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EDITORIAL

## Impacts of COVID-19 on agriculture and rural poverty in China



The recent outbreak of COVID-19 has spread rapidly across the world. The pandemic has been seriously affecting public health and national and global economies since the beginning of 2020. By 3 November 2020, the world's cumulative reported infections exceeded 46 million and the number of deaths reached 1.2 million (WHO 2020). The rapid spread of COVID-19 and its induced pandemic control through territory lockdown, travel bans and many other restrictions imposed on people's movements have seriously affected the economy of all countries across the world. Worldwide, the pandemic has significantly affected food systems, particularly agricultural inputs and outputs markets, food processing and employment along food value chains, which has exacerbated poverty and food and nutrition insecurity. The latest FAO report on the State of Food Security and Nutrition in the World estimates that the COVID-19 pandemic could add 130 million people worldwide suffering from chronic hunger in 2020 (FAO *et al.* 2020). The pandemic is still serious and even worsening in some countries while it is currently under control in other countries.

In China, the first case of COVID-19 was reported in December 2019 in Wuhan, the capital of Hubei Province. Wuhan was locked down completely on January 23, 2020 and similar lockdown measures were soon implemented in both urban communities and rural villages in almost every province in China. It is worth noting that the lockdown started at the time when most Chinese had returned to their hometown for the Spring Festival. Nearly all public transport, inter- and intra-provincial in some cases was suspended until middle or late March when the spread of COVID-19 was largely controlled. Finally, Wuhan lifted its lockdown policy and resumed near-normal economic activities after 8 April, 2020.

Although the Chinese economy has quickly recovered from the COVID-19 pandemic, the initial impacts of the pandemic on the economy was serious. In the first quarter of 2020, compared with the same period in 2019, real GDP (Gross Domestic Product) fell by 6.8%. The agricultural sector was affected to a lesser extent compared to other sectors. Agricultural GDP nevertheless fell by 3.2% in the first quarter of 2020. Since the effective control of COVID-19 in late March, China has gradually restored its economy, with its real GDP increasing by 3.2% (agriculture 3.3%) and 4.9% (agriculture 3.9%), respectively, in the second and third quarter in 2020 (NBSC 2020).

Despite a new normal era of post-COVID-19 in China, examining the effects of the pandemic on agriculture and the corresponding policy responses and farmer's mitigating measures during the outbreak in China has important policy implications. The investigations are valuable not only for China that is currently undergoing economic recovery and preparing to cope with potential similar health crisis in the future, but also for many other countries that are still suffering economic damage from the pandemic.

The overall goal of this special focus of the *Journal of Integrative Agriculture* is to provide empirical evidence of the impacts of the COVID-19 pandemic on agriculture and the effectiveness of the coping strategies — both the mitigating measures adopted by farmers and the policy responses developed by governments — in China. Nine papers are included, which cover a broad spectrum of research topics: agricultural production, consumer food purchasing behaviors, agricultural and food marketing and international trade, rural poverty, and policy responses. I hope these studies could provide readers with a better understanding of the effects of the COVID-19 pandemic on farmers, consumers and traders in China and derive informative experience and lessons for China and the rest of world. Based on the nature of agricultural commodities and their research topics, the nine papers are organized into the following four sections.

## Section 1: Crop production and marketing

The impacts of the COVID-19 pandemic on crop sector, particularly on seasonal vegetables and fruits harvested in early 2020, have been widely reported in media. Given the pandemic-related restrictions on transportation from the production regions to the consumption regions and the difficulties in marketing and consuming these products within the production regions, damage and recovery of the vegetable value chains were the primary concern during the pandemic in China.

