

China's agricultural challenges

Roads to be travelled

October 2015





Foreword

Since reforms began some four decades ago, the world's attention has been focussed on China's rapid economic growth.

However, an equally fascinating story has been unfolding that holds more profound significance for people both within and beyond China's borders.

Indeed, until recently, very little attention outside China has been devoted to understanding the agricultural industry that has effectively fuelled the workforce that has underpinned the country's economic miracle of recent decades. Still less has been devoted to the increasingly urgent question of how the country will meet its future nutritional needs.

This paper has been produced jointly by PwC UK's China Business Group and Agribusiness team. In recognition of the importance of this topic we have produced this paper to highlight the most significant of the challenges and opportunities presented by China's evolving agricultural and nutritional needs.

We hope it will stimulate discussion with regard to the economic, environmental and social ramifications of these issues and inspire action to address challenges and capitalise on opportunities. Furthermore, we would welcome the opportunity to discuss the issues raised in this paper with you and may be reached via the contact information provided below.

Yours sincerely

A handwritten signature in black ink, appearing to be the Chinese characters '姜隼隼'.

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Summary

Evidence of an economic slowdown in China is demonstrated clearly by the leading indicators of falling commodities prices. Soft commodities prices have paralleled the decline of copper, oil and gas in recent months. But there is a significant difference between them. China is likely to shift its economic emphasis from a high-investment, export-driven model towards one spurred by domestic consumption. In crude, almost simplistic, terms, manufacturing and infrastructure spending slows while a service-led economy emerges over time. Thus, while there might be some short-term adjustment, growing affluence should remain the norm. In short, the need to build bridges, highways and commercial property will become less prominent but diets will continue to change. This will place enormous burdens on an already challenged domestic food system and have significant ramifications on international trade in agriculture.

The average Chinese eats some 57kg of meat a year, an increase of 11kg from 2003 when some 46kg per person was consumed. If Chinese meat consumption mirrors other developed Chinese societies over time, we can assume Taiwan's current 74kg consumption is a realistic long-term extrapolation. To satisfy this increased consumption, China will require an additional 94mn tonnes of corn and soybeans for feedstock. In turn, this will require an additional 15mn hectares of agricultural land – an area the size of England and Wales – which China simply does not have.

Increasing meat consumption has manifested itself in China losing its near self-sufficiency in soybeans – a key feedstock. While it was barely self-sufficient in the 1970s and 1980s, from the late 1990s, Chinese imports of soybeans have steadily increased and now represent 87% of consumption. Corn – the other major feedstock – is at the beginning of a trajectory, which will likely prove similar to the experience of soybeans. China now imports a small quantity of corn compared to the past when it was self-sufficient. Simultaneously, wheat and rice – the main food crops for human consumption – are just self-sufficient.

These demand pressures have been augmented by supply-side constraints such as diminished farmland, polluted rivers, depleted aquifers, overuse of fertilisers, unclear ownership of farmland and an archaic legal code. Fixing these takes time, capital and effort, which is why the Chinese government is tackling these challenges with a broad range of measures. Recent policy schemes include the liberalisation of leasing activity, the promotion of large-scale mechanised farms, tackling land and water pollution and the restructuring of agricultural subsidies.

As agriculture modernises, companies, which through technology can transform yields, enhance output or allocate resources more efficiently, will make significant gains. So too will companies that can deliver secure, safe and sustainable sources of food. Global firms that can provide services such as digital mapping, soil analysis, precision farming, waste management, traceability and so on will find substantial opportunities.

Self-sufficiency is no longer a practical policy goal for China. The government appears to recognise with its priorities shifting towards high-value crops, such as fruits and vegetables, and a focus on quality and food safety. Simultaneously, China is venturing overseas to bolster its food security through investments in foreign farmland and the acquisition of companies across the broader food value chain. This is where the global impact of China's increasing food needs will be felt most acutely. Already, numerous countries have erected barriers to foreign ownership of farmland as a response to land purchase by countries such as China. In some cases this already extends to the acquisition of food companies. However, these acquisition trends, driven by domestic policy imperatives, are likely to continue.

China and agriculture: Roads to be travelled

China's size, scale and its consequent impact on any business sector globally have become almost a cliché to the many observers, analysts and watchers of the world's second largest economy. From the export of textiles, electronics and toys to the import of iron ore and copper, attention has switched in recent years towards other sectors – most notably agriculture. It has become increasingly apparent that a more affluent and more urbanised China is experiencing a dramatic increase in the consumption of food – specifically meat – and this too will have a global impact. How we came to this point is not a simple, straightforward story of growing affluence. To understand the nuance, we need to look in detail at how Chinese food consumption has changed over recent decades.

While most analysis approach this issue from a national level, a complete picture only emerges by considering three factors: – 1) the change in per capita calories consumed and its composition, 2) consumption patterns of specific commodity groups per capita, and 3) the overall demand and supply of commodities at national level. Taking all three together provides clear insights into Chinese food consumption patterns and offers indicators for the future.



Consumption

Consider the table below– it highlights daily calorie consumption per person across a range of countries over the past five decades. In 1971, the average Chinese consumed just about 60% of that of the average American or Briton. Chinese consumption levels were also lower than that of its neighbours Malaysia, Thailand and Vietnam. Part of the reason for this was that China had suffered greatly under the Great Leap Forward and the horrors of the Cultural Revolution had reached a peak. However, following the liberalisation process in 1978, China caught up rapidly with the rest of the world. By 2011, the average Chinese was consuming more calories per day than the average Malaysian, Thai, Indonesian, Filipino, Vietnamese and even Japanese. More importantly, calorie consumption was fast approaching the levels of South Korea, the UK and the US.

Consumption (kcal/capita/day)					
Total calories	1971	1981	1991	2001	2011
China	1,863	2,178	2,444	2,819	3,074
Indonesia	1,964	2,315	2,356	2,424	2,713
Malaysia	2,527	2,747	2,650	2,822	2,855
South Korea	2,899	2,970	2,950	3,080	3,329
Thailand	2,194	2,198	2,245	2,578	2,757
Philippines	1,837	2,221	2,214	2,374	2,608
Vietnam	1,957	2,004	1,856	2,298	2,703
UK	3,245	3,091	3,210	3,402	3,414
US	3,052	3,218	3,522	3,709	3,639
Japan	2,729	2,750	2,934	2,890	2,719

Source: FAO

At first glance, it appears obvious that growth in Chinese per capita consumption has slowed down. An easy conclusion, which could be drawn, is that since it is close to the levels of developed countries, future growth is likely to be muted. However, considering total calories consumed alone distorts the picture. Consider the tables below: daily per capita calories consumed from vegetal sources and animal sources separately. Vegetal products are chiefly cereals, starches, vegetables, oils and fruits, while animal products are chiefly meat, eggs, milk and fish.

This is where the previous conclusion becomes less obvious. In vegetal products, Chinese per capita calorie consumption has risen by about a third over the past five decades, while that from animal products has increased some four and a half times. This is in line with what is often referred to as Bennett's Law. Merrill K. Bennett noted in his 1941 publication '*Wheat in National Diets*', that calories derived from staple foods decrease as income increases and, as a consequence, calories from other foods such as meat increase.

Consumption (kcal/capita/day)					
Vegetal calories	1971	1981	1991	2001	2011
China	1,738	2,002	2,128	2,296	2,383
Indonesia	1,904	2,238	2,242	2,299	2,536
Malaysia	2,244	2,336	2,134	2,297	2,336
South Korea	1,944	2,061	2,136	1,953	1,974
Thailand	2,007	1,995	1,978	2,284	2,410
Philippines	1,581	1,980	1,925	2,020	2,218
Vietnam	1,829	1,880	1,690	2,004	2,129
UK	2,014	1,965	2,175	2,395	2,425
US	2,056	2,258	2,544	2,697	2,644
Japan	2,284	2,211	2,316	2,287	2,166

Source: FAO

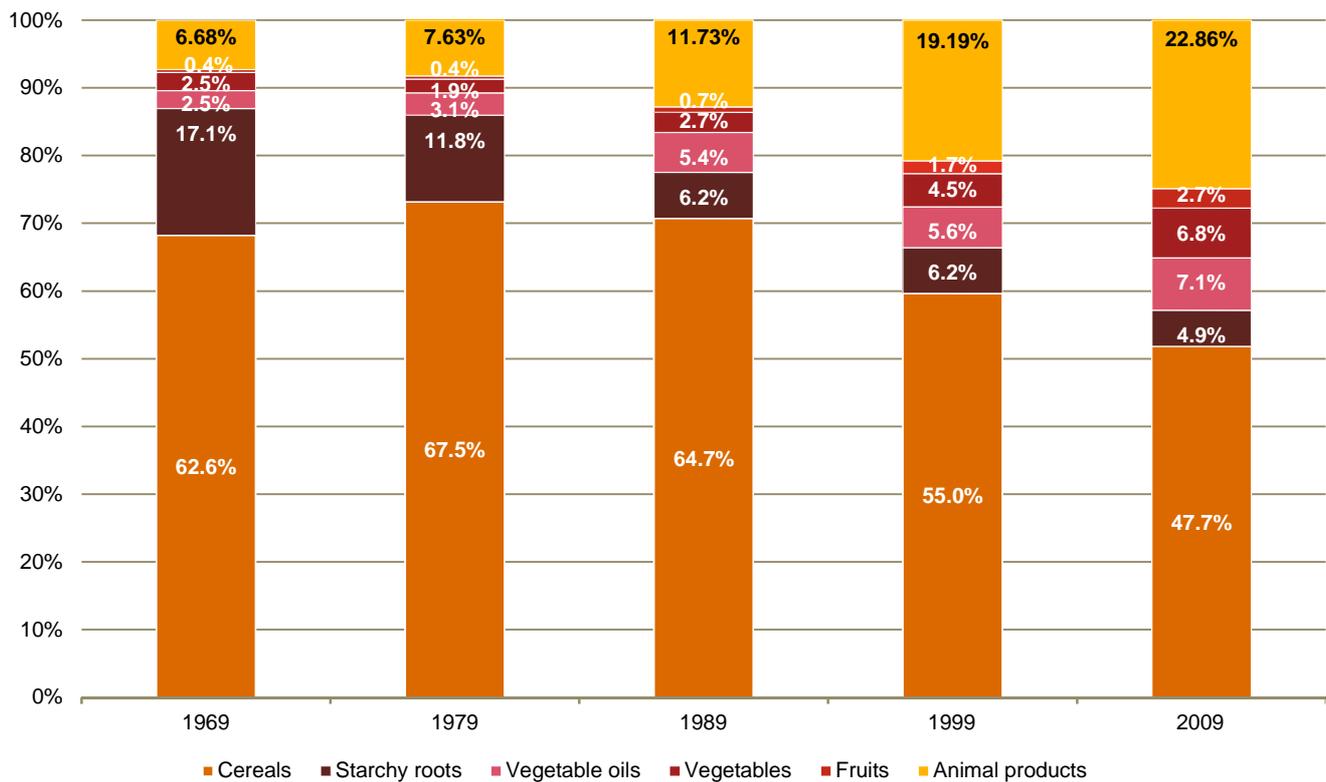
Consumption (kcal/capita/day)					
Animal calories	1971	1981	1991	2001	2011
China	125	177	317	523	691
Indonesia	60	77	115	126	177
Malaysia	284	411	516	525	519
South Korea	153	235	233	143	128
Thailand	188	203	267	294	347
Philippines	256	241	290	354	390
Vietnam	128	124	166	294	574
UK	1,231	1,126	1,035	1,007	989
US	996	961	978	1,012	995
Japan	445	539	618	603	553

