



AGENCE FRANÇAISE
DE SÉCURITÉ SANITAIRE
DES ALIMENTS

Maisons-Alfort, 16 October 2009

Opinion

of the French Food Safety Agency on the surveillance measures to be implemented in France on pig farms for the 2009 A (H1N1) influenza virus, and the control measures to be implemented in case of outbreaks in pigs

DIRECTOR-GENERAL

Review of the request

On 13 August 2009, the Directorate General for Food (DGAL) and the Directorate General for Health (DGS) submitted a joint request to the French Food Safety Agency (AFSSA) to evaluate various measures that could be implemented on pig farms to control the epidemic of human influenza caused by the 2009 A (H1N1) influenza virus and also the risk of consuming meat and meat-based produce from infected swine.

This Opinion deals with questions concerning the surveillance process to be set up in France on pig farms with respect to this virus and the measures for controlling possible outbreaks of the 2009 A (H1N1) influenza virus in pigs.

Report of the 'Swine Flu' emergency collective expert assessment group

The available members of the 'Swine Flu' emergency collective expert assessment group ('IP' GECU), appointed on 22 May 2009, met at AFSSA and communicated by e-mail and telephone on 11, 14 and 24 September 2009 and drew up this report and its conclusions:

"Context

- *The European Community guidelines concerning measures for monitoring and combating the pandemic caused by the H1N1 influenza virus in pig farms recommend setting up targeted surveillance on farms for which there is an epidemiological link with a case of human infection with the 2009 A (H1N1) influenza virus .*
- *They also suggest isolating any infected farm, and prohibiting the movement of animals off the farm until seven days after the influenza symptoms have ceased, while also stating that the slaughter of the pigs is not recommended.*
- *In its Opinion no. 2009-SA-0126 concerning the zoonotic risk associated with the H1N1 A/California/04/2009 virus in the context of French farming, dated 15 May 2009, AFSSA underlined the importance of maintaining epidemiological surveillance of influenza syndromes on pig farms, as currently applied in France.*
- *The Agency also recommended that experimental studies be undertaken into the eventuality of cross-protection for pigs against the H1N1 A/California/04/2009 virus by means of bivalent inactivated vaccines currently used in France.*

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Questions raised

The DGAL has requested AFSSA's opinion on:

- the surveillance procedure for influenza strains circulating on a pig production unit set up at the AFSSA station of Ploufragan: "Does this surveillance need to be reinforced? If so, what surveillance plan is recommended?"
- measures for combating the 2009 A (H1N1) influenza virus in the event of an outbreak among pigs in France:
 - "Would these methods be sufficient to prevent the virus from spreading? Are any other measures necessary to counter the risk of spreading?"
 - "Concerning surveillance, is any specific surveillance necessary on farms (pig farms, or possibly poultry farms) located in the vicinity of the infected farm and/or any farms with an epidemiological link?"
 - "Would it be possible to vaccinate the pigs? If so, by what means and using which vaccine (given our current knowledge)?"
 - "What are the recommended preventive measures to be applied for those who by profession are the most exposed (farmers, veterinarians technicians, farm workers) and have been or are in contact with animals likely to be infected with the A/HN1v virus in the event of an outbreak occurring on a farm?"

Assessment method

Following the meetings of the 'IP' Gecu at AFSSA and by telephone on 11, 14 and 24 September 2009, the scientific coordination committee of the 'Animal Health' Scientific Panel wrote a report that was jointly drafted by the members of the 'IP' Gecu communicating with e-mail and validated on 12 October 2009.

The assessment was carried out on the basis of:

- documents supplied by the requesting bodies:
 - the letter of request, dated 13 August 2009;
 - the annexe "Influenza A H1N1 – biosecurity measures on pig farms";
 - the "Working document on surveillance and control measures for the pandemic 2009 A (H1N1) influenza virus in pigs" issued by the European Commission;
- AFSSA Opinion no. 2009-SA-0126 concerning the zoonotic risk associated with the H1N1 A/California/04/2009 virus in the context of French pig farming, dated 15 May 2009, that can be consulted online at the following URL:
<http://www.afssa.fr/Documents/SANT2009sa0126.pdf>
- AFSSA Opinion no. 2009-SA-0230 concerning the risks presented by the 2009 A (H1N1) influenza virus for humans, measures for monitoring and controlling outbreaks of the virus among pig populations as laid down in the European Community guidelines concerning this virus and specific biosecurity measures for pig farms dated 30 September 2009;
- official notifications to the World Organisation for Animal Health of cases of 2009 A (H1N1) influenza virus in pigs in Northern and Southern Ireland, available at the following URLs:
http://www.oie.int/wahis/public.php?page=single_report&pop=1&reportid=8451,
http://www.oie.int/wahis/public.php?page=single_report&pop=1&reportid=8465,
http://www.oie.int/wahis/public.php?page=single_report&pop=1&reportid=8473,
http://www.oie.int/wahis/public.php?page=single_report&pop=1&reportid=8491,
- information available on this subject on the ProMED website, available at the following URL:

http://www.promedmail.org/pls/otn/f?p=2400:1001:633689515128346::NO::F2400_P1001_BACK_PAGE,F2400_P1001_PUB_MAIL_ID:1004,79468;

- various scientific articles listed in Annexe 2 of this opinion;
- discussion among the experts of the 'IP' Gecu .

Discussion and recommendations

1/ Surveillance measures: "Does this surveillance procedure [implemented by AFSSA at Ploufragan] need to be reinforced? If so, what surveillance plan is recommended?"

a) Current surveillance in France

At the moment, there is no specific surveillance procedure for swine influenza viruses (SIVs) in France. The principal information today about the circulation of SIVs in France, mostly in Brittany, has been collected by AFSSA's Ploufragan laboratory in the context of national or European **research projects**. This mainly concerns farms in Brittany where pigs showed respiratory symptoms, sentinel farms and, for all of continental France, animals at slaughterhouses (see Annexe 1).

b) Recommendations made by the European Commission

The guidelines concerning measures for monitoring and combating the pandemic influenza (H1N1), 2009 virus in pigs, issued by the European Commission, indicate that surveillance of the virus on pig farms should be carried out either when there is a clear epidemiological connection with human cases and when a risk of transmission from humans to pigs is suspected or when the influenza syndrome is observed in pigs.

c) Goal of surveillance in France

For France, the 'IP' Gecu confirmed (see Opinion no. 2009-SA-0230) that the goal of monitoring SIVs on farms should be to isolate and make a posteriori studies of SIVs in circulation in order to follow their evolution and try to understand their dynamics, with a view to adapting diagnostic resources and prophylaxis measures (vaccines in particular).

It considers **that a network should be put together for the epidemiological surveillance of SIVs**. This surveillance should investigate a sample of swine flu outbreaks and a percentage of all SIV strains. The Gecu stresses that it would be practically and functionally impossible to detect all SIV strains (new or already in circulation in France) immediately, particularly because of the large number of analyses that would be needed to reach such a target and because of the frequency of flu-like syndromes observed on pig farms but not caused by SIVs.

Surveillance therefore should aim to reach the goal defined above, i.e. to undertake a posteriori monitoring of SIV strains circulating among pigs in continental France and to adapt SIV diagnostic and preventive measures on pig farms.

d) Epidemiological surveillance procedures to be implemented in order to reach the goal

- The surveillance recommended by the European Commission is partially based on the prior detection of human cases. Since the latter are no longer confirmed by the Member States' public health authorities, their detection is more random than in the past. However, so as to prevent spreading of the influenza virus among farms and in accordance with good husbandry practices, the 'IP' Gecu recommends, whenever a person working in contact with pigs is **suspected of being infected** with the 2009 A (H1N1) influenza virus :

- that s/he comply with all specific biosecurity measures for the Influenza A (H1N1) 2009 virus, which include ceasing all contact with pigs, as indicated in the AFSSA Opinions nos. 2009-SA-0126 and 2009-SA-0230,
- that suspicion of infection with the 2009 A (H1N1) influenza virus be verified in this individual,
- that movement of the pigs to other farms be suspended until the analytical results have been obtained.

In the event that **infection is confirmed**, the Gecu also recommends,

- that the farm's pigs be put under clinical surveillance for the first ten days that they are no longer exposed or for seven days after the flu symptoms cease if the pigs have been infected (see below 2.1);
 - that movement of the pigs to other farms remain suspended during this period.
- Moreover, the European Commission document recommends surveillance of farms on which respiratory symptoms suggesting an SIV infection have been observed in pigs.
As the isolation of SIVs using nasal swabs taken from live animals has a greater chance of succeeding during the disease's febrile period (Kuntz-Simon, personal communication, September 2009; Olsen et al., 2006), surveillance should focus on farms on which the animals show flu symptoms, even if the latter are minor, since some SIV strains can circulate without causing an acute influenza syndrome.
 - Surveillance of SIVs in France should include the use of 'sentinel' veterinarians responsible for detecting potential swine-flu outbreaks and for sending samples to the laboratory for initial analyses before they are sent to the national reference laboratory if SIV strains have been detected.

