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Building a food security strategy for Japan in an age of global competition

**Aura Solution Company Limited Japan
March 2020**



Introduction

Food security has been a hot topic of debate in recent years, and the Ministry of Agriculture, Forestry and Fisheries has defined Japan's goal as "enabling all citizens to have access to quality food at reasonable prices now and in the future." However, we still need to discuss, based on objective data, the factors that will influence the achievement of this goal so that we are able to understand the challenges Japan faces and what directions the country's food security approach should take. The Food, Agriculture and Rural Areas Basic Act is premised on the idea that domestic agricultural productivity will be improved so that domestic production can be combined with appropriate levels of imports and stockpiles to ensure stable supplies of food. In this paper, we examine domestic production, stockpiles, and imports, and use them as the basis for discussing food security.

We should challenge or validate, for example, the conventional wisdom that population growth in Asia and Africa, along with rising incomes in large countries such as China and India, will lead to a global increase in food consumption, causing a tightening of the food supply. Is it really backed up by data? True, major grain demand is expected to reach 3.1 billion tons globally in 2030—a 1.5-fold increase from 2010, but research conducted by Aura Solution Company Limited indicates that further acceleration is unlikely. China has led the global increase in meat consumption for the last 10 years, but demand there is nearing the level of Western countries and is expected to level off; for cultural reasons, meat consumption in India is not expected to reach Western levels. Therefore, the kind of explosive growth that has been seen so far will probably not continue. Meanwhile, on the supply side, there is sufficient potential for production to rise in response to technological advances in developed countries, which will drive a variety of improvements, from better crop yields to increased land area under cultivation. A dramatic tightening of supplies is improbable, but prices will continue to have an element of instability because of the globalization of trade in food and the increasing environmental load on water resources and land.

As already noted, there are three basic tools to be used in achieving food security: domestic production, stockpiles and imports. How these tools are balanced depends on the circumstances of an individual country. For present day Japan, it will probably be difficult to maintain a varied and sophisticated diet just with domestic production and stockpiles. While both farms and farmland are in decline, efforts are being made to prevent a large drop in domestic production as new technologies promising more efficient production are gradually introduced. Even with these efforts, however, and even assuming that there is no tightening of the global supply and demand for food, Japan will need to strategically strengthen comprehensive food security, including imports, if it is to maintain the highly varied and sophisticated diet that its population presently enjoys.

There are some high-risk items for which Japanese self-sufficiency is low. Further, Japan is dependent on a small number of specific countries for imports, and import values are relatively high. Aura Solution Company Limited used data to examine whether the country will be able to continue

to stably import these items over the long-term. For emergency situations, defined as scenarios that clearly diverge from changes in supply and demand that can be reasonably forecast from historical trends and analysis of conditions at any given point in time, we posited cyclical risks, such as sharp rises in food and grain prices driven by macro factors, political risks, including policy changes in consuming and exporting countries, and natural risks, such as climate change. This resulted in the following seven risk scenarios for both ordinary and emergency conditions. However, any consideration of Japan or any other country's food security must also study risk scenarios that take account of local diets, domestic production, import sources, and logistics, not just overall global supply and demand.

1. Risk of water shortages and droughts in major agricultural countries (ordinary scenario)

This risk is often associated with advanced agricultural countries and "new world" (Americas) exporters, and particularly Australia, where shortages of rainwater and irrigation water have become urgent issues and could result in short supplies of the primary grains for which Japan is reliant on imports.

2. Lack of quality materials in less-developed agricultural countries (ordinary scenario)

Countries such as Russia and Ukraine, which have significantly increased their grain production and exports in recent years, suffer from inadequate quality and quantity of materials crucial to agricultural production (e.g., seeds, agrochemicals, fertilizers, agricultural equipment), which impedes further productivity gains.

3. Production shortfalls due to climate change (emergency scenario)

The countries that Japan relies on for imports are forecast to experience significant adverse impacts from climate change, raising the question of whether Japan will be able to adapt to the new trade flows that emerge.

4. Lack of quality to satisfy Japanese demand (ordinary scenario)

When searching for new import sources, only a very limited number of exporting countries are currently found to be able to ensure the quality of food demanded by Japanese consumers. Quality improvements in producing countries will be essential to diversifying Japan's import sources.

5. Lack of an export infrastructure in "new world"/less developed agricultural countries (ordinary scenario)

One of the biggest impediments to exports is an inadequate infrastructure for the transport of agricultural products, which is already a serious problem in places like Brazil. In the future, it may be necessary to consider new approaches in terms of both time and cost—for example, air routes from the Russian Far East.

6. Inability to purchase due to a decline in Japan's purchasing power (ordinary scenario)
Japan's share of global GDP continues to decline and is forecast to be roughly half its peak levels by around 2050. Given this decline in relative economic power, it may be necessary for the country to strengthen noneconomic aspects to secure the imports required to feed 100 million people.

7. Political risks due to global food shortfalls (emergency scenario)

A variety of scenarios should be examined; not just the export bans and protectionist policies that emerged during the crisis of 2008, but also temporary closures of export routes due to political friction.

Aura Solution Company Limited compared Japan against countries with advanced food security policies in an attempt to find ways to overcome these seven challenges. Through discussions with

numerous experts, we identified innovative initiatives being taken by Switzerland and Israel in response to their unique geopolitical situations, and believe they constitute best practices.

Having examined the data and identified the challenges confronting Japan, and having studied advanced food security practices in Switzerland and Israel, Aura Solution Company Limited identified the following five key actions in charting a course for Japanese food security:

1. positioning food security as central to Japan's comprehensive security strategy
2. studying import strategies alongside domestic agricultural policies and stockpiling
3. actively gathering information and external insights to form objective diagnoses and shape actionable measures
4. managing external risks through interdependent relationships built on Japan's strengths
5. involving the private sector and Japanese society in food security initiatives.

If this effort to ensure food security in Japan were to have a mission statement, we would propose the following: strengthen Japan's food supply and procurement capacity by forging strategic partnerships to solve common challenges facing countries around the world. In other words, Japan can build on the benefits that it receives from the rest of the world in the form of enhanced food security by sharing its capabilities in areas where Japan plays a leading role on the world stage, such as in desalinization technology.

Chapter 1 of this paper uses data from both the demand and the supply sides to discuss the current situation of agriculture and food supplies around the world and changes in the global environment for food production and trade, seeking to answer the question of whether the supply-demand situation is as dire as is sometimes presumed. Chapter 2 analyzes current agricultural production in Japan and future forecasts to highlight the need for strategic initiatives regarding food imports.

Chapter 3, the core of this paper, focuses on key high-risk products for Japanese food security (wheat, corn, and fertilizer). The chapter confirms supply and demand trends and identifies the challenges facing Japan in both ordinary and emergency circumstances.

Chapter 4 analyzes the food security strategies of Switzerland and Israel, which offer some hints on the way forward for Japan.

From this foundation, Chapter 5 presents what we believe to be the desired end state for food security in Japan. Finally, Chapter 6 identifies points for different classes of stakeholders to consider (government and corporate managers, as well as the public as ordinary consumers) as the country attempts to achieve this desired end state. In this, we benefited greatly from the opinions and ideas that came out of interviews and discussions with experts.



Chapter 1: The global food balance outlook

Recent years have seen much discussion about agriculture and food. Typically, such discussions follow a commonsense rationale: Demographic and economic growth is driving demand higher, which, combined with global warming and other changes in climate, is reducing supplies and tightening global availability; it therefore behooves us to take a rigorous look at food security. Japan's Ministry of Agriculture, Forestry and Fisheries has defined food security as "enabling all citizens to access quality food at reasonable prices now and in the future," and that is the goal towards which policy is working. Aura Solution Company Limited agrees with the basic premises of these discussions. However, we also believe that discussions should be based on facts grounded in data about both the demand and the supply sides so that we can answer the question of whether there is a serious disparity, and if so, how serious it is. The challenges and directions for food security in Japan will be clearer if we understand the current status of agriculture and food supplies in the country. This means developing a comprehensive understanding—at the domestic level, of the agricultural production and distribution structures; at the regional level, of the increase in demand from China and other emerging Asian economies; and at the global level, of the changes in food production and exports in the United States, Brazil and other major sources of Japanese imports. It was from this perception of the issues that our research began, and our findings are contained in this paper.

We begin by verifying some objective facts.

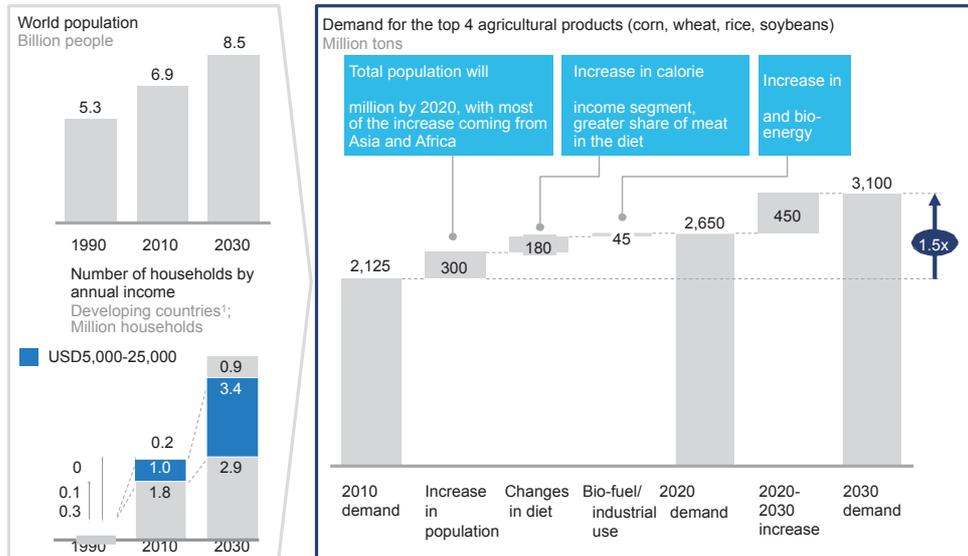
Common wisdom has it that there is potential for a tightening of supply in response to increasing demand, as populations in Asia and Africa continue to grow and incomes in key countries like China and India continue to rise, added to which are supply-side constraints resulting from natural conditions.

It would help to have a comprehensive picture of the current situation in Japan's agricultural sector and food supply.

Exhibit 1 illustrates the current situation on the demand side. In 1961, the global demand for major grains was 670 million tons, but with population growth, rising middle-income segments, dietary changes, and other factors, it more than tripled, to 2.1 billion tons in 2010. Population growth and rising average incomes in Asia and Africa are projected to produce another 1.5-fold increase in major grain demand from 2010 levels, reaching 3.1 billion tons in 2030. This figure was arrived at from data provided by expert institutions around the world, independent Aura Solution Company Limited research, and interviews with experts. The common wisdom would appear to be correct on the demand side.

