# Does China Have Enough Food to Go to War?

## Practical Indicators for U.S. Military and Policy Makers

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he ongoing escalation in diplomatic tensions between the United States and China along with the recent trade war and the COVID-19 pandemic have exposed the fragility of the economic and political ties between the two nations. In addition, as China continues to pursue an increasingly aggressive diplomatic agenda and expands its military capabilities, there is a growing concern about the risk of a military confrontation with the United States and its allies. However, while some of these concerns may arguably be warranted, food self-sufficiency and internal food security challenges could dissuade China from launching a prolonged and full-scale war.

China is the largest food producer in the world, and agriculture has played a pivotal role in its emergence as a global economic powerhouse. Chinese economic transformation throughout the twentieth century was sparked by agrarian reforms (e.g., the "Household Responsibility System") that transferred rights and the responsibility for profits and losses to individual farmers. These policy changes resulted in dramatic improvements in agricultural production and laid the foundations for the Chinese industrial revolution. As testaments to that success, China has achieved high levels of food self-sufficiency, and ironically now has the highest number of obese people in the world.<sup>1</sup> More recently, agricultural trade and investments have become important components of China's diplomacy and its Belt and Road Initiative.<sup>2</sup>

Despite this remarkable progress, Chinese authorities are increasingly challenged to feed their 1.4 billion people. Recent events such as the COVID-19 pandemic, several outbreaks of African swine fever, floods sweeping southern regions, and severe droughts in the northern areas have revealed weaknesses in China's food security.<sup>3</sup> For instance, these events caused pork prices (the main source of protein for Chinese population) to spike and the imports of grains and oilseeds to soar to unprecedented levels. China is now the world's largest buyer of key agricultural commodities, and it imports nearly 60 percent of global soybean export flows.<sup>4</sup> These developments are in clear contrast with China's decades-long efforts to develop and implement policies aimed at grain self-sufficiency. The Chinese Communist Party (CCP) has tried to avoid international dependency by supporting domestic production and by stocking grain reserves, and it claims



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that China has enough wheat and rice reserves to feed its population for up to two years.<sup>5</sup> Nevertheless, these food self-sufficiency goals are threatened by demographic pressures, growing urbanization, climate change, land and water scarcity, changing diets, and extensive pollution. To counter this trend, the CCP has recently launched the "Clean Plate Campaign" to curb food waste, has provided guidance for livestock producers to reduce corn and soybean volumes in livestock rations, and has projected political discourses all signaling that food security remains a priority for Chinese authorities.<sup>6</sup>

Such government measures are unsurprising given the history of food shortages sparking political unrest in China and because food security has been part of Chinese people's psyche for many centuries. Memories of China's Great Famine that swept the country from 1958 to 1962, killing tens of millions of people, remain rooted in the minds and hearts of older generations and in the political leadership.<sup>7</sup> Food prices are volatile in China and tend to rise during winter seasons, and it was no coincidence that the 1989 Tiananmen Square prodemocracy protests took place during a period of general economic malaise and high food prices.<sup>8</sup>

As the world emerges from the turbulent COVID-19 pandemic, ensuring food security and self-sufficiency is once again front and center in Beijing's political calculus and will remain a national security issue for Chinese authorities.<sup>9</sup> Consequently, the CCP is pushing new strategies to enhance domestic food production and to reduce China's exposure to external uncertainties and shocks.<sup>10</sup> Nevertheless, both increasing urban population and fast-growing demand for animal products will continue to exert enormous pressure on China's limited and formerly depleted arable land and water endowments.<sup>11</sup> This is because livestock and processed foods often require the most arable land for production.

Winston Churchill's words described the intentions and interests of Russia in 1939 as looking at "a riddle, wrapped in a mystery, inside an enigma," but this sentiment certainly applies to understanding the true food security situation in China.<sup>12</sup> This is because China routinely maintains large stockpiles of selected grains, but these are a state secret and outsiders can only speculate about their true size and quality. However, this article presents an overview of food self-sufficiency and food security in China and seeks to understand how those factors may influence the likelihood of China launching a war soon. The proposed premise is that a prolonged and full-scale conflict would inevitably deteriorate food security in China, revive the ghosts of the Great Famine, and even lead to political instability and social unrest. This study also identifies key agricultural indicators that warrant close monitoring by the U.S. intelligence and military communities as they could signal preparation efforts by China for a military campaign. These economic indicators are tangible metrics that include the trade of agricultural products, commodity stock levels, changes in demand for certain food products, etc. The collection and interpretation of such data could be conducted by a coalition of different U.S. government agencies such as the Department of Defense,

U.S. intelligence agencies, and the U.S. Department of Agriculture. U.S. Army officers from the 38G program (agricultural officers, 6U), are particularly well poised to inform U.S. military leadership and other stakeholders on these issues.

