



CHAPTER 10

COOPERATION IN AGRICULTURE

Dermot HAYES

Pioneer Chair in Agribusiness, Iowa State University

PAN Suwen

Research Scientist, Department of Agricultural & Applied Economics, Texas Tech University

Francis TUAN

Principal, The World Agricultural Economic and Environmental Services

ZHANG Haisen

Director, The Center for International Agricultural Cooperation and Development

With contributions from XU Changchun (Associate Research Fellow, Department of Strategic Research at CCIEE), Helen CHIN (The Fung Business Intelligence Centre)

Executive Summary

The U.S. and China are two of the world's largest producers and consumers of agricultural products. With a population of 1.33bn, a rapidly modernizing economy, and land and water constraints, China has a long-term need to source adequate food to satisfy rising domestic demand. The U.S. – with much more land per capita than China and higher agricultural productivity – is a major net exporter of food in the world, particularly in land-intensive products such as wheat, soybean, corn and beef. Given its abundance of workers, China has a comparative advantage in labor-intensive, processed items such as certain aquatic products, apple juice, and feathers and down.

In the past decade, both countries have made remarkable progress in liberalizing agricultural trade. Since China's accession to the World Trade Organization (WTO), U.S. exports of agricultural products to China have increased rapidly. China is now the largest market for U.S. agricultural exports while the U.S. is China's largest supplier. In the other direction, the U.S. is the second largest export destination for Chinese agricultural commodities while China is the third largest supplier to the U.S. Looking forward, the U.S. and China should develop further a cooperative relationship that benefits both countries.

One important recommendation of this Study is to set up long-term supply contracts between American suppliers and Chinese buyers, say, for a period of 10 years or longer. The quantities and prices of the products to be traded should be pre-determined, based on mutually agreed pricing formulas and arrangements. Such long-term contracts would encourage U.S. sellers to invest in new supply and logistics for the long term, while both buyers and

sellers would not have to be concerned too much about short-term volatility in commodity prices. Arrangements have to be put in place to address China's concerns about the security of supply in such long-term arrangements. One solution is for U.S. suppliers to set up warehouses in China or a third country with one-year's supply stored as collateral. In return, China could have the corresponding funds held in escrow in the U.S. or a third location.

Another recommendation of this Study is for China to import more meat instead of feedstock as this helps reduce the strain on already tight land and water resources in China.

Agriculture is a sensitive trade issue in almost all countries. In China, ensuring food security is a strategic objective and hence the government has always emphasized the need to maintain self sufficiency. Protecting the small farmers is also an important consideration. China is highly self-sufficient in cereals with net imports of wheat, rice and corn in 2011 less than 1% of local production. There are a lot of opportunities for China to tap into both local and global resources, participate actively in agricultural trade, thus helping it to satisfy growing demand and cushion the country against fluctuations in supply and in prices without jeopardizing food security.

Meanwhile, continued growth in agricultural production and exports plays into the competitive edge of the U.S. Every US\$1bn of agricultural exports creates 8,400 American jobs. Exports to China in 2011 were US\$20bn, which supported more than 160,000 jobs – both farm and non-farm – across a wide range of sectors. As China develops and its people's incomes rise, their increased demand for imported, higher quality and new food products

will offer unprecedented export opportunities for the U.S. agricultural sector.

Apart from the mutually beneficial trade ties, there are also many opportunities for technological cooperation and bilateral investment. In the long term, facing land and water constraints as well as an ageing agricultural workforce, China will have

to keep improving its agricultural productivity so it can meet growing domestic demand, while at the same time address the many related environmental and health issues. This will generate many more opportunities for cooperation between China and the U.S. to foster modern, sustainable and resilient agricultural development.

Cooperation in Agriculture

Introduction

The U.S. and China are both the world's largest producers and consumers of agricultural products. China is the world's largest producer of cotton, rice, pork, peanuts, apples, tea and dairy products. The U.S. is the world's largest corn and soybean producer and exporter, the largest beef producer and the second biggest poultry producer.

In the past decade, both countries have made remarkable progress in liberalizing agricultural trade. Agricultural cooperation between the two countries has evolved into one of the most successful bilateral relationships. While disputes are inevitable over some contentious issues, more important are the tremendous mutual advantages that could be achieved by further deepening collaboration in the agricultural sector. Such benefits include economic growth and employment, enhanced food security, productivity and efficiency gains, lower and more stable food prices, profitable investment opportunities and a more sustainable environment. In short, the differences matter less than the common interests, and much remains to be done.

A Strong Basis for Cooperation

The U.S. and China are natural complementary partners in agriculture. Land and water constraints, coupled with rapid growth in its food requirements, mean that China's demand for imported agricultural products is strong. In the U.S., agricultural production capacity exceeds domestic demand. Export markets are thus crucial, particularly for land-intensive products in which the U.S. has a comparative advantage. For its part, China has a comparative advantage in labor-intensive, processed items such as certain aquatic products, apple juice, feathers, down, honey, garlic, ginseng, tea, ornamental plants, fruit trees, flowers, and dried and processed fruits and vegetables.

The two countries could reap enormous mutual benefits if they strengthen agricultural trade and cooperation. China's large market offers the U.S. opportunities to export its excess capacity. On the other hand, importing U.S. farm products not only helps China meet growing domestic demand and keep food prices low and stable, but also eases pressures on the environment due to land and water use. Meanwhile, the need to modernize China's agriculture sector should provide U.S. companies attractive opportunities for investment and technical cooperation.

Resources complementarity

Arable land

In terms of domestic supply, the biggest challenge for China's agricultural production is the constraint in arable land. While China's land size is comparable to that of the U.S., most of China's land is non-arable desert, dry savanna and mountains. China has around 120 million hectares of arable land, which needs to support a population of 1.33 billion and an agricultural workforce of 499 million. By contrast, the U.S. has 170 million hectares of arable land that supports 307 million people, including 2.28 million agricultural workers. In short, the U.S. has 40% more arable land than China, while China has over four times the population of the U.S. Each arable hectare in China provides food for eleven people; in the U.S., the figure is fewer than two people per hectare. The average for the world is 4.4 people per hectare¹.

China has lost about 8.3 million hectares of arable land over the last decade. Cultivated land in China decreased from 133 million hectares in 2001 to 122 million hectares in 2011. Apart from factors such as natural hazards and soil degradation, rapid economic development and urbanization are crucial factors leading to the shrinkage of arable land in China. Cities have increasingly expanded and encroached upon arable land in the past decades. In its 12th Five-Year Plan, China expects that the country will be 54% urbanized by 2015. By that year, its urban population is expected to exceed 700 million². The World Bank forecasts that the urbanization rate will reach 70% by 2030³. The Chinese leadership vows to preserve arable land⁴ in a gradual and

healthy urbanization process. But the pressure on agricultural land is expected to continue and this is a major challenge for China over the long term.

Water

China faces an acute water shortage. While it has 20% of the world's population, it has only about 7% of the fresh water resources. The problem is compounded by uneven distribution. Around 80% of China's rainfall and snowmelt occurs south of the Yangtze River, while just 20% of the moisture occurs in the mostly desert regions in the north and west. The majority of China's arable land lies in the more water-scarce northern areas. For example, the North China Plain consumes an immense amount of water to produce half of China's wheat. In an average year, 15.3 million hectares of farmland – 13% of the total – suffer from drought.

To relieve the problem of uneven distribution of water resources, China launched a multi-decade South-North Water Diversion Project (SNWD) to better utilize water resources. The project was first proposed in the 1950s, but only after decades of planning was it approved in 2002, when construction of the eastern route began. The following year, the building of the central route started. Completion is expected in 2014. Estimated to cost more than US\$80bn (RMB500bn), the system will divert 44.8 billion cubic metres of water every year from the Yangtze River to northern China by 2050.

The SNWD, however, is a limited solution to the water shortage problem in China, as the Yangtze River has also been in severe drought in recent years. During the dry season of 2007-2008, the water level in the Hankou region plunged to 13.98 meters, the lowest since records began in 1866. This unexpected drop caused more than 40 ships to run aground. In 2011, the Yangtze had its worst drought in 50 years. Most badly affected was Hubei province, which from January to April received 40% less rainfall than the average over the same period since 1961. The emergency forced the government

1 "Sino-U.S. Agricultural Cooperation", Eric Trachtenberg, unpublished manuscript, July 2012.

2 The National Bureau of Statistics of China released its census results in late April 2011. According to the latest census data, the urbanization rate was 49.68% in 2010. According to the 12th Five-Year Plan, the urbanization rate is to increase by 4% during 2011-2015.

3 "China's urban population to reach 70% by 2030", *China Daily*, 3 April 2012 http://www.chinadaily.com.cn/bizchina/2012-04/03/content_14974978.htm

4 China has maintained a 'red line' (minimum) of 1.8 billion mu, or 120 million hectares, of agricultural land.

to release water from the Three Gorges reservoir, sacrificing hydroelectric generation for irrigation, drinking supplies and ecosystem support. The drastic measure came amid warnings of power shortages and highlighted the severity of the dry spell in the Yangtze Delta, which supports 400 million people and 40% of China's economic activity.

The SNWD has also adverse social consequences as many people had to be relocated to make way for the first phases of the eastern and central routes. Because of high costs, uncertainty over the carrying capacity of the Yangtze River and other environmental and technical concerns, the western route has been delayed.