The first paper by Zhou *et al.* (2020) aims to understand the impacts of the pandemic on vegetable production and marketing and the effectiveness of measures to mitigate the impacts in the major vegetable production provinces. The analyses are based on a stratified random sampling survey that collects information from more than 500 households in Shandong, Hubei and Zhejiang in March and April 2020. The results show that the impacts of the pandemic on vegetable production, sale volume and price were relatively small in Shandong, moderate in Zhejiang, but substantial in Hubei. The survey results are consistent with the strictness and lengths of restriction measures imposed in these provinces. The impact of the COVID-19-induced health control measures on vegetable production and marketing was most serious in Hubei, because this province, as China's epicentre of COVID-19 cases, was in full lockdown from late January to early April 2020. The impacts were slightly stronger in Zhejiang than in Shandong. This is because, compared to Shandong, Zhejiang's vegetable production sector employed more inter-provincial migrant labors who were unable to return for production due to travel bans. The empirical analyses further find that the short-distance transportation and marketing products through e-commerce and community home delivery could significantly mitigate the negative effects. Availability of labor and production facilities were also important in reducing farmers' losses during the pandemic. The paper concludes with several policy recommendations on creating innovative marketing channels, enhancing transparency of information on vegetable supply and demand, and promoting the role of agricultural insurance for farmers in order to cope with price volatilities or sale collapse during the pandemic.

While Zhou *et al.* (2020) focus on the major vegetable production provinces, Gu and Wang (2020) examine the impact of the pandemic on vegetable production, marketing and demand in a major consumption area, Shanghai, the biggest mega city in China. Their study is based on a primary survey of 46 agricultural cooperatives (with an average of 167 farm members per cooperative) conducted in sub-urban Shanghai during February and March 2020.

This study confirms the findings of Zhou *et al.* (2020) that the pandemic had affected almost all stages of the vegetable supply chain with the marketing section being most severely affected. Moreover, Gu and Wang (2020) show that the pandemic had a greater impact on the demand side than on the supply side due to lockdown restrictions on residents. They also show that the gap between the farm gate price and the retail market price was widened due to rising marketing cost during the pandemic. As expected, farm gate prices through e-commerce were much higher than through traditional marketing channels since farmers bear extra logistic and marketing cost. Nevertheless, e-commerce enables farmers to sell products and mitigate the pandemic impacts on farmers' income losses. Gu and Wang (2020) also show that agricultural insurance can play an important role in stabilizing farmers' vegetable production and supply. Therefore, they call for improvements in agricultural insurance policies, especially those against market risks.

This section also includes a study by Du *et al.* (2020) that examines the impacts of the pandemic on family farms in the short and long term. While the average farm size is small, the medium or relatively large farms have been emerging in China (Huang and Ding 2016). Most of these relatively large farms, normally with a farm size ranging from dozens to hundreds of mu (15 mu=1 ha), are operated by individual households. They are often called family farms in China. To better understand the impacts of the pandemic on these emerging family farms, this study conducted a large scale online survey of more than 2300 family farms in February 2020. Based on this dataset, the authors examine the impacts on farm operation in the short term and the potential impacts on crop production and agricultural insurance in the long term. Their survey results show that the pandemic had effects on farms' daily operation, particularly on their preparation of spring tillage and planting and purchase of agricultural inputs. Meantime, many farmers adopted emergency measures to mitigate the pandemic impacts. Regarding the likely impacts in the long-term, despite that the farmers' perceived impacts were small, nearly half of the farmers reported that they would adjust their crop structure, one-third were considering to change farm size, and more than 80% intended to buy agricultural insurance in the future. Further analyses suggest that human capital is an important factor that could facilitate farmers' adoption of mitigating measures in farming if the pandemic would continue in the long term. The paper also finds that contract farming is a double-edged sword. Under normal situations, contract farming helps farmers to have access to stable market and reduce marketing risks. However, during the pandemic, the breach of contract often occurred due to disruptions from or broken of the downstream value chain. Similar to the findings in vegetable studies, Du *et al.* (2020) also find

that agricultural insurance is important for farmers in coping with the pandemic.

## Section 2: Livestock production and marketing

This section includes two papers, one investigates farmers' willingness to recover their pig production under the COVID-19 pandemic shock in China (Zhuo *et al.* 2020), and the other examines the impacts of the pandemic on the dairy industry (Wang *et al.* 2020). China is the largest producer and consumer of pork in the world. However, Chinese pig farmers have seriously suffered from African swine fever since November 2018. The outbreak of COVID-19 has confronted them with even more uncertainties. Pig farmers' willingness to recover their production under the pandemic shock could have significant impacts on the recovery of domestic pork supply in China. The dairy industry is the other sector that is mostly likely to be affected by the pandemic because dairy products are highly perishable with time-sensitive supply chains. Despite widely reported impacts on dairy industries around the world, how the impacts may differ among countries remain unclear primarily due to limited data.

