

African swine fever: a global factor affecting agricultural markets over the medium term

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Summary

The African swine fever (ASF) outbreak in the People's Republic of China (China) is affecting regional and global meat and feed markets with potential impacts on vegetable oils, biofuels and even pharmaceuticals. Using the Aglink-Cosimo modelling system, the authors adopt three different scenarios to assess the impacts of ASF in China, South-East Asia and the world. The simulation results show a range of possible effects for agricultural commodity markets, notably a large initial protein gap that will be filled by higher production of both eggs and non-pork meats (poultry, beef and sheep/goat) in China and by pork imports from international markets. The results suggest a fast and near complete closure of the protein gap, reflecting China's low responsiveness of meat demand to prices. A sizeable share of the protein gap could remain unfilled if the necessary import infrastructure for meat, with gapless cold chains and efficient and comprehensive sanitary controls, is not set up as assumed in the scenarios. Not filling the protein gap would also leave domestic meat prices at permanently high levels, which could even translate into

higher overall inflation rates. The simulations further suggest that an ASF pandemic would drive a lasting wedge between plant protein and animal protein prices, both locally and internationally. Oil meal prices will be particularly adversely affected, whereas pork and poultry will see a significant price rise. Countries that import the former and export the latter are likely to become the main beneficiaries of an ASF pandemic, benefitting from lower input prices and higher output prices for potentially large volumes of exports.

Keywords

African swine fever – Global protein markets – Meat and feed consumption – Pig production – Trade.

Introduction

The 2018 outbreak of African swine fever (ASF) in the People's Republic of China (China) has left a marked footprint on regional and global meat markets in South-East Asia. In principle, ASF tends to reduce feed demand and puts downward pressure on feed grain and feed protein prices; at the same time, it supports meat and dairy prices. The outbreak of ASF in China has confirmed these effects, in practice. In fact, pork prices in China increased by 188% in the year from October 2018 to October 2019 (1) and remained elevated as of July 2020 (2). In response, the national authorities implemented emergency measures by releasing frozen pork from a strategic pork reserve in late 2019 and during 2020 to stabilise prices (3, 4). As pork is one of the main sources of protein intake in China, production declines from emergency culling, import bottlenecks resulting from coronavirus disease of 2019 (COVID-19) and rising prices are genuine concerns for national supply security.

China is the world leader in pork production and consumption, accounting for roughly half of the global pig herd. China also plays an important role in global commodity markets to support its pork production with feed grain and oil meal. Therefore, the impacts of ASF are likely to be felt worldwide, affecting all of these commodity

markets. The disease could remain endemic for decades in the region and is likely to spread further within and beyond the region.

In the short term, supply deficits and rising prices may be stabilised by pork reserves and other measures (pre-emptive culling). In the medium term, a number of important questions arise, including:

- How will the pork protein gap be filled once short-term measures are no longer effective?
- How will feed and protein markets adjust to ASF?
- How will the complex tangle of substitutions and complementary products both within the grain and feed markets and across related markets, such as those for biofuels, evolve over several adjustment periods?

Examining the impact of ASF across commodity markets can help policy-makers to address the protein gap and adjust to other changes in commodity markets.

This paper aims to gauge these complex cross-commodity and cross-country effects over the medium term, that is, within a ten-year time horizon. While focusing on meat and feed markets, it also assesses the effects of ASF on all main agricultural markets. The results are based on several counterfactual runs undertaken with the Aglink-Cosimo modelling system, a comprehensive partial equilibrium model for global agriculture, jointly maintained by the secretariats of the Food and Agriculture Organization of the United Nations (FAO) and the Organisation for Economic Co-operation and Development (OECD). The effects will be presented in three scenarios. All three scenarios make country-specific assumptions on the speed and extent of the spread of ASF as well as options to contain its proliferation. These assumptions are based on the biosecurity status of different countries and their ability to handle the disease, such as the ability to maintain production while controlling and combatting an ASF outbreak.

The rapid spread of African swine fever in Asia

African swine fever was first detected in Africa in 1907 and subsequently spread throughout much of Europe, Latin America, Africa and Siberian parts of the Russian Federation during the 20th and early 21st centuries. In August 2018, ASF appeared in China (5) and it was reported in Vietnam (6) in February 2019. With these two countries, it hit the world's largest and fifth-largest pig producers, respectively. Since then, ASF has spread quickly throughout Asia, and is now found in East Asia, South-East Asia, South Asia and the Asian Pacific. The FAO Emergency Prevention System for Animal Health (EMPRES-AH) (7) closely follows the spread of ASF throughout the world, offering advice on preventing, containing and combatting the disease.

A number of factors have facilitated the speed and far-reaching spread of the disease in South-East Asia. First, many South-East Asian countries have high to very high stocking densities, which makes it easy for the virus to spread. Second, current husbandry practices in many South-East Asian countries fail to provide the biosecurity standards that are required to contain the disease effectively. In most countries of the region, pig production is still dominated by small, 'backyard' operators that often keep their pigs outside of confined environments and feed them with table scraps or uncooked organic refuse ('swill feeding'). The ASF virus survives a long time in meat, organs, blood, bone marrow, ham/sausage/dried meats and dried blood, among other items, and can infect pigs that eat these items. There is also a lack of vertical integration in the farming system, which means that piglets and sows are transported between farms and sometimes across regions, further supporting the rapid spread of the disease over a larger distance. The virus can spread through infected or ill animals or contaminated vehicles and equipment (inanimate objects known as 'fomites').

A lack of local specialisation not only supports the spread of the disease but also impedes the continuity of production where ASF is endemic. Production can be maintained in 'compartmentalised'

systems, for example systems where interactions between farms are minimal or entirely absent. There is also a lively intra-regional exchange of all sorts of pork products, including sausages, cured meats and other processed pig meat products. These products may contain the ASF virus, which is highly resistant to temperature, environmental factors and treatments (salting), and can persist for months or years in organic matter. This means that the chances of ASF spreading far and fast in Asia are high, and the disease may resurface long after the initial outbreak.

