Short Term Policy Brief 65

China’s Food Security

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Background Briefing: China’s Food Security

Executive Summary

1. China’s post-1978 record in protecting its basic food security is impressive. With only 7 per cent of the world’s arable land and 8 per cent of its water supplies, its output of staple cereals (rice, wheat and corn) has been sufficient to meet the basic needs of a population that constitutes around one-fifth of the global total.

2. Pursuit of food security requires China to meet two challenges: first, that of eliminating hunger among 120 million poor farmers; second, that of meeting the dietary aspirations of an increasingly affluent population that seeks to consume more meat, poultry, fish, fruit and dairy products.

3. Since 1979 (the start of the ‘Reform Era’), staple food production has shown quite a strong positive trend. In particular, the period from 2008 to 2011 has seen successive bumper crops, taking total and per capita cereal production to record levels in 2011. But past fluctuations in production make it unwise merely to extrapolate from this performance in predicting future output growth.

4. Cereals apart, China has already found it impossible to meet its soyabean requirements (mainly needed for feed) from its own resources. In recent years soya imports have risen explosively, making China the largest purchaser in international markets.

5. In addition, China is now at a tipping point in terms of meeting its corn requirements (mainly needed for feed, but also biofuel). In the last few years China has shifted from being a net exporter to becoming a net importer of corn. Imports will continue to rise, albeit not on the same explosive scale as soyabean.

6. Looking ahead, rising incomes and changing diets will dictate a greater involvement for China in other international food markets. These include pork, milk and dairy products, and some fresh fruits.

7. China’s size ensures that its increased engagement in international grain markets will have potentially significant implications for global food security by squeezing available staple food supplies, and by leveraging international prices at a time when they are already under severe pressure.
8. In its efforts to generate sustained food output growth into the future, China faces difficult policy challenges. Resource (especially land and water) constraints are already severe, and will intensify. There is evidence too that farm chemicals are being used wastefully, and that marginal returns to further chemical fertiliser use are diminishing or have become negative.

9. Central to China’s future food security strategy is the need to maximise returns from relevant scientific and technological research. Pay-offs from advanced research promise to have the greatest impact. China has invested heavily in genetically modified (GM) crops and will continue to do so. At the same time, it has taken a cautious stance on GM technologies. In November 2011 the Chinese government announced that it would suspend commercialisation of GM rice and wheat for up to 10 years. Significantly, however, this suspension did not apply to GM corn, commercialised use of which could be endorsed by 2020.

10. Recent years have seen rapid growth in EU-China agricultural trade. The EU27 is the third largest market for Chinese farm products; China is the EU’s fifth largest such market.

11. As China’s population becomes more affluent, increased demand for high-value products (e.g. wine, meat and dairy products) will offer favourable commercial opportunities for EU producers. The ability of the EU27 to export staple foods, such as wheat and corn, will be severely constrained, at least until EU enlargement incorporates countries such as Ukraine and Belarus.

12. Strengthened cooperation between the EU and China, pursued within the framework of the EU-China Dialogue on Agriculture and other more recent institutional initiatives, will serve the interests of both sides. Food security and related issues have consistently and explicitly been included as priority issues for discussion in such forums. In its own interests as well as those of China and the rest of the world, the EU should use its rich experience and expertise to enhance China’s food security through technology transfer and other facilitating mechanisms.

13. The commercial dimension of collaboration is also important. Major European agrifood companies already have a strong presence in China, and collaborative and commercial ventures should be used to extend this presence. Opportunities for value creation span a wide range of activities across the entire supply chain, including input provision, food production, processing, logistics, and wholesale and retail trade.
Main points

- Despite the massive poverty alleviation impact of China’s post-1978 reforms, hunger afflicts well over 100 million poor Chinese farmers and their families. Providing them with more calories is the government’s most elemental food security challenge – a task that requires farmers to produce more grain for direct consumption.

- The greater food security challenge is, however, the need to meet the dietary aspirations of an increasingly affluent population, who are consuming more meat, poultry, fish, fruit and dairy produce. In order to meet their needs, an increasing premium is being placed on grain farmers to produce grain for indirect consumption (i.e. to feed pigs, poultry, etc.).

- The Chinese government has for many years sought to maintain 95 per cent self-sufficiency in staple foods. It has largely succeeded in meeting this target for cereals (rice, wheat and corn); but it has failed to do so for soyabeans (a rich source of animal feed).