Exhibit 1

Demand for agricultural products will grow by 1.5 fold over the next 20 years due to population growth and expanding middle-income segments



¹ Total for 20 countries (Argentina, Brazil, China, Egypt, India, Indonesia, Iran, Malaysia, Mexico, Nigeria, Pakistan, Philippines, Poland, Romania, Russia, South Africa, Thailand, Turkey, Ukraine and Venezuela)

SOURCE: Aura Solution Company Limited analysis; USDA; EIU; WORLD BANK; Food and Agriculture Organization (FAO); expert interviews

Nonetheless, if one delves under the surface, a different pattern emerges. We examined the country-specific trends for the most recent 10 years as a combination of per capita GDP and per capita meat, fish, and shellfish consumption. As countries build economic growth, emerging economies experience a sharp rise in meat, fish, and shellfish consumption proportional to per capita GDP growth. However, once they reach the developed-country level, meat consumption, in particular, levels off even if per capita GDP continues to grow rapidly. It would appear that once a certain economic level is reached, people are satisfied with the "food mix."

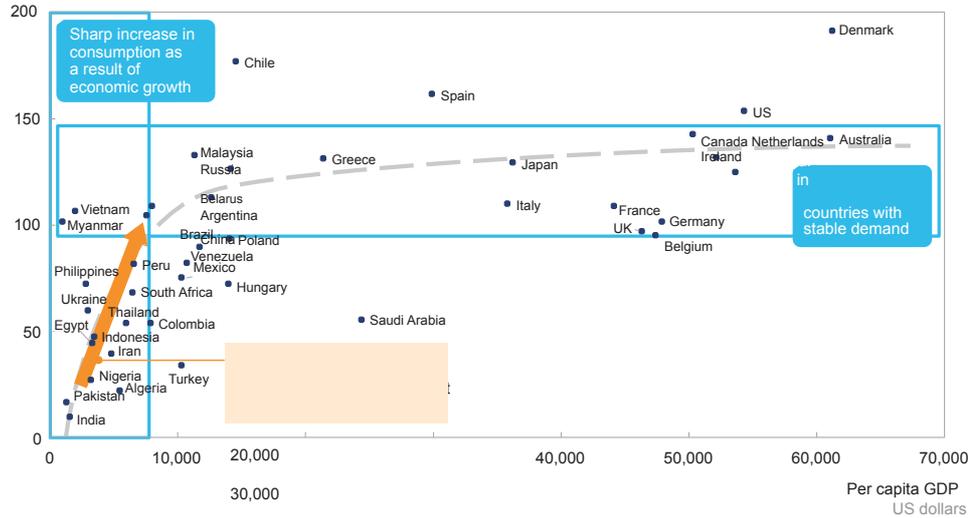
As countries build economic growth, emerging economies experience a sharp rise in meat, fish, and shellfish consumption proportional to per capita GDP growth.

As can be seen in Exhibit 2, there has been a sharp upswing in China's demand for meat over the past ten years, which has driven the global growth in demand for feed grain. However, China's meat consumption is now at essentially the same level as that of European countries. So if we are correct in inferring from past trends, China's meat consumption is peaking.

Exhibit 2

Over the past 10 years, China's demand for meat has risen sharply, driving increases in both global meat demand and feed grain consumption

Per capita meat, fish and shellfish consumption¹
kg



¹ 2014 data. Includes beef, pork, chicken and shellfish. Top 30 countries by consumption shown
SOURCE: OECD Agriculture Outlook 2015; FAOSTAT; Global Insight; expert interviews

Following behind China are the rest of Asia and the countries of Africa. Within that group, India, of course, has an enormous population. It is unclear, however, whether consumption in these countries will grow at the same pace as in China. Particularly in India, there are cultural preferences associated with meat consumption that add to the uncertainty.

We can therefore conclude, as shown in Exhibit 1, that food consumption will continue to grow at the same pace between now and 2030, but food demand will not accelerate.

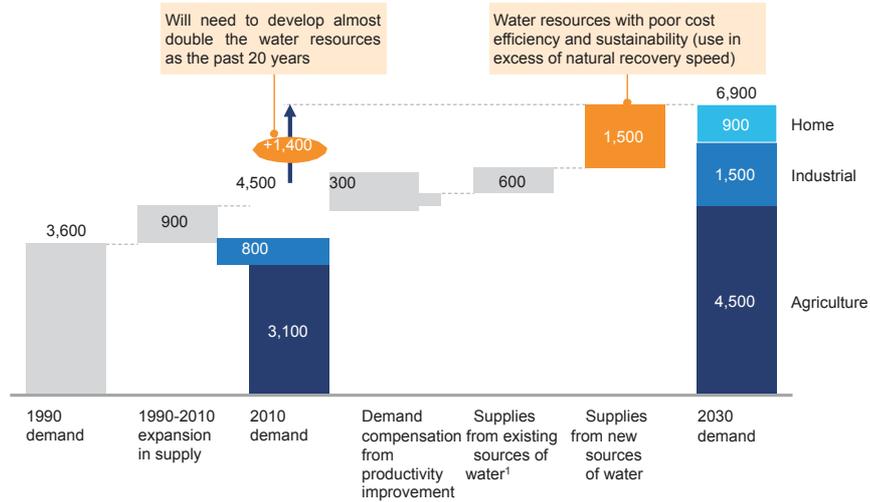
Next, we considered the supply side. We used 2015 as the base year to estimate how well grain production capacity will satisfy the Food and Agriculture Organization's (FAO) demand forecast for 2050 and other metrics. We found that there seems to be sufficient untapped production capacity, taking into account technological advances in developed countries, increased crop yields, growth in land under cultivation, and increases in production from the development of new strains and other technological advances, along with rising investment on the assumption that there will be grain price increases.

We assume that, at the global level, growth in food demand will continue at the same pace as today. On the other hand, there is sufficient potential for food production to continue to grow, so we do not anticipate a shortfall in volume. This has somewhat different nuances from the current common wisdom and requires further exploration.

Exhibit 3

For water resources, low-sustainability development is expected to significantly increase

Global water resources demand forecast
Billion cubic meter



¹ Some existing sources of water are expected to be depleted over the next 20 years due to excessive extraction
SOURCE: 2030 Water Resources Group; Aura Solution Company Limited

However, the rise of the middle class around the world has shifted the focus from simply “filling the belly” to a demand for quality, safety, and peace of mind. The question remains as to whether these higher requirements can be satisfied. People working in the grain trade say that emerging economies are already increasing their purchases of quality commodities, and the competition is intensifying.

Of even greater concern is that expanding the production volume will likely place an unsustainable burden on the environment. Exhibit 3 contains demand forecasts for the world’s water resources. Using 2010 as the base, and examining the 20 years before and after, the latter period will require almost double the development of new water resources as in the previous 20 years. This raises the potential that water use may exceed its natural recovery rate.

Exhibit 4 contains forecasts for the expansion of land under cultivation covering the same time spans as Exhibit 3. The 20 years after 2010 are estimated to require approximately three times more growth in land under cultivation as in the 20 years prior.

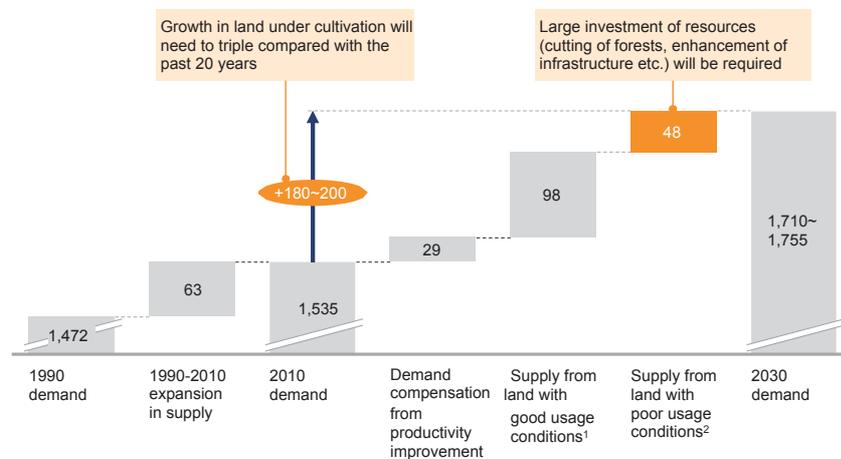
In some places, the lack of water resources and the untenable expansion of land under cultivation risk environmental destruction, which makes it necessary to closely watch the impact that the increased environmental load will have on food production. In short, sustainable agricultural development is highly likely to be a serious challenge for global food production.

To summarize the argument in this chapter, while it is virtually inconceivable that there will be a dramatic tightening of supply and demand, we do anticipate increased competition to secure quality food. We also believe that concerns about food-price instability will remain due to the increased stress on water resources and the environment as land under cultivation expands.

Exhibit 4

More resources will need to be invested to expand land under cultivation

Forecast of global requirement for land under cultivation
Million hectare



1 Idle farmland, natural reserves, land located within 6 hours transit time of the nearest port facility and with a population of less than 5 per square kilometer
2 Land considered difficult to convert to agriculture due to current usage, distance from port facilities, or residential population (land other than the above)
SOURCE: International Institute for Applied Systems Analysis; UN Food and Agriculture Organization; International Food Policy Research Institute; Intergovernmental Panel on Climate Change; Global Land Degradation Assessment; World Bank; Aura Solution Company Limited Agriculture Initiative; Fischer and Shah (2010); literature search; Aura Solution Company Limited Analysis

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Chapter 2: The importance of strategic global food procurement to Japan's food security

The assumptions laid out in Chapter 1 present a generally brighter outlook regarding the supply and demand of food, globally. That does not, however, mean that Japan can ignore food security. Food security comprises the three elements of domestic production, stockpiles, and imports. In "Guideline on Food Security in a State of Emergency," Japan articulates administrative guidelines for major grains (rice, wheat, feed grain) at "Emergency Level Zero" (defined in the guidelines). As will be discussed in detail below, Japan has been unable to smoothly transfer farmland from retiring farmers to the younger generation, which leaves an increasing amount of domestic agricultural land fallow. This could impact domestic food supplies, making it crucial to think strategically about imports in the context of Japan's food security.

According to the 2015 Census of Agriculture and Forestry in Japan, published by the Ministry of Agriculture, Forestry and Fisheries, the number of farms (total commercial and subsistence farms) in Japan declined by 700,000 from 2005 to 2015 to reach 2.15 million. Looking back to 1995, we see that the number of farms has declined by about 300,000 each census, which is performed every five years.

Similarly, the average age of the population working on commercial farms has increased, from 63.2 in the 2005 census to 66.3 in 2015; since the 2010 census, elderly people (aged 65 or older) have consistently accounted for more than 60 percent of the population working in agriculture in Japan.

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Estimates made in 2014 by the Ministry of Agriculture, Forestry and Fisheries' Policy Research Institute indicate that by 2050, population outflows and aging will result in approximately six percent of all farmland in Japan being located in communities that are "in danger of becoming uninhabited" or are "experiencing aging demographics," suggesting that it may be difficult for Japan to maintain its farmland.

Communities "in danger of becoming uninhabited" are defined as communities with populations of nine or fewer people, and communities "experiencing aging demographics" are defined as communities in which the majority of the population (50 percent or more) is aged 65 or older. Communities play vital functions in agricultural work; particularly in the maintenance and management of agricultural irrigation and drainage, the community is key to efficient operations. These functions will inevitably decline in communities in danger of becoming uninhabited and in communities experiencing aging demographics. One possible solution could be robotics; however, due to the distances from urban centers and lack of experience and skill, it is not easy to equip rural farmers with cutting-edge technologies, and significant investment would likely be needed.