The medium-term impacts of African swine fever

Assessing African swine fever in a counterfactual analysis

There are already a number of analyses that have described the immediate short-term impacts of ASF on meat and feed markets (8, 9, 10). The fundamental limitations of all these assessments are that they compare a situation before an ASF outbreak with one after an ASF outbreak. They therefore capture a confluence of factors that took place in parallel with the spread of the disease, notably the trade conflict between China and the United States of America (USA), the adverse weather conditions at the beginning of the USA sowing season and the appreciation of the US dollar against almost all other currencies.

A model-based simulation adds value to these short-term analyses in several ways. The first is to isolate the impacts of ASF from all other effects taking place in parallel. Unlike the short-term assessments, the model-based analysis makes a counterfactual, that is, a ‘with *versus* without’ not a ‘before *versus* after’, comparison. The second is that a model-based approach gauges the effects that arise from all the interactions among all other commodity markets affected by the ASF shock, assesses their global effects and does so in a consistent manner across countries and commodity markets. Lastly, the model captures the dynamics caused by an important disruptor and its effects over time, from the start date until 2030.

Defining the basic scenarios and their underlying assumptions

The past and current disease dynamic was systematically reviewed in conjunction with all possible factors that could help contain the spread of the disease. In collaboration with the Animal Health Service led by the Chief Veterinary Officer of FAO, these factors were translated into country-specific trajectories of pig herd developments and pork production. Three basic scenarios are distinguished.

The first scenario (scenario 1) captures the likely impacts of ASF on all countries already affected by the disease which are not captured in the baseline projections to 2030. The main thrust of this scenario is to assess the impacts of the 2018 and 2019 outbreaks in South-East Asia, notably in China and Vietnam, two globally important producers. For those countries in East and South-East Asia that are not yet affected, notably Thailand, it is assumed that ASF will appear in 2020 and then take a path that reflects the country-specific factors that determine the spread and containment. As described above, these include, *inter alia*, biosecurity, degree of vertical integration, compartmentalisation of production, stocking densities and overall veterinary preparedness.

The second scenario (scenario 2) builds on the first by assuming that ASF will leave a much deeper initial footprint in China. These assumptions reflect the expectations voiced by numerous analysts and observers (11). This second scenario also assumes that the deeper initial footprint gives rise to a faster structural change in ensuing years, enabling the country to control the disease more effectively and eventually produce more competitively, in larger units, at lower overall costs and with the ability to contain a further spread of the disease.

The third scenario (scenario 3) returns to the assumptions made for China in the first scenario, that is, a more moderate impact, but assumes that ASF will spread further within and outside of the currently affected regions, and eventually reach all major producing areas (except that Australia, New Zealand and parts of the Pacific region have been excluded from the global scenario, reflecting their

high biosecurity status and insulated geographical positions). This includes all the countries in the European Union that are still ASF free. Importantly, it also assumes that ASF returns to the Americas, recurring in the Caribbean and Brazil and spreading to all major producers in North and South America. However, in the return of the disease to the Americas, the assumptions reflect a much-improved biosecurity status, allowing most of the affected countries in the region to swiftly overcome the initial shock, contain the spread and continue production. All newly affected countries in the third scenario are assumed to be affected by 2024. This is an arbitrary assumption, setting the start of the outbreak conveniently in the middle of the outlook period.

There are country-specific assumptions for all three scenarios of this paper. It should suffice here to depict a few idiosyncratic trajectories, such as those that reflect the assumptions that determine the different speeds of spread and recovery from the disease.

People's Republic of China

Arguably, the greatest uncertainties arise from China's meat market in general and its pig meat market in particular. China accounts for about 50% of the global pig herd and nearly the same percentage of global pig meat consumption. Within China, pork is the preferred meat, accounting for 70% of meat consumption. Meat is an important element of traditional diets, also making demand rather unresponsive to changes in prices (inelastic), as consumers try to maintain their habitual consumption levels even at higher price levels.

Available estimates to assess the immediate effects of ASF on China's pig meat output vary greatly, with declines ranging from 20% to 50%. The Chinese authorities estimated a decline of 22% in 2019, while experts from the United States Department of Agriculture (USDA) (10) estimated a decline of 21% in 2019, followed by a further decrease of 10% in 2020. These estimates were used to guide the reductions in the first scenario, at least for the period 2019–2021 (Fig. 1). The initial impact is assumed to diminish over time without, however, allowing production to return fully to the baseline path by

2030. In addition, the effects of a deeper impact in scenario 2 doubled the initial decline in production caused by ASF, i.e. giving a scenario where the decline reaches a level of 44% (Fig. 2). As the baseline already assumes a mild decline of about 6%, such a scenario would amount to a 50% decline in 2020–2021 relative to an outcome without ASF. This scenario would reflect the assumptions made by Rabobank analysts, who assume roughly a 50% overall decline (11).