Source: FAO

Compared to the US and the UK, Chinese vegetal-derived calories in 2011 are just marginally behind, while animal-derived calories are still 30% lower. This implies that in the future, growth in vegetal consumption is likely to be muted, but growth in animal protein will likely remain strong. In other words, the overall Chinese food consumption picture will remain a globally prominent theme in the years ahead – at least with respect to animal products.

Breaking down the consumption statistics further, the chart below shows the change in Chinese per capita calorie contribution from different commodities over the past five decades. The most obvious observations are the decline in calorie contribution from cereals – from approximately two-thirds in 1971 to less than half in 2011, and the increase in calorie contribution from animal products from 7% to 22% over the same period. Since consumption of animal products implies the indirect consumption of cereals, the net change in cereal demand is not clear from this.

China calorie consumption distribution



Source: FAO

To answer that question we need to look at consumption in kilograms. In 2003, the average Chinese consumed around 46kg of meat pa, of which about 71% was pork. By 2013, FAPRI estimated that this had increased to approximately 57kg, a 23% increase in a decade. At the same time, the average American's meat consumption was estimated to be almost double that of the Chinese. However, it could be justifiably argued that the American number reflects excessive levels of consumption and that China is unlikely to ever reach those peaks. A better benchmark for China would be a developed Chinese society such as Taiwan. Note that Singapore or Hong Kong would not be appropriate for this purpose since they have too many 'outliers' and render any meaningful comparisons redundant.

Meat consumption (kg/person/year)					
Country	2003	2013	2015	2020	2025
China	46	57	60	67	73
European Union	76	77	78	79	80
Hong Kong	104	145	147	151	156
Indonesia	8	9	9	10	11
Japan	43	47	48	49	51
Philippines	25	27	28	30	31
Russia	45	59	61	64	67
South Korea	51	63	65	70	76
Taiwan	74	74	76	82	87
Thailand	25	27	28	30	32
US	115	107	106	107	109
Vietnam	20	29	29	31	32

Source: FAPRI

Note: China includes the mainland only

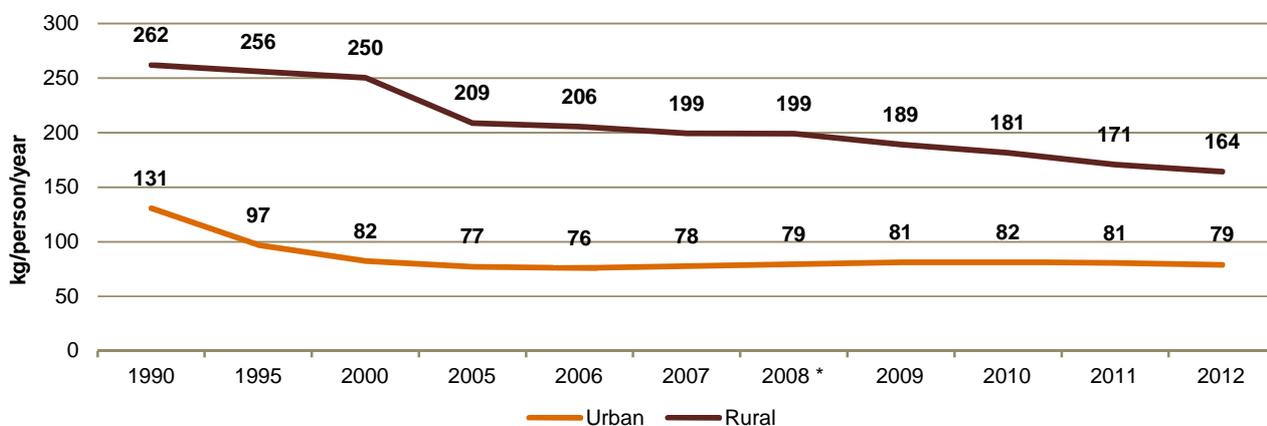
The average Taiwanese consumed an estimated 74kg of meat in 2013 – 30% more than the average Chinese. If China's per capita meat consumption equalled Taiwanese levels immediately, China would require an additional 94mnt of grains – almost the entire expected corn output of Brazil and Argentina in 2014. This shows the impact that meat demand has on cereals indirectly. Fortunately, perhaps, FAPRI expects China and Taiwan to equalise only after 2025.

urban consumers. Given the different socio-economic profiles of the two, their consumption patterns are vastly different. Furthermore, given China's increasing levels of urbanisation, the average citizen is becoming more urbanised. Thus to establish the outlook for the country as a whole, we need to examine both urban and rural consumption separately and combine that while taking into account increasing urbanisation rates.

The above analysis is at the individual level. To get a national view, we simply have to aggregate the numbers across the population. However, to determine future trends, we need to take into account another variable – namely, the split between rural and

The following charts highlight per capita consumption of grains and meat for rural and urban dwellers. The premise that grain consumption has declined while meat consumption has risen is true for both urban and rural residents.

China per capita grain consumption

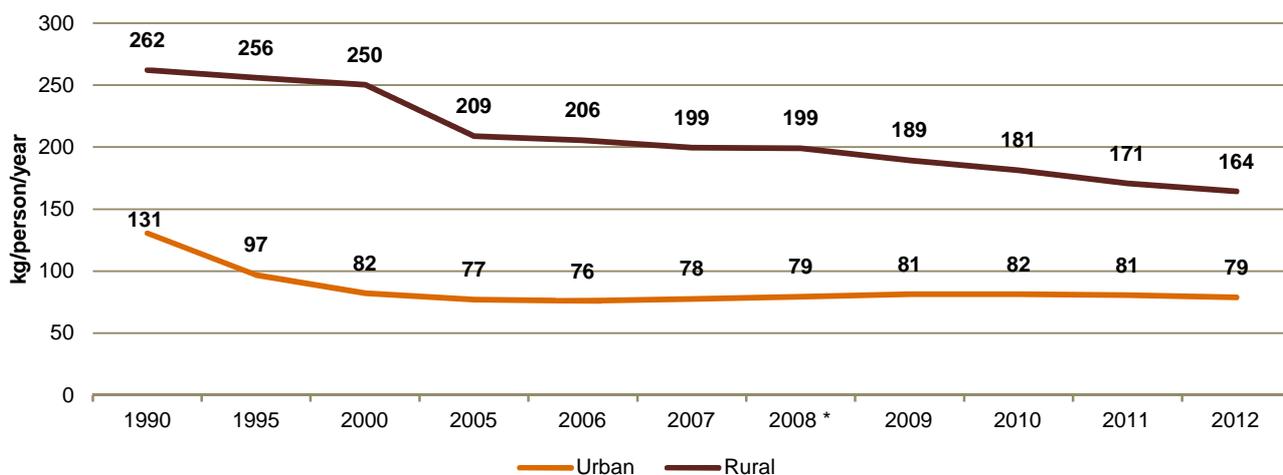


Source: National Bureau of Statistics of China (NBSC)

Note: The x-axis is not to scale

Note: 2008 data is not available; for charting purposes, we have used an average of 2007 and 2009

China per capita meat consumption



Source: NBSC

Note: The x-axis is not to scale

Given that meat ultimately requires grains in the form of feed, this means that direct grain consumption has declined much more dramatically. However, in the future, the balance of increasing meat consumption and decreasing direct grain consumptions could be positive or negative.

Before we try to estimate that, a caveat is in order. The statistics noted above are sourced from National Bureau of Statistics of China (NBSC) and the per capita meat consumption numbers are lower compared to those from FAPRI or FAO. This discrepancy is usually attributed to two factors – these are estimates from household surveys, which do not effectively measure consumption that occurs outside homes, which is especially relevant for urban residents; and, consumption by migrant workers is not accounted for accurately.

It takes approximately 7kg of feed grain to produce 1kg of beef, 4kg for 1kg of pork and 2kg of grains for 1kg of poultry. We use these conversion factors to estimate total grain consumption. As the below table demonstrates, for both urban and rural dwellers, the per capita increase in indirect grain consumption through meat was less than that of the per capita decrease in direct grain consumption over 1990-2012.

Changing consumption patterns in China (kg/pa)					
	1990	2012	Net change	Grain to meat conversion ratio	Net increase in grain use
Urban per capita consumption of					
Grain	130.7	78.8	(52.0)		(52.0)
Pork	18.5	21.2	2.8	4.0	11.1
Beef and mutton	3.3	3.7	0.5	7.0	3.2
Poultry	3.4	10.8	7.3	2.0	14.7
Net change in urban per capita demand for grain					(23.1)
Rural per capita consumption of					
Grain	262.1	164.3	(97.8)		(97.8)
Pork	10.5	14.4	3.9	4.0	15.4
Beef and mutton	0.8	2.0	1.2	7.0	8.1
Poultry	1.3	4.5	3.2	2.0	6.5
Net change in rural per capita demand for grain					(67.8)

Source: NBSC, PwC

While on a per capita level there is a decline in total grain consumption, on an aggregate level, Chinese grain consumption (rice, wheat, corn and soybeans) has increased – from about 316mnt in 1990 to 545mnt in 2012. This is mainly attributable to an increasing population and urbanisation. We would expect total grain consumption in China to continue increasing for four reasons.

