus scrofa*) in Lithuania (2014–2018)" *Veterinary Sciences* 7, no. 1: 15. <https://doi.org/10.3390/vetsci7010015>
- National Sanitary Veterinary and Food Safety Authority - A.N.S.V.S.A., 2021. Actualizarea situației privind evoluția Pestei Porcine Africane [Actualization regarding African swine fever virus evolution] [online] Available at: < <http://www.ansvsa.ro/blog/actualizarea-situatiei-privind-evolutia-pestei-porcine-africane-105/>> [Accessed 22, November 2021]
- Romanian Government, 2009. *HOTĂRÂRE nr. 1.214 din 7 octombrie 2009 [Government Decision no. 1,214 from 7 October 2009]* [online] Available at: <<http://legislatie.just.ro/Public/DetaliiDocument/112910>> [Accessed 21, November 2021]
- Romanian Government, 2018. *HOTĂRÂRE nr.484 din 5 iulie 2018 .[Government Decision no. 484, from 5 July 2018]* [online] Available at : <http://www.cdep.ro/pls/legis/legis_pck.htm_act?ida=151957> [Accessed 20, November 2021]