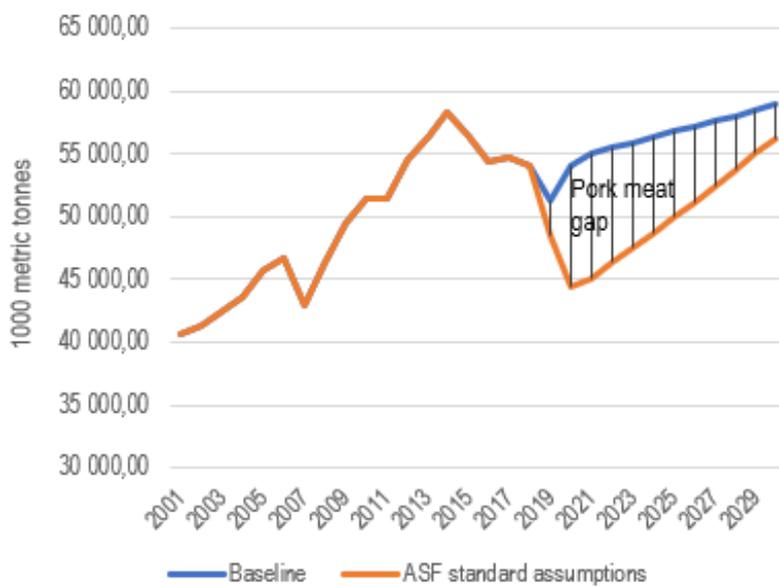


Fig. 1
African swine fever in the People’s Republic of China
(scenario 1): pork production trajectory and protein gap

ASF: African swine fever

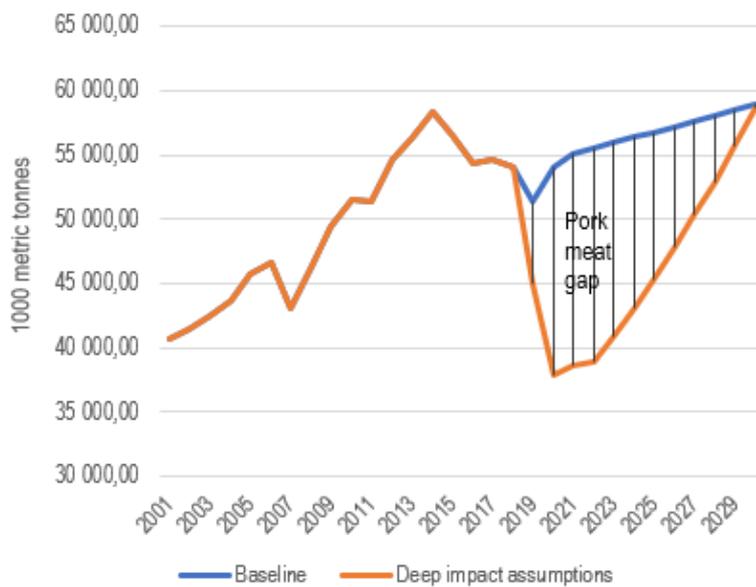


Fig. 2

African swine fever in the People's Republic of China (scenario 2): pork production trajectory and protein gap

It is also worth noting that Figures 1 and 2 show that the decline in pig production in China began well before the 2018 ASF outbreak. Beginning in 2013, a confluence of factors contributed to this decline. First, the pork industry faced a series of non-ASF outbreaks, such as classical swine fever, Aujeszky disease, porcine reproductive and respiratory syndrome and porcine epidemic diarrhoea, which all took a heavy toll of the country's pig inventory. Second, high stocking densities in the south of China caused water pollution, resulting in a policy intervention to move pork production from the south to the north. This policy shift led to long distance transportation of pigs and consequently a rapid proliferation of disease. Ultimately, the ASF outbreak in China accelerated an already trending decline in pork production.

South-East Asia

The importance of China's pig sector dwarfs the combined effects for all other affected countries in the region. For instance, China's production alone is about five times higher than the combined output of all other countries of the region. However, the rest of the region is also different from China with regard to the likely ASF trajectories for their impacts over the medium term. Figure 3 illustrates the aggregate effects of ASF and the notably slow recovery path.

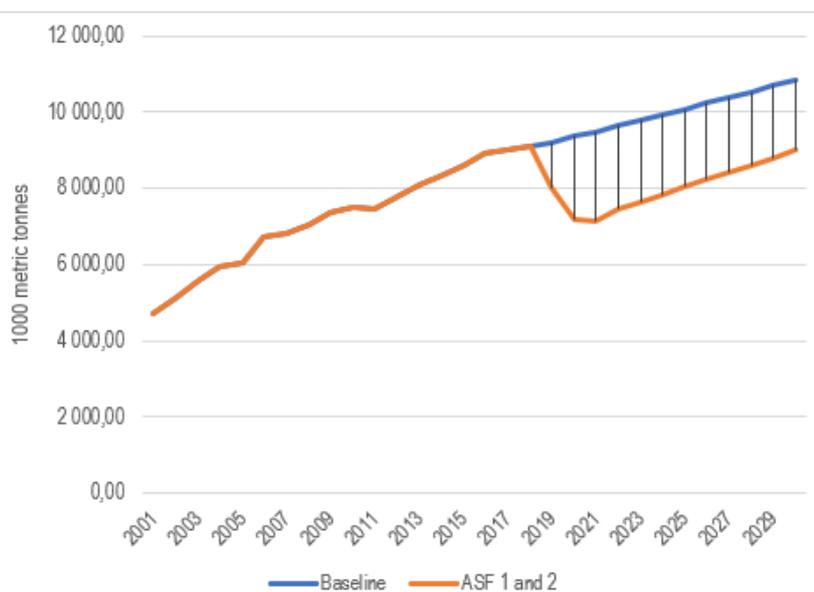


Fig. 3

African swine fever in South-East Asia* (scenarios 1 and 2): pork production trajectory and protein gap

ASF: African swine fever

* The People's Republic of China is not included in Figure 3

The comparison of the different trajectories in China and in all other countries of the region also suggests markedly different speeds of recovery. Many producers in the region, notably Vietnam and Myanmar, still have only limited biosecurity capabilities, and much of the output stems from small-scale units, offering limited scope to compartmentalise production. Once affected, it will take longer for

these countries to contain the disease and it will be harder to return to pre-outbreak production levels.

Global outbreak

A possible global outbreak is modelled in scenario 3. It assumes a faster recovery path for higher-income countries with compartmentalised production systems and a less pronounced initial impact on China’s pig herd. The impacts therefore look much less dramatic (Fig. 4).