- First, China's population growth may be slowing, but it is still growing.
- Second, the decline in urban per capita direct grain consumption is showing signs of levelling off. It declined to a low of 75.9kg in 2006, and then rose in later years to reach 81.5kg in 2010. It again declined over the following two years to 78.8kg in 2012. Combined with a likely increase in indirect urban grain consumption, this means that total per capita urban grain consumption will most likely rise. While rural per capita grain consumption is likely to continue decreasing, its effect in the aggregate would be muted as more people migrate to the cities.
- Third, as China's meat production industrialises, feed grain demand will increase – the average pig raised in a Chinese factory farm consumes 350kg to reach slaughter weight, while that raised on a family farm consumes only 150kg (i.e., the rest comes from household waste and so on).
- Finally, we have restricted our analysis to the use of grains for food. In other words, we have omitted the impact of industrial uses of grain such as ethanol or biodiesel production, which may possibly increase in the future



Supply

Self-sufficiency in grains has long been a hallmark of Chinese government policy. Since 1996, the explicit aim was to produce 95% of its grains domestically. Or, as Chinese officials put it somewhat less prosaically, the Chinese must '*hold the rice bowl firmly in our hands*'. However, its meaning has evolved over the years. While it was initially understood to include rice, wheat and corn, policy makers now seemingly count only rice and wheat, that is, the two grains used directly for human consumption. And soon, it could end up as an '*empty bowl*' – as self-sufficiency becomes an increasingly unrealistic ideal.

The recent demand-supply history of soybeans, a key oilseed, should be seen as a leading indicator. Soybean meal is used as the chief protein source in industrial feed for poultry and pork. As the Chinese consume more meat, and as the meat producers industrialise, demand for soybeans has increased

dramatically. China has barely been self-sufficient in soybeans since the liberalisation process began in 1978. Domestic output peaked in 2004/05 at 17.4mnt but has declined erratically in the subsequent decade. In 2014/15 domestic production is expected to reach a new low of under 12mnt. Yields held up but at the expense of the harvested area, which declined as farmers switched to corn. Meanwhile, annual consumption has more than doubled from approximately 40mnt to almost 85mnt over the past decade. Consequently, imports have tripled from almost 26mnt to an estimated 74mnt over the same period. If China replaced this amount of imports with domestic production, the country would require another 42mn ha of land – nearly six times the current soybeans area of 6.7mn ha. That alone explains the exclusion of soybeans from the government's self-sufficiency calculations

Soybean statistics

Soybean	2004/ 05	2005/ 06	2006/ 07	2007/ 08	2008/ 09	2009/ 10	2010/ 11	2011/ 12	2012/ 13	2013/ 14	2014/ 15
Area harvested (mn ha)	9.6	9.6	9.3	8.8	9.1	9.2	8.5	7.9	7.2	6.9	6.7
Yield (tonnes/ha)	1.8	1.7	1.6	1.5	1.7	1.6	1.8	1.8	1.8	1.8	1.8
Production (mnt)	17.4	16.4	15.1	12.7	15.5	15.0	15.1	14.5	13.1	12.2	11.8
Imports (mnt)	25.8	28.3	28.7	37.8	41.1	50.3	52.3	59.2	59.9	69.0	74.0
Exports (mnt)	0.4	0.4	0.4	0.5	0.4	0.2	0.2	0.3	0.3	0.2	0.3
Domestic consumption (mnt)	40.2	44.4	46.1	49.4	51.3	59.4	65.9	72.1	76.2	80.1	84.9
Ending stocks (mnt)	4.7	4.6	1.8	2.5	7.5	13.2	14.5	15.9	12.4	13.2	13.8

Source: USDA

Corn appears to be following a similar trajectory. In 2012, China's Minister of Agriculture Han Changfu stated that the country must prevent corn from becoming the 'second soybean'. This moniker alone indicates the strength of desire for food security in China. However, increasingly the country appears to be fighting a losing battle as demonstrated by the table below.

Corn statistics											
Corn	2004/ 05	2005/ 06	2006/ 07	2007/ 08	2008/ 09	2009/ 10	2010/ 11	2011/ 12	2012/ 13	2013/ 14	2014/ 15
Area harvested (mn ha)	25.4	26.4	28.5	29.5	29.9	31.2	32.5	33.5	35.0	36.3	36.8
Yield (tonnes/ha)	5.1	5.3	5.3	5.2	5.6	5.3	5.5	5.7	5.9	6.0	5.9
Production (mnt)	130.3	139.4	151.6	152.3	165.9	164.0	177.2	192.8	205.6	218.5	217.0
Imports (mnt)	0.0	0.1	0.0	0.0	0.0	1.3	1.0	5.2	2.7	3.4	3.0
Exports (mnt)	7.6	3.7	5.3	0.5	0.2	0.2	0.1	0.1	0.1	0.0	0.1
Domestic consumption (mnt)	131.0	137.0	145.0	150.0	153.0	165.0	180.0	188.0	200.0	212.0	220.0
Ending Stocks (mnt)	36.6	35.3	36.6	38.4	51.2	51.3	49.4	59.3	67.6	77.4	77.3

Source: USDA

Unlike the soybean sector, corn output has kept pace with consumption. The harvested area has increased some 45% while yields have increased some 15% over the last decade. However, as is the case with soybeans, demand growth is likely to remain strong for many years to come. And the spectacular increases in planted area and yields seen in the past decade are highly unlikely to be repeated in the medium term. From a position of self-sufficiency in recent years imports are likely to reach 3mnt in 2014/15. Compare this to a net export position of almost 8mnt in 2004/05, and it appears that corn is well on its way to becoming the 'second soybean'. One moderating factor is that, in recent years, some feed demand has shifted to wheat – as we discuss below. However, this simply means that China will import wheat instead of corn.

Consider wheat, which along with rice, is used primarily for human consumption –and therefore has a strategic position, which is not shared by corn or soybeans. Until 2010, consumption increased only marginally and China managed to fulfil additional demand through a gradual increase in planted area and yields. However, in 2011/12 demand jumped about 11% and has remained at these levels. At the same time, production has increased at a much slower pace while imports have plugged the shortfall. Over the last five years, the planted area has remained constant while yields have increased marginally. This suggests that future increases, if any, are likely to be minimal.

Wheat statistics											
Wheat	2004/ 05	2005/ 06	2006/ 07	2007/ 08	2008/ 09	2009/ 10	2010/ 11	2011/ 12	2012/ 13	2013/ 14	2014/ 15
Area harvested (mn ha)	21.6	22.8	23.6	23.7	23.6	24.3	24.3	24.3	24.3	24.1	24.1
Yield (tonnes/ha)	4.3	4.3	4.6	4.6	4.8	4.7	4.7	4.8	5.0	5.1	5.2
Production (mnt)	92.0	97.4	108.5	109.3	112.5	115.1	115.2	117.4	121.0	121.9	126.0
Imports (mnt)	6.7	1.1	0.4	0.0	0.5	1.4	0.9	2.9	3.0	6.8	2.0
Exports (mnt)	1.2	1.4	2.8	2.8	0.7	0.9	0.9	1.0	1.0	0.9	1.0
Domestic consumption (mnt)	102.0	101.5	102.0	106.0	105.5	107.0	110.5	122.5	125.0	121.5	124.0
Ending Stocks (mnt)	38.8	34.5	38.6	39.1	45.8	54.4	59.1	55.9	54.0	60.3	63.3

Source: USDA

A key feature highlighted the table above is the sudden jump in demand for wheat in recent years. The reason for this rise is the growing use of wheat as feed. Total demand is split into food, seed, and industrial demand (FSI) and feed demand. FSI demand has barely moved in recent years and only rose marginally over the last three years. However, feed demand has risen steadily. In 2011/2012, it nearly doubled and has stayed at that level since. While corn remains the main carbohydrate component of industrial feed other cereals such as wheat are also used depending on relative prices.

Wheat consumption split											
Wheat	2004/ 05	2005/ 06	2006/ 07	2007/ 08	2008/ 09	2009/ 10	2010/ 11	2011/ 12	2012/ 13	2013/ 14	2014/ 15
Feed consumption (mnt)	4.0	3.5	4.0	8.0	8.0	10.0	13.0	24.0	25.0	21.0	23.0
Food, seed and industrial consumption (mnt)	98.0	98.0	98.0	98.0	97.5	97.0	97.5	98.5	100.0	100.5	101.0
Total (mnt)	102.0	101.5	102.0	106.0	105.5	107.0	110.5	122.5	125.0	121.5	124.0

Source: USDA

While we can safely predict a rise in feed use, the split between corn and wheat is difficult to estimate. However, regardless of the split, it is reasonably certain that the bulk of this excess consumption will be satisfied by imports. The reason for our pessimistic view on Chinese production is explained later in this report when we look at supply constraints.

Finally, the table below highlights rice statistics for the last decade. Production rose gradually as consumption declined initially. However, it is now increasing. For the most part, China has managed to avoid imports. However, in the last three years, harvested area and yields have stagnated while consumption has maintained a steady rate of growth. This has led to a rise in imports although it remains a fraction of total consumption. Growth in rice consumption is likely to remain muted as slowing population growth and urbanisation keep a lid on growth. That said, since production is also unlikely to increase significantly in the years ahead, some imports may continue.