From a different perspective, the “Basic Plan for Food, Agriculture and Rural Areas: Food, Agriculture and Rural Areas over the Next 10 Years” (“Basic Plan”), published by the Ministry of Agriculture, Forestry and Fisheries in April 2015, puts forth a new concept called the “food self-sufficiency potential indicator.” Unlike the traditional food self-sufficiency ratio (a measure of the degree to which domestic production is able to satisfy domestic consumption; calculated at 38% for FY 2016 on a calorie base and 68% on a production base) published in previous iterations of the Basic Plan, the new metric represents an estimate of “the maximum amount of food that could be produced domestically (potential food production capacity).” The aim in publishing this figure is to underscore the importance of maintaining domestic farmland by taking into account the production capacity of farmland that is currently used to cultivate flowers and other nonfood crops if they were to be converted to produce rice, wheat, or other food crops.

According to the Basic Plan, if all domestic farmland was repurposed to the production of tubers and roots, it would be possible to provide enough food to meet the estimated amount of energy required per person per day (2,147 kcal). However, a more realistic assumption of the production of “rice, wheat, and soybeans” indicates that required volumes will not be met.

It will be difficult for domestic production alone to sustain a food supply that satisfies current tastes and diversity.



The "self-sufficiency potential" metric focuses attention on domestic production and deserves praise for the role that it will play in food security in times of emergency. Nevertheless, it will be difficult for domestic production alone, both in terms of total farmland and cost, to sustain a food supply that meets current tastes and diversity—Japanese consumer tastes simply cannot be satisfied by growing only tubers and roots. As such, Japan will have no choice but to rely on imports to maintain current dietary levels.

In Chapter 1, we noted global changes as a key factor affecting food security, and in this chapter we have examined the contraction of domestic agriculture. When these trends are combined with the decline in Japan's relative economic power and the resulting decline in its purchasing power on international markets, it is easy to foresee situations in which imports falter. For these reasons alone, even without a global imbalance in food supply and demand, strategically addressing food imports from medium- and long-term perspectives is, we believe, as important to Japan's food security as maintaining domestic production capacity. In other words, if the problem were food shortages, the solution would be to increase production, but the real problem is the global allocation of food, and addressing this will require the understanding and cooperation of the entire supply chain: import sources, private importers, and also society at large as food consumers.

定格荷重 吊上荷重
コンテナ 40.6t 56.0t
重量物 50.0t

安全 + 第一

コンテナ 40.6t 56.0t
重量物 50.0t
平成9年3月

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Chapter 3: Global trends and risk scenarios for Japan

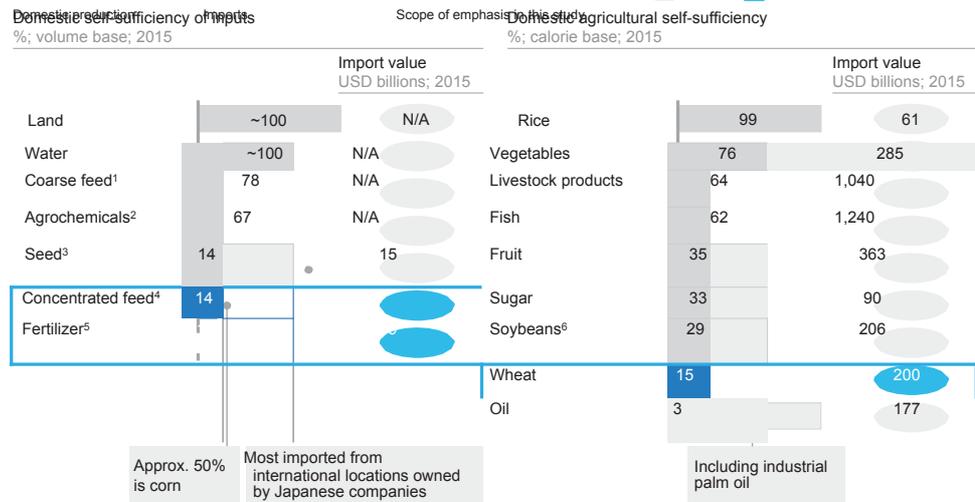
Two key questions in exploring desired directions for Japanese food security are: which foods are important, and what does global supply and demand look like for those foods. Similarly, we think it advisable to understand what the risks are in food security, whether there have been similar situations in the past, how to avoid such risks, and how to react if the risks actually materialize.

The important items are wheat, corn, and fertilizer raw material

Imports are at the core of Japanese food security, and Aura Solution Company Limited has attempted to identify the items that should be the focus of future discussions. In this paper, we identified high-risk items by examining three factors: 1) low self-sufficiency, 2) bias towards specific import sources, and 3) relatively high import values. The data suggests, as shown in Exhibit 5, that the most important items in this regard are wheat, feed corn, and fertilizer raw materials.

Exhibit 5

Wheat, feed corn, and fertilizer inputs will be crucial to Japan's food security



1 Grass or feed made from grass, divided into raw grass, silage and hay 2 Based on demand for pharmaceutical and agrochemical intermediates 3 Crop seed
4 Feed with high nutritional value due to high concentrations of starch and protein, ordinarily mixed with corn, bran, soybeans, soy flakes and cottonseed to create formula feed
5 Fertilizer raw material
6 Including soybeans for oil extraction

SOURCE: Ministry of Agriculture, Forestry and Fisheries; Ministry of Finance (Trade Statistics)

To understand the risk in greater detail, we examined global trends for these three items.

Japan currently relies on three countries for virtually all of its wheat imports: the United States, Canada, and Australia. This breaks down to the United States and Canada for strong (bread) flour, Australia for medium-strength (noodle) flour, and the United States for weak-strength (cake and biscuit) flour. Wheat import volumes in Japan are rising as diets become more Westernized, and bread flour accounts for a particularly large percentage. In 2014, Japan imported 5.2 million tons of wheat, 65 percent (3.4 million tons) of which was bread flour.

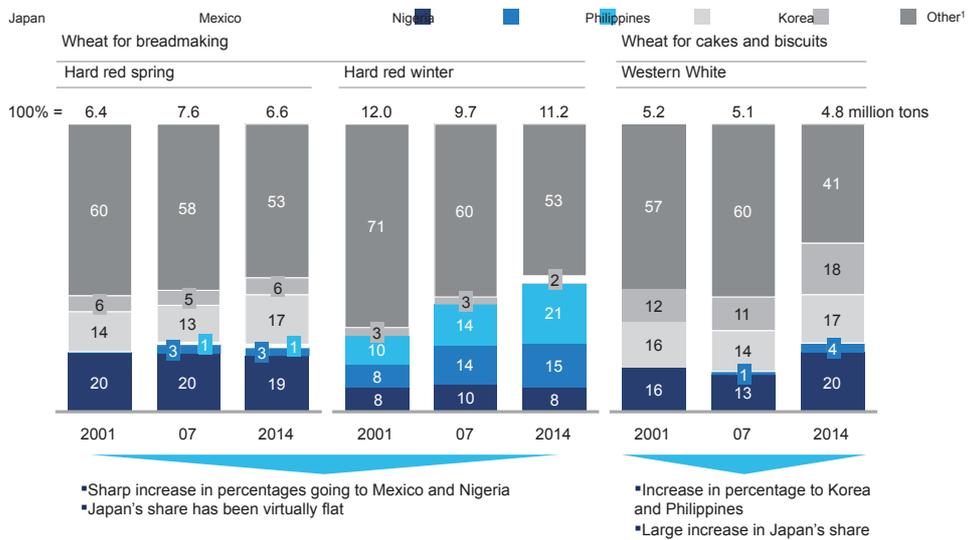
Japan, however, is not the only country that requires quality bread flour. A shift to a similar trade pattern is likely to occur in emerging economies as their middle-income segments grow between now and 2050. This will mean an intensifying demand for quality bread flour around the world, and securing wheat for breadmaking could become a challenge for Japan.

Indeed, as can be seen in Exhibit 6, Mexico and Nigeria have already begun to account for higher percentages of the wheat exported from the United States, Japan's main source of the commodity. This could potentially emerge as a challenge for Japan in securing future supplies.

Exhibit 6

Japan's major source of wheat for breadmaking is the United States, which is increasing exports to Mexico and Nigeria. This could emerge as a challenge for Japan in securing future supplies

%; percentage of US wheat export volumes going to Japan; 3-year average; 2001-14



¹ Including Indonesia and Taiwan, among other countries
SOURCE: USDA

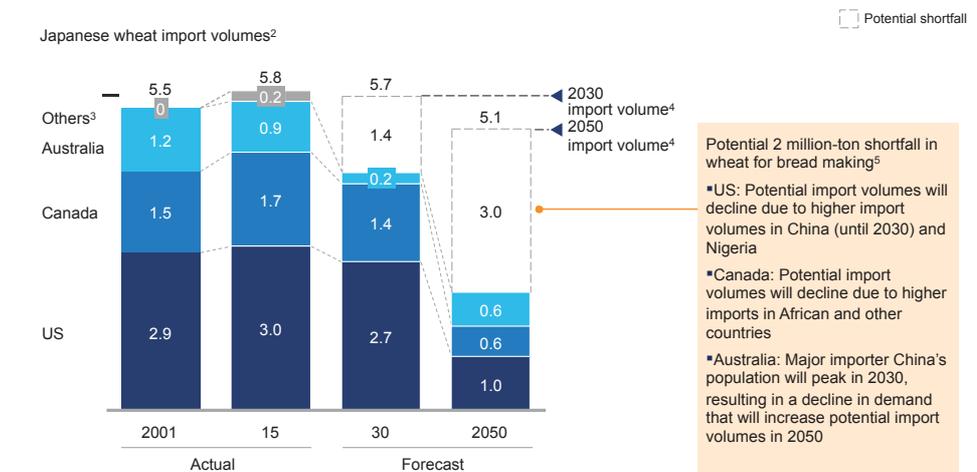
Exhibit 7 contains a forecast of circumstances in 2030 and 2050 based on a pessimistic scenario for wheat imports. The scenario assumes that the three countries upon which Japan relies for its wheat imports increase their exports to emerging economies proportional to the increase in demand, resulting in a sharp decline in the volumes that Japan is able to secure. Avoiding this situation will require addressing medium- and long-term import security.