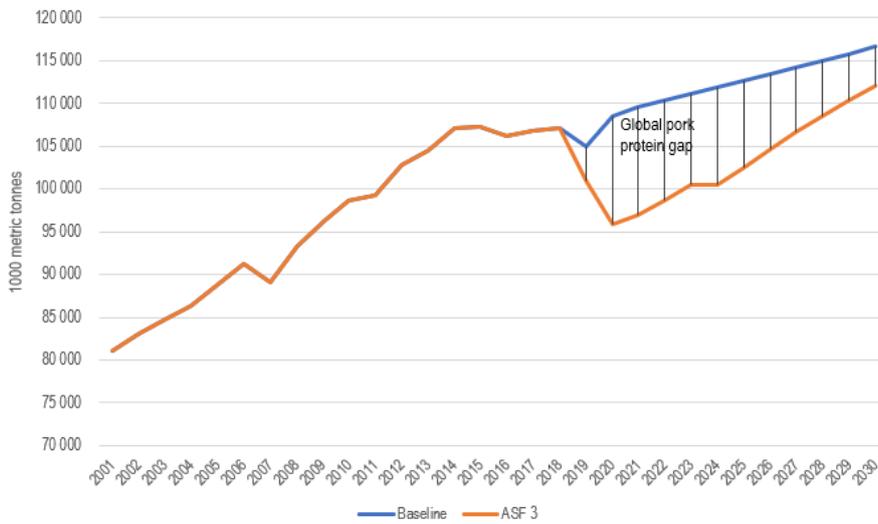


Fig. 4
Scenario 3: pork production – global impacts

ASF: African swine fever

Figure 5 combines the effects of the various scenarios and their different assumptions on the extent and speed of ASF proliferation.

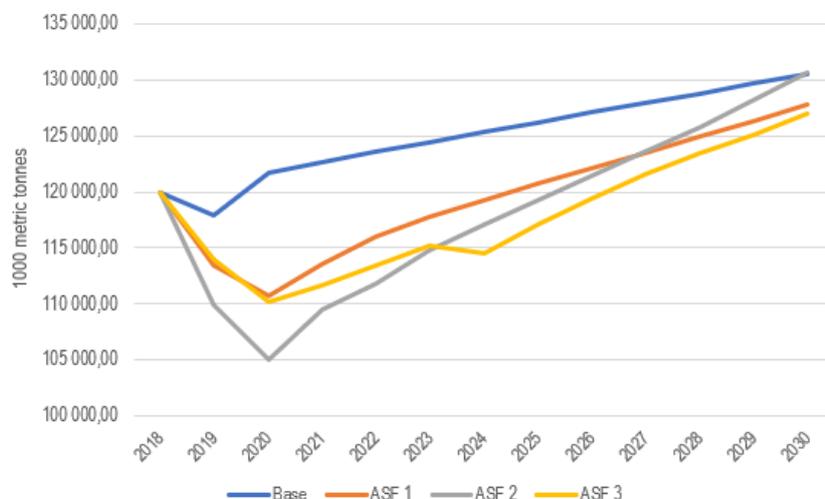


Fig. 5

Summary of assumptions for all three African swine fever counterfactuals at the global level (thousand metric tonnes)

ASF: African swine fever

The results of the African swine fever simulation scenarios

Protein markets: impacts on production and trade

The outbreak of ASF has already left an immediate footprint on protein markets. It has created a supply gap for animal proteins destined for human consumption and, at the same time, a surplus of plant-based proteins destined for animal feed use. This holds for China and the world market at large. China's supply gap arises from the fact that demand for animal protein in China is rather unresponsive to changes in prices and consumers strive to keep a constant level of overall intake of animal proteins, notably meats, fish and eggs. As neither domestic producers nor imports can adapt swiftly enough to fill consumer needs, a noticeable supply deficit for animal proteins (gap) emerges in the short term.

Over the medium term, the protein gap for human consumption can be closed by tapping into different supply channels. In principle, these

include: *a)* importing pork, *b)* importing other meats and *c)* increasing domestic meat production other than pork. In addition to meat, other sources of animal protein destined for human consumption can be used to close the protein gap, including dairy products such as cheese or whole milk and skimmed milk powder.

The model-based results suggest that the largest part of the animal protein gap created by ASF will be filled over the near to medium term, almost regardless of the scenario and the size of the protein gap. The sources contributing to filling the gap are summarised in Figure 6 and reflect 2021. To ensure comparability and additivity, all products have been converted into grams of protein available per person and per day. The protein gap will largely be filled after an initial adjustment period of about three years. This happens in all scenarios, and is facilitated either through higher imports of meat, higher domestic production of meats other than pork, or increases in production and imports of eggs and dairy products. The only significant unfilled gap occurs in the first years of the ASF outbreak. Notably, plant-based proteins were not found to contribute to filling the protein gap in any significant amount.

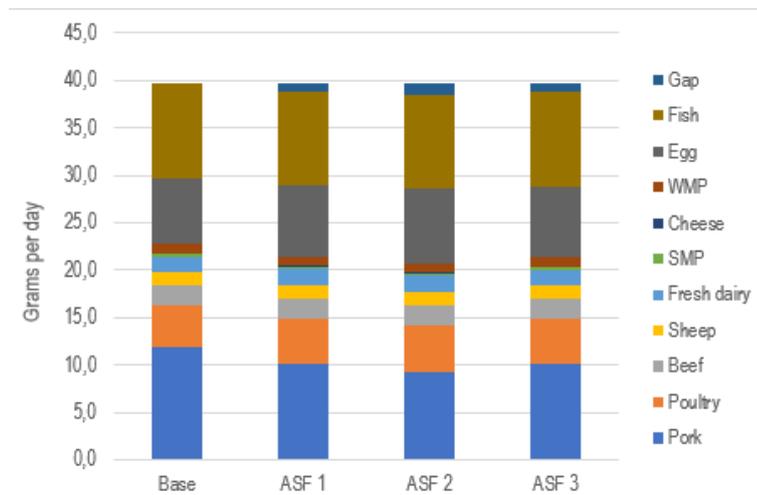


Fig. 6

People’s Republic of China pork protein consumption and gap in 2021 (grams per day)

