



News & Views

China needs long-term solutions for African Swine Fever

Jun Zhao^{a,b,*}, Zhaohai Bai^a, Lin Ma^a^a Key Laboratory of Agricultural Water Resources, Hebei Key Laboratory of Soil Ecology, Center for Agricultural Resources Research, Institute of Genetic and Developmental Biology, Chinese Academy of Sciences, Shijiazhuang 050021, China^b School of Social and Public Administration, East China University of Science and Technology, Shanghai 200237, China

African Swine Fever (ASF) has received a lot of public concerns in and outside of China [1]. Currently, more than 1 million head of pigs have been culled, and the stocking number of fattening pigs and sows has been reported reduced by more than 20% (Fig. 1a, b), and the price of pork has been increased by around 30% compared with the same period in 2018 (Fig. 1c). ASF in China has also had a significant impact on the world meat market, due to its huge contribution to global pig production.

After the outbreak of ASF, the Ministry of Agriculture and Rural Affairs (MOARA) quickly enacted the emergency management. The first was culling the infected pigs; the second was banning the trans-provincial transport of live pigs and pork products from the infected regions; the third was banning the swill feeding; and the fourth was enhancing bio-security management of pig production farms. What's more, some regions took more aggressive actions to promote industrialization of pig production. Some of these policies proved to be very effective to control ASF in the short run. However, we argue here the short- and long-term impacts of ASF and its related reaction policies have been greatly underestimated.

One direct short-term impact of ASF is greatly damaging pig production. Despite that the government reported that only around 1 million head of pigs has been culled due to ASF, there is no report about how many pigs have been culled due to other diseases. There is doubt about the willingness of local government to report the ASF infections, as it will greatly influence local pig industry and may also lead to punishment of relevant officials. Besides, the compensation for the pigs culled by ASF is 50% higher than for other diseases and thus local governments may lack enough budgets [2]. So there is great doubt about the real damages of ASF in China.

Another direct short-term impact is damaging the confidence of traditional and medium industrial pig production system, in which the number of pigs produced per year is below 50 and 2000 head for a farm, respectively [2]. A recent survey by MOARA showed that the stock number of sows and fattening pigs in 7 major pig production provinces in March–June 2019 has been reduced by around 20%–40% compared with the same period in 2018. There is also some debate that the real stock number of sows which could have

been reduced by 50% compared with the same period in 2018. Currently, both pork and piglets price have reached its highest level in the past 13 months (Fig. 1c, d).

There are three major negative long-term impacts. Firstly, government has banned the trade of live pigs and pork from infected regions. However, this contradicted with the current pig production and consumption pattern among different regions. Due to the huge difference in production costs, land availability and environmental regulations, trans-provincial transportation of live pigs and pork products is common in China. The top 500 pig export counties accounted for 70% of total pig production, and government supported 2.2 billion RMB for these counties each year. Banning the trans-provincial trade of pigs has greatly impacted the self-sufficiency of pork supply in leading importing provinces in Shanghai, Guangdong, Zhejiang and Jiangsu. Meanwhile, pork price has been greatly decreased and kept at the lower level in exporting provinces in Liaoning, Heilongjiang and Jilin.

Secondly, to control further spreading of ASF virus, swill feeding has been totally banned. However, it is clearly stated in the Animal Husbandry Law that high-temperature processed kitchen waste could be used as animal feed. So, these two policies contradict each other. In addition, around 90 million tons of kitchen waste is produced per year in China [3]. It is of great importance to recycle all these kitchen waste, either as animal feed or as organic fertilizer, to protect the environment in China. Hence, long-term banning use of kitchen waste is breaking the law and has a high environmental risk. It may also be difficult to monitor the feed use in the 26 million pig production farms, who are the main consumers of raw kitchen waste.

Thirdly, considering types of farms that have been impacted by ASF, government starts to reinforce industrialization of pig production. It is suggested to speed up the elimination of traditional small-scale pig farming. Obviously, the government has foreseen the great benefits of industrialization, such as improving and monitoring the implementation of bio-security in pig farms, and using safer and more reliable feed resources. However, further industrialization of pig production is not easy with the current land policy in China. Pig production was decoupled with arable land as the pig production was intensified. Manure produced by pigs has nowhere to go, and it is either accumulated in the farm or discharged to the environment without any treatment, which becomes sources of nutrient loss and potential diffusion of ASF virus. What's more,

* Corresponding author.

E-mail address: zhaojun@sjziam.ac.cn (J. Zhao).