The deficit of surface water has led to excessive exploitation of groundwater resources, which in turn, has resulted in the rapid depletion of groundwater reserves. In Beijing, for example, the groundwater table has already dropped by 100 to 300 meters. As a result, scientists say, local aquifers may be exhausted within 30 years⁵.

China also faces a water quality problem. According to China's State Environmental Protection Administration (SEPA), in 2006, 60% of the country's rivers could not be safely used as a source of drinking water. A 2008 SEPA report about the Yellow River pointed out that severe pollution caused by factory discharge and sewage from fast-expanding cities had made one third of the river unusable even for agriculture or industry. Pollution, which exacerbates water scarcity, is worse in the northern regions than in other parts of China. Due to the scarcity of water, polluted water supplies are used for irrigation in about 4.05 million hectares, or 7.4%, of the nation's irrigated land, two thirds of which is in northern China.

To make up for the water shortage, Chinese farmers have relied heavily on the use of chemical fertilizers and pesticides to support farm output growth. The intensive use of chemicals, however,

has led to severe soil degradation and pollution, which will, in turn, adversely affect long-term agricultural production capacity.

Labor

Agriculture in China employs 499 million workers or 37.5% of the population, a much larger share than in the U.S. (2.28 million workers, or just 0.7%). With an agricultural labor force over 200 times larger than the U.S., China has a comparative advantage in labor-intensive agricultural products, such as processed food. Wage differentials of course matter in this agricultural division of labor, although productivity, access to capital and raw materials, closeness to markets and infrastructure may partially offset this.

Modernization of the Chinese economy and urbanization are driving a gradual migration of the agricultural population to cities. The availability of higher paying jobs in urban areas has attracted young people from the countryside to look for job opportunities and settle down there. The older generation is less adaptable to the demand for new skills in urban jobs and tend to stay behind and stick to farming. This means that, as time goes by, China's agricultural workforce is aging and deteriorating in quality. This is likely to become a more serious problem in the next decade.

U.S. excess capacity and the need for export markets

Driven by innovation and improved technology such as improved seeds, pest control and better farm management practices, U.S. agriculture productivity has been rising rapidly over the past few decades⁶. Looking ahead, the conservation of

5 "Sino-U.S. Agricultural Cooperation", Eric Trachtenberg, unpublished manuscript, July 2012; <http://www.chinawaterrisk.org>.

6 Over the past few decades, American agriculture has relied almost entirely on productivity growth to raise output. According to the US\$A, U.S. farm output in 2009 was 170% above its level in 1948, an average annual rate of 1.63%. Aggregate input use increased by a mere 0.11% annually so the positive growth in farm sector output was substantially due to productivity increases. This contrasts with a 3.6% annual output increase in the private non-farm sector, with productivity growth accounting for slightly more than a third of the growth.

Figure 1: Summary of the U.S. Production, Domestic Use and Ending Stocks (1000 mt), 2001-2013

	2001/2002	2002/2003	2003/2004	2004/2005	2005/2006	2006/2007	2007/2008	2008/2009	2009/2010	2010/2011	2011/2012	2012/2013
Production												
Barley	5,407	4,940	6,059	6,091	4,613	3,923	4,575	5,230	4,949	3,925	3,392	4,796
Corn	241,377	227,767	256,229	299,876	282,263	267,503	331,177	307,142	332,549	316,165	313,949	273,832
Cotton	4,420	3,747	3,975	5,062	5,201	4,700	4,182	2,790	2,654	3,942	3,391	3,703
Soybean	78,672	75,010	66,783	85,019	83,507	87,001	72,859	80,749	91,417	90,605	84,192	82,055
Wheat	53,001	43,705	63,805	58,698	57,243	49,217	55,821	68,016	60,366	60,062	54,413	61,755
Domestic Consumption												
Barley	5,661	5,179	4,990	5,672	4,570	4,596	4,324	5,127	4,604	4,537	4,193	4,680
Corn	200,941	200,748	211,595	224,610	232,015	230,674	261,632	259,272	281,590	285,014	279,023	262,571
Cotton	1,715	1,620	1,410	1,480	1,235	1,140	1,091	712	771	889	681	733
Soybean	50,867	47,524	44,600	51,410	52,751	53,473	51,627	48,112	50,671	48,403	48,810	47,207
Wheat	32,434	30,448	32,498	31,783	31,320	30,940	28,614	34,293	30,978	30,710	32,155	38,110
Ending Stock												
Barley	2,006	1,510	2,619	2,796	2,350	1,500	1,485	1,932	2,515	1,945	1,306	1,661
Corn	40,551	27,603	24,337	53,697	49,968	33,114	41,255	42,504	43,380	28,644	25,122	16,062
Cotton	1,622	1,172	751	1,196	1,321	2,064	2,188	1,380	642	566	729	980
Soybean	5,663	4,853	3,059	6,960	12,229	15,617	5,580	3,761	4,106	5,852	4,610	3,397
Wheat	21,150	13,374	14,872	14,699	15,545	12,414	8,323	17,867	26,552	23,466	20,211	18,818

Source: Foreign Agricultural Service, USDA, 2013

water and soil resources will play a critical role in supporting U.S. agricultural production. With the productivity of U.S. agriculture growing faster than domestic food and fiber demand, farmers and agricultural firms rely heavily on export markets to sustain prices and revenues. In fact, the Foreign Agricultural Service (FAS) of the U.S. Department of Agriculture (USDA) has made huge efforts jointly with farmers to develop and expand export markets around the globe.

Since 1960, U.S. agricultural exports have been larger than imports, generating significant surpluses in agricultural trade. This helps counter the persistent U.S. deficit in non-agricultural merchandise trade.

Over the past two decades, the shares of the value of exports with respect to the value of production rose from 13% in 1990 to 20% in 2012, while the shares based on volume remained relatively stable at around 20% over the same period⁷. Figure 1 presents production, domestic use and ending stocks for major commodities in the U.S. during

the last decade. The numbers suggest that the U.S. continues to have a surplus for major agricultural commodities.

U.S. Agriculture Secretary Tom Vilsack recently pointed out that every US\$1bn in agricultural exports supported 8,400 American jobs, meaning that in 2011 farm exports supported more than one million U.S. jobs throughout the farming, transportation, renewable energy, manufacturing and other sectors. Vilsack noted that, over the past few decades, agriculture was the second most productive sector of the U.S. economy after IT⁸. Indeed, amid sluggish growth and unbalanced overall trade, agricultural production and exports are the bright spots of the American economy.

According to the USDA, in the 2011 fiscal year, China became the top export market for American agriculture, purchasing US\$20bn worth of goods. U.S. farm exports to China supported more than 160,000 American jobs in 2011 across a variety of

7 "US\$Export Share of Production", ERS-US\$A, 2012, [http://www.ers.us\\$A.gov/topics/international-markets-trade/us-agricultural-trade/export-share-of-production.aspx#estimation](http://www.ers.us$A.gov/topics/international-markets-trade/us-agricultural-trade/export-share-of-production.aspx#estimation)

8 "Statement from Agriculture Secretary Vilsack on Record U.S. Farm Exports for Calendar Year 2011", Release No. 0046.12, US\$A, 10 February 2012 [http://www.US\\$A.gov/wps/portal/US\\$A/US\\$Ahome?contentid=2012/02/0046.xml&contentidonly=true](http://www.US$A.gov/wps/portal/US$A/US$Ahome?contentid=2012/02/0046.xml&contentidonly=true)

Figure 2: Forecasts of China's Imports of Major Commodities (million mt), 2012-2022

	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22
Cotton										
ERS-USDA	1.60	1.65	1.65	1.66	1.67	1.68	1.70	1.73	1.76	1.79
FAPRI										
WAEES	2.44	1.56	1.99	2.19	2.30	2.36	2.39	2.56	2.64	2.80
OECD-FAO										
Corn										
ERS-USDA	4.03	4.86	6.13	7.53	9.05	10.85	12.46	14.20	16.03	18.10
FAPRI	2.07	2.16	2.34	2.47	2.64	2.78	2.94	3.10	3.26	3.41
WAEES	1.34	5.69	7.96	8.85	10.01	11.05	11.97	12.61	13.11	14.03
OECD-FAO	5.83	6.86	7.35	7.85	8.26	8.83	9.35	9.91	10.43	11.04
Wheat										
ERS-USDA	1.49	1.33	1.39	1.42	1.49	1.56	1.60	1.69	1.75	1.77
FAPRI	0.68	0.79	0.93	1.06	1.20	1.33	1.48	1.63	1.78	1.94
WAEES	1.53	3.40	2.69	3.23	3.08	3.21	3.12	3.06	2.94	2.84
OECD-FAO	6.08	5.86	5.06	4.13	4.01	4.41	4.66	5.01	5.14	5.32
Rice										
ERS-USDA	0.53	0.50	0.51	0.50	0.53	0.56	0.59	0.61	0.63	0.65
FAPRI	1.24	1.28	1.32	1.35	1.33	1.35	1.37	1.44	1.44	1.50
WAEES	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50
OECD-FAO	0.53	0.51	0.56	0.64	0.68	0.72	0.75	0.78	0.81	0.86
Soybean										
ERS-USDA	63.06	66.05	69.04	72.03	75.03	78.02	81.01	84.01	87.00	90.00
FAPRI	61.93	64.33	66.15	67.91	69.58	71.30	73.04	74.82	76.59	78.31
WAEES	61.00	63.86	66.08	67.59	69.20	70.67	72.15	73.70	75.21	76.70
OECD-FAO	58.60	60.37	61.68	63.95	65.68	67.01	68.45	69.94	71.46	72.75

Source: ERS-USDA; FAPRI; WAEES; OECD-FAO

sectors⁹. China's market potential is attractive as continued rapid economic growth will lead to unprecedented expansion in food demand. China will continue to offer a growing market for soybeans, oilseeds, cotton, hides, meats and grains. As incomes increase, the product mix of China's agricultural imports will also become more diversified. The Chinese are spending more on higher-value food items such as meat, dairy, fruits, vegetables and horticultural products, and less on staples like rice and wheat. U.S. farmers and agricultural firms are well positioned to tap these huge opportunities by adjusting their product mix to meet better the changing needs of China's consumers.