ASF: African swine fever
 SMP: Skimmed milk powder
 WMP: Whole milk powder

The near closure of the protein gap is at variance with the expectations of many market observers (12). There is rationale to support either outcome, that is, to assume that the protein gap will be filled or will remain open. Arguments supporting the closure of the protein gap include the low responsiveness of demand to changes in meat prices and the high levels of *per capita* incomes already attained in urban areas in China. China's cities also have the requisite marketing infrastructure as well as the economic power to purchase more meat and other forms of animal protein. Metropolitan areas in the east are close to international markets and well-connected to them. Internally, there is the possibility to step up production, notably for poultry meat and eggs, and given the rather short production cycles for these products, a high domestic supply response appears plausible, even if it would require the building of new production facilities, which would come with their own environmental problems and would have to clear administrative hurdles.

Arguments supporting an outcome where a large part of the protein gap will remain unfilled include the lack of physical infrastructure to support a sizeable increase in imports to China. Channelling up to seven million tonnes of additional meat into China's ports and from there into its cities or even its hinterland would entail significant investments in discharge and transportation facilities to handle frozen products and would require the development of gapless cold chains with facilities for intermittent storage, handling, marketing and processing. It would also require a comprehensive upgrade to sanitary control capacities (food safety inspection etc.). Prohibiting swill feeding would require an alternative feed system and infrastructure to process food waste throughout the system, particularly in remote areas. Likewise, not all exporters may be fully prepared to step up shipments to China at the volumes needed to close the protein gap. They, too, may lack the physical export infrastructure, the shipment facilities and the food inspection capacities to facilitate trade without jeopardising food safety and/or domestic food supplies. Finally, the investments to expand and upgrade the import infrastructure may present considerable sunk costs on both sides of the trade at a later

stage, that is, once ASF is under control, which is expected for the end of the outlook period.

These factors suggest that the projected closure of the protein gap represents an extreme outcome, driven by the economics written into the model, which may not fully capture the boundary conditions arising from exogenous constraints such as infrastructure or sanitary control capacities.

In addition to whether and to what extent the protein gap will be filled, questions arise as to how and by whom the gap will be filled. Given the importance of China as the single largest protein market globally, the focus in describing the results will be on China.

The key results addressing these questions are depicted in Figures 7a, 7b and 8a, 8b. Three major sources are available to supply China's market: imports of pork, a domestic increase in alternative meat production (poultry, beef and sheep) and higher imports of these meats. The relative shares of these supplies differ among scenarios and over time. In the 'deep impact' scenario 2, almost 80% of the gap is filled by imported pork, while the remainder comes from other types of domestically produced meat. Apparently, both domestic producers and foreign suppliers can increase their supplies, but large commodity-specific differences across the different sources of animal protein remain. As far as the meats are concerned, foreign suppliers can capture the major share of the protein gap created by lower domestic pork production. They will capture 75% of the meat gap, compared with 25% captured by domestic producers. Practically all foreign supplies will be pork, while domestic producers will capture some of the meat market by stepping up poultry meat, sheep and beef production.

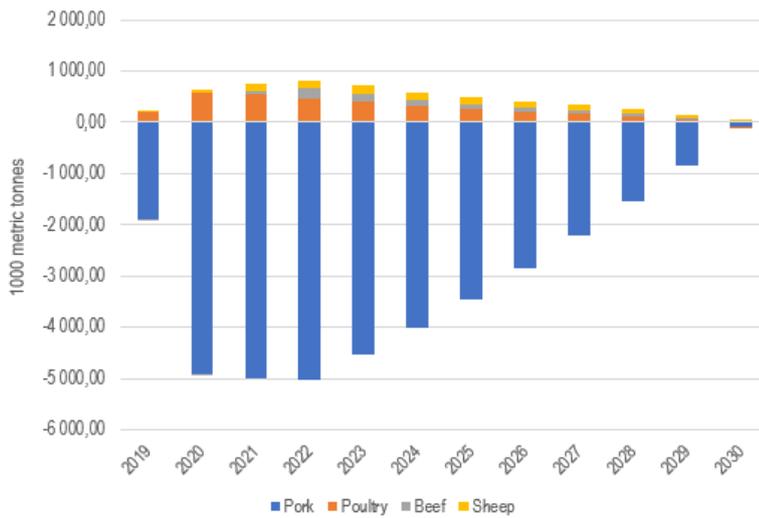


Fig. 7a
African swine fever, scenario 2: change in meat production
 (protein equivalents, thousand metric tonnes)

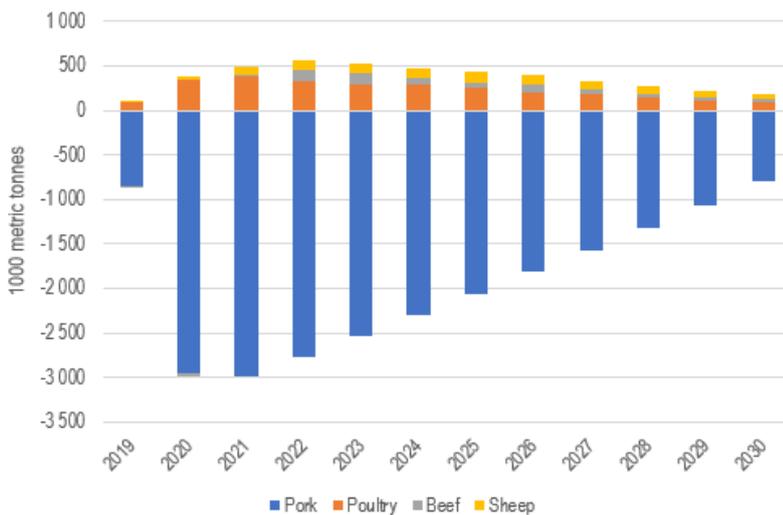


Fig. 7b
African swine fever, scenario 3: change in meat production
 (protein equivalents, thousand metric tonnes)