Based on a survey of about 200 pig farmers in Jiangsu and Zhejiang provinces, Zhuo *et al.* (2020) suggest that only 40% of the surveyed pig farmers were willing to recover pig production during the pandemic in March 2020, which would have important implications for China's pork supply in the coming years if the pandemic was not successfully controlled since late March 2020. The study finds that: (1) the small-scale farmers had a lower willingness to recover their pig production than their larger-scale counterparts; (2) decrease in access to feed was the greatest difficulty encountered by pig farmers; and (3) the perceived risk of raising pig was an important factor affecting farmers to recover their production during the pandemic. The analyses also show that cooperative, farmers' knowledge of government supporting policies, education and production experience had statistically significant effects on farmers' willingness to recover pig production under the pandemic shock. Based on the findings, the paper concludes with several policy recommendations on feed supply, farm cooperative, credit support, etc.

Regarding the impacts of COVID-19 pandemic on the dairy industry, Wang *et al.* (2020) assess and compare the impacts in China and the United States. The analyses are based on both a primary online survey of 128 dairy farms in China during February and March in 2020 and secondary data obtained from media reports, dairy cooperatives, farm organizations and extension services in the United States

and China. The paper also examines and compares the mechanisms through which the pandemic has affected their dairy industries and explores potential lessons from these two countries. The study finds that the pandemic had affected the dairy industries in both countries through similar mechanisms such as decreased farm gate milk prices, disruption and difficulties of moving milk along the supply chains, worker shortages, increased production costs, and lack of operating capital. The two countries nevertheless show differences. For example, China's dairy farms were significantly affected by marketing difficulties associated with the transportation lockdown in February and March 2020, while their counterparts in the United States were seriously affected by the shutdown of many dairy processors due to the closing of schools, restaurants and hotels. Based on the findings, the authors suggest that government financial support is essential for dairy farms and processors to survive under the pandemic in the short run. Several policy recommendations are made for the healthy development of dairy industry in the long run.

## Section 3: Food purchasing behavior and agricultural export

The COVID-19 pandemic-induced health control measures affect not only production, but also consumers' food purchasing behaviors, domestic marketing and international trade. This section includes three papers. The first one examines the impacts of COVID-19 pandemic on consumers' food hoarding behaviors (Wang *et al.* 2020). While pandemic often results in food hoarding that leads to food market instability and price fluctuation, the pandemic may also raise consumers' food safety knowledge and change their behaviors. The latter is empirically examined in the second paper by Min *et al.* (2020). The third paper analyses the impacts of the pandemic on agricultural exports that highly depend on external demand and trade policy during the pandemic (Lin and Zhang 2020).

Facing the uncertainty of market supply of food during the pandemic, citizens in many countries are reported to stockpile groceries when they encounter the outbreak in their regions. This had also occurred in China in the early stage of COVID-19 spread. To investigate the mechanism of consumers' food hoarding behavior, Wang *et al.* (2020) conducted an online consumer survey in Beijing, Shanghai and Guangzhou in February 2020 when the lockdown policies were imposed in these cities. Based on the survey data, they are able to distinguish between rational food hoarding and irrational buying. They find that consumers indicating increased purchase of vegetables, fruits, meats, and instant noodles accounted for 60, 50, 50 and 20% of

the total respondents, respectively. They show that the quantity of food at hand and the status and possibility of COVID-19 infection are two major factors affecting rational hoarding. Bad mood and herd psychology contribute to the panic buying. Other factors affecting food hoarding are education, income, online store shopping and gender. The results of this study have important implications for intervention policies aiming at mitigating panic buying and promoting market stabilization during the pandemic.

Min *et al.* (2020) investigate the impacts of the pandemic on Chinese food safety knowledge and related food safety behaviors, and explores the possible influence mechanism through media information. This study is based on a dataset from an internet survey of about 1 370 respondents from more than 230 cities in China in early March 2020. They find that nearly 70% of respondents paid more attention to food safety news due to the pandemic. Most respondents tended to obtain food safety news timely, and respondents focusing on food safety-related information tended to have higher food safety knowledge and took more efforts to ensure food safety. The results of descriptive analyses are consistent with those of the multivariate regression analyses. The findings of this study provide empirical evidence that public health events could enhance residents' safety awareness and improve their food safety protection measures.