China as a vast and growing market for U.S. agricultural products

Over the past 30 years, China's economy has achieved impressive average annual growth of about 10% and as a result, an astonishing rise in household income. Income growth, together with the rising population, has led to heightened demand for food, with consumers wanting higher quality products. Domestic production, even with improved yields, cannot keep up. While self sufficiency is a strategic goal of the Chinese government, China has seen rapid growth in agricultural exports and imports in recent years, with a growing agricultural trade deficit. Considering China's limited land and water resources, there is a need to seek more sources around the world.

⁹ "U.S., China Sign Plan of Strategic Cooperation in Agriculture", Release No. 0057.12, US\$A, 16 February, 2012 [http://www.US\\$A.gov/wps/portal/US\\$A/US\\$amediafb?contentid=2012/02/0057.xml&printable=true&contentidonly=true](http://www.US$A.gov/wps/portal/US$A/US$amediafb?contentid=2012/02/0057.xml&printable=true&contentidonly=true)

Figure 3: The U.S. Domestic Production and Exports of Major Commodities (million mt), 2012-2022

		20012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22
WAEES Forecasting											
Cotton	Production	3.76	2.85	3.07	3.21	3.21	3.28	3.30	3.34	3.35	3.35
	Exports	2.55	2.24	2.39	2.51	2.49	2.56	2.62	2.67	2.70	2.73
Corn	Production	291.36	396.22	395.59	398.29	401.47	408.39	409.58	412.46	417.48	424.05
	Exports	29.95	50.87	62.23	66.15	68.31	71.19	73.67	76.54	79.59	82.41
Soybean	Production	77.84	90.26	91.36	93.08	94.63	94.13	96.67	98.24	99.53	100.68
	Exports	34.08	37.90	39.87	40.10	41.12	40.69	41.26	41.86	42.05	42.13
Wheat	Production	61.76	61.46	61.07	58.40	60.94	60.92	61.54	62.18	62.61	62.70
	Exports	31.15	31.41	30.78	30.63	31.00	31.46	31.71	32.27	32.48	32.25
ERS-USDA Forecasting											
Cotton	Production	3.53	3.83	3.85	3.88	3.90	3.88	3.90	3.92	3.92	3.94
	Exports	2.56	2.87	2.98	3.05	3.07	3.09	3.09	3.09	3.11	3.11
Corn	Production	387.41	374.08	376.25	383.06	390.00	396.80	401.43	408.37	413.00	420.07
	Exports	51.03	53.07	57.15	59.87	61.23	62.60	63.96	64.64	65.32	66.00
Soybean	Production	87.50	90.22	91.72	92.67	93.62	94.57	95.39	96.34	97.30	98.25
	Exports	38.92	41.23	41.78	42.32	42.46	42.59	42.73	43.00	43.27	43.41
Wheat	Production	57.70	55.79	54.02	54.43	54.84	55.25	55.79	56.20	56.61	55.79
	Exports	25.85	25.85	25.85	25.85	25.17	25.17	25.17	25.17	24.49	24.49
FAPRI Forecasting											
Cotton	Production	3.70	2.95	3.04	3.05	3.11	3.15	3.18	3.24	3.30	3.36
	Exports	2.47	2.33	2.33	2.35	2.42	2.46	2.51	2.58	2.65	2.73
Corn	Production	293.36	391.52	385.34	390.65	393.75	399.42	406.71	409.38	413.56	417.15
	Exports	33.75	51.44	55.93	59.49	63.19	66.54	72.14	76.19	80.24	86.86
Soybean	Production	73.26	90.52	90.71	92.12	94.14	95.53	95.98	97.22	97.91	98.47
	Exports	30.29	39.73	40.66	41.72	42.95	43.79	43.72	44.03	44.11	44.00
Wheat	Production	61.72	60.96	58.60	56.55	56.04	56.36	56.69	57.15	57.49	57.76
	Exports	32.69	31.00	28.88	26.86	26.45	26.59	26.98	27.06	27.44	27.53

Source: World Agricultural Economic and Environmental Services; USDA Economic Research Service; Food and Agricultural Policy Research Institute

China's middle class is estimated to be around 230 million people – already more than two thirds of the entire U.S. population – and projected to reach 630 million by 2022¹⁰. This is expected to make China the world's second largest retail food market, behind the E.U. and ahead of the U.S. Diets will diversify as income rises. The mounting demand for new food products, imports and higher quality foods should offer unprecedented opportunities for U.S. agriculture.

Figure 2 presents China's import numbers forecast for different commodities based on different institutes. Based on those forecasts, China is expected to import around 2 million metric tons (mt) of cot-

ton, 5 million-18 million mt of corn, 2 million-5 million mt of wheat, 1 million mt of rice, 60 million-90 million mt of soybeans in the next 10 years.

Figure 3 presents forecasting results on U.S. domestic production and exports of major commodities by ERS-USDA, FAPRI and WAEES. Comparing those numbers with forecasts of China's imports of major commodities (see Figure 2), except for soybeans, the U.S. appears to be able to provide enough cotton, grains and oilseeds for China's imports in the next decade.

¹⁰ See Chapter 7 for more details.

U.S.-China agricultural trade and cooperation can help some of China's long-term concerns, while opening up market and investment opportunities for the U.S.

Food security

China's foremost concern is food security. Throughout its history the country's first priority has always been to feed its growing population. Many policy measures adopted by the government were to ensure the country's food security, including: a household contract responsibility system for farmers; policies for protecting cultivated land; the governors' grain responsibility system and mayors' vegetable basket responsibility system for ensuring production and supplies of grains and other staple foodstuffs; financial supports for commercial grain bases and vegetable bases as the most effective measures for sustained food security; expansion of state grain reserve capacities and grain marketing infrastructure as a major measure for strengthening the government's ability to control or regulate the national grain market; and a food quarantine system that has been set up and implemented for protecting consumers' health¹¹.

Although China has successfully attained a high degree of grain self sufficiency and will try to maintain this trend in the future, most international organizations recently forecast that China will become one of the major cotton, soybean and corn importing countries in the next decade. The self-sufficiency rates for soybeans, cotton and corn would be lower than 20%, 60% and 95%, respectively (see Figure 4).

Given the acute shortages of land and water resources, urbanization and environmental degradation as mentioned above, the issue of food security looms large for China. U.S. agricultural exports can

help buttress China's food security in case of shortfalls. In February 2012, the U.S. and China signed a five-year agreement on food security, sustainable agriculture and food safety at an agricultural symposium in Iowa. The agreement was largely focused on food security and agricultural sustainability issues and strengthened food supply and agricultural technology cooperation between China and the U.S.

Stable food prices

China also needs to maintain stable and affordable food prices, which are essential to social stability. Imports from the U.S. can help keep prices from rising, especially during shortages. For example, in 2007-2008, when the blue ear disease in swine cut production by 17% and prices rose by 54%, U.S. exports of pork made up the shortfall, preventing more severe price increases¹².

Environmental problems

A grave concern in China is the environment. Soil degradation and pollution have exacerbated the scarcity of arable land and water. Imports of agricultural products can help reduce China's environmental problems. The use of green technology and farming practices would attract more attention and be promoted, which would offer new opportunities for U.S. companies and investors.

Agricultural modernization

China has invested substantially in modernizing its agriculture sector. The upgrading of swine production, for example, is driving improvements in the feed business. Domestic and foreign investments are also flowing into seeds, chemicals and machinery for grain production.

Adopting technology and modernizing agriculture are part of China's long-term strategy for sustainable development. Increasing emphasis will be placed on areas such as farmland conservation

¹¹ "Food Security in China. China: Regional Sustainable Development Review", Gu S. and Y. Zhang, Vol. I, Institute of Geographic Science and Natural Resources Research, Chinese Academy of Sciences, Beijing, 2007.

¹² "Sino-U.S. Agricultural Cooperation", Eric Trachtenberg, unpublished manuscript July 2012.