These results hold mainly, but not only, for scenarios 1 and 2, i.e. where the ASF outbreak remains limited to South-East Asia. In the case of wider proliferation, as assumed in scenario 3, foreign suppliers will have less supply to export to China and South-East Asia. More generally, ASF will limit the amounts of meat available on global

markets, notably for pork. As a result, even a rather inelastic buyer like China will see a drop in import growth compared with the baseline, reacting to much higher import prices. Figure 8b illustrates the impacts in the case of a wider spread of ASF. It is only under these circumstances that a more significant part of the pork protein gap will remain unfilled. In scenario 3, the ‘global impact’ scenario, the situation is almost reversed. Depending on the year, pork imports cover only about 40% of demand, while the domestic production of other meats can supply up to 75% of the diverted demand.

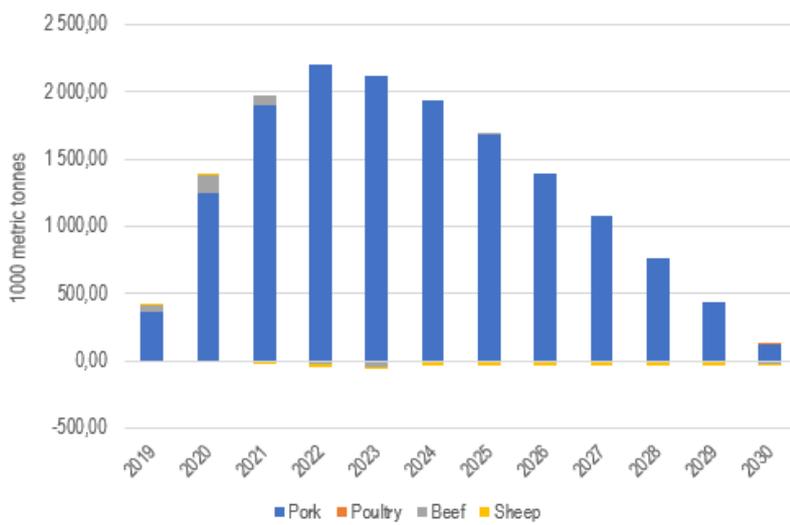


Fig. 8a
African swine fever, scenario 2: change in meat imports
 (protein equivalents, thousand metric tonnes)

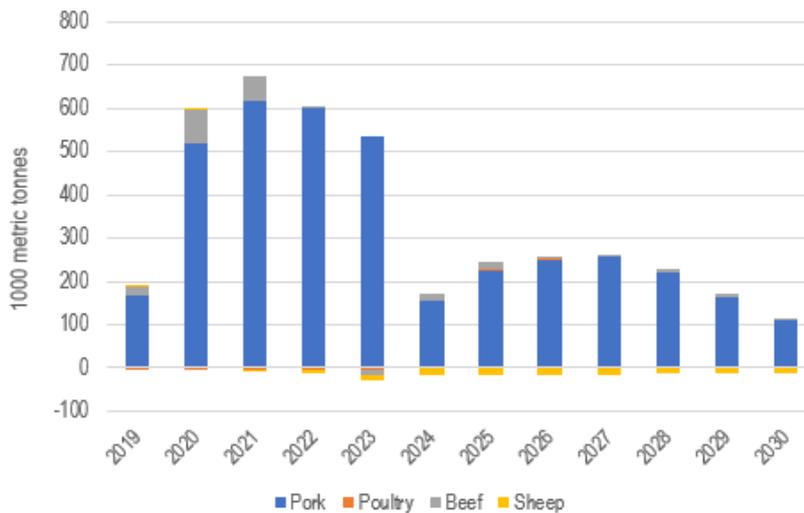


Fig. 8b
African swine fever, scenario 3: change in meat imports
 (protein equivalents, thousand metric tonnes)

In all scenarios, pork will see the largest gain in terms of import supplies to China. By contrast, net imports of poultry meat could see a slight decline, owing to a strong rise in domestic poultry production in conjunction with the sharp increase in import prices.

While pork imports are the main contributor to filling the meat gap, domestic egg producers reap a large share of the broader animal protein gap. They see a rise in production of almost four million tonnes or 12% relative to baseline levels of production. They benefit from the lower tradability of eggs and the ability to expand production quickly. Overall, eggs will cover as much as 39% of the reduction in domestic pork protein production in the early years, but their importance will decline over time as meat production recovers.

The principal commodity effects under scenario 3 are largely the same as under scenario 2. They differ insofar as fewer sources of imports are left to supply China’s meat market once ASF has become endemic in all of Europe and most countries of the Americas. As ASF spreads, it will slow the reduction of net pork imports and keep overall net imports above baseline levels. Under this scenario, the effects on imports of both poultry and ruminant meats will be more muted.

The production of domestic meat will cover more of the domestic demand, and the compensatory share of eggs will be only around 35% at the peak.