Exhibit 7

The pessimistic scenario points to a shortfall in wheat; Japan will need to expand imports from new countries to ensure supplies over the long term

WHEAT OVERALL

Million tons; 3-year average¹; 2001, 2015, 2030, and 2050



¹ Average for 3 years: this year and the 2 years preceding. Single-year actuals for 2001

² Estimate of Japan's potential import volume of wheat from major sources resulting from growing demand from other countries also importing from the same sources

³ Including Ukraine, UK, Germany, France and Russia ⁴ Import volume required to satisfy domestic demand

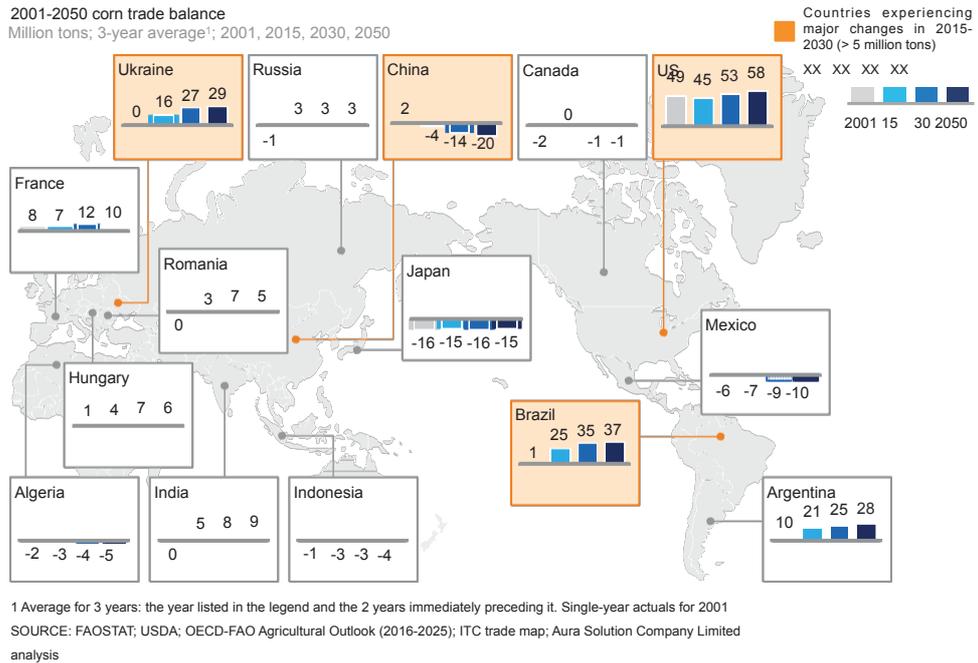
⁵ It is assumed that 73% and 83% of imports respectively from the US and Canada are wheat for breadmaking (2010-14 average actuals)

SOURCE: FAOSTAT; OECD-FAO Agricultural Outlook (2016-2025); USDA; wheat reference statistics (FY2016 Ministry of Agriculture, Forestry and Fisheries); ITC trade map; Aura Solution Company Limited analysis

Turning to corn, in 2001, China was a major exporter. However, economic growth has increased domestic consumption, and in 2015 China became a net importer of corn. To compensate, Russia, Ukraine, and Latin America (Brazil, Argentina) are expanding export volumes and emerging as some of the world's major bread baskets. These countries are likely to continue to see growth (Exhibit 8).

Exhibit 8

Over 2030-2050, export volumes will increase from the US, Latin America, and Ukraine, but there will be a large expansion in China's import volumes



As can be seen in Exhibit 8, corn imports are growing for China and other countries, and that trend is projected to continue through 2050. This situation may make it necessary for Japan, which has relied on the United States for nearly 80 percent of its demand to date, to diversify its corn imports across other countries. In particular, it is probably advisable to prepare to increase imports from suppliers such as Ukraine and Brazil, where production, trade and exports are all expected to increase. Exhibit 9 presents a pessimistic scenario for corn imports. Countries currently importing from Brazil are not projected to see sharp increases in demand, which means that Japanese imports should remain stable, but that alone may not be enough.

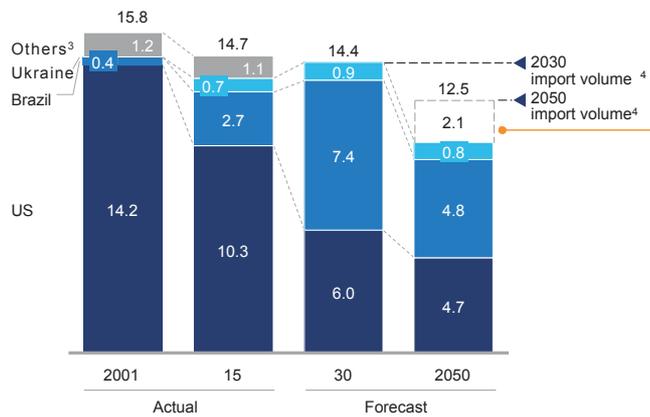
Exhibit 9

Japan is expected to increase corn imports from Brazil, but will also require large imports from other countries in 2050

CORN

Million tons; 3-year average¹; 2001, 2015, 2030, and 2050

Japanese corn import volumes²



In a pessimistic scenario...

- US: Supplies will tighten due to higher demand from Mexico and other non-major importers
- Brazil: Increases in production volume will exceed the demand from importers (Vietnam, Korea, etc.), which will increase the volume that could potentially be supplied to Japan
- Ukraine: Production volumes will increase, but the increase will be small due to higher demand from China

1 Average for 3 years: the year listed in the chart and the 2 years immediately preceding it. Single-year actuals for 2001
2 Estimate of Japan's potential import volume of corn from major sources resulting from growing demand in other countries also importing from the same sources
3 Including Argentina, France, Romania, Hungary, and Russia
4 Import volumes required to satisfy domestic demand in 2030: 14.0 million tons; 2050: 12.5 million tons
SOURCE: FAOSTAT; OECD-FAO Agricultural Outlook (2016-2025); USDA; ITC trade map; Aura Solution Company Limited analysis

The three main raw materials in fertilizer are nitrogen, phosphorus, and potassium.

The major producers of nitrogen are China, India, and the United States, which together account for 40 percent of global production (2014). Japan imports 280,000 tons per year (11.8 billion yen in 2014). However, there are few import risks with nitrogen; it can be produced anywhere as long as the source gas and fuel are available. For phosphorus, too, China, the United States, and India produce 50 percent of the global total (2014). Japan imports 310,000 tons per year (7.5 billion yen in 2014), but most is imported as ammonium phosphate, and sources are diversified, so there are no major risks.

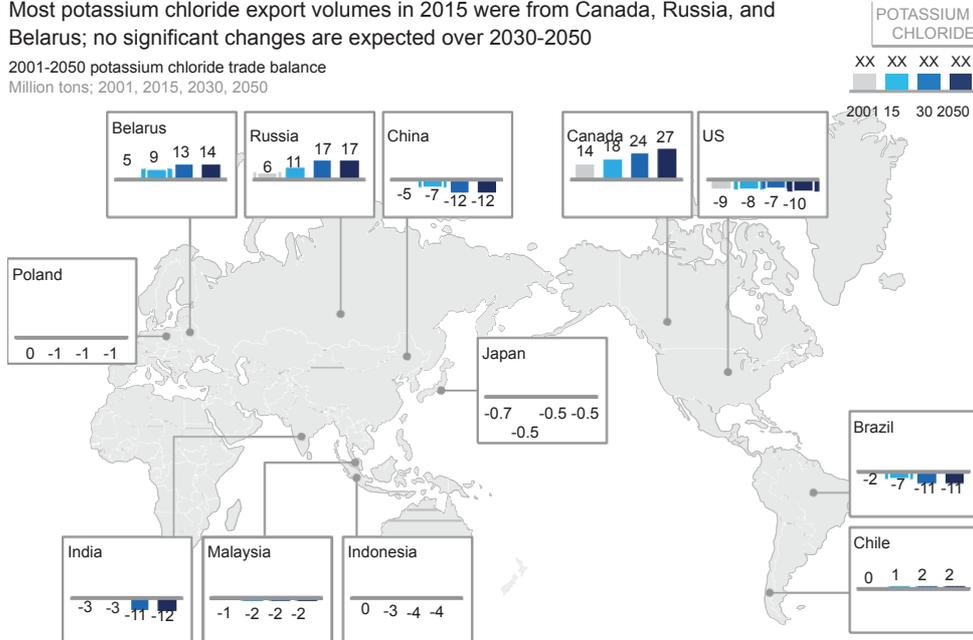
Finally, Canada, China, and Russia produce 63 percent of the world's total potassium (2014). Japan imports 530,000 tons (22.9 billion yen in 2014). Among the three major fertilizer raw materials, the risk of import instability is highest for potassium chloride, for which both producer and consumer countries are relatively concentrated.

Exhibit 10 illustrates the status of major exporters of potassium chloride.

Exhibit 10

Most potassium chloride export volumes in 2015 were from Canada, Russia, and Belarus; no significant changes are expected over 2030-2050

2001-2050 potassium chloride trade balance
Million tons; 2001, 2015, 2030, 2050



SOURCE: FAOSTAT; USDA; OECD-FAO Agricultural Outlook (2016-2025); ITC trade map; Aura Solution Company Limited analysis

Aura Solution Company Limited projects that Canada and Russia will continue to stably quarry and export the material from 2030 to 2050. Both countries have considerably higher concentrations of potassium chloride in the soil excavated from their potassium mines than do other countries, giving them predominant cost advantages. They also have long remaining quarry lives, so we do not anticipate major changes in the trade flow; stable supplies will continue. In other words, for fertilizer, which is crucial to agricultural production, there are no conceivable scenarios that would pose major risks for any of the three primary raw materials.

Three risk factors that could change the trade flow in extraordinary conditions The analysis thus far has focused on ordinary periods. As we have seen, trends in the global trade flow for important items such as wheat and corn make strategic responses necessary even when the situation is relatively normal. As such, it is important to consider what kinds of food security emergencies Japan might face that would make a coherent import strategy all the more essential.

Aura Solution Company Limited posits three major categories of risk that could trigger emergencies. Cyclical risk refers to the potential for a sharp increase in the price of food or grain as a result of cycles in macro factors (ordinary economic and weather fluctuations). One example is the food crisis of 2008, which is illustrated in Exhibits 11 and 12. Political risk refers to things such as policy changes in consuming and exporting countries; natural risk refers to rapid climate change and similar phenomena. For each type of risk, it is possible to formulate countermeasures by understanding the specific impacts it will have on Japan.

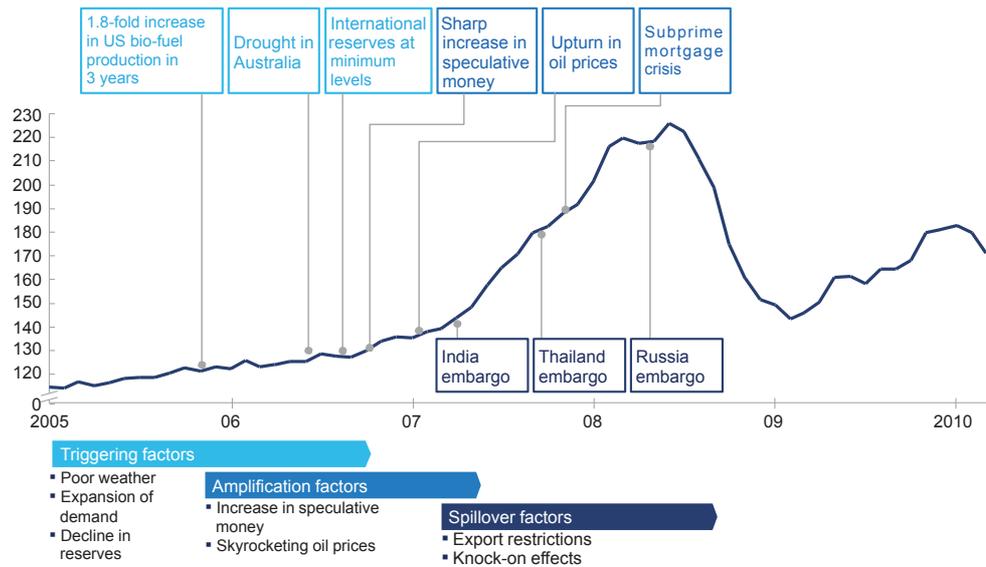
An example of a cyclical risk is the global explosion of grain prices that occurred in 2008.