Figure 4: Chinese Self-Sufficiency Rates Forecast by Different Organizations, 2012/13-2021/22

	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22
Cotton										
ERS-USDA	58%	58%	58%	58%	58%	59%	59%	59%	59%	59%
FAPRI	77%	76%	75%	75%	74%	73%	72%	71%	71%	70%
WAEES	69%	79%	75%	74%	73%	73%	74%	73%	72%	72%
OECD-FAO										
Corn										
ERS-USDA	98%	98%	98%	97%	97%	96%	96%	95%	95%	94%
FAPRI	99%	99%	99%	99%	99%	99%	99%	98%	98%	98%
WAEES	99%	97%	96%	96%	95%	95%	95%	95%	94%	94%
OECD-FAO	97%	97%	97%	96%	96%	96%	96%	96%	96%	95%
Wheat										
ERS-USDA	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%
FAPRI	100%	100%	100%	99%	99%	99%	99%	99%	99%	99%
WAEES	99%	97%	98%	97%	98%	97%	98%	98%	98%	98%
OECD-FAO	95%	95%	96%	97%	97%	96%	96%	96%	96%	96%
Rice										
ERS-USDA	100%	100%	100%	100%	100%	100%	100%	100%	95%	95%
FAPRI	99%	99%	99%	99%	99%	99%	99%	99%	89%	89%
WAEES	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%
OECD-FAO	100%	100%	100%	100%	99%	99%	99%	99%	99%	99%
Rapeseed										
ERS-USDA										
FAPRI	86%	86%	87%	87%	87%	88%	88%	88%	88%	87%
WAEES	85%	89%	90%	91%	91%	92%	91%	92%	92%	92%
OECD-FAO										
Soybean										
ERS-USDA	29%	27%	25%	23%	22%	20%	19%	17%	16%	14%
FAPRI	18%	17%	17%	16%	16%	15%	15%	14%	13%	13%
WAEES	19%	18%	17%	17%	16%	16%	16%	15%	15%	15%
OECD-FAO	49%	49%	49%	48%	48%	48%	47%	47%	47%	47%

Source: World Agricultural Economic and Environmental Services; USDA Economic Research Service; Food and Agricultural Policy Research Institute; Organization of Economic Cooperation and Development Food and Agriculture Organization

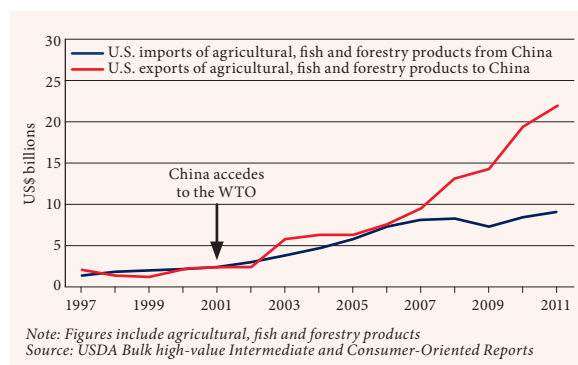
and resource-saving technology, biotechnology, plant and animal health and diseases, improved farming practices and mechanization, post-harvest treatment, distribution and cold chain logistics, and upgrading agriculture processing facilities. Foreign investment could play a prominent role in these areas. As U.S. agriculture continues to apply the latest technology and achieve an unparalleled level of productivity, the participation of the U.S. agriculture sector and investors in modernizing Chinese agriculture will generate great benefits for both countries.

Existing Agricultural Cooperation

The rapid growth of U.S.-China agricultural trade
U.S. exports of agriculture, fish and forestry products to China rose from US\$2.2bn before China's WTO accession in 2001 to US\$21.9bn in 2011. At the same time, Chinese agricultural exports to the U.S. rose from US\$2.3bn in 2001 to US\$9.2bn in 2011¹³ (see Figure 5).

13 US\$A BICO reports, [http://www.fas.US\\$a.gov/GATS](http://www.fas.US$a.gov/GATS).

Figure 5: U.S.-China Agricultural Trade, 1997-2011



China is now the largest market for U.S. agricultural exports, while China is the third largest supplier to the U.S. Major Chinese exports include tea, spices, apple juice, fresh vegetables, tree nuts, cat and dog food, processed fruit and vegetables, and seafood; while the U.S. exports soybeans, cotton, corn, hides and skins, seafood and forest products. Much of this trade is driven by the fact that the U.S. production exceeds domestic demand and needs export markets in land-intensive products such as field crops. On the other hand, China has a comparative advantage in labor-intensive, processed products such as apple juice¹⁴. Chinese demand is changing the face of U.S. agriculture. For example, in the meat industry, chicken feet are now exported. The tree nut sector is changing because of high prices driven by Chinese demand, and huge new pecan plantations are going online to meet Chinese demand. And there are tremendous exports of bovine genetics. America is even exporting alfalfa for Chinese dairy production. At the same time, new Chinese products are also grown and sold to America.

Until 2006, the U.S. trade surplus in its agricultural trade with China was relatively moderate. Since 2007, however, this surplus has risen rapidly, and reached US\$12.7bn in 2011¹⁵.

Figure 6: Top 10 U.S. Agricultural Exports to China, 2011 (US\$ thousands)

Rank	Product	Value
1	Soybeans	10,480,227
2	Cotton	2,623,395
3	Hides and skins	1,163,410
4	Logs and chips	1,079,281
5	Coarse grains	842,770
6	Other edible fish and seafood	750,766
7	Red meat, FR/CH/FR	641,122
8	Feeds and fodders	627,108
9	Hardwood lumber	506,691
10	Other intermediate products	468,799

Source: USDA Bulk high-value Intermediate and Consumer-Oriented Reports

Figure 7: Top 10 U.S. Agricultural Imports from China, 2011 (US\$ thousands)

Rank	Product	Value
1	Other edible fish and seafood	1,784,403
2	Other value-added wood products	1,445,192
3	Panel products (including plywood)	1,117,421
4	Processed fruit and vegetables	948,906
5	Other consumer-oriented products	753,710
6	Other intermediate products	641,134
7	Fruit and vegetable juices	558,813
8	Groundfish, fillet/steak	486,454
9	Shrimp	289,350
10	Snack foods	203,021

Source: USDA Bulk high-value Intermediate and Consumer-Oriented Reports

Trade in selected major agricultural commodities is examined below:

Trade in livestock

In 2011, the U.S. imported animal products worth US\$449.3m from China and exported animal products worth US\$2.63bn to China¹⁶.

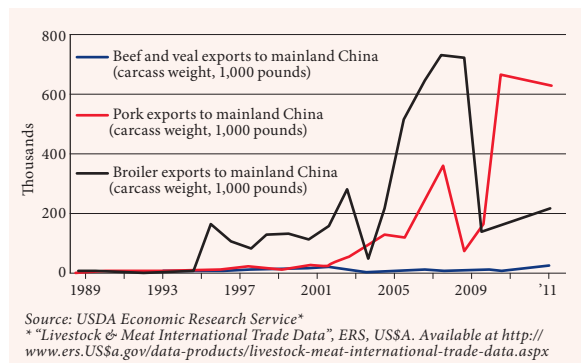
U.S. exports of broilers (chickens) to China rose rapidly after 2004 and reached the peak of 733.8 million lbs (332.85 million kg) in 2009. In 2010, China imposed anti-dumping and countervailing

¹⁴ Unpublished manuscript by Eric Trachtenberg, "Sino-U.S. Agricultural Cooperation", July 2012.

¹⁵ US\$A BOCI Reports, [http://www.fas.US\\$A.gov/GATS](http://www.fas.US$A.gov/GATS).

¹⁶ "Trade", China, ERS, USDA, [http://www.ers.US\\$A.gov/topics/international-markets-trade/countries-regions/china/trade.aspx](http://www.ers.US$A.gov/topics/international-markets-trade/countries-regions/china/trade.aspx)

Figure 8: U.S. Livestock Product Exports to China, 1989-2011



duties on broiler products from the U.S., and U.S. exports of broiler products dropped significantly. At the moment, these imposing anti-dumping and countervailing duties are being challenged at the WTO by the U.S.

China's imports of U.S. pork rose rapidly after 2000. In 2003 the volume reached 44.7 million lbs (20.28 million kg) (carcass weight). Despite the drastic fall in 2008, imports of U.S. pork rebounded quickly to a new height of 639.5 million lbs (290.07 million kg) in 2011.

Trade in soybeans

Soybeans are the most important agricultural product traded between the U.S. and China. China's soybean growing area fell 13.8% from 2011/12 and totaled only 5.79 million hectares in 2012/13. Figure 10 presents the soybean monthly price margin during the last few years. The price margin between domestic soybeans and imported soybeans and mounting demand for vegetable oils and feed proteins have contributed to the increased imports. China imported nearly 60 million mt in 2011/12 and this will reach 63 million mt in 2012/13. Its domestic self-sufficiency rate (see Figure 9) was less than 20% and received more than 70% of total U.S. soybean exports during the last two years. Basically, all soybean imported into China are processed into soybean meal for animal feed and cooking oil for human consumption. The large quantities traded

are consistent with the U.S. position as the world's largest soybean producer and China's as the world's largest soybean consumer.

Trade in cotton

Cotton is increasingly used in China due to the expansion of its large textile and apparel industries. China is the world's largest cotton producer, user and importer. Cotton imports accounted for 40% of domestic use (see Figure 9). U.S. cotton represented over one third of China's total imports. It was the second largest agricultural commodity imported from the U.S. Due to transportation costs, however, U.S. cotton has lost market share to India in recent years. India has also accounted for about one third of China's cotton imports since 2010/11. However, India exports are limited due to growing domestic mill use and quality issues. Therefore, even the U.S. suffered from cotton share decreases, the export value of U.S. cotton to China grew from less than US\$50m in 2001 to more than US\$3bn recently, and this trend is likely to continue in the future.

