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# World Food Supply and Demand Projections to 2030: Impact of the COVID-19 pandemic and other events on the projection

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## 1. Introduction

The World's food supply and demand in recent years indicates that the production of grains and oilseed crops has increased both in developed and developing countries due to advancements in agricultural technology, whereas food consumption, including that of livestock products, has increased due to the growth in population and economic growth in emerging and developing countries. Therefore, uncertainties of the world's food supply and demand are increasing because of various factors. As a food-importing country, the stability of Japan's food supply depends heavily on the global food supply and demand trends, and thus, analyzing these trends and reviewing a future outlook based on our original analysis will serve as an important basis for Japan's food and agricultural policies.

The Policy Research Institute, Ministry of Agriculture, Forestry and Fisheries has been publishing the "World Food Supply and Demand Projection" for the next 10 years from such prospects every year since 2008 using the "World Food Supply and Demand Model." In March 2021, it published the "World Food Supply and Demand Projections to 2030" (hereinafter referred to as the "2030 Projection") with 2018 as the base year (taking a three-year average of 2017–2019). This projection incorporates the impacts of the novel coronavirus infectious disease (COVID-19) pandemic that broke out in 2020, and this paper introduces the outline of the "2030 Projection" along with the overview of the medium-term impacts of the pandemic on the food supply and demand projection as compared with the world's food supply and demand projections to 2029 (hereinafter "2029 Projection"), although this can be achieved only to a limited degree due to space constraints. For details, please see "World Food Supply and Demand Projections to 2030."[(1)]

## 2. Characteristics of the World Food Supply and Demand Model

The World Food Supply and Demand Model is a large-scaled simultaneous equations model for supply–demand balance that balances the demand and supply of each of the 20 major agricultural commodities of grains, oilseed crops and livestock products every year until the projection target year, taking the entire world as a single market and using prices as intermediums based on macroeconomic indicators, such as the total population and economic growth rate in the future. The model consists of a set of approximately 6,000 equations. The projected commodities used in the World Food Supply and Demand Model are mainly production, consumption, net exports (or net imports) by commodity and region, as well as international reference prices (real and nominal) by commodity. The 20 commodities in the model include 6 products of cultivated crops (wheat, maize, rice, other coarse grains, soybeans, and other oilseeds), 5 products of meat and hen egg (beef, pork, chicken, mutton, and hen eggs), 4 products of processed products of cultivated crops (soybean meal, other oil meal, soybean oil, and other vegetable oil), and 5 products of milk and dairy products (raw milk, butter, skimmed milk powder, cheese, and full-fat milk powder).

## 3. The "2030 Projection"

### (1) Assumptions of the "2030 Projection"[(1)]

The projection of global food supply and demand using the "World Food Supply and Demand Model" is calculated based on the assumption that the policies of each country will be maintained as they are and the weather will be normal throughout the years of the projection period (the baseline projection). The global economic growth forecast assumed in the 2030 Projection also takes into account the major slowdown of the world economy due to the COVID-19 pandemic and the subsequent recovery for the coming decade. The model assumes that the future global population will increase mainly in emerging and developing countries, such as countries in Asia and Africa, reaching 8.5 billion in 2030 (an increase of 11.2% from the base year), while real GDP per capita is assumed to increase to US$13,374 in 2030 (an increase of 24.2% from the base year). Figure 1 shows the estimated real GDP growth rates of major countries in 2020 and 2021. Due to the impact of the pandemic, growth rates are expected to decline in most countries in 2020 and then start to recover in 2021. After that, medium-term economic

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growth in many countries will be mixed but will most likely be slower than pre-pandemic assumptions, as the global economy is expected to grow more slowly than it has in the past.

(2) Summary of the "2030 Projection"

The global economy experienced a major slowdown in 2020 due to the outbreak of the COVID-19 pandemic and the policy measures taken by countries to prevent the spread of the disease, including lockdowns. After 2021, it is expected that the global economy will be revitalized and recover because of vaccination against COVID-19 in many countries and the implementation of various policies to support economic actitives and growth, but there is still severe uncertainty about the containment of the COVID-19 pandemic due to uncertainties such as the spread of new coronavirus variants.

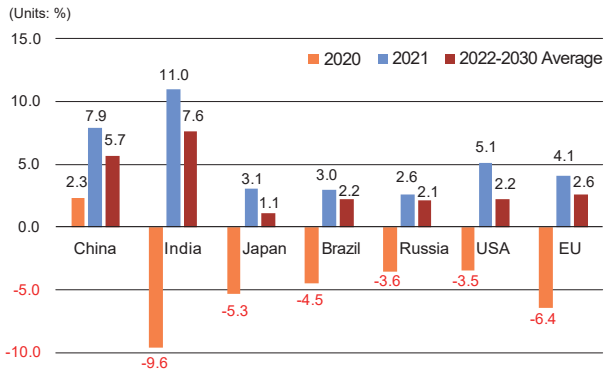


Figure 1. Economic outlook for major countries in 2020 and 2021
Source: Based on IMF Economic Outlook and applied to 2030 Projection

Currently, economic recovery is notable in China, the U.S., and other countries, and it is expected that economic growth in China, India, and other emerging and developing countries will remain relatively high in the medium term, but the rate of economic growth will likely be mixed in both developing and developed countries, and the global economy for the coming decade is expected to grow more slowly than before.