Rice statistics											
Rice	2004/ 05	2005/ 06	2006/ 07	2007/ 08	2008/ 09	2009/ 10	2010/ 11	2011/ 12	2012/ 13	2013/ 14	2014/ 15
Area harvested (mn ha)	28.4	28.8	28.9	28.9	29.2	29.6	29.9	30.1	30.1	30.3	30.6
Paddy yield (tonnes/ha)	6.3	6.3	6.3	6.4	6.6	6.6	6.6	6.7	6.8	6.7	6.7
Production (mnt)	125.4	126.4	127.2	130.2	134.3	136.6	137.0	140.7	143.0	142.5	144.0
Imports (mnt)	0.6	0.7	0.5	0.4	0.2	0.4	0.5	1.8	3.1	3.9	3.7
Exports (mnt)	0.7	1.2	1.3	1.4	0.7	0.7	0.5	0.4	0.3	0.3	0.4
Domestic consumption (mnt)	130.3	128.0	127.2	127.5	133.0	134.3	135.0	139.6	144.0	146.3	148.0
Ending Stocks (mnt)	38.9	36.8	35.9	37.8	38.5	40.5	42.6	45.0	46.8	46.7	46.0

Source: USDA

Early in 2014, the State Council called for grain production to stabilise at 550mnt, lower than the 602mnt produced in 2013, signalling a shift from self-sufficiency. It seeks to set a priority on labour-intensive and high-value crops such as fruits and vegetables at the expense of land-intensive, low-value grains. Furthermore, the guidelines demonstrate an increasing emphasis on for quality and food safety. Some of this newfound stress on quality and safety stems from the many negative cases reported in recent years in China. These range from cadmium contamination of rice, adulterated fox meat sold as mutton and dead pigs floating down the Huangpu River through Shanghai.

Part of the reason for this strategic shift, in our view, is merely the government facing up to reality. To meet rapidly rising demand, supply can increase primarily through an increase in planted area and enhanced yields. In China's case, while yields can increase – an area we discuss later – an increase in planted area is highly unlikely. In short, China has been struggling to maintain its 'red line' of 120mn ha of farmland due to land degradation, water scarcity and pollution.

Thus, the only option is to set priorities. That is, accept that self-sufficiency is not possible for all the major grains and oilseeds, which is what the country appears to be doing in practice. Initially, the government encouraged corn planting over soybeans over the last decade. Now, rice and wheat remain high priority grains given that they are used for human consumption, while corn and soybeans are considered lower priority.

Even with meat, there are two options available: import meat directly or import feed grains and produce meat domestically. The implications of these alternatives are quite different. If China imports corn and soybeans from the US or Brazil for its livestock, it will have to address the livestock-related negative effects on the environment and health. On the plus side, it will have an industry that provides high levels of employment. If China were to import meat from the US or Brazil, it would transfer environmental and health problems to the US or Brazil but would be susceptible to supply and price volatility. The other major benefit of this approach would be to allow scarce land and water resources to be shifted from animal husbandry to priority crops such as rice and wheat.

Evidence suggests that China is doing a bit of both. As we saw earlier, in the past decade, corn imports have gone from being non-existent to about 3mnt and soybean imports have tripled to 74mnt. Simultaneously, meat imports have grown five-fold to 1.5mnt. This trend is likely to continue with both feed grains and meat imports growing. The purchase of the USA's largest pork producer Smithfield, by the Chinese company Shuanghui International (now called the WH Group), is a demonstration of how Chinese meat imports are likely to rise.



Supply constraints

China feeds 20% of the world's population with just 8% of the earth's arable land, which works out at about 0.09ha per person. The 'red line' of 120mn ha of farmland as a Chinese policy goal is an acknowledgement of this pressure. The first policy document of 2014, referred to as 'No.1 Document', emphasised that the 'red line' should be strictly protected.

The reason for this obsession is simple: China has lost farmland consistently over the years due to urbanisation, construction, land degradation and so on. According to China's first national land survey in 1996, arable land amounted to 130mn ha. This was estimated to have fallen to about 121mn ha by 2008. However, after a second national land survey which concluded in 2009, but whose result were only published last year, arable land was now estimated at about 135mn ha. However, after deducting land set aside for restoration or polluted, available arable area was estimated to be just above 120mn ha.

The 'No.1 Document' also recognises the importance of developing sustainable agriculture and the need to restore polluted and degraded land. Land is degraded usually due to over-cultivation, over-grazing and deforestation. In 2008, a three-year study conducted jointly by the Ministry of Water Resources, the Chinese Academy of Sciences and the Chinese Academy of Engineering, found that over 350mn ha of land was affected by erosion, of which 160mn ha was due to water and 200mn ha was due to wind. Combined, about 4.5bn tonnes of soil were eroded each year, at a cost of RMB200bn since 2000.

Land can also be degraded by pollution and this has become a major concern in recent years. Earlier this year, China's vice-minister of land and resources, Wang Shiyuan, noted that a soil survey had identified some 3.33mn ha of contaminated land. Not that these are new problems. In 2006, Zhou Shengxian, the director of the State Environmental Protection Administration (SEPA) said that China faced 'serious' soil pollution that would affect both people's health and the environment. He further noted that approximately 12mnt of grain are polluted each year by heavy metals from the soil, with economic losses of over US\$2.5bn.

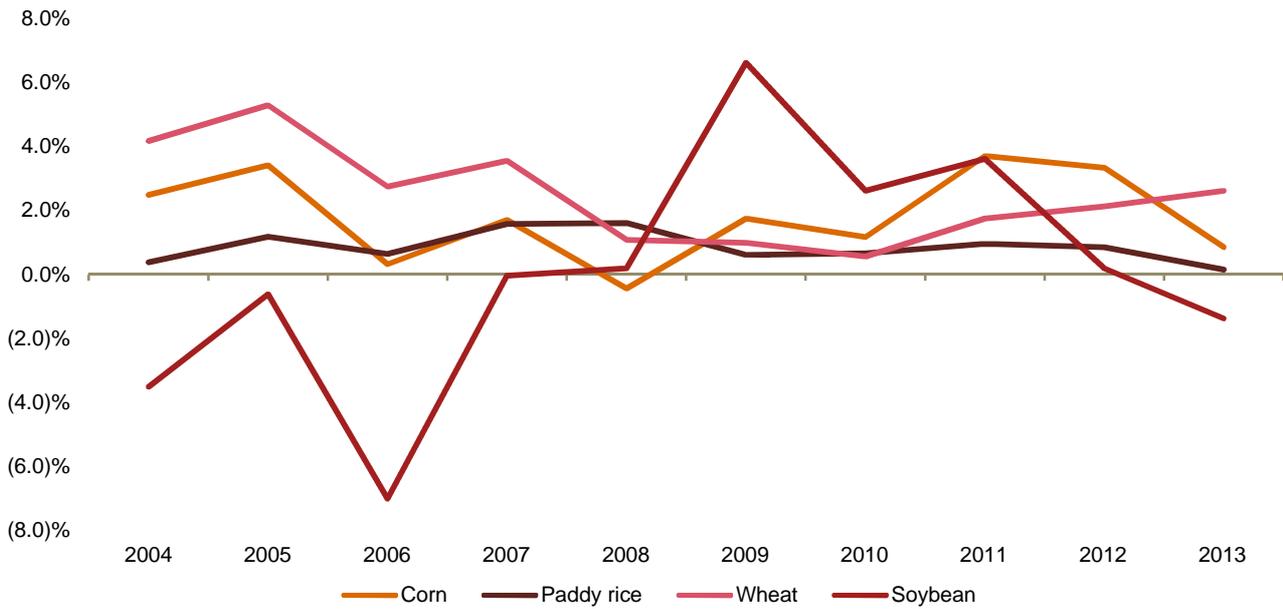
To tackle this issue, SEPA along with the Ministry of Land and Resources jointly launched a soil pollution survey with a budget of US\$125m, with the aim of assessing land pollution due to heavy metals, pesticides, and organic pollutants, and use the results to rehabilitate affected land. While this soil survey was completed in 2010, its results were never announced. The Environment Ministry rejected requests for the survey data to be published saying that they were a 'state secret'. Fears that the survey results might prove disquieting may be well founded. According to Bai Chengshou, Deputy Head of the Nature and Ecology Conservation Department at the Ministry of Environmental Protection, the results of the survey would be published after further sampling to improve accuracy. He also said that the government was in the process of coming up with an action plan to control soil pollution.

Recently, the government released statistics from a soil survey – it is not clear if it is the one previously noted – which indicate that nearly a fifth of China's farmland is polluted mostly by human, industrial and agricultural activities. Again, there were assurances of the government taking action to stop and reverse this pollution.

The key point here is that the Chinese government is struggling to maintain its existing cultivated land bank. Under these circumstances, increasing the supply of available land is highly unlikely. So, any increase in output will have to come via enhanced yields.

As we pointed out in the previous section, yields of major commodities have stagnated or grown slowly in recent years. The chart below shows the yield growth over the past decade for rice, wheat, corn and soybeans. The yield growth for both wheat and corn are showing a declining trend, while that for rice is moribund and just barely positive. Soybean yield growth has been erratic in recent years and on a net basis has been effectively stagnant over the past decade.