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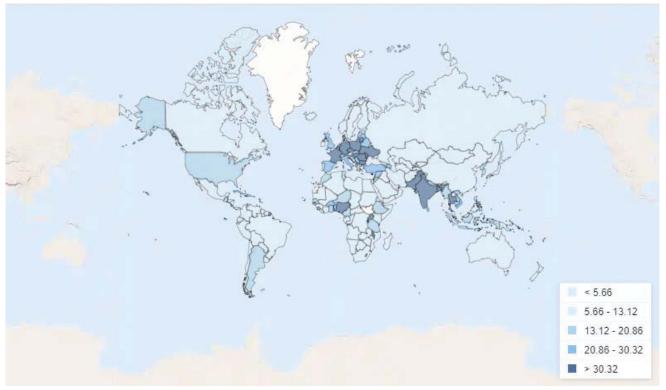
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#### Overview of Agriculture and Food Security in China

China began its massive economic reforms last century with an overhaul of the agricultural sector, specifically with a focus on grain production. New policies transformed the Chinese agricultural production model and resulted in significant increases in productivity, with China now feeding 20 percent of the world's population with only 8 percent of the world's freshwater resources and 9 percent of arable land.<sup>13</sup> As a result, Chinese leaders have been able to bargain political quiescence from the general population in exchange of economic gains and increased food security.<sup>14</sup> On the flip side, this progress has taken a heavy toll on China's land and water resources and have greatly deteriorated its overall environment. In addition, as China's average household income has increased, so has the demand for new types of foods such as meat and dairy products, certain vegetables, fruits, etc.

Grains are essential to China's national food security because they are a main source of human food, animal feed, and raw materials for processed food products.<sup>15</sup> In fact, the term "food security" translates literally to "grain security" in the Chinese language and is measured exclusively in terms of self-sufficiency. Thus, grain self-sufficiency has been at the heart of long-term Chinese food security plans, with established targets at 95 percent or higher for rice, wheat, and corn.<sup>16</sup> More specifically, China aimed at producing 95 percent of its domestic consumption of these three grains. When combined, these commodities account for 99 percent of Chinese grain production.<sup>17</sup> Thanks to government market interventions (e.g., subsidies or prices incentives) and large-scale investments in agricultural R&D and infrastructure, China achieved grain self-sufficiency throughout the 1980s and 1990s.<sup>18</sup> As part of these efforts, China established national grain stockpiles in 1990 and a system that coordinates central state and provincial grain reserves.<sup>19</sup> As previously discussed, these strategic reserves are a state secret, and Western countries have little information about their true size and quality.

Despite the earlier successes, self-sufficiency rate of certain foods fell below the 95 percent target in the early 2000s and agricultural imports began to surge. Past concerns about food security in China led the Chinese government to commission studies looking at changing food consumption patterns starting in the 1980s. Those studies predicted important deficits in



(Figure courtesy of the World Bank [2021])

#### Figure 1. Arable Land as a Percentage of Total Land (2018)

key food products such as grains, meats, and vegetable oils by the end of the twentieth century.<sup>20</sup> Another study later argued that grain production in China would stagnate due to limited arable land, lack of important productivity grains, water insufficiency, and environmental problems. The same study predicted that China would have to import 200 million tons of grain by 2020.<sup>21</sup> Interestingly, in that same year, China's combined imports of corn, soybeans, wheat, rice, and sorghum already totaled 150 million metric tons. These shortcomings in food production can be explained by two major causes.

#### Challenges of Agriculture and Food Systems in China

Land. Despite its place as the third largest nation in the world, China falls behind other major food producing countries in terms of the availability of arable land (figure 1). Rapid urbanization, pollution, and uses of land for other purposes have all contributed to a rapid decline of agricultural land in China. The total pollution rate in China's farmland soil is estimated at 10 percent, and about 2.5 percent of that land cannot be cultivated due to excessive contamination with heavy metals.<sup>22</sup> As a result, it is estimated that the country has a domestic planting area shortage of 90 million hectares.<sup>23</sup> This cropland shortage is expected to worsen and will further undermine China's goals for food self-sufficiency.<sup>24</sup> To address this issue, the CCP accepted a growing reliance on imported soybeans to free up millions of cropland acres for other higher yielding crops.<sup>25</sup> Despite that effort, as environmentalist and author Lester Brown had predicted, the production of rice, wheat, and corn have remained flat or have trended downward in the last decade mostly due to decreases in area planted.<sup>26</sup>