- China’s record in pursuit of food security is impressive. With 7 per cent of the world’s arable land and 8 per cent of its water, it has largely met the basic needs of one-fifth of the world’s population.

- But China is now at a tipping point. It is, and will continue to be, the biggest soyabean importer in the world.

- The most significant recent development has been China’s transformation from being a net exporter to becoming a net importer of corn. As demand for corn – a critically important livestock feed, as well as a biofuel source – increasingly outstrips domestic supply capacities, imports will grow exponentially.

- Maintaining a high degree of food security in the future has a production and distributional dimension. Generating sustained food output growth will depend on the ability of Chinese farmers to continue to increase per hectare yields. At the same time, in order to ensure that nutritional improvements are shared by all, the worst effects of growing inequalities in income distribution must urgently be addressed.

- Logistical needs must also be met in order to strengthen food transport and distribution networks, and to enhance storage facilities (especially at local levels).

- As rising incomes, urbanisation and continuing population growth place domestic staple food supplies under increasing pressure, it is unlikely that China will be able to maintain 95 per cent food self-sufficiency. Failure to fulfil this target will have potentially serious implications for the rest of the world through its impact on international food prices and
access to imports of staple foods for countries in which the incidence of under-nourishment is greatest.

Recent performance

- China’s grain (cereals and oil crops) output has trended upwards during the last three decades. In 2011 the grain harvest recorded a fourth successive record level. Meanwhile, per capita grain production was also at an historic peak.

- However, analysis of China’s output performance since 1979 reveals sharp fluctuations, with periods of positive growth contrasting with periods of negative growth. From this perspective, it would be unwise to extrapolate from the most recent past and assume that the momentum of strong output growth will automatically be maintained into the future.

- In recent decades, expanding sown areas under corn and soyabees have contrasted with contracting areas under rice and wheat. This pattern of change reflects the increasing premium placed on growing grain for animal feed.

- The most encouraging aspect of China’s recent performance is that per hectare yields of all staple food crops have risen. However, it is significant that recent years have seen such growth slow for all such crops.

- To date, except for soyabees, China’s involvement in international staple food markets has been minimal. In general, since 1980 it has been a net exporter of rice and (until recently) corn, and a net importer of wheat.

- In the last five years, China has shifted from being a significant net exporter of corn to becoming a significant net importer. This is set to become a permanent feature of China’s agricultural foreign trade.

- Cereals and oil crops are not the only foods traded by China. Today, oilseeds dominate its food imports, as 20 years ago cereal previously did. But as dietary patterns have changed, so too the import share of vegetables, fruit, meat and dairy produce has also risen significantly.

- In the last five years, China’s overall balance on its food trade account has shifted from surplus into deficit (totalling more than €220 million in 2010).

Outlook

- The principal drivers of future food demand in China will be rising incomes and demographic change (above all, urbanisation).
• Growing affluence will be reflected in a continuing shift from a grain-based diet to one based on higher consumption of animal protein (meat, poultry and dairy products), as well as of fish and fruit.

• The most important consequence of the changing pattern of food demand will be to place a higher premium on the need for feed grain to meet the anticipated rise in demand for meat and dairy produce.

• With arable and sown areas already under severe pressure, the key to future grain output growth lies in generating sustained increases in unit area yields. The recent slowing in cereal and soya yield growth throws into sharp relief the urgency of this task.

• There is a consensus view within and outside China that maintaining 95 per cent self-sufficiency in staple foods will become unsustainable. Authoritative Chinese projections indicate major declines in self-sufficiency rates for corn, soyabeans, edible oils and dairy products in the coming decades.

• Declining domestic food self-sufficiency will have serious foreign trade implications for China. The biggest burdens will be carried by the two main feed grains – soya and corn.

• US Department of Agriculture projections suggest that China’s soya imports will rise from 53 million tonnes to 90 million tonnes between 2011 and 2022. During the same period, its imports of corn are expected to increase from 3 million to more than 18 million tonnes.

• China’s extra soya imports during the next decade are projected to account for 80 per cent of expected growth in global soya imports, while its incremental corn imports will absorb some 45 per cent of global corn import growth.

• Chinese imports of some meat (especially pork – imports of which are expected almost to double by 2021), fruit and dairy products are also set to increase.