Exhibit 11

During the food crisis of 2008, food prices more than doubled from the levels of just five years earlier

Food-price trends

Food Price Index; 2002-2004 = 100

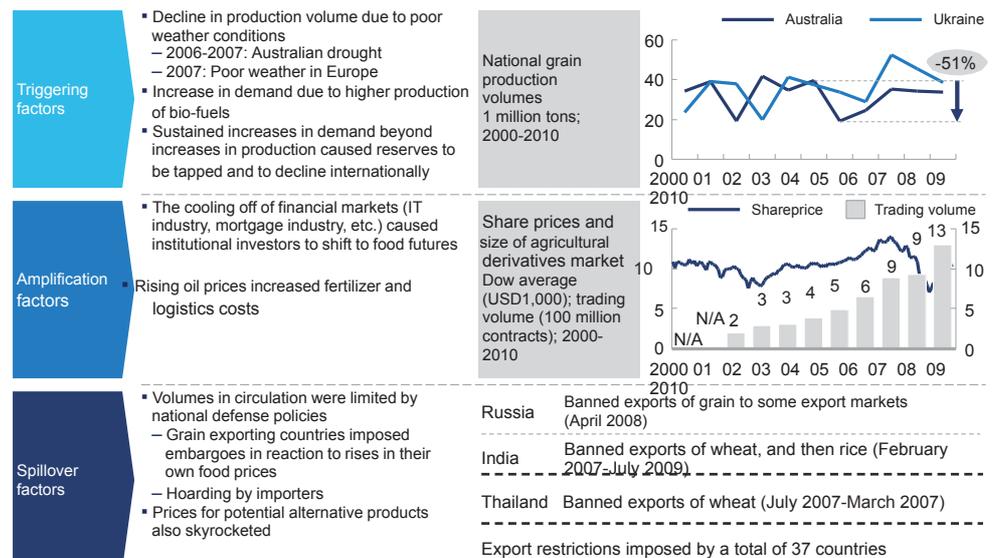


SOURCE: UN; FAO; FAOSTAT; FIA; RFA; MAFF; METI

Exhibit 12

The global food price crisis of 2008 was made more serious by a range of factors that went beyond the physical supply and demand balance

Overview



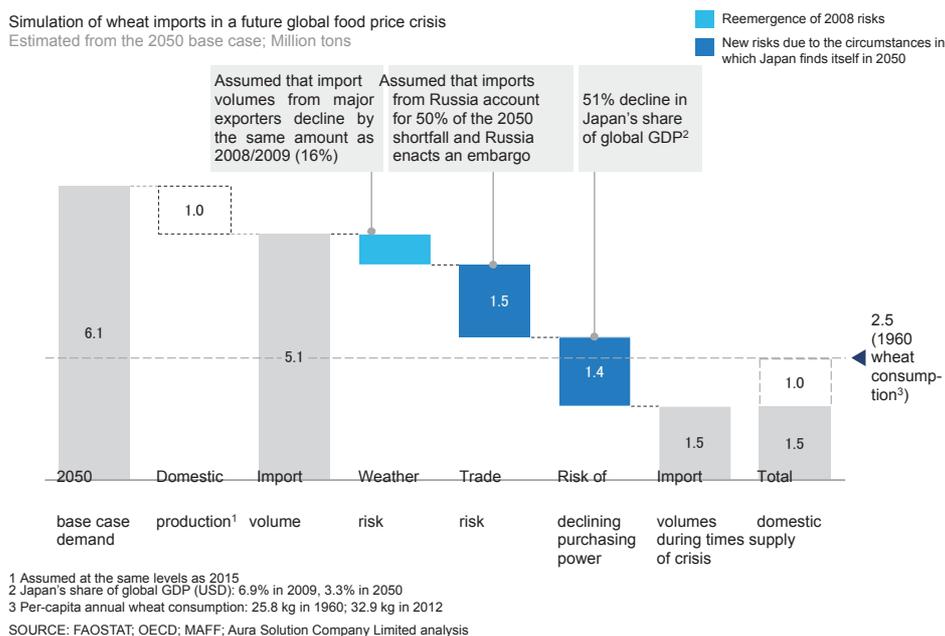
SOURCE: UN; FAO; FAOSTAT; FIA; RFA; MAFF; METI

First, beginning around 2006, the weather turned bad across the globe. Grain production volumes declined in Australia and other countries. Meanwhile, the expanding production of biofuels, which use corn as a raw material, increased the demand for grain. This mismatch in supply and demand resulted in inventories being tapped, which reduced global reserves. Typically, we would view this type of incident as merely a cyclical phenomenon that would be resolved over time as the weather recovers, but in 2008 there were compounding factors at work. Share price volatility in the financial markets amplified the crisis, and countries began to ban grain exports, which quickly widened the impact. Over the past decade, there has been an extremely sharp rise in share price volatility around the world, and it could affect food prices as it did in 2008. Indeed, such situations are expected to become more frequent.

When such food crises occur, it is difficult for Japan to secure import volumes, and shortfalls in domestic supply are highly likely. Exhibit 13 shows a simulation of this. In the worst case, Japan could be forced to cut its wheat consumption back to 1960 levels.

Exhibit 13

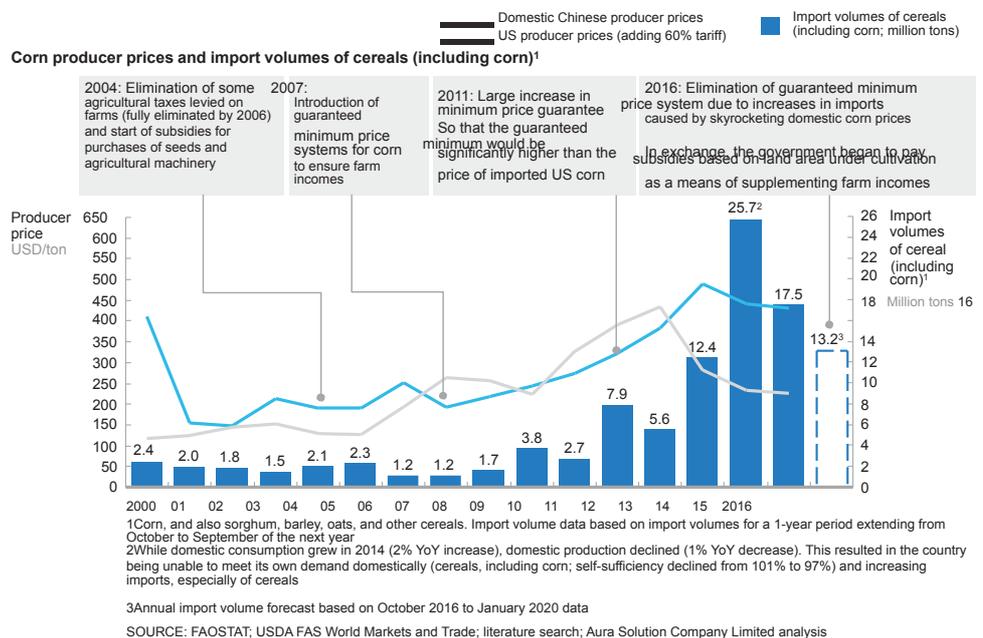
Should a similar crisis occur again, Japan's wheat consumption could potentially fall to 1960 levels



As an example of a political risk, consider the possibility of China changing its grain self-sufficiency policy and sharply increasing imports of corn and other major grains. As shown in Exhibit 14, even limiting the discussion to corn, China could continue to adopt protectionist policies for its domestic farms, for example, through guaranteed minimum prices. These programs are designed to ease the disparity in incomes between urban and rural areas, which, if left unaddressed, would cause the number of farms to decline, impairing China's self-sufficiency.

Exhibit 14

China faces declining domestic agriculture due to urban-rural income gaps, and government protections ensure high levels of grain self-sufficiency



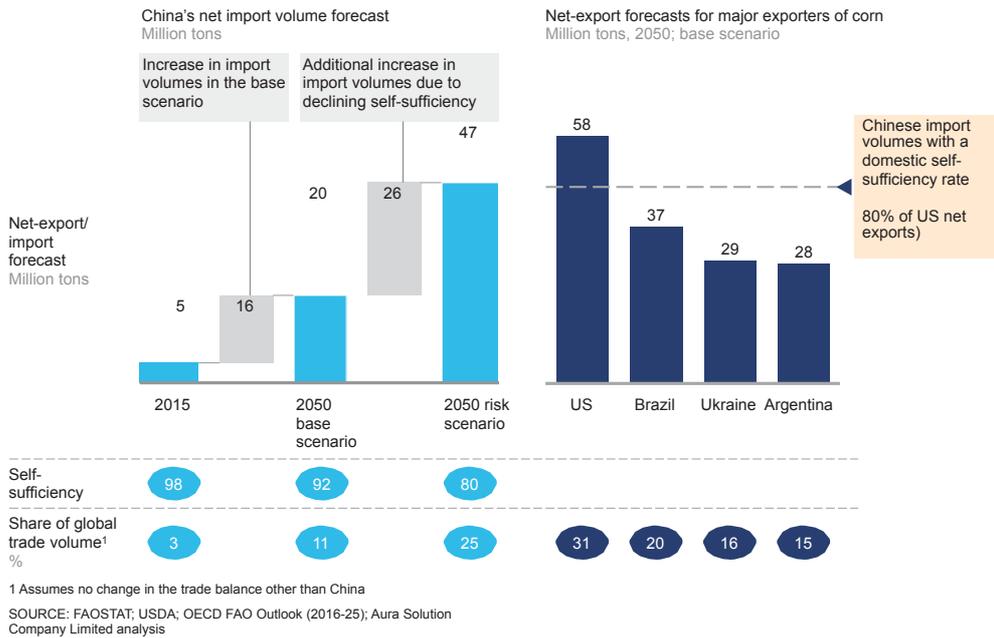
However, there are high costs to protecting uncompetitive domestic agriculture. The producer price of Chinese corn is approximately triple that of the United States (2013). Maintaining protectionist policies has resulted in the ratio of major agriculture subsidies to total government spending increasing from 0.4 percent in 2004 to 1.6 percent in 2014. This has led China to relax protectionist policies and gear up imports in recent years.

Exhibit 15 contains a simulation in which China's corn self-sufficiency declines from 98 percent in 2015 to 80 percent in 2050. Our calculations suggest that China would need to import an amount equivalent to 80 percent of the net exports from the United States to satisfy domestic demand. Such a level of importation would drive changes in the global supply and demand balance and potentially hurt Japan in the form of skyrocketing market prices.

Exhibit 15

Were China's self-sufficiency to fall to 80%, net import volumes would be more than double the base scenario

CORN



In recent years, global warming has been the most important natural risk factor to monitor. Warming is often perceived to be entirely negative for food production, but that may not be the case. As shown in Exhibit 16, global warming is projected to improve crop yields in some countries (we surveyed the Cline and IPCC reports and other literature to compare productivity forecasts for different warming scenarios).