Impacts on world market prices

The rapid supply response in the global pork market is explained by a significant reaction in prices. Under the assumptions of scenario 2, the Pacific pork price, which is the world indicator price for pork, sees an increase of 68% (2020) over baseline levels (Fig. 9). Pork producers not only benefit from higher pig meat prices, they also stand to gain from lower feed prices, notably lower prices for protein meals and to a lesser extent lower feed grain prices. The combination of higher output prices and lower input prices boosts their gross margins over the short term. However, the intermediate impact shows that the overwhelming response by pork producers to meet the high demand in China has led to higher feed costs, resulting in lower gross margins for producers in many exporting countries, notably in Europe and the Americas. The large size of the South-East Asian meat market and the long time it takes to contain the disease suggest that higher margins could resurface over the medium term as markets readjust.

The impacts on profitability for individual producers are not necessarily the same as those for the whole agricultural sector, that is, the micro-level results differ from the macro-level results. From a macro perspective, the main beneficiaries are those countries that import feeds and export meats and, more generally, those that import plant-based proteins and export animal-based proteins. The latter holds for many countries in Europe that have developed a pig and poultry meat sector that converts imported protein meal into exports of meats and milk products.

From a micro perspective, the impacts on profitability differ within and across countries. The resumption of pork production in China in 2020 and early 2021, and the assumed reduction in swill feeding, in conjunction with higher egg, poultry and fish (aquaculture) production, has resulted in high imports by China of soybean, maize, barley and sorghum. This has resulted in rising margins for crop

producers in Brazil, Argentina and the USA, but in a contraction of margins for producers of non-ruminant meat in these and particularly in other countries who fail to benefit from higher soybean and feed grain prices (Europe and Canada). These country- and product-specific impacts can be further analysed by taking a closer look at the impacts on feed markets.

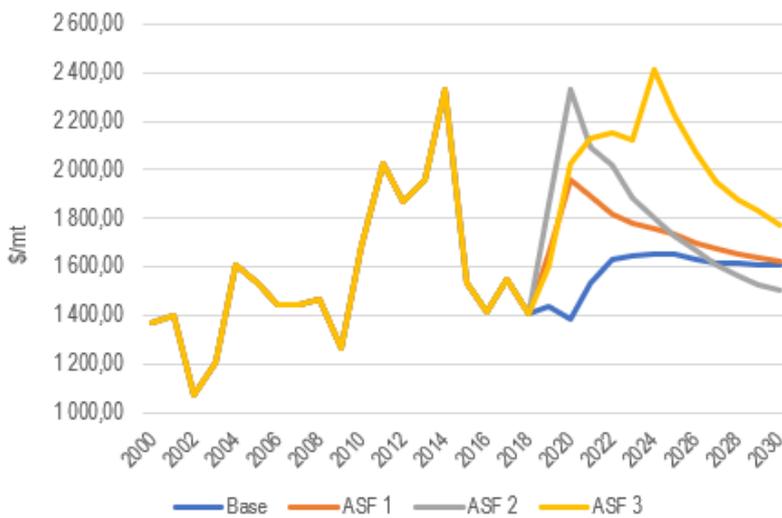


Fig. 9

Pacific pork price (US\$ per metric tonne)

ASF: African swine fever
 US\$: United States dollar

Feed markets

Much of the effect on feed markets depends on the extent and the speed with which the pork protein gap caused by the spread of ASF will be filled, and the productivity of the herd, including through enhanced genetics and incorporation of formal rations, requiring more corn, soybean meal, vitamins and minerals, in place of informal swill feeding. The Aglink-Cosimo modelling system projects a fast and near complete closure of the protein gap. The gap is filled either by higher production of eggs and non-pork meats in China and South-East Asia or by imports of pork to the region from international markets.

With a rapid filling of the protein gap, changes in the protein meal market are mainly the net effect of a shift between different types of

animal protein and between different animal protein producers. A number of factors are at play in determining the amounts of grain and protein meals needed under a given ASF trajectory. First, there is the composition of the overall livestock herd, for example a shift from pork to poultry or to beef and sheep production. The changes in intensity rates also apply to a shift within a given form of meat production. For instance, a shift in pork production from backyard production to industrialised production would increase the use of compound and concentrate feeds in a similar way to a shift across different sources of meat production. Second, there is a shift that arises from livestock sectors with different efficiency rates within the same type of meat or animal protein. For instance, a shift from less developed pork production systems, such as those characteristic of Vietnam or Myanmar, to more advanced systems such as those of Europe or the Americas will not only increase intensity rates, but also improve efficiency rates, that is, the amounts of concentrate feed needed for a unit of animal protein at a given intensity rate. Such shifts in efficiency can offset shifts to systems with higher intensity rates. Lastly, the overall responsiveness of the animal production system plays a role, as different rates of closure of the protein gap would obviously result in different needs for feed grain and meal requirements.

When production is reallocated between producing countries and products, different efficiency and intensity rates apply and change the requirements for a given amount of animal protein. No assumptions about acceleration of the structural change in the Chinese pork sector induced by the ASF outbreak were made in the scenarios. A faster transition from backyard production to more industrialised production systems would result in additional feed requirements.

Maintaining the baseline assumptions about a gradual commercialisation of the Chinese pork industry means that the predicted impact on the feed sector is rather limited. Not only is the animal protein gap small, but the effects that arise from a shift in products and producing countries largely offset each other globally and do not significantly affect the amounts of feeds required and the

prices to be paid. For feed grains and protein meal this is mainly due to the additional demand from the poultry sector, which can readily absorb the feed no longer needed by the pork sector. The coupled nature of the two soybean products, meal and oil, adds to the observed rigidity in the global soybean price and explains China’s behaviour in this market. After a short-term decline in soybean imports, the scenarios indicate that China continues to import oilseeds (Fig. 10a), crushes them domestically and exports the excess meal to countries that are expanding their pork and poultry production in response to the increased meat import demand from China (Fig. 10b). The unchanged domestic demand for vegetable oils and processing cost considerations provide additional incentives to keep domestic processing at near capacity levels. Finally, exporting excess soymeal could also be a way to maintain soybean imports from the USA, thereby easing the USA–China trade conflict.