Policy issues

• Land and water shortages seriously threaten to constrain future food output growth.

• China’s arable land base has declined significantly under the impact of post-1978 reforms, although the rate of decline has slowed sharply in recent years. A mandatory target under the current Five-Year Programme (2011-15) is that the arable area should be maintained unchanged at 121 million ha.

• Pressures of industrialisation and urbanisation will make it difficult to fulfil this target. If it is fulfilled, it will be at the cost of bringing less fertile, reclaimed land into cultivation, with a consequent fall in average yields.
• Farmers currently enjoy land use, but not land ownership rights. The introduction of a free land market would facilitate the emergence of more efficient, larger-scale farms. Although current official orthodoxy continues to oppose such an initiative, land consolidation is starting to take place through transfers of land use rights, and will accelerate.

• China faces serious water shortages, which are acute in parts of the North China Plain, where much of China’s wheat and corn is produced.

• The ‘South-North Water Diversion Project’ seeks to redirect water from southern China to the North, though many doubt the wisdom of this huge and costly engineering project. Water conservation and the introduction of more rational water charges are also high policy priorities.

• Policy initiatives notwithstanding, it seems inevitable that farmers will continue to face serious water shortages for the foreseeable future.

• Increased applications of farm chemicals show signs of running into negligible, even negative marginal returns. Their use has also had deleterious environmental consequences. Future policy priorities will be to raise the efficiency of fertiliser use through the greater use of compound fertilisers.

• Scientific and technological progress is central to maximising China’s domestic food security. The Chinese government is investing heavily in advanced research, including development of GM technologies.

• China currently ranks sixth in the world in terms of its GM crop acreage. However, it lags well behind leading GM crop growers, such as the USA, Brazil and Argentina.

• The Chinese government is taking a cautious stance on endorsing the commercialisation of GM rice and wheat. However, there are signs that commercialisation of GM corn may be less restricted.

Implications for the EU

• Bilateral EU-China agricultural trade has grown rapidly in recent years, and China is now the fastest growing market for EU farm products.

• The EU27 is the third largest export market for Chinese farm products, and China’s fifth largest source of agricultural imports.

• Food security considerations will help shape the EU’s future export trajectory vis-à-vis China. In particular, growing affluence will generate increases in demand for European high-value food products (e.g. wine, meat and dairy produce), as well as for organic foods.
• Bilateral trade in cereals and other staples will, however, be severely constrained by existing patterns of food production and foreign trade in China and the EU.

• The embrace of major cereal producers, such as Ukraine and Belarus, within an enlarged EU would, however, offer significant cereal export opportunities.

• Food security and related issues are priority issues for discussion within the EU-China Dialogue on agriculture and other bilateral institutional initiatives (including the 2012 bilateral ‘Cooperation Plan on Agriculture’).

• Cooperative programmes, taking advantage of EU research and experiential expertise, promise to facilitate sustainable food output growth and diversification in China.

• Enhancing China’s food security-related capabilities through such cooperation will help meet China’s needs, and simultaneously serve EU and wider interests by mitigating the detrimental impact on prices and global food security arising from a major increase in China’s involvement in international markets.

• China’s search for food security also offers major commercial opportunities to EU agrifood companies. Such opportunities are not confined to food production, but extend to a wide range of ancillary activities across the entire food supply chain.
**Introduction: China’s Food Security**

For many years, a priority goal of Chinese government economic policy has been to maintain 95 per cent self-sufficiency in staple foods. To date, China has largely succeeded in fulfilling this objective. In more than three decades of reform, only one year saw cereal imports exceed 5 per cent of total domestic output, and China has frequently been a net cereal exporter. The only staple crop for which the 95 per cent target has not been met is soyabeans, of which China has become by far the largest importer in the world.

China’s record in protecting its basic food security is a remarkable one. With only 7 per cent of the world’s arable land and 8 per cent of its water supplies, it has produced sufficient cereals (rice, wheat and corn) to meet the basic needs of a population that constitutes about one-fifth of the global total. There is, however, growing evidence that China may have reached a tipping point. In addition to soya imports continuing to rise to record levels, the last three years (2009-11) have seen a sharp increase in corn imports that have pushed China’s trade balance in cereals firmly into deficit. Maintaining adequate food supplies from domestic sources will prove increasingly difficult in the years ahead, as China’s population becomes more affluent. As excess demand emerges, China’s involvement in international grain markets will increase. To what extent such involvement will affect food prices and destabilise international markets should be a matter of major concern to Western governments and the corporate sector.