Trade in corn

Since China is the second largest corn producing country in the world, the country imported very little up until 2008/09. However, due to livestock feed demand, China has imported 1.296 million mt, 0.979 million mt and 5.231 million mt in 2009/10, 2010/11 and 2011/12, respectively, with most of the supply coming from the U.S. U.S. corn accounted for 40% of world corn exports over the last five years, with a record 62 million mt exported in 2007/08. The large influence of the U.S. on corn supply makes world corn trade dependent on the weather in the U.S. Corn Belt. Due to biofuel expansion in the U.S. and drought issues, the U.S. only exported 39 million mt and 23 million mt of corn in 2011/12 and 2012/13, respectively. Chinese corn export policy has often changed, with seemingly little relationship to the country's official corn production statistics, making China's corn trade difficult

Figure 9: Chinese Self-Sufficiency Rate, 2001/02-2012/13

	Soybean	Vegetable Oils	Cotton	Corn	Wheat	Barley
2001/02	63%	82%	98%	100%	99%	57%
2002/03	39%	60%	89%	100%	100%	63%
2003/04	51%	61%	71%	100%	96%	68%
2004/05	36%	68%	83%	100%	93%	62%
2005/06	39%	59%	56%	100%	99%	47%
2006/07	36%	55%	78%	100%	96%	73%
2007/08	24%	62%	76%	100%	100%	72%
2008/09	20%	62%	84%	100%	100%	63%
2009/10	15%	69%	78%	99%	99%	44%
2010/11	21%	67%	74%	99%	99%	60%
2011/12	18%	71%	47%	97%	98%	46%
2012/13	18%	72%	61%	99%	98%	50%

Source: Foreign Agricultural Service; USDA, 2013

to predict. However, population growth and consumer demand for meat products in China should continue to support expanding feed grain imports in the long term.

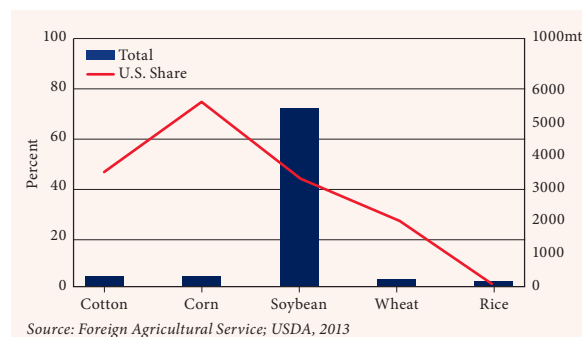
Trade in vegetable oils

Vegetable oils are China's second-largest agricultural import. The total imports are 8.56 million mt in 2012/13. During the last three years, palm oil and soybean oil accounted for 87% of total vegetable oil imports. Most of the palm oils are from Indonesia. China's soybean oil imports are relatively low compared to soybeans due to the difference in tariff treatment between soybean oil and soybeans, which are duty free, compared to soybean oil's 9% tariff. Price margins between domestic prices and cost, insurance and freight (CIF) prices of edible oils are presented in Figure 12.

Bilateral investment in agriculture

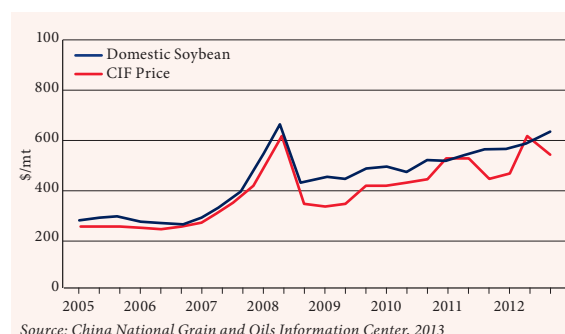
Since the Chinese government implemented economic reform in 1978, there has been an influx of foreign capital into the agriculture industry in Chi-

Figure 10: China Commodity Imports and their U.S. Shares, 2009/10-2011/12



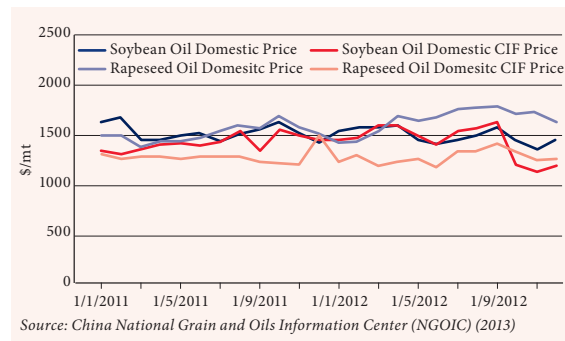
Source: Foreign Agricultural Service; USDA, 2013

Figure 11: Domestic Soybean Port Price and CIF Price, Jan 2005-Dec 2012



Source: China National Grain and Oils Information Center, 2013

Figure 12: Edible Oil Price Comparison between Domestic Port Price and CIF Price, Jan 2011-Nov 2012



Source: China National Grain and Oils Information Center (NGOIC) (2013)

na. U.S. companies have made massive investments in areas such as planting, breeding, grain and oil processing, agricultural machinery, etc. in China. These moves, which have also brought about massive technology transfer, have fostered the development and modernization of agriculture and related industries in China.

On the other hand, China has been encouraging outbound investments, particularly in selected sectors including agriculture in recent years. In fact, compared with the outbound investments in sectors such as energy, utilities and mining, China's outbound investment in the agricultural sector has just started. The rise in worldwide food prices in recent years has spurred China's enthusiasm to invest in the overseas agricultural sector. One of the most eye-catching examples was Chinese food manufacturer COFCO acquiring in 2008 a 4.95% minority stake of Virginia-based Smithfield, the world's leading processor and marketer of fresh pork and packaged meat as well as the largest producer of hogs. Afterwards, in late-2009, COFCO paid US\$31.24m (RMB194m) to take over Maverick, a joint venture between Smithfield and Belgium's ARTAL Group in China. The takeover was aimed at expanding COFCO's high-quality meat business; but it also hoped to acquire the technology and management skills of Smithfield and Maverick.

Also noteworthy is that, besides outbound investments and acquisitions made by China's state-owned enterprises (SOEs), the Chinese government is now also encouraging outbound investments and acquisitions by the private sector. On 29 June 2012, the National Development and Reform Commission (NDRC), the Ministry of Commerce (MOFCOM), the State Administration of Foreign Exchange (SAFE) and ten other regulatory authorities jointly released the "Implementing Opinions on Encouraging and Guiding the Active Outbound Investment by Private Enterprises" (the Opinions). The Opinions lay the foundation for more detailed measures to be promulgated in the future for encouraging cross-border investments and mergers and acquisitions activities by Chinese private enterprises. This may signal the beginning of a new wave of overseas investments and acquisition activities by Chinese private enterprises, many of whose owners wish to diversify their investments and wealth geographically. Agriculture is in China's list of 'preferred sectors'.

In view of these latest developments, China's outbound investments in agriculture are likely to increase at a fast pace going forward. The U.S. is likely to be one of the favorite investment destinations, and more focuses will be placed on agricultural technologies and green technologies.

Enhanced agricultural technology cooperation and personnel exchange

Since the U.S.-China Joint Working Group on Agricultural Technology was established in 1980, over 450 missions and over 2,500 visiting experts have been exchanged between the USDA and the Ministry of Agriculture of China (MOA), covering topics ranging from germplasm, biotechnology, biomass energy, pest management, pesticide management and agricultural technology extension. In addition, through various forms of collaboration, including joint research centers and laboratories, cooperative platforms and cooperative plans, a large number of personnel were trained in modern agricultural technologies, and made significant contributions to agricultural technology advancement and agricultural development in both countries¹⁷.

A series of effective dialogues have been established

Both the U.S. and China have a chance to gain hugely from increased synergies. The key is to create a positive agenda to build on the accomplishments achieved in the past decades. Both governments have attached great importance to this, and have established a long-running series of dialogues – including the Joint Committee on Cooperation in Agriculture (JCCA) and Joint Working Group on Agricultural Technology – and have continued to engage in the Joint Commission on Commerce and Trade (JCCT) and the Strategic and Economic Dialogue (S&ED). In February 2013, agriculture ministers from the U.S. and China signed an historic

¹⁷ China-U.S. Plan of Strategic Cooperation in Agriculture 2012-2017

Figure 13: China's Agricultural Subsidies

			2009	2010	2011	2012
Direct Payment	US\$ Billion		2.30	2.30	2.30	2.48
Seed Subsidy	US\$ Billion		3.02	2.30	3.49	4.30
Machinery	US\$ Billion		1.98	2.36	2.78	3.42
Fuel/Fertilizer Subsidy	US\$ Billion		11.51	13.00	13.75	17.26
Total	US\$ Billion		18.80	20.32	22.32	27.45
Government Procurement Price						
Rice	• Early Indica Rice	US\$/MT	286	295	324	381
	• Late Indica Rice	US\$/MT	292	308	340	397
	• Japonica Rice	US\$/MT	302	333	406	444
Wheat	US\$/MT		270	279	298	324
Corn	US\$/MT		214	221	265	317
Rapeseed	US\$/MT		582	574	730	754
Soybean	US\$/MT		548	550	587	613
Lint Cotton	US\$/MT		1,912	1,912	3,143	3,246

Source: collected from different China government rules

Plan of Strategic Cooperation that will guide the agricultural relationship of the two countries for the next five years. The plan builds on the already strong relationship the two countries enjoy around agricultural trade, science and education. It looks to deepen cooperation in priority areas such as food security, animal and plant health and diseases, sustainable agriculture, genetic resources, biotechnology, emerging technologies, as well as agricultural markets and trade¹⁸.