The Gecu therefore recommends creating and structuring a national network for the epidemiological surveillance of SIVs:

- based on the surveillance (isolation and in-depth characterisation) of SIV strains circulating on farms in continental France;
- investigating pig farms in which the animals show possible flu symptoms;
- relying on 'sentinel' veterinarians with knowledge of SIVs and
- on specialised laboratories supervised by the SIV National Reference Laboratory;
- in close collaboration with the epidemiological surveillance networks for influenza viruses in birds and humans.

2/ Measures for combating the 2009 A (H1N1) influenza virus in the event of an outbreak among pigs in France

2.1 "Would these methods be sufficient to prevent the virus from spreading? Are any other measures necessary to counter the risk of spreading?"

- As indicated in the AFSSA Opinion no. 2009-SA-0230 concerning the potential risk of infection with the Influenza A (H1N1) 2009 virus for humans, the measures for monitoring and preventing infection in pig populations recommended by the European Commission guidelines on this virus and specific biosecurity measures for

pig farms, the 'IP' Gecu affirmed that biosecurity measures implemented on farms, whether they are general or specific to the 2009 A (H1N1) influenza virus cannot **entirely** prevent the spread or introduction of a pathogenic agent on a farm, but can help reduce the risk that this will occur.

- **The majority of the members of the 'IP' Gecu consider that the measures proposed in the European Community guidelines to combat infection with the 2009 A (H1N1) influenza virus are sufficient** to stop the virus from spreading. These guidelines include prohibiting movement of the infected animals off the farm for seven days after the flu symptoms (fever, anorexia) have ceased. The members of the 'IP' Gecu consider the recommendation to not slaughter the infected animals to be relevant.
- **On the other hand, two members of the 'IP' Gecu do not find these measures to be adequate**, and they recommend not introducing sensitive pigs, and particularly young gilts from an uninfected farm, or sensitive poultry if it is a mixed farm, among the infected livestock, until seven days after the symptoms disappear (see 2.2).

2.2 "Concerning surveillance, is any specific surveillance necessary on farms (pig farms, or possibly poultry farms) located in the vicinity of the infected farm and/or any farms with an epidemiological link?"

- As stated in point 1.1 of this opinion, surveillance involving isolation of animals infected with the SIV is only relevant, given our current knowledge, on pig farms on which symptoms have appeared (Kuntz-Simon, personal communication, September 2009; Olsen et al., 2006¹).
- The members of the 'IP' Gecu therefore emphasise the importance of monitoring surveillance plan based on the onset of clinical symptoms (even if minor) on pig farms with an epidemiological link or in the vicinity of farms infected with SIVs.
- This clinical surveillance should also apply to any turkey and quail farms that are in the vicinity of an infected farm, given the sensitivity and susceptibility of these poultry species (Andral et al., 1984; Hinshaw et al., 1983; Jestin V., data of the avian influenza NRL, personal communication, September 2009; Swayne, 2009). If a clinical symptom appears, and particularly egg drop syndrome in breeding flocks, samples should be taken for virological analysis (Fenner et al., 1987).

2.3 "Would it be possible to vaccinate the pigs? If so, by what means and using which vaccine (given our current knowledge)?"

- In its Opinion no. 2009-SA-0126 concerning the zoonotic risk associated with the H1N1 A/California/04/2009 virus in the context of French farming, dated 15 May 2009, AFSSA pointed out that one of the bivalent inactivated vaccines authorised for marketing and marketed in France is prepared, among other things, from the A/Fort Dix/1976 strain, a classical swine H1N1 strain. This vaccine could partially protect vaccinated pigs against the 2009 A (H1N1) influenza virus, in which the encoding HA gene for the H1 type comes from the classical swine H1N1 virus.
- Without prematurely judging the efficacy of this bivalent vaccine against the 2009 A (H1N1) influenza virus, the emergency vaccination of pigs on an infected farm does not appear to be a useful preventive measure, particularly given the time needed for animals to acquire immunity (only partial with this virus) after the initial vaccination and the speed at which SIVs spread in infected herds and farms.