**Context**

The problem of food security poses one of the most profound challenges facing the world today. In 2011 the UK Government Office for Science’s report on ‘The Future of Food and Farming’ noted that 925 million people throughout the world suffered from absolute hunger, while a further one billion people endured ‘hidden hunger’ through lack of vital micronutrients, such as vitamins and minerals. Ironically, another one billion people were ‘over-nourished’ - susceptible to ill-health and disease as a result of over-consuming.

In many ways, China is a microcosm of global nutritional conditions. The poverty-alleviation impact of more than three decades of GDP growth averaging almost 10 per cent per year is unprecedented in human history. The incidence of hunger has fallen dramatically during the last three decades, and China is one of few countries – perhaps the only one – certain to fulfil the Millennium Development Goal of halving the incidence of hunger between 2000 and 2015. Yet absolute poverty has not yet been eliminated in China, especially in the countryside, where in 2012 more than 120 million rural Chinese were officially classified as falling below the poverty line. In absolute terms China is second
only to India in terms of the number of people affected by under-nourishment (129.6 million, 2006-08). These under-nourished are overwhelmingly farmers, living in remote inland (especially western) regions of China. Relieving them of the threat of hunger is the most elemental food security challenge facing the Chinese government today.

By far the greater food security challenge facing China reflects the increasing affluence of its urban population, as well as of growing numbers of rural residents. Sustained income rises have already facilitated major dietary adjustments through changes in both the level and also the structure of food consumption. Higher incomes have enabled hundreds of millions of Chinese to shift to a more diversified diet, characterised by the consumption of more meat, poultry, fish, fruit and dairy produce. The less favourable consequences of growing affluence have also started to emerge. The healthy nature of the traditional Chinese diet, characterised by low intakes of fat, oil and sugar, has long been recognised. But since the 1980s, changing work and life styles have encouraged a sharp rise in consumption of less healthy snack foods, alcohol, soft drinks and fast foods. Obesity now affects more than 100 million in China, compared with fewer than 20 million in 2005. Almost 10 per cent of the population has diabetes – almost the same as in the United States (the corresponding figure for the EU is around 7 per cent).

Part of the burden on Chinese farmers is to produce more grain for direct consumption by those who are still hungry. But the shift towards a more varied diet based on higher consumption of animal protein has placed an increasing premium on the production of grain for indirect purposes: above all, to provide more feed for pigs, poultry, cattle, etc. Between 1980 and 2011, the amount of corn used for animal feed relative to total domestic output rose from 43 to 68 per cent; for wheat, the corresponding increase was from 3 to 19 per cent. The explosive rise in soya imports too reflects burgeoning demand for livestock feed.

In its pursuit of food security, China faces major production and distribution challenges. Recent output growth has been impressive, but in the face of resource and environmental pressures, significant rises in yields will be necessary to maintain the momentum of such growth. The distributional (including logistical) challenge is also formidable. Estimates of national Gini coefficients show that in the mid-1980s China was one of the most equal societies in the world. Subsequently, steadily widening gaps in income distribution have made it one of the most unequal. As for logistics, although state grain storage capacity has expanded considerably in recent years, large-scale investment is needed to further extend and improve storage facilities, especially at local levels. Meanwhile, the burden on rail transport to ship grain from producers to consumers is immense. In
2010 China’s over-worked railway system carried 97 million tonnes of grain over an average distance of 1,802 km.

Beijing has traditionally pursued a policy of 95 per cent self-sufficiency in food grains (including soyabean). A recent plan issued by the Ministry of Agriculture seeks to achieve 100 per cent self-sufficiency in rice, wheat and corn during 2011-15. This target will be difficult to fulfil, as domestic grain supplies come under increasing pressure to generate increasing amounts of animal feed to grow meat and dairy products to meet changing dietary tastes. If it is not met, China’s increased involvement in international grain markets will have significant implications for global food security at a time when food prices are already under severe pressure.