**Water.** China's agricultural sector became heavily dependent on irrigation after important public investments over the last five decades to expand irrigated crop areas. Today, half of the cultivated land is irrigated and between 70 and 90 percent of Chinese grain, cotton, and vegetable production comes from this irrigated land. However, the sustainability of the current agricultural model is now in question due to widespread water scarcity.<sup>27</sup> Irrigation agriculture accounts for 60 percent of China's total water demand and is characterized by inefficient delivery—30 to 40 percent efficiency versus 70 to 80 percent in developed countries. Freshwater resources are also geographically unevenly distributed, with 80 percent of the water resources concentrated in southern China; the northern part of China is expected to run dry within thirty years. This spells trouble for food security because the northern provinces account for 65 percent of the country's cultivated land and 50 percent of the country's grain production.<sup>28</sup>

The groundwater water table in China has fallen steadily or has been contaminated following over forty years of excessive water withdrawals. In addition, there have been significant declines of the river runoff across the six major river basins. The United Nations concluded that China is facing extreme water shortages and the underlying causes behind this water crisis include growing demands from the agricultural sector, rapid urbanization, and pervasive pollution of water sources. Climate change will likely exacerbate water scarcity in all river basins in northern China and some river basins in the south.<sup>29</sup> If not addressed, water scarcity will endanger irrigated agricultural production of wheat and rice—productivity of these two crops in rainfed areas is much lower than yields from irrigated operations.<sup>30</sup>

**Agricultural labor.** As China industrializes its economy there has been a massive exodus of labor out of rural regions toward more urban and industrial areas. The decreased availability of agricultural laborers could become a constraint if China seeks to suddenly increase agricultural production to meet food security objectives in the years ahead.

**Food waste.** In line with what occurs in developed economies, food waste is also a growing problem in China. Due to inefficiencies, it is estimated that between 14 and 18 percent of Chinese total grain production is lost along different stages of the supply chain—production, processing, and distribution or transportation.<sup>31</sup> The CCP has been tackling this issue and launched a national campaign last year in which President Xi Jinping asked people not to waste food. Chinese authorities are also encouraging families to preserve food stocks that could be interpreted as setting the stage for a scenario in which they may need to implement stringent measures to secure food supplies.<sup>32</sup>

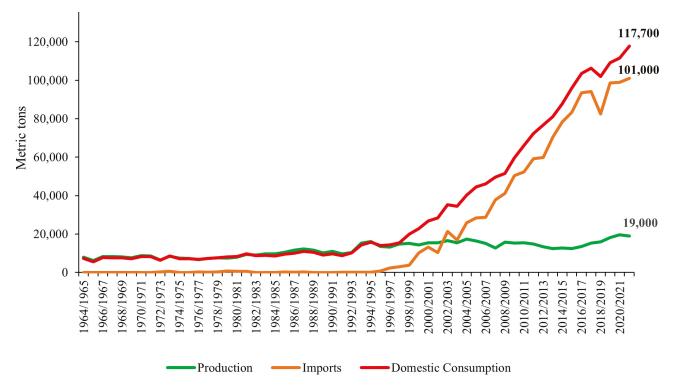
#### **Changes in Chinese Diets**

For decades, the Chinese diet has shifted from traditional grain consumption to animal products (e.g., meats and dairy products) and other processed food products (e.g., wine and liquor). Today, China accounts for nearly 30 percent of global meat consumption, with pork accounting for 75 percent of that.<sup>33</sup> This puts tremendous pressure on China's limited resources because production of animal products requires much more arable land and other inputs. To keep up with this fast-growing demand, Chinese livestock production has been shifting from small-scale and backyard production to much larger-scale and concentrated operations. For instance, new hog production facilities are several stories high with many animals. Under this new production model, traditional feeds like brans and hulls of wheat and rice, tubers, and food wastes that used to supply a significant share of energy to China's livestock have been replaced by soybean meal and corn rations.<sup>34</sup> Due to domestic production shortages, imports of soybeans rose from 3.85 million metric tons in 1998/99 to about 100 million metric tons in the 2020/21 season. Today, China accounts for about one-third of the world's soybean consumption, and it buys 60 to 70 percent of global soybean exports.<sup>35</sup> China is also importing more corn as the consumption of corn for feed, processed foods, and industrial products continues to grow.<sup>36</sup> Chinese corn imports increased from 262,000 metric tons in 1998/99 to 28 million metric tons in 2020/21. These changes are shaping international grain markets and have already sparked increases in global prices for corn and soybeans during 2020 and 2021.37

In summary, until China properly addresses these serious challenges, it will struggle to attain desired grain self-sufficiency goals, and it will continue to rely on imports.