Ongoing concerns and disputes

Complaints and concerns from the two countries

There are complaints from China about the limited market access for Chinese agricultural products in the U.S., due to the high tariffs levied on certain types of agricultural products. For example, although the overall tariff level in the U.S. is relatively low, the U.S. levies a 20% tariff on the imports of fowl, 19% on soybean oil and as high as 139% on dairy products. China also argues that the huge amounts of agricultural subsidies by the U.S. government have given U.S. agricultural products such as corn, cotton, wheat and soybean an unfair price

advantage in the competition. The U.S. has argued that China's agricultural subsidies are stimulating production of land intensive products at the expense of U.S. exports (see Figure 13).

Green standards, packaging requirements and other technical barriers by the U.S. on China's exports are other areas of disputes. Disagreements also arise on China's 'market economy' status, as well as the selections of 'inappropriate surrogate countries' when the U.S. launches anti-dumping investigations against Chinese agricultural products.

Meanwhile, increasing food imports by China have prompted concerns about over-reliance on the global markets and food security, especially if the surge in imports would lead to dramatic falls in local production. Moreover, China is concerned about the potential harmful impact of genetically modified food from the U.S.

The U.S. has complained about the 'unscientific and inconsistent' applications of sanitary and phyto-sanitary measures by China, especially on U.S. beef and pork¹⁹. The U.S. is also concerned about China's

¹⁸ "China-U.S. Plan of Strategic Cooperation in Agriculture 2012-2017", USDA, 2012.

¹⁹ USITC (2011) estimated that China's sanitary and phyto-sanitary (SPS) measures have a larger effect on U.S. exports to China than tariffs. SPS measures substantially limit or effectively prohibit certain U.S. agricultural products. Refer to "China's Agricultural Trade: Competitive Conditions and Effects on U.S. Exports", United States International Trade Commission (USITC), 2011, USITC publication 5419, <http://www.usitc.gov/publications/332/pub4219.pdf>

seed and genetically modified organism (GMO) regulatory system. One example is the use of ractopamine in U.S. pork production. Ractopamine is a U.S. Food and Drug Administration (FDA) approved beta agonist feed ingredient that increases lean meat yield and is widely used in the swine industry in the U.S. However, ractopamine has been banned in countries such as E.U. member states, China and Russia. In 2002, China banned the use of all beta agonists, and delisted U.S. exporters whose products were found to contain ractopamine residue.

The U.S. claims that the allocation of China's tariff-rate quotas (TRQs) is opaque and problematic. In a WTO case initiated in September 2011, the U.S. challenged China's imposition of anti-dumping and countervailing duties on various U.S. poultry products. In addition, some U.S. agriculture companies argue that China's restrictions on foreign investment in the agricultural sector will limit competition and lead to slower industry development. Meanwhile, the U.S. government is actively monitoring China's subsidies and support measures for the agriculture sector in recent years. U.S. meat exporters are also frustrated by lengthy delays at custom clearance – a situation that prohibits them from exporting chilled meat.

Efforts and progress made by the two countries

In its “2011 Report to Congress on China's WTO Compliance”, the U.S. Trade Representative's Office (USTR) acknowledges that China has implemented its tariff commitments for agricultural goods each year in a timely manner. Tariffs on agricultural goods of greatest importance to U.S. farmers and ranchers were lowered from the 1997 average of 31% to 14%, in almost all cases over a period of five years running from 1 January 2002, or by 1 January 2006. China did not have to implement any new tariff reductions in 2011, as the last few required tariff reductions on agricultural goods took place in 2008.

The USTR has commented that the accumulated tariff reductions made by China, coupled with in-

creased demand, contributed to continued healthy exports of certain U.S. exports to China in 2011. Exports of some bulk agricultural commodities have increased dramatically in recent years, and continue to perform strongly, including soybeans and cotton. The value of U.S. soybean exports to China rose almost five-fold from US\$2.2bn in 2005 to US\$10.8bn in 2010; while U.S. cotton exports to China totaled a then record of US\$1.4bn in 2004, and subsequently rose to US\$2.2bn in 2010. Exports of forest products such as lumber encountered high demand, increasing by 86% from January through September 2011, when compared to the same period in 2010. Fish and seafood exports also grew significantly, up 57% for the first nine months of 2011. Meanwhile, exports of consumer-oriented agricultural products grew by 64% for the first nine months of 2011²⁰.

China claims this exemplifies its strong commitment to WTO principles, despite the potential damage to domestic farmers who face difficulties competing with imported products – for example, imports of cheap cotton from the U.S. have undercut Gansu and Xinjiang-based suppliers.

Over the last few decades, the U.S. farm policies have become more market orientated. The 1985 and 1990 Farm Bills reduced supply controls and cut price supports. The 1996 Farm Bill made a major move away from price support and income supports and focused more on conservation and water quality. The Export Enhancement Program (EEP), which was introduced in 1985 and was the U.S.' largest agricultural subsidy program, became inactive after 2002 and was finally repealed in the 2008 Farm Bill. U.S. production of meat products, horticultural products and processed foods are not subsidized. While the 2012 Farm Bill that aimed to terminate the Dairy Export Incentive Program (DEIP) was not passed because of political gridlock related to 'fiscal cliff' arguments, the need to reduce the federal deficit will put downward pressure on

²⁰ “2011 USTR Report to Congress on China's WTO Compliance”, The United States Trade Representative (USTR), December 2011.

government spending to support U.S. agriculture in the coming years. President Obama's budget proposal for the fiscal year 2014 released in April 2013, for example, proposed to eliminate direct payment and reduce the crop insurance fund²¹.

China has maintained high self sufficiency in grains and not overly relied on U.S. agricultural imports²²

China has a high degree of self sufficiency for cereals – rice, wheat and corn – the national staple food. In 2011, China produced 496.37 million tons of cereals and has a net import of only 4.51 million tons, 0.91% of domestic production. While the proportion of net imports has increased significantly in recent years (the percentage of net imports to domestic output was 0.38% in 2010), the sufficiency ratio remains high. Net imports of grains will continue to increase in the future, as there is a consensus among Chinese policy makers and scholars to lower the self-sufficiency ratio to 95%.

In cereals, China has gone from a net exporter of rice to a net importer in 2011, with the top three importing countries being Vietnam, Thailand and Pakistan. Among the total imports of 1.25 million tons of wheat in 2011, imports from the U.S. accounted for 0.43 million tons (34.34%) and ranked as the second largest importing country, while the largest source of imports was Australia with 0.64 million (51.11%). For corn, the U.S. was the largest supplier (96.16%), with Laos being the second largest (2.01%) and Myanmar being the third (1.62%).

On the other hand, China relies heavily on the import for soybeans, a substantial proportion of which is used as feed for animals. In 2006-2011, its imports of soybeans increased from 28.3 million tons to 52.6 million tons, while total domestic output remained around 14 million tons. The U.S. was

one of the top three countries for imports of soybeans by China. In 2011, the volume of U.S. imports amounted to 42.46%, with another 39.18% of soybeans imported from Brazil and 14.90% from Argentina. The market has remained diversified and competitive.

Genetically modified agricultural products

While there remain issues of concern about U.S.-China bilateral trade on biotechnology or genetically modified (GM) agricultural products, they are usually of an administrative, procedural or technical nature²³. While the Chinese Ministry of Agriculture (MOA) is alleged to have a time-consuming and inconsistent approval/registration process for GM agricultural products, the fact remains that bilateral trade of GM agricultural products between the U.S. and China is huge and growing. Unlike governments in Europe or Japan, both governments are in fact encouraging GM research, production and consumption.

Today, U.S. ranks first and China ranks sixth in terms of GM product cultivated area. Commercialized biotech crops in China include Bt Cotton, Bt Poplar, PRSV Papaya, VR Sweet Pepper, and DR and VR Tomato. Among these crops, adoption rate of Bt cotton in China was 71.5%²⁴ and nearly all commercial papaya grown in China are GM ones. Biotechnology plantings as a percentage of total crop plantings in the U.S. in 2012 were about 88% for corn, 94% for cotton and 93% for soybeans²⁵.

Both China and the U.S. are also relatively open to GM imports, as witnessed by the enormous flow of GM agricultural products between the two coun-

21 See "Farm Policy Roundup", Jeremy Peters, A New Farm Bill, 12 April 2013 <http://www.farmbillfacts.org/farm-policy-roundup-4-12-2013>

22 See the monthly report by Department of Foreign Trade of the Ministry of Commerce of China, <http://big5.mofcom.gov.cn/gate/big5/wms.mofcom.gov.cn/aarticle/subject/ncp/subjectbb/200603/20060301783733.html>

23 Issues include the lack of a low level presence (LLP) policy or a 'stacked traits approval' policy, which is highly technical. Refer to "Risk assessment of GM stacked events obtained from crosses between GM events", De Schrijver, A., et al, *Trends in Food Science & Technology* (2006), doi:10.1016/j.tifs.2006.09.002 <http://www.lacbiosafety.org/wp-content/uploads/2011/09/risk-assessment-of-gm-stacked-events-obtained-from-crosses-between-gm-events1.pdf>

24 "Global Status of Commercialized Biotech/GM Crops: 2011", Clive James, ISAAA Brief No. 43. ISAAA: Ithaca, New York, 2011.