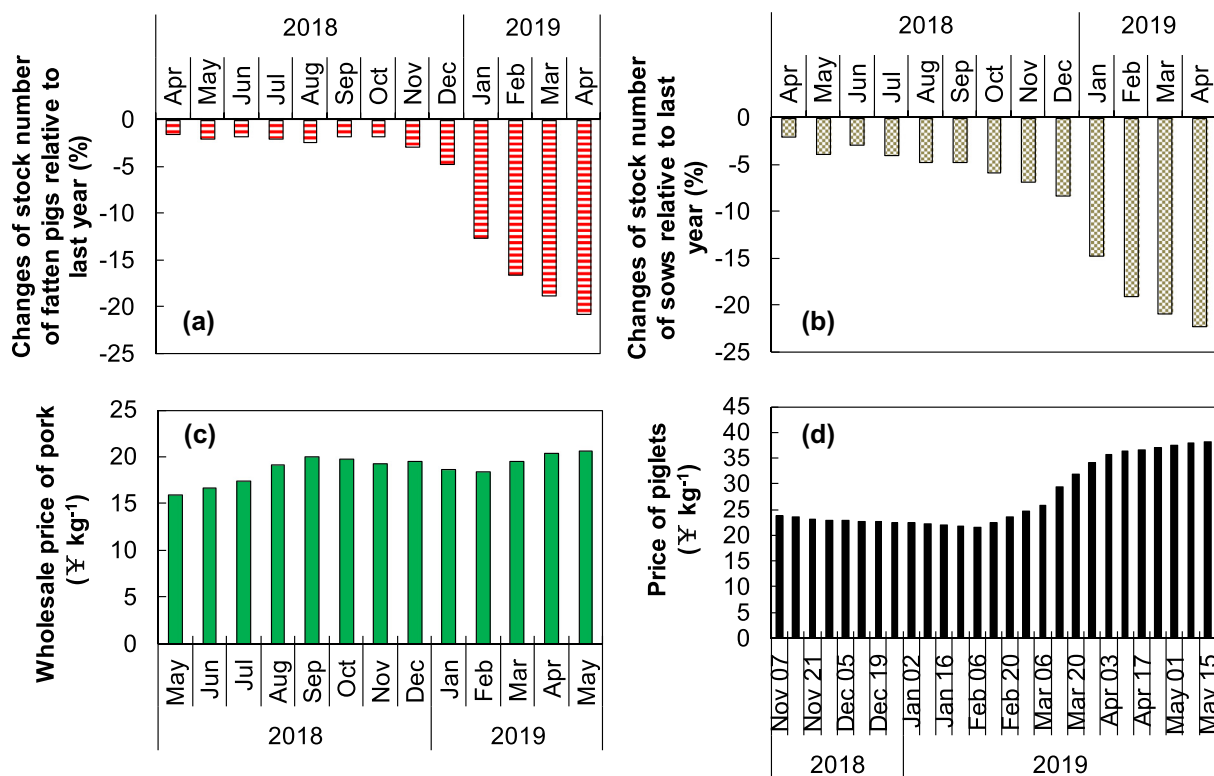


Fig 1. (Color online) Changes of the stock number of fattening pigs and sows between April 2018 and April 2019 (a, b), changes of wholesale price of pork from May 2018 to May 2019 (c), and change of price of piglets between Nov 2018 and May 2019 (d). Data derived from <http://zdsccx.moa.gov.cn:8080/misportal/public/dataChannelRedStyle.jsp>.

diminishing 26 million traditional farms requires providing job opportunities for these farmers who rely on pig production to support their family.

Successful control of the ASF is a very serious issue in China, because pig production itself is a business worth more than 1500 billion Yuan per year. If current 20%–50% reduction of pig production lasts for 5–30 years as learned from European experiences, the direct cost will be about 1.5–2.3 trillion Yuan. This ongoing large scale and long-term reduction of pig production will have enormous global impacts, as China may increase import of pork from the global market and reduce the import of soybeans, to release the pressure of deforestation in the Brazil [4].

To control ASF and maintain the pig production capacity is not easy. Some short-term and direct policies should be implemented, for example, the government should prescribe the right medicine and take effective measures in many ways. Local government should report the culled pig numbers due to not only ASF but also other type of diseases. Meanwhile, build a non-biased national system to track the stock number for sows both at the national and regional level. Additional subsidies are needed to help those traditional pig farms – which have greatly suffered from ASF more than industrial farms, to regain their confidence to raise more pigs. Eliminate the ASF is also a long-term challenge. Government should consider long-term effects of its policies, but this was not reflected in its recently released emergency response plan in January 2019. Policies need to have a solid scientific base if they are to be effective in the long run. To achieve the goal, it requires joint efforts of policy makers, scientists and the pig industry.