Under medium-term post-COVID-19 conditions, therefore, the growth rate of global grain and oilseed crop demand is expected to slow down in response to more moderate economic growth, and the recovery in grain and oilseed crop demand will be less robust, although it will be supported by a gradual increase in the use of biofuels. As demand for food and feed grains continues to increase in the medium term, especially in emerging and developing countries due to the continued growth of the total population in Asia, Africa, and other regions as well as gradual income growth, total world grain consumption, including food and feed grains, is expected to increase from 2.61 billion tons in the base year to 3.01 billion tons in 2030. Although the growth rate of grain and oilseed crop consumption for feed use will be 19%, higher than 14% for food and other uses, due to the increase in meat consumption, the growth rate of the consumption for feed use will be much lower than that of the past decade or so, reflecting the slowdown in economic growth in some of the emerging and developing countries. Thus, the growth in demand for grains and oilseed crops is expected to be more moderate than in the past. On the other hand, global grain production is expected to continue increasing due to a 16.5% rise in yield, but the total harvested area of wheat and other coarse grains is expected to decrease slightly, resulting in a 1.1% decrease in total grain production. However, if the depressed prices would continue over the medium to long term, there are consequently concerns about whether the high productivity growth of yield, etc. which was maintained until the 2010s can also be maintained in the future.

As a result of all these factors, the international reference price of grains and oilseed crops is expected to remain flat or slightly negative, with a stronger likelihood of weakening amid an almost equal increase in world demand and supply for grains and oilseed crops. However, if there would be an early economic recovery due to COVID-19 vaccination and other policy measures in many countries, there will even be an upside risk that the price of grains and oilseed crops will increase sharply in the short term if the economy would recover more rapidly than expected after 2021 because of monetary easing and fiscal stimulus by many countries, in addition to soaring container freight rates.

(3) Comparison of price projections to the 2030 and 2029 Projection

A comparison will be made here between the real price projections to the 2030 Projection based on the impact of the COVID-19 pandemic, and those to the 2029 Projection made with an assumption that there would be no impact of the pandemic. In this regard, since there are differences of the base and target years between the 2029 and 2030 Projection respectively, and the database and models of the 2029 and 2030 Projection that are formed with the assumptions and the base year have been updated separately, a direct comparison between the two projections is not essentially possible. Therefore, the comparison here is only for convenience's sake to give an overview of the two medium-term impacts(2).

The 2029 Projection is based on the IMF's forecasts for future economic projections made prior to the occurrence of the pandemic and can be viewed as a scenario that assumes that there would not be the historic global economic slowdown due to the pandemic. However, the 2030 Projection is based on the IMF's economic forecasts that are based on the situations in 2020 and 2021, and incorporate the effects of the big economic slowdown that has been caused by the pandemic as well as the economic recovery that is expected to happen because of vaccination and policy support.

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As the result of the comparison, it is indicated (Table 1), that prices of most agricultural commodities will be lower in the 2030 Projection than in the 2029 Projection, and in particular, with an exception of maize, grain prices are expected to be lower than those in the base year with negative growth. This is because medium-term economic growth in many countries will be slower than originally expected; resulting in lower demand for food and so on in the 2030 Projection than what was anticipated in the 2029 Projection.

Table 1. Changes in the real price of each agricultural commodity up to the target year

| (%) | The 2030 Projection | The 2029 Projection |
|---|---|---|
| Wheat | -0.2 | 0.0 |
| Maize | 0.6 | 0.6 |
| Rice | -1.8 | -0.3 |
| Other grains | -1.2 | -0.1 |
| Soybeans | 0.6 | 2.0 |
| Beef | 1.0 | 1.6 |
| Pork | 1.9 | 3.3 |
| Chicken meat | 3.0 | 4.4 |

Source: The 2030 Projection and 2029 Projection

Furthermore, among the grain and oilseed crops that are projected to have negative growth, the decline in rice prices is significant because of the slack increasing trend toward slowing economic growth in sub-Saharan Africa, the Middle East, and other regions that are major importers of rice, resulting in lower demand for rice imports in the 2030 Projection than in the 2029 Projection, and this will lead to lower real prices in the future. For livestock products, too, demand growth will be less robust due to slower economic growth in many countries in the medium term, and prices for all the agricultural commodities are expected to be lower than those given in the 2029 Projection.

## 4. Conclusion

Regarding the aftermath of the COVID-19 pandemic, there are concerns, on the one hand, about the risk of a sharp rise in prices of grains and oilseed crops in the short term because of rapid economic recovery in 2021, and a weakening trend is likely to gain momentum in the medium term, on the other, it is expected that various effects, both positive and negative, will emerge individually and independently in agriculture and other food-related segments in the short term and medium term. Accelerating changes in agriculture and food-related sectors through digital transformation in both production and consumption will be one of those effects. However, in addition to further dependence on lopsided agricultural trade and unevenly distributed agricultural exporting countries, the global shift to the sustainability of resources, including resources in the agricultural sector, may have a strong impact on maintaining agricultural production and its high productivity in the medium term since they rely heavily on the economies of scale and large amounts of water, fossil fuels, and other resources.

As described above, this paper introduces the 2030 Projection and the impact of the COVID-19 pandemic and other factors. The Policy Research Institute, Ministry of Agriculture, Forestry and Fisheries will continue to analyze the trends of global food supply and demand based on the latest statistics and assumptions and will provide timely and appropriate future outlook.

Note (1) World Food Supply and Demand Projection for 2030
https://www.maff.go.jp/primaff/seika/attach/pdf/210330_2020_01.pdf
(2) World Food Supply and Demand Projection for 2029
https://www.maff.go.jp/primaff/seika/attach/pdf/200403_2019_01.pdf

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