Chinese annual yield growth

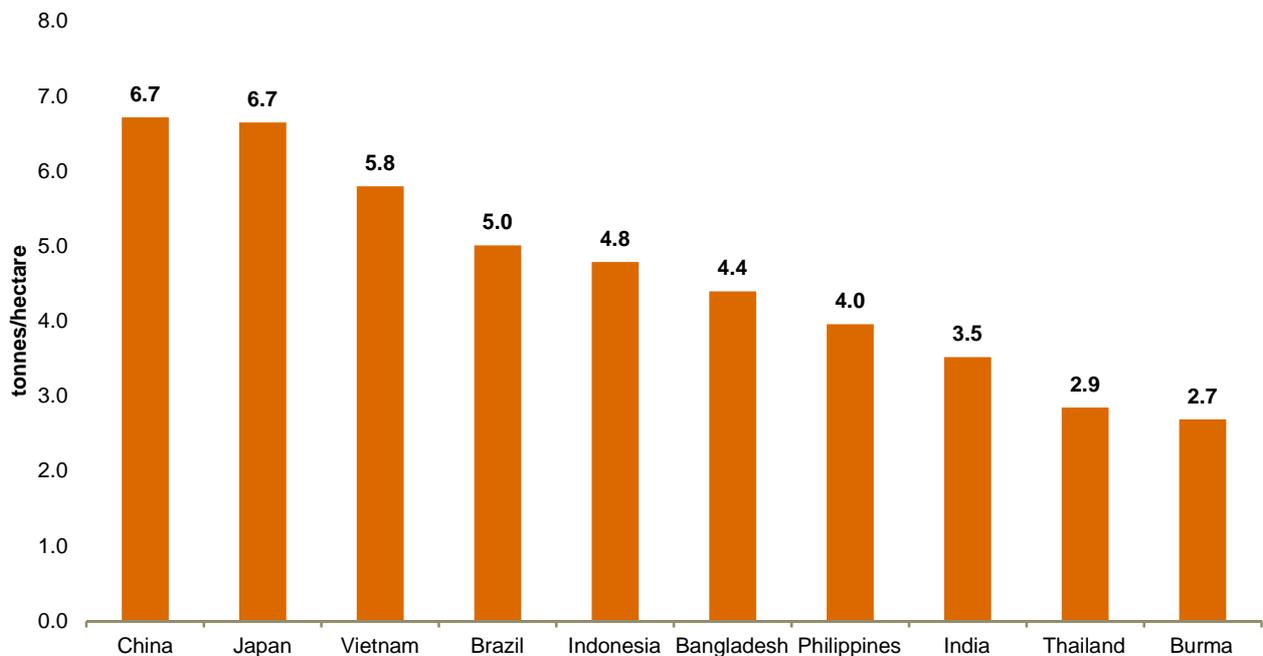


Source: USDA

Note: Yields are calculated on a 3-year moving average basis

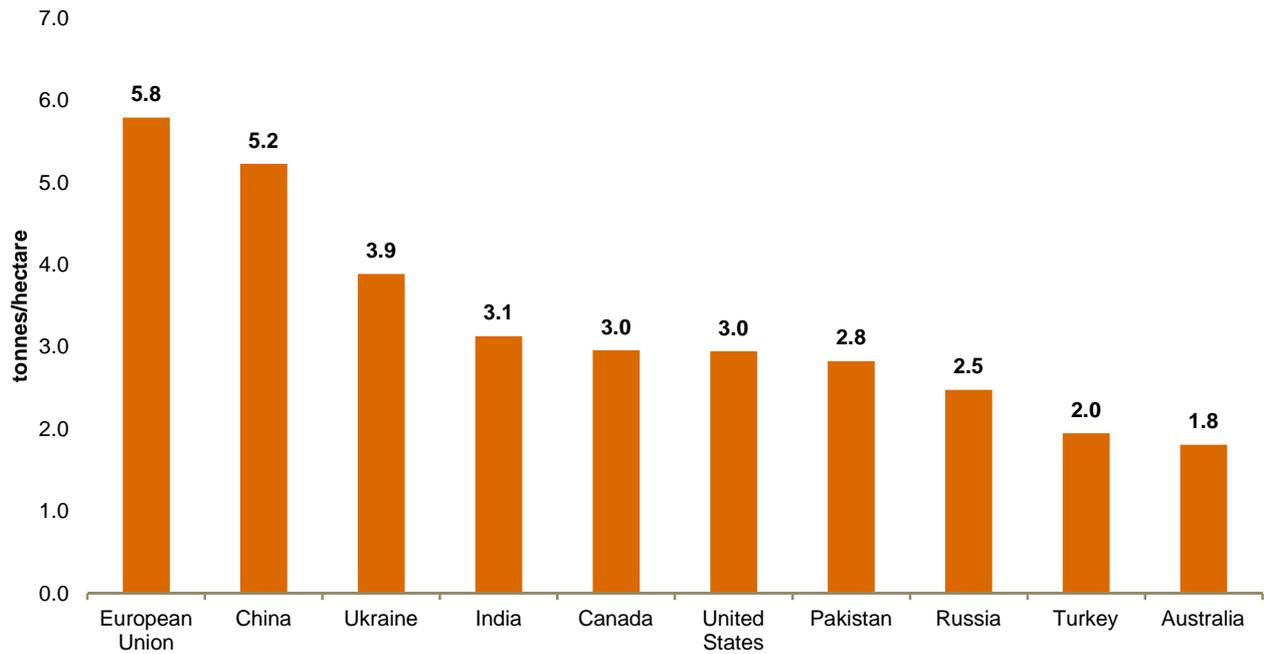
The most likely conclusion based on the above historical performance is that future yield gains will be difficult to achieve. However, before we draw our final conclusion there is another way to consider long-term yield potential; look at how Chinese yields compare with those of other major producers to see the potential upside. The charts below show the 2014/15 yields for the top-10 producers of each commodity.

Paddy rice yields for major producers (2014/15)



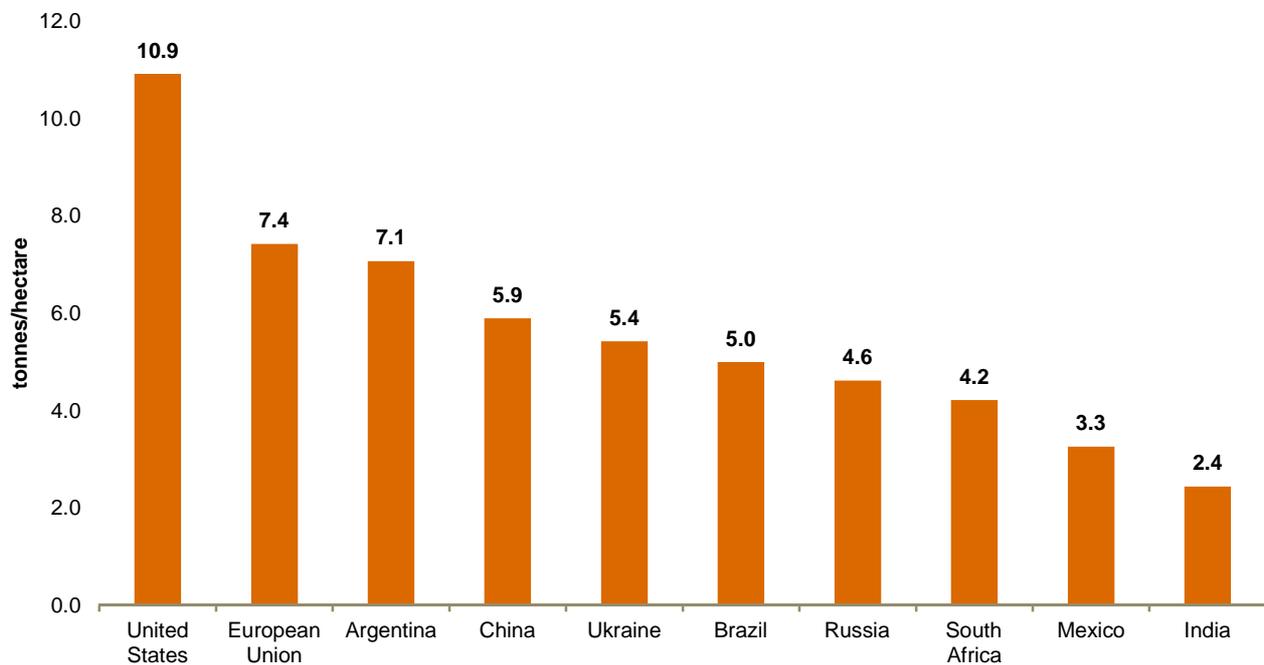
Source: USDA

Wheat yields for major producers (2014/15)



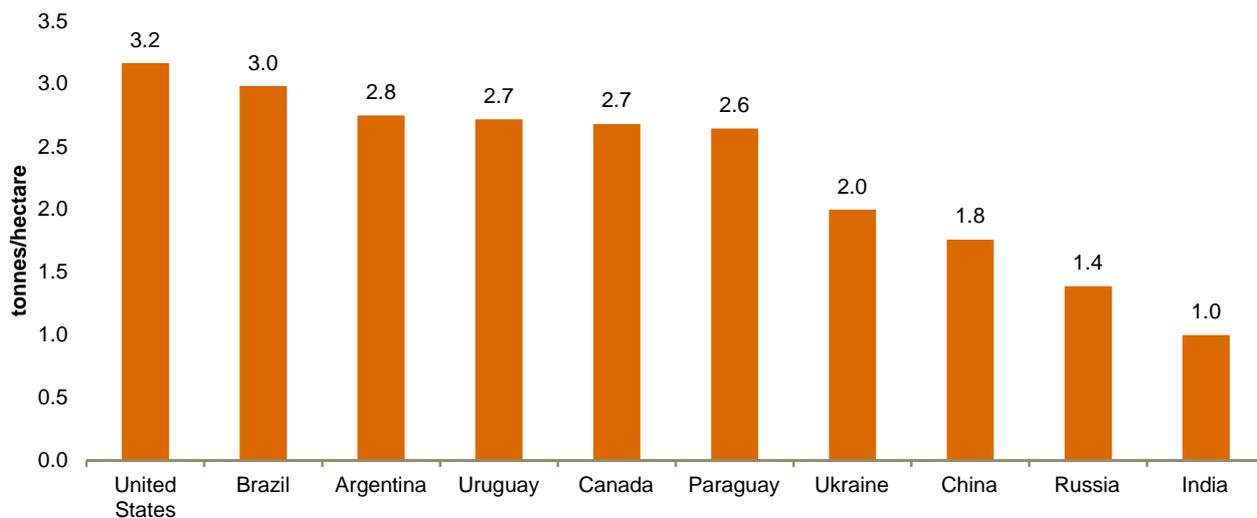
Source: USDA

Corn yields for major producers (2014/15)



Source: USDA

Soybean yields for major producers (2014/15)