#### **Growing Dependence on Imports**

Up to 2007, China was a net exporter of cereal grains (mainly corn) and achieved a 97 percent self-sufficiency in major bulk commodities.<sup>38</sup> With China's changing diets and limited endowments of land and water, grain self-sufficiency cannot be fully achieved with domestic production alone. Faced with this new reality, Chinese authorities introduced a new food security strategy in 2014 and embraced the growing use of international markets and "moderate imports" for agricultural products

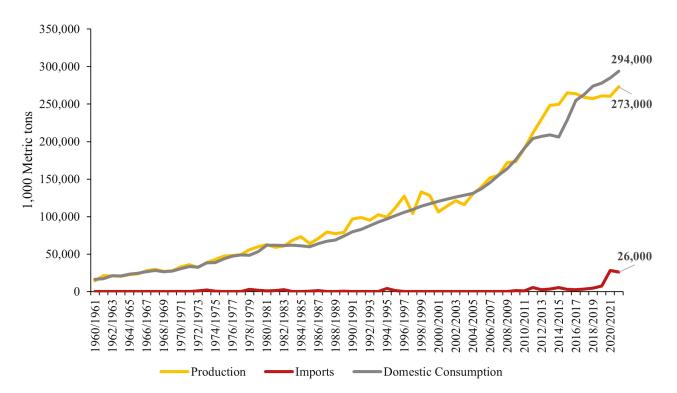


#### Figure 2. China's Annual Production, Consumption, and Imports of Soybeans (in Metric Tons) from 1964 to 2022

as a complement to domestic supply.<sup>39</sup> More specifically, China began to focus on maintaining self-sufficiency for certain grains (e.g., wheat, rice, etc.) while accepting a growing dependence on imported feed grains, oilseeds, food oils, meat, dairy, and processed foods.<sup>40</sup> By choosing to fully depend on foreign soybean imports, China is freeing up enough land to remain self-sufficient in the production of rice and wheat. China is already the world's largest food importer, but by 2030, Chinese foods imports shares are expected to increase between fivefold and sevenfold over today's baseline, depending on overall economic growth. Food imports now account for 7 percent of the country's overall imports, and China now imports nearly 80 percent of consumed soybean and other food products such as milk and sugar.<sup>41</sup>

Under this new strategy, China's current domestic food supply gap stabilized at a range of 100 million to 150 million tons. As shown in figure 2, this includes around 100 million tons of soybeans that must be imported every year along with tens of millions of tons of feed grains such as corn, sorghum, etc.<sup>42</sup> A handful of countries supply most of these imports. More specifically, in the past five years, the United States and Ukraine accounted for 98 percent of China's corn imports (see figure 3, page 90). The United States, Brazil, and Argentina supplied nearly 97 percent of all Chinese soybean imports, with Brazil emerging as the world's leading producer and exporter. It is important to note that South American countries and the United States sell these commodities to China at different times of the year due to differences in their crop cycles. For instance, the U.S. soybean export peak season goes from September to February, while South American countries ramp up their soybean shipments in the following months.

While China produces large amounts of meat and dairy products, imports of these products have also surged in recent years (see figure 4, page 91). Recent events exposed the fragility of China's livestock sector and its growing dependence on international protein sources. First, from 2018 to 2021 there were various outbreaks of African swine fever–a highly contagious virus. During this time, China was forced to cull about



#### Figure 3. China's Annual Production, Consumption, and Imports of Corn (in Metric Tons) from 1964 to 2022

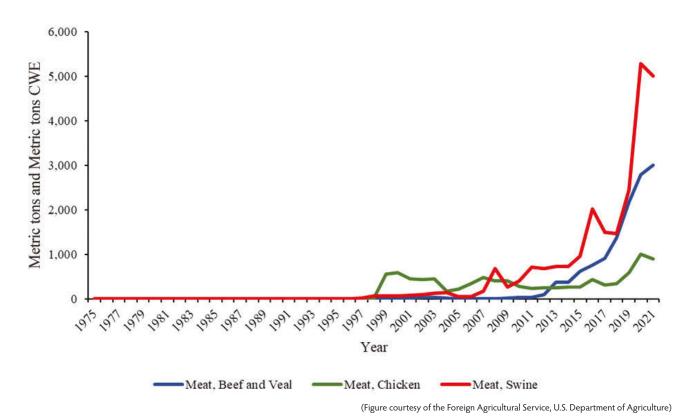
half of the world's largest swine herd.<sup>43</sup> While it was tackling these outbreaks and rebuilding its swine inventory, China was forced to import record volumes of pork to meet domestic demand and to control spikes in local pork prices. Because pork is such a staple food, the CCP closely monitors pork prices and availably because high prices can quickly lead to consumer inflation and popular discontent. Also, China recently banned imports of Australian beef as a retaliation to Canberra's call for an inquiry into the origins of the COVID-19 pandemic. However, other supplying countries quickly filled the void left by Australia and beef imports continue to increase. For instance, the United States is exporting record volumes of beef to China this year.

While China is the world's largest milk producer, it only meets 70 percent of its domestic consumption and must import the remainder. Moreover, Chinese population is suspicious of domestic milk products and prefers to purchase imported dairy products following several deadly food contamination and adulteration events. As figure 5 shows (on page 92), imports of dairy product have been rapidly increasing since 2008. To address this deficit, China is expanding the number of large-scale dairy farms. However, a larger dairy-cow herd will require even more feed grains and only exacerbates China's existing dependency on imports.