The significant impacts of COVID-19 pandemic on the world economy and global supply chains have raised serious concerns on the uncertainty of international trade. To better understand the effects of the pandemic on China's agricultural exports, Lin and Zhang (2020) conducted a survey in March 2020, of more than 100 agricultural export companies in Fujian Province, the third largest agricultural exporting province in China. Their survey data suggest that 13% of companies reported that they were unable to conduct normal export trade during the pandemic; but about one third of companies considered the impact was moderate only, and 12% said no impact at all. While the surveyed companies did experience decline in exports, the effects depend on the size of companies and commodities. Small export companies suffered more than the large ones. Exports of horticultural, livestock and aquatic products fell, but exports of grain, edible oil and medicinal herb increased during the pandemic. The top five challenges faced by exporting companies during the pandemic were rising export costs, financing difficulties, blocked logistics and transportation, labor shortage and order cancellation. The major mitigation measures include selling the products in the domestic market, rejecting unprocessed orders, and obtaining financial support from multiple channels. The most needed supports from government were tax reduction, epidemic-prevention supplies and financial supports.

## Section 4: Rural poverty and policy responses

The COVID-19 pandemic has affected agricultural inputs and output markets, food processing, and labor employment worldwide. The World Bank (2020) warned that the current pandemic could push an additional 71 to 100 million people into extreme poverty in 2020. The pandemic and the lockdown measures can affect poverty through many channels such as health, production, employment and consumption. China also faces serious concerns with the impacts of the pandemic on poverty, mainly rural poverty, because of the nation's target to eliminate extreme poverty by the end of 2020.

To investigate the likely impacts of COVID-19 on rural poverty in China, Luo *et al.* (2020) apply a unique dataset with two rounds of a nationally representative household survey involving 1 733 rural households in eight provinces in China. The first survey was conducted in December 2019 and the follow up survey in February 2020. The survey data show that among those who were recently out of poverty, 23% reported that they might fall back into poverty due to the COVID-19 pandemic. Among those who have never been under poverty since 2013, about 7% reported that they could fall into poverty due to the pandemic; the number was as high as 13% in Hubei Province because Hubei had experienced the most serious infections of COVID-19 and implemented the strictest lockdown measures. The multivariate analyses further reveal that the fall in off-farm employment during the pandemic was the most important factor that resulted in higher incidence of falling back or falling into poverty. They also find that the lower income households (e.g., the bottom four quintiles) were more likely to fall back or fall into poverty during this pandemic. Other important factors that could raise rural households' poverty risk are low education and old age.

Given the challenges of the COVID-19 pandemic and the national goal to eliminate poverty in 2020, China has responded promptly and strongly to mitigate its impacts on rural poverty. Luo *et al.* (2020) point out that responses of the government to mitigate the impact of the pandemic on poverty are supported by their research findings. The most effective policy tools, include those aiming to increase off-farm employment, provide income and financial supports, and promote capacity building for rural households, especially those are already under poverty and are most likely to fall back into poverty.

## Final remarks

The unprecedented shocks of COVID-19 had affected

agricultural production, marketing, consumption behaviors and agricultural exports in February and March in China. The impacts were relatively higher in the horticulture and animal sector than in other sectors. The greatest challenges include purchasing agricultural inputs timely, selling and marketing farm products, consumer food purchasing behaviors, rural household off-farm employment, and likely rising rural poverty. However, with the government's elimination strategy for COVID-19 that is enabled by strict quarantine measures and strong contract tracing capacity, the Chinese economy at large is operating at pre-COVID-19 levels since early April 2020. This undoubtedly creates an ideal environment for the agricultural and food system to recover and stabilize speedily. Despite the decrease in agricultural production in the first quarter of 2020, China's annual agricultural production is expected to increase in 2020 (FAO 2020; NBSC 2020). In terms of rural labors' off-farm employment, about 80% (or 100 million) of migrant workers had returned to off-farm works by 19 March 2020 (MARA 2020). The synergistic efforts by the governments at all levels, farmers, industries and the wider community to mitigate the impacts are extremely crucial in combating the pandemic and recovering the agricultural production and food system.