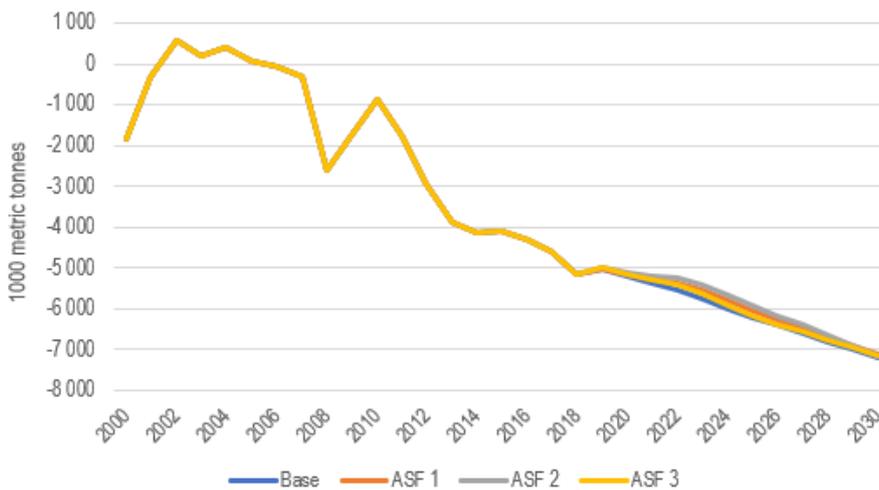


Fig. 10a
People’s Republic of China other oilseeds* net-trade
 (thousand metric tonnes)

ASF: African swine fever
 * Other oilseeds include rapeseed, sunflower and peanuts

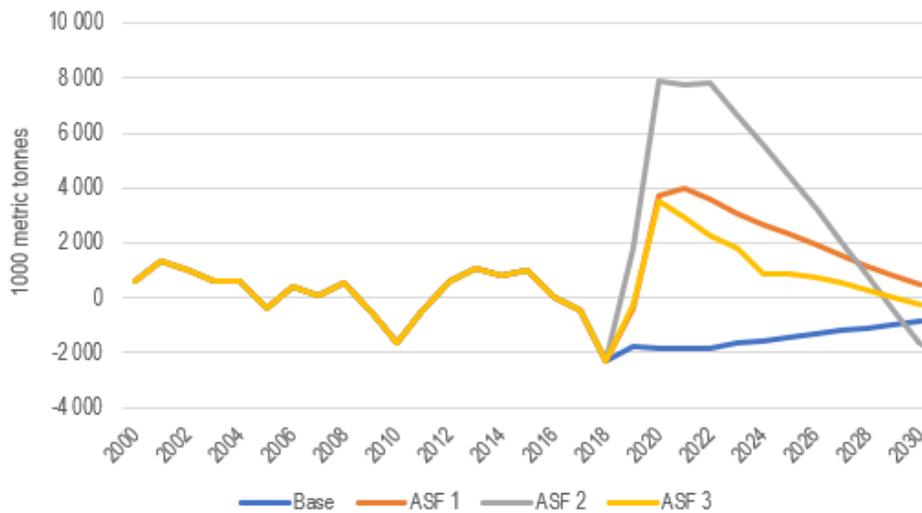


Fig. 10b

People’s Republic of China protein meal net-trade
(thousand metric tonnes)

ASF: African swine fever

Conclusion

The ASF outbreak in China is affecting regional and global meat and feed markets. The simulation results show a range of possible effects for agricultural commodity markets, notably a large initial protein gap. The Aglink-Cosimo modelling system assumes that this protein gap will be filled rapidly and almost completely in about three years by both a higher production of eggs and non-pork meats (poultry, beef and sheep/goat) in China and pork imports from international markets. The discussion of the results also suggests that there are plausible reasons for a fast and near complete closure of the protein gap, notably the high income levels in China and the low responsiveness of Chinese consumers to higher protein prices. However, a sizeable share of the protein gap would remain unfilled if the necessary import infrastructure for meat, with gapless cold chains and efficient and comprehensive sanitary controls, could not be set up as assumed in the scenarios. Not filling the protein gap would also leave domestic meat prices at high levels, which would translate into higher overall inflation rates, at least initially.

The simulations further suggest that an ASF pandemic would drive a lasting wedge between plant protein and animal protein prices, both locally and internationally. Oil meal prices will be particularly adversely affected, whereas pork and poultry prices will see a significant rise. Countries that import the former and export the latter – in particular Canada and countries in Western Europe – are likely to become the main beneficiaries of the ASF pandemic, benefitting from lower input prices and higher output prices for potentially large volumes of exports. The paper also suggests that the current crisis could trigger a shift to a more biosecure production system, which may be not only more resilient to diseases but also more economically competitive.

The results are important for decision-makers in both the private and public sectors. Farmers outside of China and in ASF-free countries are afforded a significant and rare growth opportunity. In particular, pig and poultry producers will see their gross margins rise for a number of years. Nevertheless, the ASF outbreak could also lead to more competitive meat production systems in China, eventually lowering high initial gross margins in exporting countries. In the public sector, policy-makers will be confronted with the growing need to promote more biosecure production and trading systems without erecting new, unjustified trade barriers. The rapid spread of ASF and its global impact also suggest a growing role for the providers of global public goods, such as FAO. This underlines the need for an effective monitoring and early warning system, such as the FAO–EMPRES. In addition, it highlights the need for strong animal traceability systems with integrated communication flows and data sharing between producers and national authorities, which can be achieved with digital technologies (13). Similarly, it underlines the importance of globally accepted biosecurity and food safety standards such as those enshrined in the World Organisation for Animal Health's (OIE) standards and guidelines in the *Terrestrial Animal Health Code* (14) and the FAO/World Health Organization (WHO) *Codex Alimentarius* (15).

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