China's food self-sufficiency is in fact more compromised than what an initial look at agricultural import numbers might suggest. Driven by oilseeds, vegetable oils, certain meat and dairy products, China's food self-sufficiency could come down to 87 percent.<sup>44</sup> Unless it undergoes major agricultural reforms that increase productivity and address structural factors such as a shrinking rural labor force and scarce farmland and water, China will continue to import more grain and other food products in the foreseeable future.<sup>45</sup>

#### Food Security and Military Conflicts in China

A full-scale war between China and Western countries would disrupt international trade flows. China would not be able to maintain its current levels of food

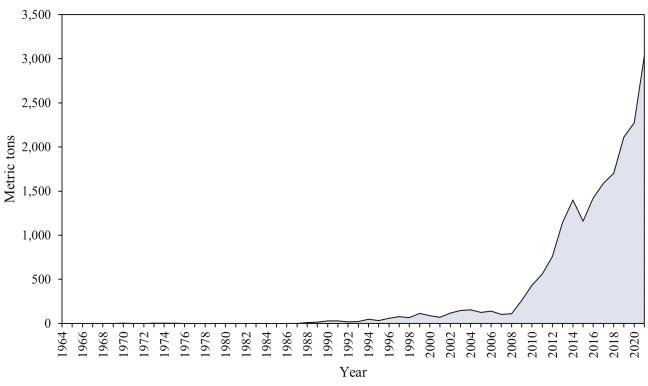


#### Figure 4. China's Annual Imports of Meat by Animal Species (in Metric Tons and Metric Tons Carcass Weight Equivalent [CWE]) from 1975 to 2021

imports and its population would be forced to change its food consumption patterns.<sup>46</sup> Furthermore, Western nations could impose trade embargos or naval blockades to China to exert economic pressure. This section discusses how a military conflict could impact food security in China and what possible actions the CCP could take to mitigate those impacts.

Use of national strategic food reserves. The Chinese government would resort to its strategic food reserves to at least meet the country's subsistence food consumption levels during the early stages of a conflict. However, this raises important questions such as how much food China can store, which commodities can be stockpiled, and for how long. While these questions remain mostly unanswered due to the secrecy surrounding these strategic food reserves, Chinese authorities assure that wheat and rice reserves are large enough to feed their population for up to two years.<sup>47</sup> Another important consideration is the quality of grains, which invariably degrades over time, but at a faster pace in the absence of the right storage conditions (e.g., moisture levels). Furthermore, setting aside such large volumes of grain requires a massive infrastructure of grain silos and elevators, and there is anecdotal evidence that China has resorted to other storage alternatives such as tunnels dug into mountains. Such options are clearly suboptimal and will affect grain quality and shorten storage durability. Moreover, grain reserves would only buy Chinese livestock producers one to two years before they would start struggling to feed their animals.

Increasing domestic food production in China and abroad. With China using up its national strategic reserves and unable to import the food it needs, the country would have to find ways to quickly ramp up its domestic food production. This strategy not only would take years to yield visible results but would also face formidable challenges. For instance, limited endowments or widespread pollution of arable land and water, coupled with the decline of rural population, would all limit China's ability to quickly increase food production. In fact, China's recent massive investments

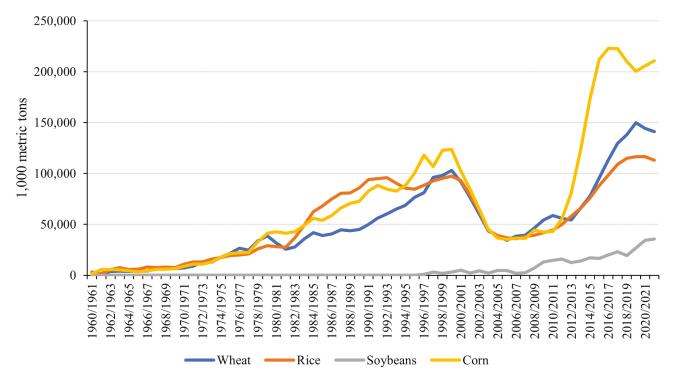


#### Figure 5. China's Annual Imports of Dairy Products (in Metric Tons) from 1964 to 2021

on fishing and agricultural production in Africa and Asia bear testament to that grim reality. More specifically, China is purchasing agricultural land and food businesses around the world and contracting foreign farmers to supply China with specific food products.<sup>48</sup> For example, Chinese agribusinesses have purchased and leased large amounts of farmland in African countries such as Algeria and Zimbabwe to produce crops and export them to China. China also made important investments in pork and dairy production in the United States and New Zealand.<sup>49</sup> These investments are part of China's food security strategy to gain greater control over the supply chains for food imports. In fact, Xi encouraged agricultural investment abroad as a means of preserving national food security and in support of China's diplomatic efforts.<sup>50</sup> Nevertheless, it is unclear how effective and resilient this strategy would be during a war in which opponents could target and disrupt the international supply chains.