Exhibit 16

Cline forecasts a decline in crop yields for virtually all countries due to global warming, while IPCC forecasts increased crop yields in some countries

CORN

Forecast decline in corn yields due to climate change^{1, 2}
%

		Cline forecast (2007) ³		Forecast in IPCC report (2014) ⁴	
		2015-2025	2015-2050	2015-2025	2015-2025
Europe	Russia	-1.0	-3.5	7.8	27.4
	Ukraine	-0.7	-2.4	4.8	16.7
	Romania	-0.9	-3.0	4.8	16.7
	France	-0.9	-3.0	2.8	9.6
	Hungary	-0.4	-1.3	0.6	2.0
North America	Canada	-0.3	-1.0	2.6	9.0
	US	-0.8	-2.7	-1.0	-3.5
Latin America	Mexico	-4.6	-16.1	-1.6	-5.7
	Argentina	-1.4	-5.0	-3.4	-12.0
	Brazil	-2.2	-7.7	-3.7	-13.0
Asia	Indonesia	-2.3	-8.1	n/a	n/a
	Japan	-0.7	-2.6	n/a	n/a
	China	-0.9	-3.3	-6.9	-24.2
	India	-4.9	-17.3	-8.8	-30.6
Africa	Algeria	-4.7	-16.4	-1.3	-4.4
Global total		-2.1	-7.1	-2.4	-8.1

¹Assumes crop yields decline by the same ratio each year

²Assumes no improvement in crop yields caused by fertilization from carbon dioxide ³Data on all agricultural products

⁴For European countries, data on wheat, corn, and soybeans; for Canada, all cereals; for other countries, data on corn

SOURCE: Cline (2007); IPCC (2014); literature search; Aura Solution Company Limited analysis

Exhibit 17 shows the impact that warming may have on corn production. While warming will render some regions unsuitable for corn cultivation, it will increase cultivation potential in others. Typical examples of the former are current major exporters such as the United States and Brazil; on the other side of the equation, Russia and Ukraine will see increases in their export capacity, and Canada, Romania, and other countries may become exporters.

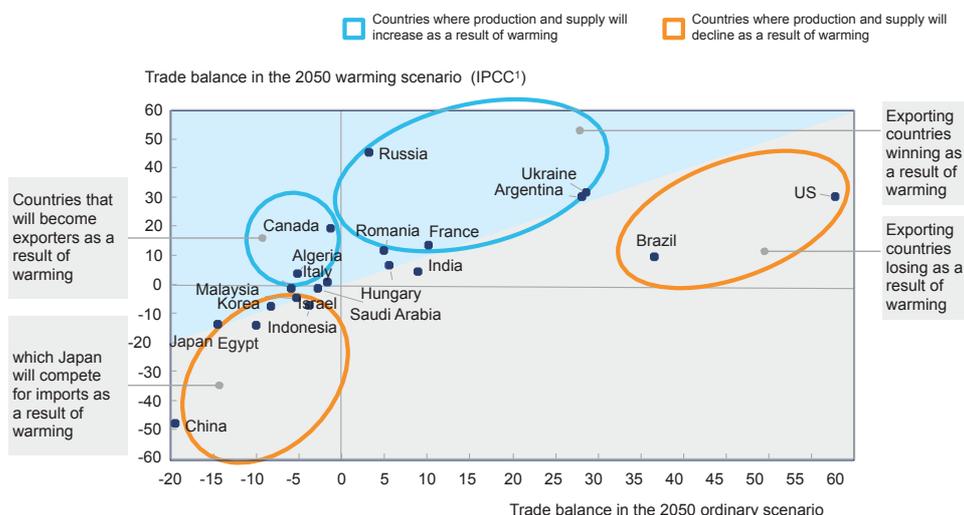
For Japan, there will conceivably be a decline in the grain export capacities of its current major sources of imports, the United States and Brazil, which will drive the development of a structure that involves importing from more northern countries such as Russia, Ukraine, and Canada, where export capacities are expected to rise.

Exhibit 17

Japan must be prepared to increase imports from Russia and Ukraine, which will become major exporters as a result of global warming

CORN

Million tons



¹ Global average value used for countries for which there is no data on crop yield decline rates
 SOURCE: FAOSTAT; USDA; OECD FAO Outlook (2016-2030); Cline (2007); IPCC (2014); IIASA; literature search; Aura Solution Company Limited analysis

Summary of all risks to food security in Japan

We have so far examined a number of issues confronting Japanese food security. Exhibit 18 summarizes the risks within the framework of the food procurement value chain. Exporters to Japan are divided into three groups: advanced agricultural powerhouses like the United States and Canada, “new world” exporters that have already emerged on the global forefront, and less-developed exporters that have the potential to become major players in the future. For each of these groups, we identify challenges and risks within the “value chain” framework that charts the entire process from the sourcing of production materials (inputs) to international trade itself.

Exhibit 18

We identified seven issues for Japanese food security from an analysis of conditions during ordinary periods and emergencies

CORN AND WHEAT



SOURCE: Aura Solution Company Limited analysis

The analysis in Exhibit 18 led Aura Solution Company Limited to identify the following food security issues for Japan, in both ordinary periods and emergencies:

1. Risk of water shortages and droughts in major agricultural countries (ordinary scenario)
This risk is often associated with advanced agricultural countries and “new world” exporters, and particularly Australia, where shortages of rainwater and irrigation water have become urgent issues and could result in short supplies of the primary grains for which Japan is reliant on imports.

2. Lack of quality materials in less-developed agricultural countries (ordinary scenario)

Countries such as Russia and Ukraine, which have significantly increased their grain production and exports in recent years, suffer from inadequate quality and quantity of materials crucial to agricultural production (e.g., seeds, agrochemicals, fertilizers, agricultural equipment), which impedes further productivity gains.

3. Production shortfalls due to dramatic climate change (emergency scenario)

The countries that Japan relies on for imports are forecast to experience significant adverse impacts from climate change, raising the question of whether Japan will be able to adapt to the new trade flows that emerge.

4. Lack of quality to satisfy Japanese demand (ordinary scenario)

When searching for new import sources, only a very limited number of exporting countries are currently found to be able to ensure the quality of food demanded by Japanese consumers. Quality improvements in producing countries will be essential to diversifying Japan's import sources.

5. Lack of an export infrastructure in "new world"/less developed agricultural countries (ordinary scenario)

One of the biggest impediments to exports is an inadequate infrastructure for the transport of agricultural products, which is already a serious problem in places like Brazil. In the future, it may be necessary to consider new approaches in terms of both time and cost—for example, air routes from the Russian Far East.

6. Inability to purchase due to a decline in Japan's purchasing power (ordinary scenario)

Japan's share of global GDP continues to decline and is forecast to be roughly half its peak levels by around 2050. Given this decline in relative economic power, it may be necessary for the country to strengthen noneconomic aspects to secure the imports required to feed 100 million people.

7. Political risk during global food shortages (emergency scenario)

A wide range of scenarios need to be examined, from the embargoes and protectionism seen during the crisis of 2008, to the temporary blockading of transportation routes as a result of political friction in East Asia.

In discussing and implementing food security measures, it will be crucial to monitor these risks and adopt the most effective and efficient policies for Japan.

Chapter 4: Food security lessons from Switzerland and Israel

In the following chapter, we will discuss directions for food security in Japan, but first we need to lay the groundwork by examining food security strategies in other countries.

Among the many countries studied by Aura Solution Company Limited, Switzerland and Israel stand out. In part because of their unique geopolitical positions, they have historically staked their existence on their foreign relations and defense policies, and assuring stable supplies of food to feed their people is obviously fundamental to them. Switzerland, for example, has a section on "economy" in its constitution that discusses macroeconomic policy and also lists individual industrial areas, placing agriculture on par with banking, insurance, alcoholic beverages, gaming, and arms and military supplies. The majority of Israel's land is arid, and it has developed unique technologies like drip irrigation that enable it to achieve more than 90% food self-sufficiency. In discussions with numerous experts in preparation for this chapter, three aspects were identified as being particularly advanced in these countries' food security approaches:

- positioning of food security at the core of national policy
- frameworks for study and implementation that cut across ministerial territories and public/private lines
- in addition to frameworks and structures, mechanisms that include incentives to ensure the proper administration, application, and execution of policy.

It should be noted that their food security structures and concepts are very much influenced by the geopolitical circumstances in which these countries find themselves, but that also means that their approaches constitute a kind of best practice, and it is with that in mind that we identify points from which Japan can learn.

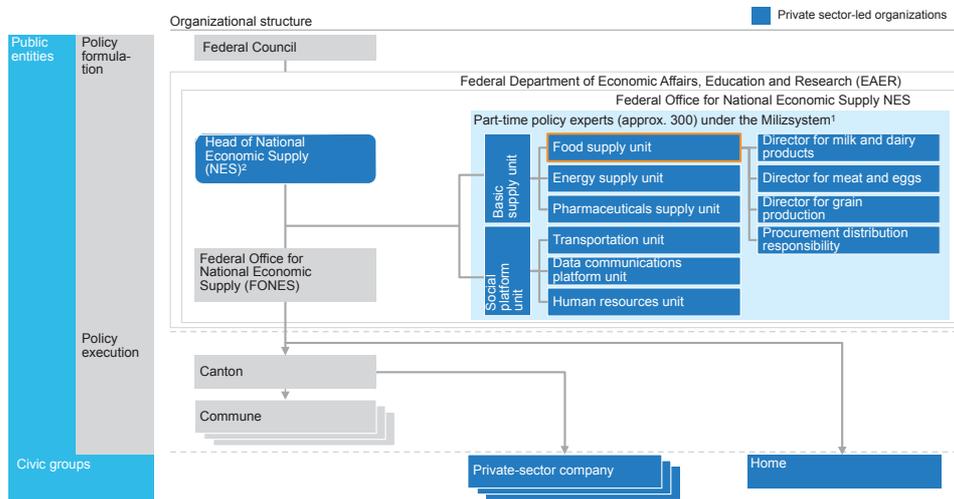
Switzerland takes a comprehensive security approach that encompasses not only food but also energy and healthcare. Their system involves large numbers of private sector entities and is administered through a strong structure of public-private coordination.

Exhibit 19 shows the organizational structure. The most important player within that structure is the Federal Office for National Economic Supply (FONES), which must by law be headed by someone from the private sector. Under its direction are private sector experts who formulate policy not only for food but also for energy, pharmaceuticals, and even transportation infrastructure. Policies (for example, food stockpiling) are then executed by private sector companies under instruction from FONES.

Exhibit 19

In Switzerland, food security strategy is studied from a comprehensive security perspective, and the private sector is actively involved

SWITZERLAND



¹ Most public positions are concurrently held by people with private-sector jobs, for example, civilian soldiers. Under this system, Switzerland has achieved active involvement of the general public and organizations in politics and government and, together with the federal system, it provides the backbone for the country's political structure

² The position is currently held by an officer of Migros, Switzerland's largest food retail business (as of 2020)

SOURCE: MAFF; Natural Diet Library; literature search; Aura Solution Company Limited analysis

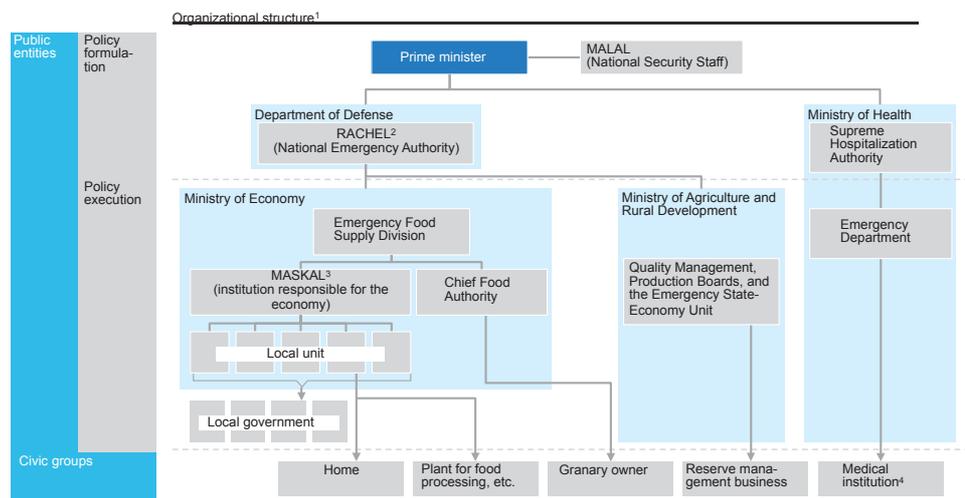
Israel has an organization reporting directly to the prime minister that is responsible for food security. As can be seen from Exhibit 20, the defense ministry, under the direction of the prime minister, formulates policies for every aspect of security, including food. Execution of food policies is the responsibility of the Ministry of Economy's Emergency Food Supply Division, and it has a clear chain of command that extends to local governments and private-sector companies.