- *Apart from any acute clinical influenza episode, the adjuvanted inactivated vaccine prepared from the A/Fort Dix/1976 strain could potentially protect pigs against subtype H1N1 SIVs, depending on a cost/benefit discussion between the farmer and the veterinarian. To the extent that this vaccine might offer protection, even partial, against the 2009 A (H1N1) influenza virus, it would then be possible to limit the consequences if these animals were infected with an 2009 A (H1N1) influenza virus.*
- *Due to a possible spread of infection with the Influenza A (H1N1) 2009 virus in herds of pigs in Europe, the 'IP' Gecu recommends launching a discussion on the potential for introducing this strain into swine flu vaccines, and on the strategies for using such vaccines, particularly in pigs bred for slaughter.*

2.4 "What are the recommended preventive measures to be applied for those who by profession are the most exposed (farmers, veterinarians, technicians, farm workers) and have been or are in contact with animals likely to be infected with the A/HNnv virus in the event of an outbreak occurring on a farm?"

- *Sanitary and medical preventive measures may be recommended to those who by profession are the most exposed, in the event of an 2009 A (H1N1) influenza virus outbreak occurring on a farm.*
- **Sanitary measures:** *the recommendations of the 'IP' Gecu are given in point 3.1 of AFSSA Opinion no. 2009-SA-0230 which describes specific biosecurity measures to be adopted on infected farms. For example, it recommends wearing appropriate masks, gloves and protective clothing to keep the farm workers from being exposed to the 2009 A (H1N1) influenza virus.*
- **Medical prophylaxis measures:** *for the same reasons as those given for the emergency vaccination of pigs in the event of an outbreak of the 2009 A (H1N1) influenza virus (see point 2.3), the 'IP' Gecu considers that the emergency vaccination of workers exposed to the virus on infected farms is not a useful measure.*

Another medical prophylaxis measure would consist in vaccinating these workers before any outbreaks of the 2009 A (H1N1) influenza virus are detected in pigs. The viewpoints of the 'IP' Gecu and AFSSA on this second type of vaccination were given in the AFSSA Opinion no. 2009-SA-0230."

These are AFSSA's conclusions following its assessment of the surveillance measures to be implemented on pig farms regarding the 2009 A (H1N1) influenza virus and preventive measures to be considered in the event of infection of pigs with the 2009 A (H1N1) influenza virus.

The Director General of the French Food
Safety Agency

Marc MORTUREUX

Keywords: influenza, swine, 2009 A (H1N1) influenza virus, SIV, emergency vaccination, passive surveillance”

ANNEXE 1

SIV surveillance undertaken by AFSSA-Ploufragan in the framework of research work

- **Clinical surveillance** is carried out on pig farms in western France on a voluntary basis. Farmers who have been informed about influenza's epidemiology beforehand, and who detect influenza syndromes in their animals, can report this to their veterinarians. The latter, or epidemiologists from the AFSSA-Ploufragan station, then go to the farm to take any necessary samples.
The scheme, which is voluntary and requires involved participants, enables:
 - **virological surveillance:** the nasal swabs taken from animals with hyperthermia during farm visits enable viral isolation in around half of all cases. The isolates are then characterised in terms of their genes (using rapid molecular subtyping, sequencing, and phylogenesis) and antigens (using haemoagglutination inhibition tests or HI tests and neuraminidase inhibition tests or NI tests). The Côtes d'Armor development and analysis laboratory also sends its isolates to AFSSA-Ploufragan for characterisation. In this way, from 2005 to 2008, some sixty SIV strains were isolated in France. These included enzootic strains and new reassortant viruses.
 - **Serological monitoring:** a blood sample is taken during the first visit, at the same time as the swabs, from pigs with hyperthermia. A second blood sample is taken three weeks later from these same animals in order to highlight seroconversion, to confirm circulation of the virus on the farm and to verify that the serological and virological diagnoses are suitable (and particularly that the antigens from the serum sample are useful when screening for current infections).
The serological surveillance undertaken on pig farms affected by pulmonary disorders has shed light on the influenza situation on 125 farms in greater western France. These recent analytical epidemiological studies have made it possible to confirm the respective prevalence of enzootic SIV subtypes in Greater Western France.
- **The surveillance of sentinel farms**, introduced in Brittany in 2006, concerns a group of 22 farms. Twice a year, on each farm, blood samples are collected from ten pigs aged 22 to 25 weeks and are subjected to HI tests. If flu-like clinical episodes occur on these farms and if they are reported to the epidemiologists at AFSSA-Ploufragan, samples are taken using the same method as for general clinical surveillance (swabs and kinetic blood analyses).
- **Serological surveillance** of animals from a representative sample of slaughterhouses is currently being carried out across France as part of an epidemiology research programme. This programme aims firstly to estimate the prevalence, in the whole of continental France, of strains of enzootic European SIVs and secondly to compare it with the prevalence in Brittany.

ANNEXE 2
Primary references

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