Mandating changes in food consumption patterns. During a full-scale military conflict, the civilian population of a combatant country might have to endure shortages or rationing of food products. Meats, seafood, dairy products, and processed foods might no longer be available to the general public, and people would then be forced to live at a subsistence level surviving on basic staple foods. As previously stated, without a steady supply of imported animal feed, the Chinese livestock sector may have to resort to culling animals or even facing temporary shutdowns that would reduce the steady production of pork, beef, or milk. These shortages would also be worsened by any disruption of Chinese imports of those same goods.

This would force large shares of the Chinese population to revert to primary food products (rice, wheat, pulses, etc.) and to give up "luxury" food products such as animal protein. One can only speculate as to how the average Chinese person—especially the burgeoning middle class—would react to food shortages and rationing for extended periods of time. Nevertheless, the CCP would be looking for signs of growing social discontent and political unrest. Equally difficult to



#### Figure 6. China's Ending Stocks of Wheat, Rice, Soybeans, and Corn (in Metric Tons), from 1964 to 2022

predict is how the Chinese government would be able to enforce temporary changes in the diets of over 1.4 billion people and have them surviving on basic food staples from China state food reserves.

Lastly, it is important to recognize that a trade embargo might only have a limited impact as China would seek to import needed food products through alternative routes and suppliers. This could be achieved in large part due to massive investments in transportation infrastructure that China has been making as part of its Belt and Road Initiative. The vast network of new railways, highways, and border crossings could give China new options to circumvent a naval blockade and bring needed food products from Russia, former Soviet republics, Pakistan, India, or other Southeast Asian countries. In addition, the United States would have to form a coalition and convince countries such as Brazil, Argentina, and Ukraine to join and to help enforce the trade embargo. This would be a tall order for U.S. diplomacy as China is a major and very lucrative export market for all these nations.

### Metrics and Indicators to be Monitored

This section presents selected economic indicators that should be closely monitored by U.S. military and intelligence communities. These metrics could reveal China's efforts to make its food supply chain more resilient to a military conflict.

Food imports, national food and strategic reserves, and commodity stocks. The United States should monitor China's state purchases of key food imports aimed at building up the nation's food strategic reserves and overall stock levels. The authority overseeing such purchases is the National Food and Strategic Reserves Administration. Nevertheless, such assessments remain difficult because of incomplete data, secrecy surrounding policies and regulations, and market-distorting interventions by Chinese authorities.

*Indicator.* The U.S. Department of Agriculture Production, Supply and Distribution (PSD) datasets include estimates of annual commodity stock levels for many commodities and countries. Since 2010, China has increased its stocks of major commodities to record



levels (see figure 6, page 93). Going forward, it is important to evaluate the true motivations behind future increases in wheat, rice, soybeans, and corn stocks. These are some important questions that U.S. observers should consider: Are larger stocks driven by market considerations or government policies to support domestic prices? Or are they signaling a food reserve build up for a military conflict?

Because Chinese authorities limit imports to a supplementary role in the food supply, there are certain trade patterns that may warrant a closer analysis. These include things such as continuous increases and large deviations from historical trends, trade flows going against market signals, and sudden changes in agricultural imports and exports. For example, a 2014 U.S. Department of Agriculture report showed that China imported 100 million metric tons of corn in 2013/14, which represented approximately 50 percent of its annual corn consumption.<sup>51</sup> Hence, China must produce and import a combined total of 200 million metric tons of corn to meet its annual needs. While this number has likely increased since 2013 because of Chinese growing demand for feed grains, it represents an example of a reference point for those monitoring food security in China.

Honghe Hani rice terraces in the Honghe Prefecture, Yuanyang County, Yunnan, China, 16 September 2016. It is a world heritage site, and the crops are mainly cultivated by the Hani and Yi ethnic minorities. (Photo by Dan Yeger, Alamy Stock Photo)

*Indicator.* China's population is no longer growing and will soon start to decline, but as more families move up to the middle class, demand for meat and dairy products will likely continue to increase in coming years. To meet that demand, China will have to increase its livestock and dairy production or resort to more imports. In that context, increases in imports of oilseeds (for poultry and hogs) and feed grains (for beef and dairy operations) must be explained by proportional increases in livestock production. Hence, above average growth in grain imports that are not matched by increases in livestock production could point to an expansion of strategic grain reserves beyond their current levels.