Policy makers should improve regulations in the following aspects. (1) Develop long-term minimum protocols for both infected pig farms and regions. These protocols need to distinguish the difference between industrial and traditional pig farms, and between pig net import and export regions. For example, build the national ASF virus regular spot check and quarantine system,

especially in the leading pig export 500 counties to ensure the national pork supply security. More laboratories should be built in these regions, to reduce the time needed for detection of ASF infections. (2) Reduce trans-provincial transportation of live pigs, and support the cold-chain pork transportation and monitoring system. This could be strengthened by spatial planning of pig production across China, which should consider environmental pollution, feed availability, trans-provincial transportation distance and so on at the regional level. (3) Coupling pig and feed production at the regional and farm scale, to reduce the risk of ASF spreading through the improper treated manure. (4) Strengthen animal husbandry extension services at the local town and village level. An educational and advisory system should be built for the whole pig industry chain, including production, processing, delivery and retail. (5) Rethink about the balance between traditional and industrial pig farms. Though large pig farms have large potential to implement strict bio-security measures, they may not react quickly enough to the changes of market and policies. Besides, 26 million small pig production farms will not vanish in the short run, and if these traditional farms are kept in a reasonable proportion, it will increase the resilience of pig production.

Scientists need to enhance innovation in the following directions. (1) Develop new technologies to diagnose the ASF infections quickly, either through real time PCR and rapid test strip based technologies, or through picture based infection symptoms. (2) Develop new vaccine. (3) There is also a need to develop a block-chain based monitoring and reporting system. This technology would allow monitoring the body temperature, heartbeat rate, walking activity, vaccination record of live pigs in the farm, and original production place, sterilization record and transport route during transportation. This information could be used to diagnose the symptom of different disease infection and trace the transportation trucks. (4) Develop new technology to treat kitchen wastes, such as the recently developed closing continuous feeding

composting machine [5]. With this machine, the temperature of organic heaps could be as high as more than 60–70 °C lasting for a few days, and is enough to kill the ASF virus. The final products could be used either as organic fertilizer or animal feeds. However, more researches are needed, since kitchen waste has different physical and biological conditions compared with organic manure.

To prevent ASF, pig industry also plays a key role in implementation and operation. First of all, pig farms should implement strict bio-security measures, and this requires enough investment to improve their facilities and management. Secondly, pigs should be raised in a closed way, and both strict isolation and protection measures should be adopted. Thirdly, pig farms should immediately report to local veterinary department once there is any occurrence of ASF, unexpected death or unusual phenomena for their pigs. Big farms should train their employees to be able to carry out epidemic surveillance and investigation.

To facilitate these regulations, a special budget needs to be allocated to ASF control. Hence, the national subsidy distribution and cost-effective monitoring system should be built, to equally and effectively allocate the resources and money to the key regions, sectors and stakeholders. In this system, there should be regular and random based double checking and evaluation system, to make sure all the budgets has been used at the right place. In addition to the above measures to improve the current ASF control policies, there is an urgent need to explore other sources to compensate the losses of pork production. As is showed in the previous section, there will be a great shortage of pork. Part of these shortages could come from Spain, where the pork production has been increased by 21% between 2014 and 2017 in reacting to Chinese shortages. This rapid increase of pig production in Spain has already raised the public concerns, since spills and illegal discharges of pig have been reported all around Spain. Therefore, government needs to explore other import resources.

Overall, the outbreak of ASF itself has caused considerable damages to pig production, and the cost could be as high as 1.5–2.3 trillion Yuan. However, policies to control ASF may have large and long-term negative impacts on pig production and consumption chain, and should be reconsidered. A long-term science-based prevention and control system should be built through joint efforts of

policy makers, scientists and other stakeholders in the pig production and consumption chain, to achieve more risk resilience and eradicate ASF rapidly.

Conflict of interest

The authors declare that they have no conflict of interest.

Acknowledgments

This work was supported by the National Natural Science Foundation of China (31572210, 31272247).

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Jun Zhao is a vice director in the Center for Agricultural Resources Research, Institute of Genetics and Developmental Biology, the Chinese Academy of Sciences. His research focuses on policy for science, innovation and technology transfer. He is also interested in the research of science popularization and key talents management.