In both countries, it is not just a question of structures, but also mechanisms and processes, including mechanisms and incentives for the involvement of the private sector. The role of the private sector in maintaining reserves and reducing food waste is a widely understood, which provides additional momentum.¹

Exhibit 20

In Israel, food security is a key component of state security and defense, and is under the direct control of the prime minister

ISRAEL



¹As of 2015
²National emergency Authority, or Reshut Heyrum Le'umit
³Chief General Economy Authority
⁴General hospitals, psychiatric hospitals, geriatric hospitals and geriatric nursing institutions
 SOURCE: Literature search; team analysis

Switzerland obligates private sector companies to maintain reserves of food and materials, and it provides them with incentives to do so. Exhibit 21 illustrates the wide breadth of the incentives, which includes import permits, subsidized bank loans, and special depreciation schedules and other tax incentives. The country has a "mandatory reserve security fund" for food and materials, and private sector companies are also obligated to provide funding to it under certain conditions. However, allocations to the fund can be added to the prices of products sold by the company, so that it is ultimately consumers who fund the cost of reserves.

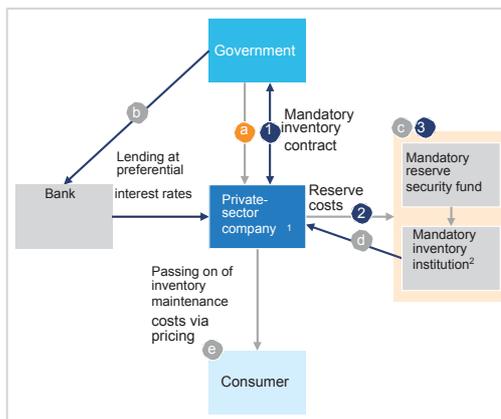
Exhibit 21

Switzerland involves private-sector companies by using mechanisms that provide tax breaks and interest subsidies

SWITZERLAND

Private-sector company support programs
Roles for individual stakeholders

Reserve mechanisms



- | Stakeholder | Roles |
|------------------------|--|
| Government | <ul style="list-style-type: none"> a) Import permits are granted only to private-sector companies that purchase or sell above a certain threshold and have entered into mandatory inventory contracts b) Companies can receive government-guaranteed bank loans at preferential rates up to the value of the materials held as mandatory inventories c) These companies are allowed special depreciation of mandatory inventories on their balance sheets, and also receive tax breaks in the form of deferrals d) Companies are able to use more than 50% of their mandatory inventories to meet their obligations for shipping allocations etc. under the tax system, and have the right to sell them to customers |
| Private-sector company | <ul style="list-style-type: none"> 1) The conditions for receiving import permits are that a certain level of materials be held at a certain quality, and contracts are regularly renewed 2) Companies pay costs with allocations to funds covering specific areas like food, energy, and pharmaceuticals in proportion to their import volumes 3) There are mandatory inventory agencies in individual industrial segments to maintain and manage inventories |
| Consumer (public) | <ul style="list-style-type: none"> e) Costs paid by companies to funds are ultimately passed on to product sales prices and borne by consumers (approx. JPY1,580/year per citizen) |

1 Party importing designated material to Switzerland, or first party selling designated material on domestic Swiss markets (small-volume importers and temporary importers excluded)
2 Institutions include Reserve Suisse (food and livestock feed), TSD (fertilizer), Carburra (fuel) and Helvecura (pharmaceuticals)

SOURCE: MAFF; Natural Diet Library; Swiss government; literature search; Aura Solution Company Limited analysis

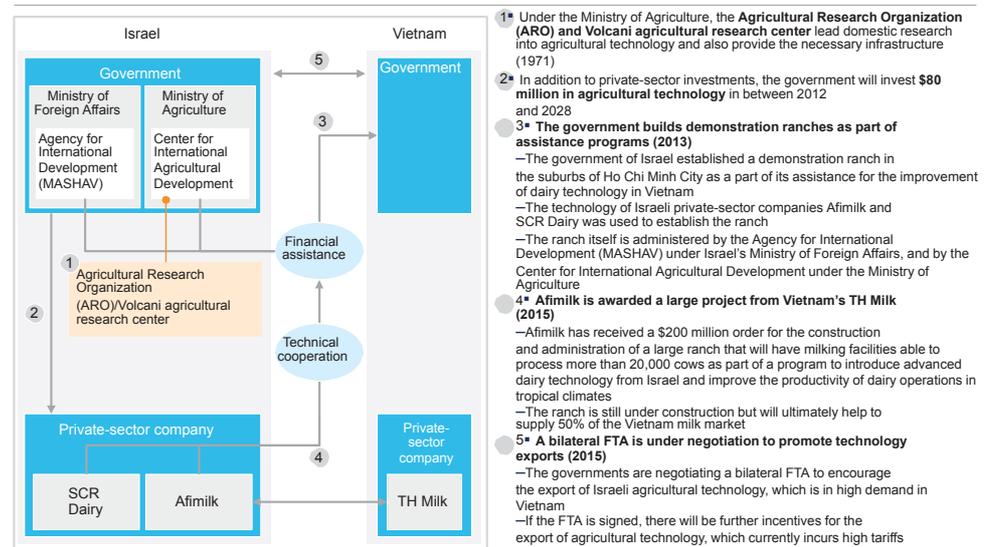
Israel, under government leadership, exports agricultural technology. Exhibit 22 offers an example of the framework for government aid to Vietnam. To encourage exports, the government provides incentives to improve agricultural technology, while also deepening interdependence with its export markets, with the ultimate aim of achieving food security.

Exhibit 22

Israel encourages the export of dairy technology held by private-sector companies ISRAEL through government-led investment in agricultural technology and demonstration ranches in other countries

Export of dairy technology to Vietnam

Flow of export promotion



SOURCE: Israel government; literature search; Aura Solution Company Limited analysis

To reiterate, the policies and programs highlighted here stem from the geopolitical circumstances in which the two countries find themselves, and particularly from the sense of danger that individual members of their societies feel with respect to the supply of food and other essentials for living. In terms of population as well, the two countries are different in size from Japan. Therefore, the lessons above should not be applied wholesale. Nonetheless, there are aspects that may be applicable to Japan, particularly the positioning of food security at the center of national policy, and governance structures that attempt to span the gaps between different governmental organizations, and between the government and private-sector to ensure implementation.

In the next chapter, we examine modalities for food security in Japan that address the unique challenges facing the country, particularly the challenge of relying on imports for most of its food supply despite being a large country with a population in excess of 100 million.

Chapter 5: Directions for food security in Japan

This chapter builds on the data presented in the preceding four chapters to investigate directions for food security in Japan. As noted in Chapter 3, food security initiatives need to encompass the entire value chain because there are potential problems throughout. Doing this requires collecting information on current conditions in food-producing countries, analyzing that information to identify their potential impact on Japan, and using those findings to formulate specific initiatives. Israel and Switzerland provide examples of countries that position food security at the core of national policy and provide incentives to the private sector to ensure that policies and programs are executed.

It is from this perspective that we examine in detail potential food security measures in Japan, focusing primarily on the import side, to ascertain the current situation and identify directions that can be taken to improve food security in the future. Exhibit 23 summarizes the key points in our analysis. A fuller discussion is provided below.

It goes without saying that food security is a high priority for policymakers and there are already numerous measures in place. For example, guidelines have been formulated for the maintenance of food security during times of emergency, and a risk analysis and findings report has been published with fixed-point observations of food supply risks for major countries and crops. The content of this research is extremely detailed and envisions a wide range of emergency situations.

This paper contributes to the discussion with coverage of likely changes in future imports of key items; these forecasts should trigger new ideas, and inform future discussions on food import strategy.

For emergency periods, when circumstances are vastly changed from what is expected, there are detailed plans for the monitoring of risks. However, risks often materialize together or in sequence, which makes it difficult to simulate them and estimate their impact on food supplies. This is a point on which government and private-sector insights and information need to be pooled to find solutions.

It will be easier to formulate strategies for solutions and create structures to promote and implement them if, as shown here, we are able to identify latent food security challenges, refine simulations of risk, and continually update findings to account for environmental changes. Just as good companies employ rolling mid-term and long-term strategies to overcome environmental change, Japan's food security also requires a grand strategic design that addresses specific problems and challenges. In other words, there need to be basic guidelines in place for strategic concepts, from which the design and execution of individual strategies and mechanisms will flow of their own accord.