**China’s recent grain performance**

The recent output performance of China’s grain sector has been impressive:

Despite significant fluctuations (most recently, in 2000-03), total and per capita grain production has displayed quite a strong positive trend (see Figures 1 and 2). In 2011 China achieved a record grain harvest (571 million tonnes). This generated a record per capita level of grain production of 424 kg of raw grain per head – a figure that is almost 25 per cent higher than the 400 kg benchmark considered sufficient to provide for a diet offering significant intakes of animal protein, as well as carbohydrates.

Recent grain output growth has been impressive, rising by 3.6 per cent per annum between 2003 and 2011. But during 1998-2003, the corresponding figure was strongly negative (-3.4 per cent per annum). Much of growth post-2003 is therefore by way of recovery from the previous severe downturn in output. Moreover, although China has enjoyed a run of four successive record harvests since 2008, the previous (1998) per capita peak was only re-attained and surpassed in 2011. It would be unwise to extrapolate from the experience of the last few years and merely assume that the momentum of strong output growth will be maintained into the future.

Output growth reflects changes in area and yields per hectare. Analysis of China’s experience during the last three decades reveals that the sown area under rice and wheat has declined, while that of
Figure 1: China’s total production of grain, 1978-2011 (m. tonnes)

![Graph showing China's total production of grain, 1978-2011 (m. tonnes).](source)

Source: China, National Bureau of Statistics.

Figure 2: Per capita production of grain, 1978-2011 (kg.)

![Graph showing China's per capita production of grain, 1978-2011 (kg.).](source)

Source: China, National Bureau of Statistics.

300 kg of raw grain provides for mere subsistence needs.

400 kg of raw grain provides for a more varied diet, incl. significant intakes of animal protein.
corn and soya has expanded. But yields of all four crops have increased. This yield performance is encouraging: China faces severe resource constraints, and increases in yields offer the firmest basis for continued increases in output.

**China’s foreign trade in staple foodstuffs**

Since 1980 China has been a net importer of wheat, a net exporter of rice and, until recently, a net exporter of corn. In general, China’s foreign trade in grain has hitherto had only a minor impact on international cereal markets. However, the potential impact of China on such markets is huge. In 2004, for example, as output declined, China was forced into international wheat markets in order to offset the depletion of domestic stocks. As a result, within a single year China shifted from being a net wheat exporter to a net importer, becoming the largest purchaser of wheat in the world.

To date, the most dramatic example of China’s impact on international food markets is that of soyabean. Until the mid-1990s, China was a net exporter of soyabean. But since 1996 burgeoning demand for protein meal by the livestock sector has forced China into international soya markets on a dramatic scale, with growing by more than 30 per cent annually. China is now easily the largest importer of soyabean in the world, accounting for more than 60 per cent of global trade. US Department of Agriculture (USDA) projections made in 2009 indicated that of an additional 20.9 million tonnes of soya expected to be traded from 2009-19, China would absorb almost 18 million tonnes (86 per cent).

In the coming years, the most significant influence on China’s foreign trade in staple foodstuffs will be the changing demand-supply balance for corn. China’s recent record in producing corn is impressive. Since 1978, not only has the sown area under this crop expanded by more than 60 per cent – in part, by shifting cultivation out of rice and wheat – but yields have also doubled. As a result, total output of corn doubled between 1978 and 1995, and thereafter increased by a further 72 per cent. In 2011 total production was 191 million tonnes, accounting for 38 per cent of total output of all three cereals (rice, wheat and corn) – a rise of 10 percentage points in little more than a decade.

The rapid increase in corn production in recent years reflects the need to meet the inexorable rise in demand for meat and dairy produce. Corn is by far the most important source of animal feed - though recent years have also seen a rapid rise in the use of wheat for feed – as well as being the basis of biofuel (ethanol) production. About 70 per cent of corn supplies are now allocated to feed.
Thanks to booming domestic output growth, for many years China was a net exporter of corn. But between 2006 and 2011 China shifted from being a net exporter of 5 million tonnes of corn to being a net importer of 4 million tonnes. As increasing excess demand emerges in China, imports of corn are set to continue to rise, placing further pressure on international markets.