25 "Adoption of Genetically Engineered Crops in the U.S.", USDA, <http://www.ers.usda.gov/data-products/adoption-of-genetically-engineered-crops-in-the-us/recent-trends-in-ge-adoption.aspx>

tries. In 2010 alone, China imported a total of 15.02 billion tonnes of corn (96.2% of its total corn import of 15.73 billion tonnes) and 235.95 billion tonnes of soybeans (42.5% of its total soybean imports) from the U.S. These imported corn and soybeans are almost entirely genetically engineered²⁶. Imports of Chinese processed tomatoes for U.S. consumption increased from 691 million tonnes in 2003 to 12,116 million tonnes in 2007²⁷, the majority of which is also genetically modified.

Moving forward, the U.S. and China can further cooperate in the area of GM research and regulation to promote consumer welfare, productivity and trade. The introduction of a synchronous approval system that allows application for a biosafety certificate in the importing country – required before the product can be exported to China – before the product gets fully approved from the exporting country will eliminate unnecessary delays in marketing and trading new biotech products. In due course, a unified registration regime can be developed where approvals issued by one country will automatically be converted into approvals of the other country.

In today's world where GM technology has become irreversible, cooperation between the U.S. and China – two of the biggest producers and consumers of agricultural products – is critical to the protection of consumers' welfare in both countries and around the world. Co-development of the two countries' regulatory regimes is the only way to bring quality GM products to the general public. Studies of U.S. and Chinese public opinion have repeatedly shown that consumers are not necessarily against GM products, but they insist on their 'right to know'. To address this issue, the U.S. and China

can learn from the E.U., where the mandatory labeling mechanism provides a framework for the traceability of products consisting of or containing GMOs, and food and feed produced from GMOs, so that effects on the environment and health can be monitored, and appropriate risk management measures can be implemented. To further protect the consumers' rights to know and enhance traceability, the U.S. and China can move ahead of the E.U. to legislate for the mandatory labeling of products such as meat, milk and eggs from animals fed on GM animal feed.

While presenting us with huge opportunities, the proliferation of GM technology would ultimately require fundamental changes to global governance that we are not fully prepared for. Unlike trade of other goods, cross-border monitoring and traceability of GMOs depend on a new level of systemic integration and convergence. As long as ongoing technical exchanges continue, and the U.S. and China learn to recognize each other's institutions and standards through dialogues, we are confident that both countries can come up with a mechanism acceptable to all stakeholders including farmers, food processors, food traders and consumers.

Our Recommendations

To sign long-term supply contracts between U.S. exporters and Chinese importers

A large proportion of most agricultural products are produced and consumed locally. Global prices for many agricultural products are affected by marginal changes in supply and demand, and therefore tend to be volatile. Such volatility in global prices, in turn, affects food prices and the livelihood of many people around the world, as well as introduces uncertainties for many producers.

Given the long-term growth in demand for food in China, this study proposes that long-term commodity supply contracts should be negotiated and signed between U.S. exporters and Chinese import-

²⁶ Values of corn and soybeans imports are computed using Chinese Ministry of Commerce (MOFCOM) figures <http://wms.mofcom.gov.cn/subject/ncp/index.shtml>. Percentages of GM varieties among the imports are estimations based on the fact that 88% of corn and 93% of soybeans grown in the U.S. are GM (cited above) and the assumption (as shared by various reports and analyses) that most non-GM products are retained in U.S. to be sold at a premium domestically.

²⁷ "Monitoring of U.S. Imports of Tomatoes 2008", United States International Trade Commission (USITC), 2008.

ers through platforms established and supported by both governments. This will help to encourage investments in new production and logistics capacity, stabilize the income of commodity suppliers, as well as enhance food security in China.

Agricultural commodities such as grains (maize, rice and wheat), soybeans and meat (beef, chicken and pork) all have potentially huge demand in China. The U.S. has the capacity to increase production and export these commodities to China. China has shortages of land and water, and the U.S. has higher productivity in the production of these commodities. In order for trade in agricultural commodities between the U.S. and China to be successful and sustainable, the U.S. farmers must, on the one hand, be assured that the Chinese demand is long term, so that they are willing to invest in land and equipment, and employ and train the necessary manpower. On the other hand, the Chinese importers must be assured of the reliability of the U.S. supply. Short-term contracts would not induce an expansion in U.S. output, investment and employment, but would merely lead to more volatility in global prices.

As for China, food security is crucial, and thus the Chinese importers must be assured that they can count on receiving the U.S. exports year in, year out. What is therefore needed is a long-term supply contract based on forecast numbers between the two sides say, for 10 or 20 years. The pricing formulas should be mutually agreed, say, on a cost-plus basis, so as to protect both the sellers and the buyers from the volatility of spot market prices. One way for China to be reasonably assured that the supply is not likely to be interrupted for any reason is for the U.S. exporters to set aside as collateral in warehouses in China, or a third country, an amount of agricultural commodities equal to one year of contracted supply, with the collateral withdrawable by the Chinese importers in the event of an interruption of exports from the U.S. At the same time, the Chinese importer would have to make available the necessary funds for one year's purchase in an es-

crow account kept in the U.S. or a third country to guarantee its purchase. Such collateral agreements would help to reduce uncertainty and discourage both sides to renege on their contractual obligations. If such a long-term supply contract can be negotiated by the two sides, it is not only win-win economically, but will also help promote a long-term friendly relationship between the two countries.

The desirability for China to import meat rather than animal feed

The U.S. has a major advantage in land intensive crops such as corn and soybeans. The issue, therefore, is where the animals that will consume this grain should be raised. All else held equal, if it is less expensive to move the animal product to China than it is to move the grain to China, then the industry should be located in the U.S. If it is less expensive to move the grain than the meat, then the industry should be in China.

The cost of corn or soybeans for Chinese pork producers is at least 11 cents per kg higher than in the U.S.²⁸. This price difference can be taken as a proxy for transportation costs for feed. The cost of shipping meat from the U.S. to China is about 26 cents per kg²⁹. From a transportation cost perspective it will make more sense to transport meat rather than the grain equivalent so long as the meat contains more than 2.4 units of grain. Using pork as an example, each kilogram of live animal contains 3 kg of grain. This live animal produces 76 kg of carcass for each 100 kg of live animal. Each 100 kg of carcass produces 75 kg of boxed pork. This means that each kilogram of boxed pork contains 5.2 kg of feed. Clearly it is far less expensive to ship pork rather than the grain equivalent.

Differentials in livestock productivity also favor locating the livestock industries in the U.S. In the

²⁸ This can be confirmed by comparing U.S. and Chinese prices for these corn and soybeans where the Chinese price is typically US\$110 per ton greater than the U.S. price.

²⁹ This meat transport cost data comes from U.S. pork exporters who routinely export containers to China.

U.S., the feed conversion ratio (FCR) for poultry is 1.9-2.0 (pounds of grain per pound of meat), and 3.3-3.6 for pork and 5.5-6.5 for beef. In China, the corresponding numbers are 2.2-4.0, 3.5-8.0 and above 10 for beef³⁰. These differentials support the idea that instead of importing U.S. grain and corn for feeding livestock, it would make more economic sense for China to import U.S. meat. (Note, however, that the economics of animal production can be greatly affected by labor costs, regulations, and distance to markets, logistics and other issues. In addition, the FCR depends on how old the animal is when it is slaughtered.)

Another strong reason for China to import more meat than feed is that the former is much more land intensive and water intensive, and China is a country with an acute shortage of arable land and water. A farmer can raise more calories on a hectare of land by growing plants rather than raising poultry or animals. Meat production also requires much more water. Beef is one of the most water-intensive meats. To produce one ton of beef requires, on average, 15,500 cubic meters of water; compared with 4,850 cubic meters for pork, 3,900 cubic meters for chicken, 1,800 for soybean and 1,300 for wheat³¹. Importing meat, especially beef, in that sense, is a way for China to import water.

To facilitate bilateral foreign investment

Restrictions on foreign investment in the agricultural sectors of the two countries result in under-investment, which ultimately will lead to a lack of competition and lost efficiency, slower agriculture development and higher food prices. To fully explore the benefits of U.S.-China agriculture cooperation, the two countries should reduce barriers for foreign participation and investment in agriculture and the food industry. This will open up lots of profitable investment opportunities for both sides,

as well as promote the development and advancement of agriculture in both countries.

Currently, the Chinese government is trying to encourage investment in projects to address the severe water shortages in northern China, as well as erosion and pollution problems throughout the country. The government is also attracting investment in China's poorer western provinces. One attractive area for foreign investment is agricultural products for export. Considerable investment has already been made in chicken meat processing for export to Japan and Europe, as well as fruit and vegetable production, packaging and processing for export around the world. Investment in soybean crushing plants and seafood processing plants is also substantial and growing. Foreign-invested companies, including some agribusinesses, are responsible for half of all foreign trade. The largest investors are overseas Chinese, mostly from Hong Kong, Taiwan and Southeast Asia³².

To maximize the synergies, more efforts should be made to promote cross-border investment in areas like biotechnology (such as large-scale seed production of genetically modified crops), green agriculture technologies (such as recycling agricultural wastes), emerging technologies (such as smart technology equipment) and modern logistics, just to name a few.

30 "Sino-US Agricultural Cooperation", Eric Trachtenberg, unpublished manuscript, July 2012.