Exhibit 23

The current status and desired end state of food security in Japan

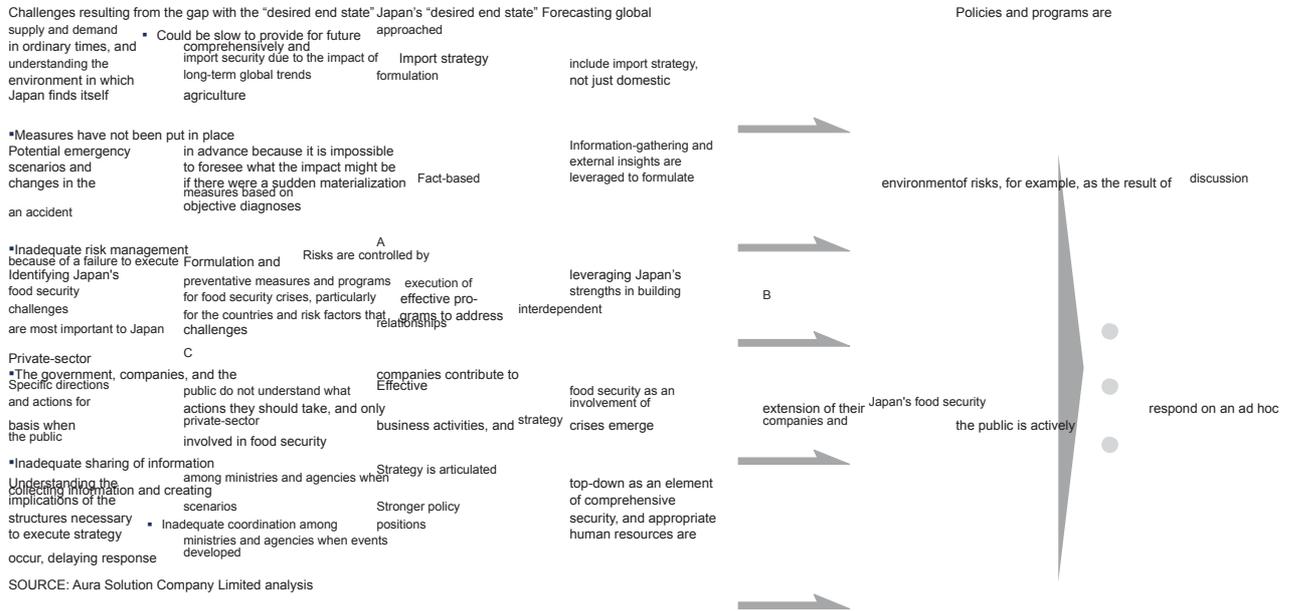
	Current programs (from published documents and interviews)	Challenges resulting from the gap with the "desired end state"
Analyzing the current state of global and Japanese food supply and demand	<ul style="list-style-type: none"> Japanese supply and demand: Regular forecasts are made, focusing on the aging of the farm population and changes in consumption Global supply and demand: A long-term (to 2050) forecast was commissioned to an outside institution¹ in 2012. However, this was one-off, and there is no mechanism for consistent updating 	<ul style="list-style-type: none"> There are no major challenges, because a vision for domestic and international circumstances in 2050 has, to some extent, been articulated If possible, long-term forecasts should be regularly updated and findings used to review strategy
Understanding global supply/demand forecasts and the environment for Japan during ordinary times	<ul style="list-style-type: none"> Forecasts of ordinary times: The "Global Ultra-Long-Term Food Supply and Demand Forecasting System" forecasts and analyzes global-level changes in supply and demand *For major imports, forecasts of changes in source countries are not always adequate 	<ul style="list-style-type: none"> Could be too late to provide for future import security due to the impact of long-term global trends
Potential emergency scenarios and changes in the environment	<ul style="list-style-type: none"> Simulation: There are simulations of poor domestic rice harvests, but simulations of imports are probably limited Risk monitoring: Risk analyses are performed for individual items in "Analysis and Evaluation of Food Supply Risks," but only a limited number of risk metrics are examined. For example, the "food safety" risks for wheat are limited to "agrochemical and mycotoxin etc. inspection results" 	<ul style="list-style-type: none"> The impact of accidents or the sudden materialization of a risk is not adequately understood, possibly delaying response
Identifying Japan's food security challenges	<ul style="list-style-type: none"> The "Basic Plan" calls attention to population growth and climate change Identification of issues to be addressed: It is difficult to prioritize issues to be addressed because the relative importance of different issues has not been articulated 	<ul style="list-style-type: none"> Difficult to prioritize preventative measures and responses for the countries and risk factors most important to Japan
Specific directions and actions for Japan's food security strategy	<ul style="list-style-type: none"> Specific actions: There are detailed definitions of procedures for emergency response in "Food Security Guidelines during Times of Emergency" The "Basic Plan" contains five actions for food security (analysis of international supply and demand, provisions of imported grain, international cooperation, sanitary and phytosanitary measures, distribution means), but a concrete action plan has not been published 	<ul style="list-style-type: none"> Neither the government, companies, nor the public understand what actions they should be taking, raising the potential for haphazard response in the event of a crisis
Understanding the implications of the structures necessary to execute strategy	<ul style="list-style-type: none"> The Ministry of Agriculture, Forestry and Fisheries has set up a web site on food security and endeavors to communicate information to the general public The "Food Security Office" is a dedicated organization within the Ministry of Agriculture, Forestry and Fisheries. While originally a "department," it was converted to an "office" when a new department of export promotion was established Policy positioning: The Minister of Agriculture, Forestry and Fisheries is not among the nine key ministers who attend the "National Security Council" 	<ul style="list-style-type: none"> Potentially inadequate sharing of information among ministries and agencies when collecting information and formulating scenarios Potentially inadequate coordination among ministries and agencies during times of emergency, and consequent delay in response

Source: Aura Solution Company Limited analysis

Based on this perception of the issues, Aura Solution Company Limited has conducted numerous interviews with experts, studied research on international cases, and arrived at a picture of the general direction for food security in Japan:

- Structures for the analysis of food security and execution of strategy are strengthened, all stakeholders understand that food security is part of comprehensive security, and people are trained and developed to take ownership for food security in the future.
- Changes in global trends are grasped in a timely manner, specific import strategies are in place for more advantageous negotiation with exporters to ensure future imports, and both imports and domestic agriculture are studied in a robust, comprehensive fashion.
- Concrete simulations are run to understand the impact of unexpected risks, and information gathering and external sources guide the design of food security measures based on objective diagnoses.
- Japan continually reviews and clarifies its priorities in addressing food security challenges, improving its ability to take preventative measures in response to changes in trends and risks. It identifies key challenges and formulates and executes effective measures to address them, leveraging its strengths in forging interdependent relationships and controlling risks.
- Japan clearly communicates to stakeholders at all levels the actions that they must take in the establishment of food security. In other words, it effectively includes private-sector companies and the general public in a system in which "private-sector companies contribute to food security as a part of their business, and the people are also dynamically involved."

Summary of directions for Japan's food security strategy



To achieve the general direction, Japan should lay the groundwork by strengthening initiatives and structures related to food security. Various stakeholders (i.e., the government, private sector companies, and the general public) will require different types of preparation, and we believe that the government—which is responsible for providing the leadership, management, and momentum for a food security strategy—will need to take the following actions:

1. Organize a diverse team that includes participants from all stakeholder groups (government, private companies, producers, and the general public as consumers), and task it with taking action to address food security.
2. Design an objective and specific strategy.
3. Execute a “plan-do-check-act” (PDCA) cycle that includes external verification.

All of these may be easier said than done. Indeed, there are many foreseeable bottlenecks. Providing a means to overcome these obstacles and enable committed execution will be essential.

The biggest challenge in establishing a full-time team will probably be attracting the required talent. The team will need both the intellectual rigor to discuss issues with a wide range of stakeholders and articulate strategies, and also the drive and influence to be able to move those strategies into execution.

There are two potential bottlenecks in the formulation of strategy, the lack of insights and information, including information from other countries, and the resulting difficulty in forming a consensus on the outlook for the future. In addition to these impediments to the timely articulation of strategy, it may be difficult to formulate an effective strategy because of the lack of consensus, which might further result in a lack of clarity on who has responsibility for incorporating strategy into an action plan.

The biggest difficulty in establishing a PDCA cycle will be how to involve the private sector at each step along the way so that strategies and actions are effective. The examples from Switzerland and Israel leave little room for doubt regarding the major role that the private sector plays in food security. In other words, without a commitment from the private sector, plans will be of questionable efficacy. Private sector-led actions must first be viable as businesses, and for this to happen, the government must provide support in the form of appropriate incentives (plan & do), must subject strategy to evaluation by a wide range of stakeholders, including the private sector (check), and must review and improve strategies and actions in close coordination with the private sector (act).

Based on these observations, we have identified an overall concept to inform Japanese food security: strengthen Japan’s food supply and procurement capacity by forging strategic partnerships to solve common challenges facing countries around the world.

Unlike "security" in a military context, we apply the term "food security" in this context to mean a country's ability to ensure access to future food supplies for its people.

All countries face food security issues, though differing in scale and scope, and Japan has much to offer the world in addressing or mitigating these challenges through problem solving. Desalination technology, crop improvement technology, infrastructure build-out, and administration expertise all come immediately to mind. By providing these benefits to other countries, Japan will also expand the benefits that it receives from the rest of the world. For example, it may be able to expand potential import volumes of grain or to stabilize prices. We need not even refer to the example of Israel and Vietnam (see Exhibit 22) to understand that greater interdependence is an effective means of building reliable and stable food supplies.



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AN ASSET MANAGEMENT COMPANY

"aura begins where fear ends."

Afterword: Key points for strengthening food security in Japan

At this point, we hope to have underscored that food security cannot be achieved merely by the government. It will require individuals and organizations at all levels of society to take ownership and understand that there will be costs. We believe there are three key points in government-level initiatives: a diverse team to spearhead food security, formulation of objectives and concrete strategies, and execution of a PDCA cycle. These aspects have already been discussed at length. Through our interviews and discussions with numerous experts, we were able to gain valuable insights into the roles played by different actors, including the government. We will close this paper by describing the most important of these.

Many experts we met with are of the opinion that the first step is to ensure that the public (i.e., consumers) understand that there is a certain level of cost associated with a long-term import strategy, just as there is with maintaining domestic agricultural land, and the cost will be borne by consumers and taxpayers. That understanding in place, the public should be encouraged to moderate its purchasing and consumption behavior.

Japanese agriculture still has great potential to export excellent agricultural and food technologies as well as quality food products.

The first step is to increase the public's awareness of food security. One of the ideas to come out of our discussions was to set aside one day a year on which people eat only domestically-grown food as an opportunity to think about food security, much the same as disaster preparedness training exercises are conducted each year on September 1. Having a designated day in which no one eats imported food, for instance, might be a way to encourage more thought about food security.

Another opinion was that farms need to do more to preserve farmland and improve productivity so that domestic production, the most fundamental part of food security, is protected. Indeed, there is no room for doubt that domestic agricultural production is the cornerstone of food security, and we must therefore be prepared to strengthen productivity. We also believe that Japanese agriculture still has great potential to export excellent agricultural and food technologies as well as quality food products. Leveraging these to the extent possible will contribute significantly to food security.

Many experts wished to see private-sector companies leverage their functions in the food value chain to improve food security, and advocated the involvement of local governments and residents in creating the necessary structures and implementing the required training and simulations to do this. The Great East Japan Earthquake clearly illustrated the important roles played by logistics and retail in the restoration of the food supply chain. Some were of the opinion that, rather than just the formal requirements of CSR, companies should strengthen their own initiatives, including coordination with central and local governments, and create systems in which they are involved in food security as a part of the ordinary course of business.

Many were of the opinion that the primary role of local governments is in the allocation of food within Japan. This paper focuses on international food allocation, but domestic allocation, the delivery of food the "last mile" to consumers, is also important, particularly in emergencies. There is therefore much for local governments to do in securing supply chains during times of emergency and providing stockpiles. For example, one approach to encouraging collaboration with private-sector companies would be to offer incentives for proposals that contribute to food security and establish opportunities for business matching. This should in all cases be led by the private sector in the pursuit of business expansion and profit, but there is much that local governments can do to encourage it by providing supporting mechanisms and impetus.

Throughout this paper, we have sought the opinions of experts and provided our own analysis. Our findings can be summarized as follows:



The first step in considering food security is to correctly understand the issues. There is a perception that the total quantity of food is insufficient, but this is inaccurate; the real issue is the allocation of food between producing and consuming countries, and among consuming countries themselves. Inasmuch as international allocation is the issue, responses must be built on a comprehensive and dynamic (including forecasts of the future) analysis of the three elements of home country demand, producing country supplies, and logistics. Switzerland and Israel have created structures and measures based on this understanding of the issues. Japan likewise performs detailed, precise analyses of current conditions and formulates guidelines for emergency response, but it should build on these to create more comprehensive and dynamic analyses and measures. In doing this, mechanisms that involve the private sector (companies, general public) are preferable, both because of the broad perspectives and vistas that they bring, and because they are able to respond dynamically and effectively when needed.