Cereals and soyabean are not the only foods traded by China. For most of the last 30 years, China’s food trade balance was in surplus. Since 2007, however, a growing deficit has emerged, reaching around 2,000 million RMB (c. €223 million) in 2010. Meanwhile, changes in the composition of food imports offer a revealing perspective on the shifting dynamics of China’s search for food security. Since 1990 the share of cereals in China’s total food imports has fallen from more than half to less than 10 per cent. Offsetting this contraction has been a huge rise in the share of oilseeds: from 8 to almost 50 per cent. The remaining balance is accounted for by vegetable oil (18 per cent of all imports in 2010); fruit and vegetables (9 per cent); and meat (6 per cent).

**Future trends**

**Outlook for food demand**

Growing affluence in China has generated continuing rises in demand for grain, but increasingly for indirect uses – above all, to feed animals and generate meat and dairy products. Before the 1970s,
the dominant shaping influence on food demand was population growth. Today, the principal drivers are income growth and urbanisation. Under the current Twelfth Five-Year Development Programme (2011-15), some 40 million farmers are expected to move into the urban sector; in the same period, rural and urban per capita incomes are targeted to rise by 7 per cent per annum.

The general direction of future changes in food demand is clear, although quantifying such changes is very difficult. Chinese demand projections confirm that as incomes continue to rise and urbanisation accelerates, the shift towards more varied diets, based on higher intakes of meat, fish, fruit and dairy products, will intensify. The biggest rise in demand will be for dairy products (with milk expected to rise sixfold by 2050). But major increases will also take place in the demand for seafood (up an expected threefold), meat, poultry and fruit. Meanwhile, demand for rice and wheat will gradually decline (see Table 1). Implicit in these projected changes are large increases in demand for feed grains.

Table 1: Expected changes in per capita food consumption in China (kg per head)

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<thead>
<tr>
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<th>Rural sector</th>
<th>Urban sector</th>
<th>All China</th>
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<tbody>
<tr>
<td>Rice</td>
<td>96</td>
<td>92</td>
<td>88</td>
</tr>
<tr>
<td>Wheat</td>
<td>85</td>
<td>82</td>
<td>79</td>
</tr>
<tr>
<td>Edible oil</td>
<td>8</td>
<td>13</td>
<td>15</td>
</tr>
<tr>
<td>Vegetables</td>
<td>158</td>
<td>189</td>
<td>192</td>
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<tr>
<td>Fruit</td>
<td>23</td>
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<tr>
<td>Poultry</td>
<td>31</td>
<td>48</td>
<td>54</td>
</tr>
<tr>
<td>Milk</td>
<td>3</td>
<td>20</td>
<td>40</td>
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<tr>
<td>Aquatic products</td>
<td>9</td>
<td>17</td>
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Hitherto, dietary changes have been most pronounced in the urban sector, where incomes have risen most rapidly. However, income growth in rural areas will become an increasingly important determinant of food demand in the future. Wealthy urban families are approaching – and in some cases, have already reached – capacity limits in terms of food consumption. As income rises among poorer households, mostly concentrated in the rural sector, begin to accelerate, their spending on food will also increase *pari passu*.

Central to estimating grain requirements is the ability to assess future levels of meat demand. Since 1990 meat consumption has more than doubled to reach around 50 kg per head. How rapidly
demand will continue to rise will depend on income growth and changes in tastes and diet (the latter
influenced by government and popular attitudes to the dangers of the increasing incidence of
obesity). Even the most conservative projections suggest that meat consumption will grow by
around 30 per cent in the coming decade (to reach 65 kg by 2020) – and some posit a figure as high
as 55 per cent (almost 80 kg). By 2030, meat consumption is expected to have reached between
about 75 and 95 kg per head. With good quality grazing land already under severe pressure, meeting
future demand for meat and dairy produce will require securing adequate supplies of feed grains to
grow pig and cattle herds. Generating such supplies is likely to be beyond China’s domestic
production capacity, making it increasingly dependent on imports of corn, soyabean and cassava.

**Outlook for domestic food production**

With arable and sown areas under severe pressure, the key to future grain output growth in China
lies in securing continuing increases in per hectare yields. China’s record in generating yield growth
is not unimpressive. But it is revealing that estimates for all four major grain crops – rice, wheat,
corn and soya – all reveal a slowing in yield growth since 2000.