It is worth noting that crisis and opportunity always coexist and the same goes for the COVID-19 crisis. While the pandemic had challenged the agricultural and food system, it has facilitated and accelerated applications of digital technologies in the agricultural and food system. For example, e-commerce in selling agricultural products has increased significantly, evidenced by several papers published in this special focus. The pandemic also alerts the importance of rural infrastructure, mechanization and new technologies in enhancing the resilience and productivity of agriculture.

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## References

- Du Z X, Lai X D, Long W J, Gao L L. 2020. The short- and long-term impacts of the COVID-19 pandemic on family farms in China — Evidence from a survey of 2 324 farms. *Journal of Integrative Agriculture*, **19**, 2877–2890.
- FAO (Food and Agricultural Organization of the United Nations). 2020. *Crop Prospects and Food Situation*. Quarterly Global Report No. 2, July 2020. Rome. [2020-10-25]. <http://www.fao.org/3/ca9803en/ca9803en.pdf>
- FAO, IFAD, UNICEF, WFP, WHO. 2020. *The State of Food Security and Nutrition in the World 2020. Transforming Food Systems for Affordable Healthy Diets*. Rome, FAO. [2020-11-6]. <https://doi.org/10.4060/ca9692en>
- Gu H Y, Wang C W. 2020. Impacts of the COVID-19 pandemic on vegetable production and countermeasures from an agricultural insurance perspective. *Journal of Integrative Agriculture*, **19**, 2866–2876.
- Huang J K, Ding J P. 2016. Institutional innovation and policy support to facilitate small-scale farming transformation in China. *Agricultural Economics*, **47**, 227–237.
- Lin B X, Zhang Y. 2020. Impact of the COVID-19 pandemic on agricultural exports. *Journal of Integrative Agriculture*, **19**, 2937–2945.
- Luo R F, Liu C F, Gao J J, Wang T Y, Zhi H Y, Shi P F, Huang J K. 2020. Impacts of the COVID-19 pandemic on rural poverty and policy responses in China. *Journal of Integrative Agriculture*, **19**, 2946–2964.
- MARA (Ministry of Agricultural and Rural Affairs of China). 2020. A press conference on the operation and production of food markets held by the Ministry of Agriculture and Rural Affairs. [2020-08-26]. [http://www.gov.cn/xinwen/2020-08/26/content\\_5537711.htm](http://www.gov.cn/xinwen/2020-08/26/content_5537711.htm) (in Chinese)
- Min S, Xiang C, Zhang X H. 2020. Impacts of the COVID-19 pandemic on consumers' food safety knowledge and behavior in China. *Journal of Integrative Agriculture*, **19**, 2926–2936.
- NBSC (National Bureau of Statistics of China). Data. [2020-10-19]. <http://www.gov.cn/shuju/index.htm> (in Chinese)
- Wang H H, Hao N. 2020. Panic buying? Food hoarding during the pandemic period with city lockdown. *Journal of Integrative Agriculture*, **19**, 2916–2925.
- Wang Q B, Liu C Q, Zhao Y F, Kitsos A, Cannella M, Wang S K, Han L. 2020. Impacts of the COVID-19 pandemic on the dairy industry: Lessons from China and the United States and policy implications. *Journal of Integrative Agriculture*, **19**, 2903–2915.
- WHO (World Health Organization). 2020. *WHO Coronavirus Disease (COVID-19) Dashboard*. [2020-11-4]. <https://covid19.who.int/>
- World Bank. 2020. *Poverty and Shared Prosperity 2020: Reversals of Fortune*. World Bank, Washington, D.C. doi: 10.1596/978-1-4648-1602-4.
- Zhou J H, Han F, Li K, Wang Y. 2020. Vegetable production under COVID-19 pandemic in China: An analysis based on the data of 526 households. *Journal of Integrative Agriculture*, **19**, 2854–2865.
- Zhuo N, Ji C, Ding J Y. 2020. Pig farmers' willingness to recover their production under COVID-19 pandemic shock in China— Empirical evidence from a farm survey. *Journal of Integrative Agriculture*, **19**, 2891–2902.