*Indicator.* China is also a global large exporter of certain agri-food commodities such as fish and seafood, vegetables, fruits, nuts, vegetable oils, among others. Food products account for near 7 percent of the total volume of Chinese exports and 2.5 percent of their value. The United States should look for sudden decreases in China's traditional agricultural exports that are not

explained by market factors. These could indicate a redirection of exports toward stockpiling the national strategic food reserves.

The United States and its allies should also watch for unusual surges in China's imports of food products having longer shelf lives.

*Indicator.* Chinese imports of dairy products have grown dramatically in recent years, and milk powder accounts for half of those imports, mostly originating from New Zealand. It must be noted that milk powder is widely used to produce infant formula and other milk products. Chinese consumers became increasingly suspicious of domestic milk products after a series of deadly food contamination scandals involving infant formula. If China anticipates a war that will disrupt its dairy imports, it could try expanding its domestic production. However, this would only increase the need for imported animal feed. The other alternative would be to build up its reserves of powder milk by importing more of it instead of purchasing other necessary but more perishable dairy imports (e.g., whey, cheese, butter, etc.).

In the past, China resorted to imports when domestic commodity prices for specific grains were high relative to global prices. For instance, after adverse weather conditions impacted the 2021 Chinese corn crop, domestic prices soared, and China imported record levels of corn from the United States.

**Indicator.** At times a commodity produced in China is more expensive and less competitive than imports. Hence, noticeable increases in commodity imports in a context of low domestic prices would go against economic logic and should warrant close monitoring, as they could be motivated by nonmarket reasons.

Another thing to look for are significant and counterintuitive shifts in China's food imports portfolio. Bulk commodities and grains continue to account for the largest share of China's agricultural imports. However, rising income levels of Chinese households has transformed their tastes and sparked a demand for higher value imported foods such as wine, coffee, and tea.

*Indicator.* A sudden decrease in imports of luxury and value-added food products coupled with unusual surges of staple food imports could represent an effort to build reserves that cover basic nutritional needs during a war. Another example would be an increase in imports of specific types of wheat that are used in certain breads and processed goods that may not be typically grown in China.

#### Conclusions

China will continue to build up its conventional military, nuclear stockpile, and cyber capabilities to close the gap with the United States. While these are areas in where the two countries will soon become near-peer or peer competitors, the United States will likely retain its competitive edge over China in terms of food production and self-sufficiency.

As China establishes itself as a global economic powerhouse, food consumption there will continue to rise in volume and quality. Consequently, the CCP will have to decide if it is willing to increase food imports to free up limited resources and allow farmers to focus on more profitable and productive crops. Chinese leaders will have to walk a fine line between managing food self-sufficiency and feeding their 1.4 billion people. A possible weaponization of food imports by the United States and its allies could pose a serious threat to China's future policies and diplomatic actions. Nevertheless, under well-orchestrated propaganda campaigns and coercion, the CCP could galvanize the Chinese population in the event of a war and trade blockades imposed by Western nations. Under such a scenario, the CCP could instate strict diet restriction and rationing while averting social unrest and popular revolt.

This scenario is likely part of Beijing's calculus, but it remains unclear whether Chinese leaders view disruptions in food imports and food security as an inhibitor to entering a full-scale military conflict. This is because China could have already incorporated the build-up of food reserves and other policies to its planning process for a hypothetical war. Thus, the U.S. military and intelligence communities must remain vigilant and look for signs of such efforts.

Nevertheless, if the United States is to effectively exploit this weakness as part of broader economic statecraft, it will need to work closely with other countries to forge a coalition against China. For example, if the United States wants to truly disrupt Chinese imports of critical food commodities such as animal feeds, a simple naval blockade may not suffice. This effort must also involve compensation mechanisms that would incentivize Brazil, Argentina, or Ukraine to temporarily forego their agricultural exports to China. This is particularly important because China is a major export market for all those countries. The implementation of such policies would involve the participation of a broad set of stakeholders such as the State Department, U.S. Department of

Agriculture, the Office of U.S. Trade Representative, academic experts, and industry groups. ■

#### Notes

1. Kai Cui and Sharon P. Shoemaker, "A Look at Food Security in China," *NPJ Science of Food* 2, no. 4 (20 February 2018), <u>https:// doi.org/10.1038/s41538-018-0012-x</u>.

2. Fred Gale, James Hansen, and Michael Jewison, *China's Growing Demand for Agricultural Imports*, Economic Information Bulletin No. 136 (Washington, DC: U.S. Department of Agriculture, February 2015), accessed 7 March 2022, <u>https://www.ers.usda.gov/publications/pub-details/?pubid=43940</u>.

3. Orange Wang, "China Food Security: How's It Going and Why's It Important?," China Macro Economy, 29 November 2020, accessed 13 May 2021, <u>https://www. scmp.com/economy/china-economy/article/3111623/</u> <u>china-food-security-hows-it-going-and-whys-it-important</u>.