A consensus view is emerging that future food output growth will be increasingly constrained, and
that China’s pursuit of 95 per cent self-sufficiency in staple foods will be progressively more difficult
to sustain in the coming years. Compared with projected increases in demand, planned rates of
output growth for edible oils, meat, fish and dairy produce contained in the ‘Development
Programme for a Modern Agriculture, 2011-15’ (published by the State Council in January, 2012)
look distinctly modest. It is telling too that estimates made by the Chinese Academy of Sciences
(CASS) indicate that under a baseline scenario, with technological development and agricultural
investment rates held unchanged at 2004 levels, self-sufficiency rates for wheat, corn, edible oils,
sugar, some meats and dairy products would all decline down to 2020. Indeed, the CASS projections
suggest that by 2050 self-sufficiency rates for corn, soyabean, edible oils and dairy products will
have fallen to 71 per cent, 38 per cent, 58 per cent and 79 per cent, respectively.

**Outlook for foreign trade**

The trade implications of demand and supply projections are likely to be quite profound. The biggest
burdens will be carried by feed grains – soya, corn and cassava.

**Soyabean**

Imports of soyabean have risen dramatically in recent years (see above). Continued
growth in demand for protein meal seems destined to maintain China’s high demand
for soyabean into the future. A recent (February 2012) USDA report has argued that
by marketing year (MY) 2021-22, China’s soyabean imports will have risen from the current level of 53.2 million tonnes (MY 2010-11) to 90 million tonnes. Although these figures point to a slowdown in the rate of import growth, the implied 59 per cent increase accounts for a remarkable 80 per cent of expected growth in global soyabean imports during the same period.

**Corn**

Since 2010, when China became a net importer for the first time since 1996, its overseas purchases of corn have risen sharply (see above). The increasing scale of such purchases is not attributable to supply deficiencies: China enjoyed bumper corn harvests in 2010 and 2011, with output rising by 8 per cent in both years. The main stimulus to imports has, and will, come from inexorable demand pressures for animal feed (to a lesser extent, also for industrial processing). The most recent projections published by USDA indicate that by MY 2021-22 China will need to import 18.1 million tonnes of corn – almost the same as current imports by Japan (the biggest importer in the world). USDA expects Chinese purchases to account for more than 45 per cent of expected growth in global corn trade between MY 2012-13 and 2021-22.

**Cassava**

Cassava is a hugely important source of dietary energy for millions of people in the developing world. However, as a traded commodity, it is mostly destined for animal feed and industrial processing purposes. An interesting development in recent years has been China’s emergence as the world’s largest cassava importer (accounting for more than 60 per cent of global trade), supplanting the EU’s former pre-eminent position. Chinese imports of cassava will continue to increase. In addition to directly helping meet livestock feed needs, cassava imports can also be used for the production of biofuel, thereby relieving pressure on corn for the same purpose.

Although grain (especially cereals and soyabean) will carry the major burden of China’s future import demand, shipments of other foodstuffs – for example, meat, dairy products and fruit - are also set to rise. For example, while China is expected to remain a net exporter of poultry and to lay a minor role in beef trade, its imports of pork are projected to increase quite significantly in the coming decade (up from 415,000 to 807,000 tonnes between 2010 and 2021). If such projections are correct, China’s share of global trade in pork will rise from 9 per cent to more than 11 per cent during the same period. Recent years have also seen a sharp rise in imports of milk and milk
products – a trend that is likely to continue, especially if concerns about the safety of domestically-produced dairy products persist. In addition, imports of some fresh fruits may be set to rise. Finally, there has been a steady trend increase in fishmeal imports since the 1980s to meet the burgeoning needs of aquatic producers.

**Policy – opportunities and constraints**

Beijing faces difficult policy challenges as it seeks to maintain a high level of domestic food security.

**Land**

The contraction of China’s arable land base – under way since the late 1950s - accelerated sharply during the 1980s and 1990s, although the rate of decline has slowed markedly in recent years. One of the few mandatory targets contained in the current (Twelfth) Five-Year Programme (2011-15) is to keep the arable area unchanged at 121 million hectares. Pressures of industrialisation, urbanisation and infrastructural construction will make it difficult to meet this target, even if illegal land grabs can be controlled. In any case, fulfilment of the target conceals an important *qualitative* dimension, as losses of fertile land in eastern coastal regions are offset by cultivation of new, but less fertile land in Northwest China (where most reclamation takes place). In other words, hidden within an unchanged arable land base is an implicit output loss. Meanwhile, the grain sown area is expected to contract – by 3 per cent decline from 109.9 to 106.7 million ha (2010-15), according to some projections. This anticipated decline throws into sharp relief the need to increase land productivity (yields per ha) to maintain continued output growth.