31 Refer to the website of China Water Risk <http://www.chinawaterrisk.org>

32 "Sino-US Agricultural Cooperation", Eric Trachtenberg, unpublished manuscript, July 2012.

How investment along the agricultural supply chain promotes food security: A case study

Continental Barge and Grain is a huge U.S. company that is involved in all aspects of grain movement. At first glance, it resembles other U.S. grain companies such as Cargill or ADM in that it offers a full range of shipping and financial service. What is unusual about the company is that it is owned by Zen-noh and Itochu. A similar situation exists with Indiana Packers, a major U.S. pork processor, which is owned by Mitsubishi Corporation and Itoham Food. Why would Japanese based companies wish to become involved in such a low margin agricultural business as grain shipping or pork processing?

Anecdotal evidence from discussions with employees of both U.S. companies mentioned above, coupled with academic research on the topic, suggest that the primary reason is for Japan to “secure stable supplies of raw material”*. Japanese control of some aspects of the supply chain gives the Japanese company and Japanese society a sense of security that is apparently worth the investment. For example, one can imagine a strike by barge operators that cripples U.S. grain exports. By owning a key component of this industry, Japan is in a position to offset the negative impact of this strike by convincing its U.S. employees not to participate.

This concern with food supplies is difficult to understand by those who live in food surplus countries such as the U.S. However, when one looks at all of the efforts the U.S. has undertaken to secure a stable supply of oil, the concern that food importing countries have with securing a stable supply of imports becomes much more understandable .

Faced with the need to import food, it would be understandable if some companies in China developed an interest in control of the production and distribution system for this food. Some in the U.S. will oppose this move, but it is important to realize that U.S. agricultural exports to China will not reach their full potential unless China is comfortable with the security of the system that is delivering this food.

* See Raymond A. Jussaume and Martin Kenney, “Japanese investment in United States food and agriculture: Evidence from California and Washington”, *Agribusiness*, Volume 9, Issue 4, pages 413–424, July 1993 .

To develop a more liberalized trade environment which enhances market access

The benefits of U.S.-China agricultural trade are so obvious that it would be unwise to pose any unnecessary barriers to it. Both countries should take sufficient measures to comply with their WTO obligations and implement their tariff commitments, while refraining from the use of non-tariff barriers such as subsidies, licensing requirements, sanitary and phytosanitary measures, packaging standards, etc. Safeguards, anti-dumping and countervailing measures must not be abused and have to be applied strictly in accordance with WTO disciplines. Meanwhile, both countries should actively seek to

resolve trade disputes through discussions and negotiations.

Both countries are set to reap the low hanging fruits of closer trade ties. A case in point is the removal of the import ban on U.S. pork by China in May 2010. Since the lifting of the ban, Chinese imports of U.S. pork have grown substantially. This has benefited both the U.S. and China, renewing American access to China’s pork market while reducing food inflation in China. In December 2012, the 23rd session of the U.S.-China Joint Commission on Commerce and Trade also concluded some agriculture deals. As the then U.S. Secretary of Agriculture Tom Vilsack said, “We were able to make

progress on several key issues, while reinforcing the inherent value of the products produced in the U.S. Much more work remains to be completed and we'll continue working with our Chinese counterparts in the year ahead."³³

Tariff-rate quotas (TRQs) are also significant barriers to trade as well as good protection methods for domestic producers. Transparency of quota distribution and the state trading issues are two of the main concerns related with TRQs. How to administer TRQs is a great challenge in the future. There are two criteria for quota administration: quota fill and non-discrimination³⁴. The former requires no imports inhibition and the latter requires equal treatment across all countries. Currently, Chinese quota distributions are based on their historical market shares and allocated by license, 'first-come, first serve' methods, which is the most likely to be discriminatory and pose a moderate risk of biased trade³⁵. However, auctioning for traders without experience may cause quota rent issues (some inexperienced traders may sell the quota instead of doing the actual trade). The management of the TRQs is a challenging but important subject, and the Chinese government should review it with a view to enhancing the best interest of the public. Taking a proportion of the quotas out for auctioning regularly to players with at least two years of experience in the business is an option to consider.

To deepen technological cooperation, information exchange and resource sharing

In the interest of boosting productivity and developing a more advanced, sustainable and resilient agricultural sector, China and the U.S. should strengthen their cooperation and exchange on the following fronts:

Sustainable agriculture – such as resource-saving agriculture: land conservation, cleaner farming practices, waste utilization and recycling; disaster management, etc.

Biotechnology and genetic resources – such as germplasm development, breeding of new varieties, genetically modified organisms, etc.

Plant and animal disease control – such as diagnosis techniques; research and development (R&D) of pesticides and veterinary drugs, etc.

Information exchange and resource sharing mechanisms and platforms can be established to exchange the latest progress in R&D and applications of agricultural science and technology. Various communication activities should be promoted and facilitated between government bureaus, universities, institutes, agricultural associations and chambers of commerce from both countries. The private sector also has a vital role to play; and the Joint Working Group on Agricultural Technology may be used as one mechanism to encourage the engagement of the private sector.

Signing long-term contracts for technology cooperation is also recommended. There are recent surges of interests in agricultural technology cooperation between China and the U.S. Agricultural development cooperation is being pursued primarily by the private sector in the U.S. and government supported research centers in China. Growing concerns for food and energy security and the volatility of global commodity prices are pushing for further cooperation. However, China should address property rights issues more seriously while the U.S. should provide more details in technology sharing policies.

To implement a transparent and science-based regulatory system in a consistent manner; as well as consider simultaneous approval and registration

Both China and the U.S. should employ a transparent, consistent and science-based approach towards the regulation of agricultural imports. Currently,

33 "U.S. and China Conclude 23rd Session of the Joint Commission on Commerce and Trade", Office of the United States Trade Representative, 19 December 2012, <http://www.ustr.gov/about-us/press-office/press-releases/2012/december/us-china-conclude-23rd-JCCT>

34 "Economics of Tariff-Rate Quota Administration", David W. Skully, Technical Bulletin No. 1893, 2001, Market and Trade Economics Division, Economic Research Service, U.S. Department of Agriculture.

35 Ibid.

the two countries have different views and standards on agricultural product quality and safety, which often lead to misunderstandings and unnecessary disputes. In view of this, China and the U.S. should work together, through bilateral dialogues, workshops and in-depth scientific exchange, on the establishment of science-based inspection and regulatory systems for agricultural products. In particular, the two countries should strengthen cooperation in the standardization of agricultural product quality and food safety requirements. Meanwhile, the possibility of simultaneous approvals or registrations in both markets should also be explored.

Regarding the implementation of the regulations, both countries should endeavor to ensure the transparency and consistency of the regulatory decision-making process. The two sides should also collaborate on the development of public-private monitoring and reporting systems for contingencies such as animal and plant disease outbreaks and food contamination.

There have been concerns from the U.S. about the inconsistent manner in which the local China Inspection and Quarantine (CIQ) offices implement the standard procedures and regulations set by the General Administration of Quality Supervision, Inspection and Quarantine (AQSIQ). For instance, periodically some local CIQ offices will deviate from the standard procedures, only verbally communicating the new requirements with no forewarning to the importers. While most Chinese ports accept electronic signatures on phytosanitary certificates issued to indicate that the plants and plant products have met specialized import requirements, at certain ports manually signed certificates are sometimes demanded indiscriminately, causing massively increased costs. Sometimes requirements for what needs to be included in contracts or certificates are arbitrarily changed as well³⁶. It is strongly advisable that local CIQ offices in all ports

throughout China consistently follow the standardized AQSIQ regulations, in order to minimize the variations in their implementation. The improved efficiency will help reduce costs for U.S. exporters, and the savings will ultimately be passed on to the Chinese consumers.

To promote rural development

Rural development is a major policy priority for both the Chinese and U.S. governments. Rural America is home to one fifth of the nation's people. As such, it is the keeper of natural amenities and national treasures, and safeguard of a unique part of American culture, tradition and history. Today, jobs and incomes are decreasing in many areas that are dependent on natural resource-based industries such as agriculture, mining and forestry, while other places, often associated with rural amenities, are thriving. In China, rural population numbers as many as the urbanites. Their standards of living vary significantly, with an average income one-third of their urban counterparts. In southern and coastal China, rural areas have seen increased development and are catching up with urban economies. In northwest and western regions, rural societies remain under-developed and isolated from other parts of the country. In some of these areas, even basic needs such as clean water and accessible transportation are still very much a problem.

Although the U.S. and China have very different histories and are in different stages of development, they are both plagued by income polarization among its rural citizens. Hence there is a huge opportunity for cooperation in social services and investments, as declining areas must diversify and attract new businesses, and growth areas must develop strategies to sustain their success. Possible areas of cooperation include investment on affordable and timely medical care for the rural population, rural education and other social services especially for the elderly. Agritourism is another investment area full of potentials.

³⁶ "2012 State of American Business in China White Paper", AmCham China, April 2012.

Concluding Remarks

Agriculture has always been one of the most sensitive issues in U.S.-China relations. Nevertheless, given the synergies and huge opportunities that lie ahead, it is important for both sides to further strengthen agricultural trade ties and cooperation. By recognizing and respecting the differences in resource endowment and development stage, the complementarities, as well as the development needs and potentials of both sides, the two countries are set to explore and expand the depth and breadth of agriculture cooperation, and thereby generate tremendous benefits for both.

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