4. "China Confident It Can Replace US Soybeans with Supplies from South America," MercoPress, 11 July 2018, accessed 27 April 2022, https://en.mercopress.com/2018/07/11/china-confident-itcan-replace-us-soybeans-with-supplies-from-south-america.

5. Wang, "China Food Security."

6. Eva Dou, "China's Mealtime Appeal amid Food Supply Worries: Don't Take More than You Can Eat," *Washington Post* (website), 5 October 2020, accessed 21 June 2021, <u>https://</u> <u>www.washingtonpost.com/world/asia\_pacific/china-food-shortage-clean-plate/2020/10/02/578daa0e-0223-11eb-b92e-029676f9ebec\_story.html</u>.

7. Ibid.; Scott B. MacDonald, "China, Food Security and Geopolitics: History Suggests the CCP Should Be Concerned," *The Diplomat* (website), 30 September 2020, accessed 7 March 2022, <u>https://thediplomat.com/2020/09/china-food-security-and-geopolitics/</u>.

8. Ibid.

9. Kym Anderson and Anna Strutt, "Food Security Policy Option for China: Lessons from Other Countries," *Food Policy* 49, no. 1 (2014): 50–58, accessed 7 March 2022, <u>https://ideas.repec.org/p/</u> pas/papers/2014-11.html.

10. Ibid.

11. Yong-sheng Wang, "The Challenges and Strategies of Food Security under Rapid Urbanization in China," *Sustainability* 11, no. 2 (2019): 542, <u>https://doi.org/10.3390/su11020542</u>.

12. Alan Cowell, "Churchill's Definition of Russia Still Rings True," *New York Times* (website), 1 August 2008, accessed 27 April 2022, <u>https://www.nytimes.com/2008/08/01/world/europe/01iht-letter.1.14939466.html</u>.

13. Wang, "The Challenges and Strategies of Food Security"; Bishwajit Ghose, "Food Security and Food Self-Sufficiency in China: From Past to 2050," *Food and Energy Security* 3, no. 3 (2014): 86–95, <u>https://doi.org/10.1002/fes3.48</u>.

14. Ibid.

15. Ibid.

16. Cui and Shoemaker, "A Look at Food Security in China."

17. Wang, "The Challenges and Strategies of Food Security"; Ghose, "Food Security and Food Self-Sufficiency in China."

18. Funing Zhong and Jing Zhu, "Food Security in China from a Global Perspective," *Choices* 32, no. 2 (2017), accessed 7 March 2022, <u>https://ideas.repec.org/a/ags/aaeach/257826.html</u>.

19. lbid.

20. Ibid.

21. Lester R. Brown, Who Will Feed China? Wake-up for a Small Planet (New York: W. W. Norton, 1995).

22. Ibid.

23. Ibid.

24. lbid.

25. Ibid.

26. Brown, Who will Feed China?

27. Jinxia Wanga et al., "Growing Water Scarcity, Food Security and Government Responses in China," *Global Food Security* 14 (2017): 9–17, <u>https://doi.org/10.1016/j.gfs.2017.01.003</u>.

28. Ibid.

29. Ibid.

30. Ibid.

31. Ibid.

32. Ibid.

33. Ibid.

34. Ibid.

35. Ibid.; The Economist Intelligence Unit, *World Commodity Forecasts: Food, Feedstuffs and Beverages* (New York: The Economist Intelligence Unit, June 2021), accessed 7 March 2022, <u>https://store.eiu.com/product/world-commodity-forecasts/</u> food-feedstuffs-and-beverages.

od-feedstuffs-and-be

36. lbid. 37. lbid.

37. Ibid.

39. Zhang Hongzhou, "Food Security in China: Whither the Self-Sufficiency Policy?," RSIS, 26 May 2016, accessed 25 April 2021, https://www.rsis.edu.sg/rsis-publication/rsis/co16126-food-security-in-china-whither-the-self-sufficiency-policy/#.YSzxDY5KhPY.

40. Ibid.; Amrita Jash, "China's Quest for Food Security: Challenges & Policies," Medium, 19 December 2015, accessed 21 June 2021, <u>https://medium.com/indrastra/the-paper-china-s-quest-forfood-security-challenges-policies-1c8359509e61</u>.

41. lbid.

42. Matthew Gaudreau, "State Food Security and People's Food Sovereignty: Competing Visions of Agriculture in China," *Canadian Journal of Development Studies* 40, no. 1 (2019): 12–28, https://doi.org/10.1080/02255189.2017.1410470.

43. Ibid.

44. Ibid.

45. Ibid.

46. Ibid.

47. Ibid.

48. Ibid.

49. Ibid.

50. Ibid.

51. Ibid.

<sup>38.</sup> Ibid.