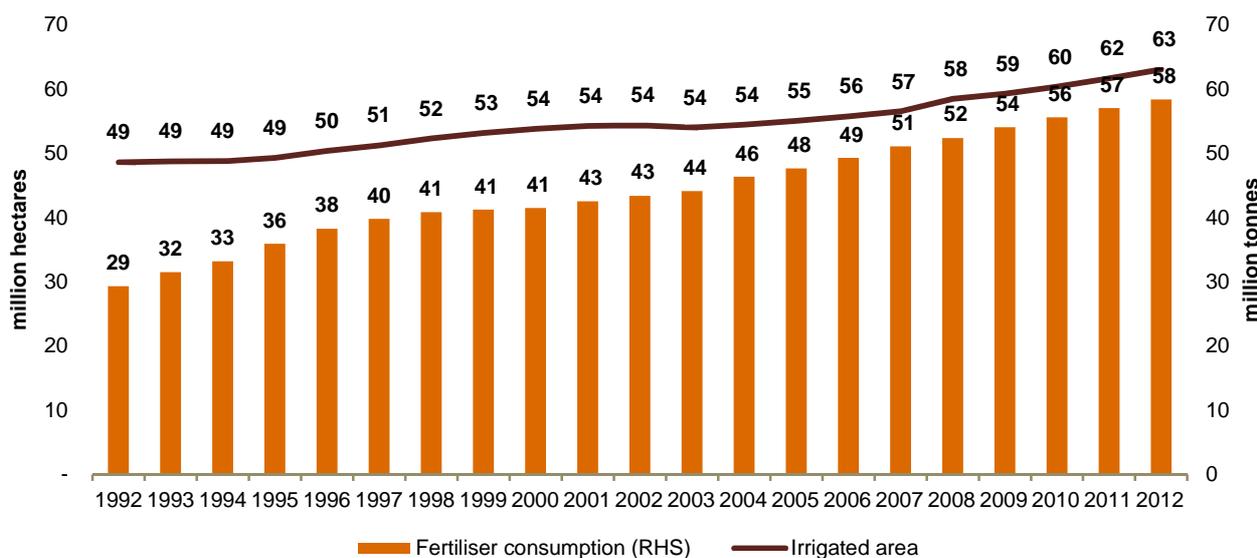


Source: USDA

In rice, China already has the highest yield along with Japan. In wheat, it is only behind the EU. In corn, it is considerably behind the US and the EU, but is still in fourth place ahead of Brazil. In soybeans, it is near the bottom of the pack. However, it is worth emphasising that China is a relatively minor player in soybean production. What it does demonstrate is that, when it comes to the three main grains, China does not lag significantly behind the other major producers. More importantly, where Chinese yields lag, it cannot be assumed that the entire gap can be bridged. Part of the gap could be attributable to differences in agro-ecological environments e.g. natural factors such as soil or climate, which cannot be overcome. The rest could be due to fertilisers, irrigation, crop management farming practices and so on – which could be bridged, at least in theory. However, in practice, the narrowing of this gap will be limited by the extent to which it is economically feasible.

Over the past two decades, China has made strenuous efforts to increase yields. Specifically it has doubled the use of fertilisers and increased irrigated areas by approximately one-third.

China irrigated area and fertiliser consumption



Source: NBSC

While the rate of growth in fertilisers has slowed in the past decade, irrigation has increased. However, the growth in yields that China can expect from these two measures in the future is limited for reasons we outline below.

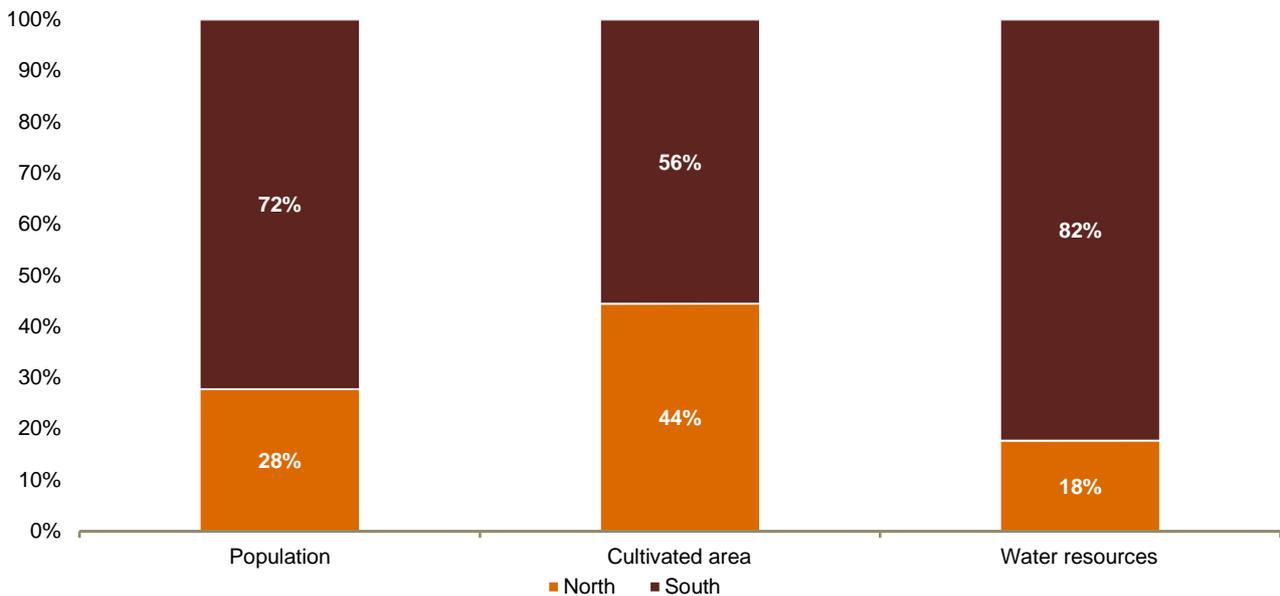
While the use of fertilisers has increased yields, it has also contributed to land, water and air pollution. Most of China's chemical inputs are applied inefficiently. The World Bank estimated that, in 2012, China applied some 650kg of fertiliser per hectare of arable land – the highest by far among major agricultural nations, even developed ones. For comparison, the corresponding numbers were 163kg for India, 156kg for the EU, 181kg for Brazil, 131kg for the US, 75kg for Canada, 45kg for Australia and 39kg for Argentina. So, even greater use of fertiliser is likely to have a lesser effect on yields, and might even have a negative indirect effect due to land and water pollution.

Zhuang Guotai, the Ministry of Environmental Protection's Director of Nature and Ecology Conservation, stated in a press conference in April 2013, that only about 35% of fertiliser used in a

typical Chinese farm contributed to crop growth. The rest evaporates, washes off into streams, or is consumed by people or animals. So, it not only contains an economic cost but an environmental one too. The Chinese Academy of Agricultural Sciences (CAAS) predicted last year that all central and South Eastern provinces bar Jiangxi and Shanxi were at high risk of suffering groundwater nitrate pollution by 2015.

While irrigation can lead to higher yields, there is a different constraint there – water; China does not have enough of it and what it has is increasingly polluted and not where it is required the most. Similar to the case with land, China supports 20% of the world's population with just over 8% of the world's renewable water resources. On a per capita basis this is over 2,000 cubic metres of renewable water pa, while the global average is over three times that number. However, even this hides a stark regional disparity – the Northern regions account for only about 18% of the total water resources. At the same time, they account for 28% of the population and about 44% of the cultivated land.

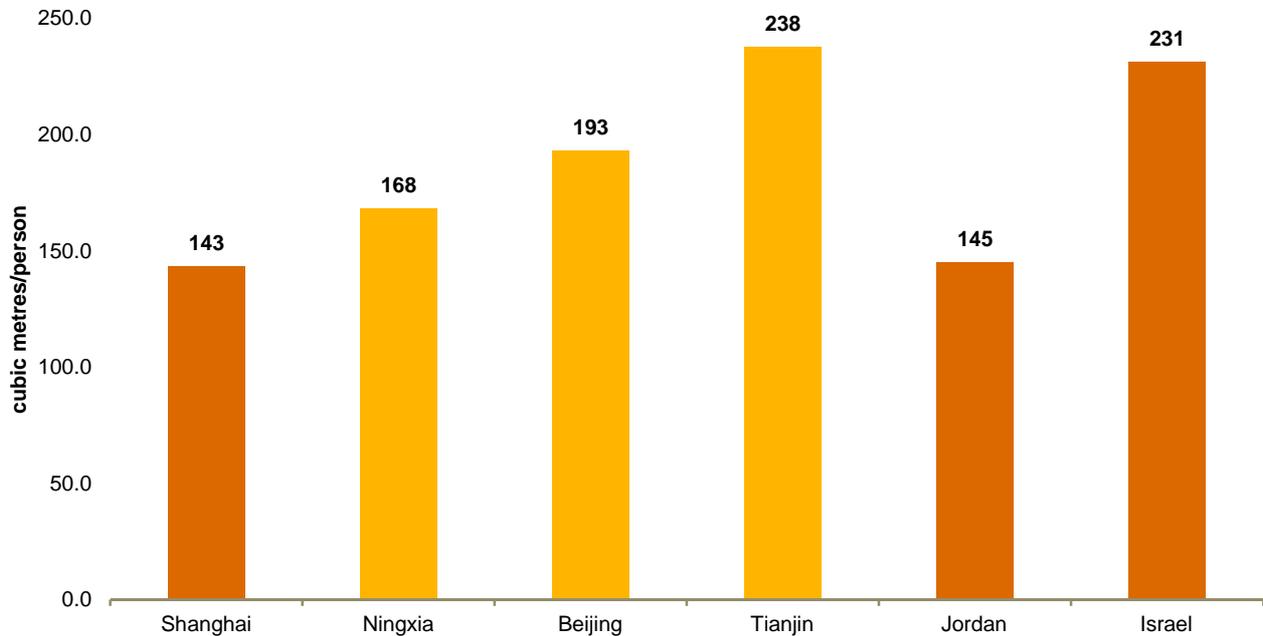
China northern and southern regions disparity



Source: NBSC

The chart below shows the renewable water resources available per person across provinces. The range extends from 143 cubic metres in Shanghai to 137,378 cubic metres in Tibet. Tibet is obviously an outlier, since it is the source of many large rivers and has a low population. However, Shanghai is not. The chart below shows the provinces with the lowest water resources, most of which are in the North. To put this into perspective, the global comparables for similar renewable water resource levels are Jordan and Israel.

Renewable water resources

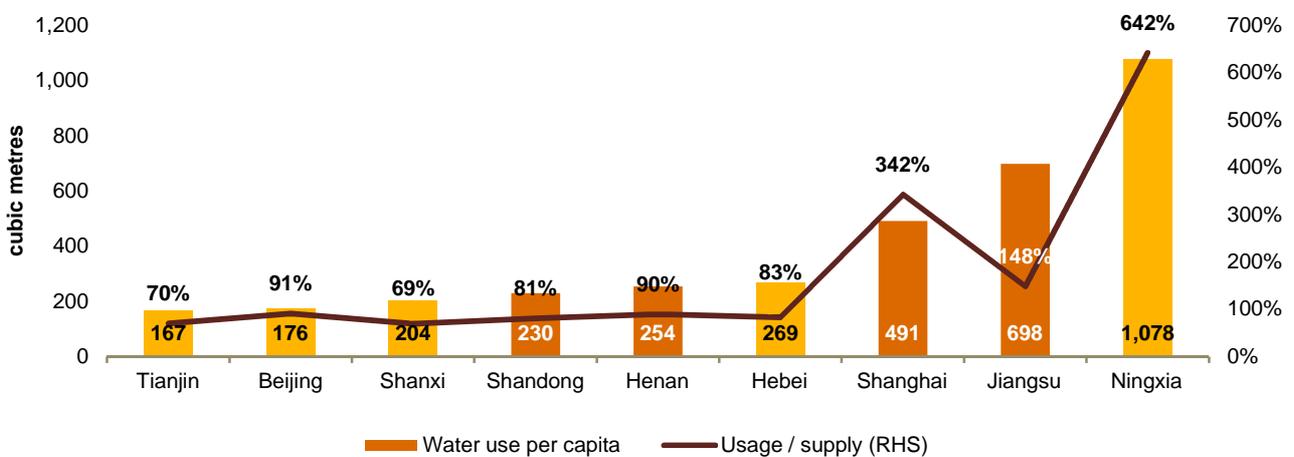


Source: NBSC

Note: Northern regions are in yellow

The previous discussion focused on the supply of water while the following focuses on water usage. The key metric here is the percentage of supply that is used annually. Consider Beijing: the average inhabitant used about 176 cubic metres in 2012, about 91% of the supply. The table below highlights usage per capita and usage as a percentage of supply for those few selected provinces where usage already exceeds availability or close to it.

Water usage in selected provinces

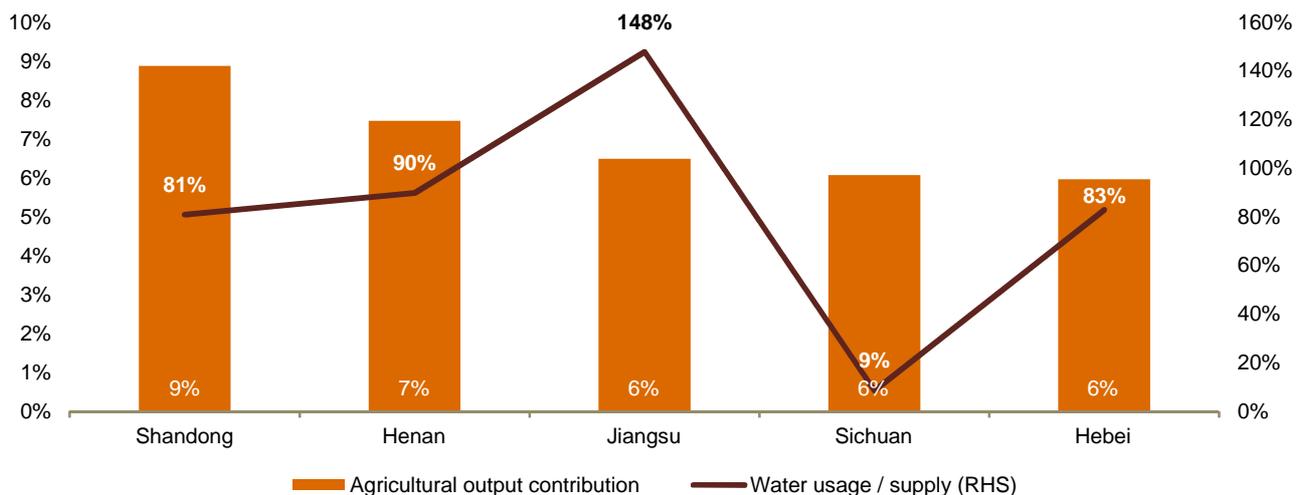


Source: NBSC

Note: Northern regions are in yellow

While water availability affects nearly every aspect of the economy, the impact is probably greatest in agriculture, which accounts for about a third of China's total water usage. Most crops require about 5,000-8,000 tonnes of water per hectare in a single growing season. Thus, any scarcity of water will lead to poor yields. To see the scope of this problem for China, consider the following chart: it shows the water usage/availability percentage for the top five provinces that were responsible for 35% of China's agricultural output in 2012. This includes farming, forestry, animal husbandry and fishery. With the exception of Sichuan, the rest of the provinces are already at critical water usage levels. Any further deterioration in water availability will affect agricultural output. At the same time, it also demonstrates that there is very little scope for increasing irrigation in these provinces.

Provincial contribution to total output and water usage



Source: NBSC

The second aspect of the water supply problem is pollution. In 2013, a Ministry of Land and Resources survey found over half the groundwater on the North China Plain to be unsuitable for industrial use and over 70% unsuitable for human contact. According to the Ministry of Environmental Protection's (MEP) 2012 State of Environment Report, about 30% of the water in the ten biggest rivers was 'polluted' or 'highly polluted'. It also found that more than half of the groundwater in 198 cities was 'bad' or 'very bad'. The chief problem was the high level of chemical pollution mostly from industry and animal husbandry.

To overcome the problems of water scarcity China has embarked on the ambitious South-North Water Diversion Project, a modern version of Imperial China's Grand Canal, which will consume over US\$80bn of investment in the next few decades in an attempt to divert water from the Yangtze River to the parched regions of the North. The first leg – the eastern route – began supplying water to Dezhou in Shandong Province late last year. However, the water is polluted and for now is only suitable only for industrial purposes.

Given the problems of water quantity and quality, it is almost certain that China is going to struggle to supply clean water for its agricultural needs. So, any yield enhancements from greater irrigation are unlikely to materialise.

We have analysed the major factors that can increase agricultural output – namely, land and water. Given the constraints present, China will find it increasingly difficult to increase output via these factors. Output growth would have to come from elsewhere, for example, land consolidation, mechanisation, improved seeds and better crop management practices.

The Chinese government has invested heavily in genetically modified crops. However, there are concerns among the Chinese over the safety of GM crops safety – an understandable one given assorted food safety scandals in recent years. To allay fears, the government launched a media campaign in September 2014 in support of GM crops. It hopes to educate the public and create a favourable atmosphere for the development of the GM industry. In the same month, the government also released President Xi Jinping's unpublished speech from December 2013, wherein he endorsed GM crops.

Paradoxically, despite an active campaign to promote GM crops, the Chinese government has rejected imports of US corn since November 2013 due to the presence of Syngenta's MIR162 genetically modified corn, marketed as Viptera. China has yet to approve the MIR162 variety for imports although Syngenta applied in 2010. The same strain can be imported into the EU – despite its virulently anti-GMO stand. Therefore the actions of the Chinese government might, at first glance, appear irrational. However there is logic to their policy response. Recall our earlier table on Chinese corn statistics, which highlights how Chinese production has increased by

some 70% over the past decade. Much of this was achieved by the government using higher prices to incentivise and promote domestic production. Seen from this perspective, the Chinese are most likely using the GM issue as a smoke screen to limit imports. Another possible explanation is that the Chinese are attempting to diversify their corn import source. After all, in 2013, nearly all of China's corn imports originated in the US. Although imports will likely continue to rise, equally likely, the government will continue to limit them.

As a footnote, note that Syngenta is being sued by Cargill and some US-based farmers for marketing its Viptera seed before it obtained import approval from China. This demonstrates the impact that Chinese policies now have overseas. Although the country currently imports a mere 3mmt of corn, you only need to look a few years hence when this near rounding error becomes material.

Obviously all of the above demonstrates that the Chinese government recognises that the agriculture sector needs to be transformed. The following section looks at how the state supports agriculture.



Government and the agriculture sector

China's agricultural sector has witnessed major structural changes since the foundation of the People's Republic in 1949. In its formative years, the state took control of all land and established a monopoly on the purchase and marketing of farm output. In 1958, the collective farms were merged into larger 'people's communes' and private food production was banned. For the next twenty years the commune system reduced incentives, removed price signals and prevented the efficient allocation of resources.

Evolution of Chinese agriculture		
Period	Political events	Impact on agriculture
1949 – 1952	Redistribution of land from landlords to peasants.	Grain output increased to 164mnt up 48% from 1949 Agricultural output reached CNY46bn in 1952, nearly doubling from 1949
1953 – 1957	Collectivisation of land Co-operative farms	Agricultural value grew only 3.1%, while grain output grew 3.5% – a dramatic reduction from 14% and 13% in the 1949-52 period
1958 – 1960	The Great Leap Forward 'People's communes' were established and private food production banned	Between 1958 and 1960, agricultural output fell by a fifth, and grain output by over a quarter
1961 – 1965	The Re-adjustment Period The government adopted the principle of 'readjustment, consolidation, supplementation and improvement'.	Compared to 1960, agricultural output grew 82% and grain output by over a third
1966 – 1976	The Cultural Revolution	Annual growth in agricultural value and grains output slowed down dramatically to just over 3.5%

Source: NBSC, *The Robinson Rojas Archive, Collectivisation and China's agricultural crisis in 1959-1961, Chinese Economic Reforms and Fertility Behaviour.*

In 1978, Deng Xiaoping initiated rural reforms, which led to the abolition of the commune system. Among the policy changes introduced thereafter, perhaps the most significant was the Household Responsibility System (HRS). Under this, land was assigned to households for 15 years (and later 30 years), and each was given crop quotas to fulfil. The quotas were relatively small but anything above that could be sold for profit in the open market. This meant that farmers were provided with incentives to increase output. In the initial period of these reforms, between 1978 and 1984, grain output grew 5% annually. However, once the easy wins were over, annual growth decelerated to 1.2% over the next decade. Rising prices and imports necessitated another round of reforms such as the 'Governor's Grain Bag Responsibility System', which made provincial governors responsible for balancing grain supply and demand and stabilising grain prices in their provinces.

While the HRS was certainly a major improvement on the commune system, it was far from perfect. The key problem was that, given the large population and limited land available, each household only received a small amount to farm. This problem was accentuated by the fact that, since land parcels had different soil

characteristics, suitability for irrigation, location, and so on, and since each household had to get parcels for all grades, the land that they got was fragmented and scattered. This limited the scope for economies of scale through irrigation and mechanisation. Furthermore, as this was a continuous process, an increasing population implied further land fragmentation. Finally, since the process emphasised household size and disregarded capability, many households received large land parcels but with limited labour forces, and vice versa – thus hindering an efficient allocation of a scarce resource. This problem was exacerbated by urban migration, which further reduced the rural labour force.

Some of these problems were addressed with reforms that limited redistribution, extended tenure and widened the scope for renting out land. This led to the development of a land rental market, but the agreements tended to be informal and short-term. The Third Plenum of the 17th Party Congress in 2008 emphasised the need to encourage the land rental market, and since then policy makers have experimented with various pilot projects. Apart from renting land-use rights, there have also been attempts to mortgage assets to raise financing. The 2013 'No. 1 Document' called for a transition to large-scale farms

in China and encouraged farmers to rent out their land to large farming entities, co-operatives and agricultural enterprises. There is even a 'large farm' subsidy being tested in a few provinces, given to farmers planting more than a certain province-specific area of grain. All of this has had an effect – the Ministry of Agriculture estimated that in 2013, around 26% of China's farmland had been rented, up from approximately 9% in 2008.

More reforms are on the way. The Third Plenum of the 18th CPC Central Committee, concluded last year, aimed to provide farmers with greater property rights, increase farmers' property income and allow rural residents to benefit from modernisation. Specifically: (i) endow farmers with mortgage and guarantee power for contractual management rights, (ii) propose to push forward 'cautiously and steadily' collateral, guarantee and transfer of farmers' residential property rights, (iii) endow farmers with rights for possession, income, pledge, guarantee, inheritance and paid withdrawal of shares in collective assets, and (iv) propose to support the development of large-scale, professionalised and modernised operations. A concrete example is that it allows collectively-owned 'rural construction land for commercial use' to be transferrable and rentable and aims to build a unified market for both urban and rural construction land. Other major reforms include the reduction in scope of land expropriation by local governments.

For sure, this is a statement of intent at this stage and the extent of implementation remains to be seen. Most reforms to date are at the pilot-test stage and not close to rollout and execution at national level. Moreover, some of these initiatives might be difficult to implement because local governments, whose revenues will be reduced, might oppose them. According to World Bank data, on average, local governments receive 40% of the tax revenues from the central government, but are responsible for 80% of total government spending. These deficits are usually covered through the sale of collectively owned land seized from farmers. Rural land reform will curtail these activities and put more strain on local governments' fiscal positions. In short, progress in land reform is an arduous, slow process.

Land reform was important and led to higher output but it did not increase rural incomes in sharp contrast to what happened with urban incomes. Crucially it also led to widespread income inequality across the country. Thus, a decade back, Chinese policymakers began seeking ways to extend direct benefits to farmers. In 2004, China introduced the first national direct subsidies to farmers and began phasing out agricultural taxes. The direct subsidy was based on the land area. However, the unintended consequence of this action was that landowners could leave the land fallow and still get subsidies, while farmers who cultivated leased land would not. Since 2013, the government has moved towards linking direct subsidies to land planted or grain harvested.

In September 2014, the government released details about the pilot 'target price' subsidy programme for cotton and soybeans. This policy represents a new approach to agricultural support that will reduce government interference in prices and let the markets have a greater role. The subsidy under this programme is calculated as the difference between a 'target price' set by the government before planting and the market price in each province.

In addition to recognising the need to increase productivity, the government also introduced subsidies for seeds, fertilisers and agricultural machinery. Subsidies are available for high-quality seeds, such as high-oil soybean, industrial-use corn and high-protein wheat varieties. These are usually paid directly to farmers but, in some areas, they are paid to seed suppliers, who are then supposed to pass it on to farmers. Fertiliser subsidies also work in a similar way. Machinery subsidies are paid to machinery dealers, who are expected to pass it on. In the Twelfth Five-Year Plan, the government aimed to increase total agricultural machinery power to 1bn KW and the agricultural mechanisation rate to 60% by 2015. However, the power target was achieved by 2012, and the mechanisation rate reached 59% in 2013.

Other government support measures include a minimum price scheme for rice and wheat, VAT refunds or waivers and transport tax waivers. The government has also sought to increase investment through the extension of finance via the Rural Credit Co-operatives that provide loans to farmers for input purchases, machinery and other investments.

All these government measures to increase production aim to get around the problem of limited land and water resources. Will these be sufficient to prevent imports? In our view, no. While these policies will most likely boost yields, it will not be anywhere near sufficient to meet the strong growth in demand in the years ahead.

Thus China has begun to turn its attention overseas; if there are constraints on land and water at home, why not buy land in Ukraine or Zambia and grow wheat and corn for export to China? For sure, this does not replicate 'self-sufficiency' as China would still be vulnerable to external shocks such as export bans and land expropriation. However, it does possess merit. Firstly, it provides an avenue for China to diversify its current account surpluses away from financial assets such as US treasuries into real assets such as farmland. Secondly, it fits in with the wider theme of food production shifting to low-cost producers such as Africa. Finally, it will also help to promote free trade through interdependency.

In its 10th five-year plan in 2001, China initiated its 'Go Out' policy aimed at encouraging Chinese investment abroad. Although China has been involved in African agriculture since the 1960s, it was mostly in a technical capacity, with some trade relations and limited farming investments. But since the 'Go Out' policy, its involvement has shifted to include large-scale farming, processing, equipment export and agricultural infrastructure development. In 2009, Chinese investment in African agriculture was estimated at US\$30bn. In the 2014 'No.1 Document', the government called for the 'Go Out' policy to be accelerated and in an August 2014 press release, the Ministry of Commerce announced that over 300 farming enterprises had invested across 46 countries.

However, most of these farming deals are at small scale and mostly less than 10,000ha. There have been media reports of large transactions but actual hard evidence is hard to come by. For example, media reports since 2007 have recorded ZTE Agribusiness's concession to cultivate palm on an area ranging from 100,000ha to the somewhat larger 3m ha of land. Another Chinese grand plan was to cultivate jatropha for bio-fuels on over 2mn ha in Zambia. Again, no progress was registered on either project. Hyperbole is not restricted to land alone – another common refrain in recent years was that China would send 1mn farmers to settle in Africa.

A similar scenario played out in Ukraine. There were reports last year of China, via state-owned companies, leasing 100,000ha of land in Ukraine for farming and that the area could potentially expand over 50 years to 3mn ha – or about 10% of Ukraine's arable land. Ukrainian agricultural firm KSG Agro, which was supposed to be the counterparty, denied those reports saying that the agreement was with regard to the transfer of irrigation technology for a mere 3,000ha.

Finally, there is Latin America. While China imports large quantities of soybeans from Brazil and Argentina, its direct involvement remains limited. There have been no acquisitions of farmland and it is also unlikely change in the near term, given the restrictions imposed on foreign land ownership in Brazil and Argentina – itself is a response to growing Chinese interest.

The same is true elsewhere; whether Australia, New Zealand, the Philippines and so on. The conclusion we would draw is that China may pursue this strategy but it is likely to remain small scale in the medium term. Deals involving millions of hectares, or even hundreds of hectares invariably generate hostility and local resentment. More importantly, large-scale projects remain difficult to execute successfully – there are numerous examples in Africa, where companies have hardly progressed beyond acquiring a large parcel of land.

That doesn't negate an alternative strategy: the possibility of China acquiring strategic assets along different points of the value chain. That is, instead of acquiring land, buy elevators and processing facilities, or provide financing and logistics services. These were the intentions behind State-owned Chongqing Grain Group's plans in 2011 to build a soybean-crushing plant, railway line and a storage and transportation hub to export goods back to China – with an investment of over US\$2bn. However, as with other large Chinese agricultural projects, this too has yet to materialise. But the wider strategic argument remains valid.

In February 2014, China's largest grain trader, state-owned COFCO, acquired a 51% stake in Dutch grain trader Nidera, which has a strong procurement platform in Brazil, Argentina and Central Europe. In April 2014, COFCO acquired a 51% stake in Singapore-based Noble Group Ltd's agribusiness unit for US\$1.5bn. COFCO aims to form a joint venture to link its grain processing and distribution business in China with Noble's grain sourcing and trading business. Noble's agribusiness unit includes sugar mills in Brazil, grain elevators in Argentina, and oilseed crushing plants in China, Ukraine, South Africa, and South America. Co-incidentally, China Investment Corporation – China's sovereign wealth fund – already owns a 14.1% in the Noble Group. With these acquisitions, COFCO will be able to purchase soybeans from Brazil and other producers directly, bypassing the 'ABCD' quartet of grain traders: ADM, Bunge, Cargill and Louis Dreyfus.

Other similar deals include the previously mentioned WH Group's purchase of US-based Smithfield Foods, China Fishery Group's purchase of Peruvian fish exporter Copeinca ASA, and COFCO's purchase of Australian sugar producer Tully Sugar. China's US\$3bn loan-for-grains deal with Ukraine was another although China recently sued Ukraine for the breach of this contract and which will be complicated still further by ongoing civil unrest in the country.



About PwC

Global Agribusiness Network

PwC has been supporting the global agricultural sector at a corporate, NGO and government level for many years. During this time, we have built up a detailed and practical understanding of how agricultural systems around the world work. Resources around the world include Agribusiness service centres in Brazil and Argentina; Agribusiness practices in India and the MENA region and Agribusiness heads in every major region.

We have helped at least four different governments formulate comprehensive food security strategies. We also have a dedicated, global food safety advisory team. In China, for instance, Assure Quality and PwC New Zealand signed a collaboration framework agreement with China Mengniu Dairy Company and COFCO Corporation to investigate the development of a China- New Zealand agribusiness service and Food Safety Centre of Excellence in China. Do feel free to contact us for further details.

China Business Group

PwC UK's China Business Group is a dedicated team of bilingual specialists who can provide in-depth knowledge of the markets, culture, legal systems, tax, accounting, auditing and regulatory framework in both the UK and China.

Together with our rich industry knowledge and working with our colleagues in PwC's global network as necessary, we provide hands-on, practical assistance to Chinese companies looking to expand in to the UK or eurozone and Africa, as well as UK companies wishing to develop their operation in China.

We provide thoughtful, bespoke services which support our clients' development strategies, wherever in the world those ambitions may take them.

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