Another major challenge reflects the tension between decentralised, small-scale farming and agricultural modernisation based on larger, more mechanised and more efficient farms. Because of the ideological imperative of retaining collective ownership of arable land, farm operators in China possess only contractually-based land *use* rights. In addition, concern that land consolidation will deprive millions of farmers of their ultimate form of social security has impeded the introduction of a free land market that would facilitate the creation of larger farms. For the time being, the government remains unwilling to sanction the institution of individual land ownership rights. Recent regulations have, however, made land transfers easier, as a result of which the profile of land use is changing. Significant land consolidation has, for example, recently taken place in parts of northern and south-western China. The economic desirability of increasing the scale of farming applies to livestock husbandry, as well as crop cultivation. Thus, by 2015 China seeks to expand large-scale dairy cattle and pig farming by significant margins.
Water

Lack of water – especially the existence of acute regional shortages - is another huge challenge for China. The North China Plain – China’s ‘grain basket’, where much of its wheat and corn is produced - is severely deficient in water, thanks to excessive use of surface water supplies and the depletion of natural underground aquifers through over-pumping. Since the early 1980s the area affected by over-pumping of water in this region has more than doubled to some 200,000 km$^2$, and in some areas the water table is falling by two metres a year.

Farming currently accounts for about two-thirds of total use. It will still account for half in 2030. Less than half of the total arable area is effectively irrigated, and physical shortages are exacerbated by inefficiency in the use of water. Farmers’ high demand for water is driven in part by their high dependence on flood irrigation, which is often wasteful. By contrast, sprinkler and drip-irrigated farms account for less than 5 per cent of total demand for wheat, corn, vegetables and oil crops. By 2030 excess water demand will exceed 200 billion cubic metres – the equivalent of one-third of total water supplies in 2010.

China’s solution to its water shortages is a gigantic engineering project, known as the ‘South-North Water Diversion Project’, intended to redirect vast amounts of water from the Yangtze River in the south to the Yellow River in the north. Although this is well under way, its wisdom is increasingly being questioned – on economic, social, geological, environmental and ecological grounds. Many would argue that a more effective approach is through water conservation and the introduction of more rational pricing policies.

Farm chemical use

China’s record in chemical fertiliser use is mixed. Increased applications over the last half-century have contributed greatly to increased land productivity. But in more recent years, marginal returns from further increases have declined – and in some areas have become negative. There is evidence too of wastage of agricultural chemicals, with unused fertilisers and pesticides left in fields, often seeping into surface or sub-surface water, with serious environmental consequences.

China still leads the world in its use of nitrogenous fertilisers. These account for more than 40 per cent of total domestic fertiliser consumption. In 2005-06 per hectare applications of nitrogen were three times the world average (for pesticides, it was twice the average). Despite a recent surge in the use of compound fertilisers, their share of total consumption (32 per cent) is still far below that of advanced countries, such as the USA and UK (around 80 per cent).
Future policy will focus on reducing nutrient inputs and increasing the efficiency of fertiliser use. One priority is to build on recent trends by applying more compound fertilisers for cereal production; a second is to increase the use of biochemical-inhibitor, slow-release fertilisers, especially for high value cash crops, such as fruit and vegetables.

**Application of science and technology**

Scientific and technological progress is central to China’s pursuit of food security. Aspirations embrace both low-level and high-level projects. On the one hand, land consolidation will encourage the adoption of more capital-intensive, mechanised technologies. On the other hand, research and development (R&D) activities relating to advanced agricultural technology are also under way. In some areas, China has already made significant progress. For example, it has invested heavily in developing genetically modified (GM) technologies (planned investment is estimated at US $2,930 million, 2008-20 [approx. EUR 2,330 million]), and its GM crop acreage ranks sixth in the world. For the time being, however, China’s 3.7 million hectares of GM crops – mainly cotton, but also papaya, tomatoes and sweet peppers – are insignificant compared with the corresponding acreage in the United States, Brazil and Argentina. In the face of concerns about safety, the government has proceeded cautiously, and in late 2011 it announced that it was to suspend commercialisation of GM rice and wheat for 5-10 years. Significantly, however, it endorsed the continued development of corn breeding technology, and observers have speculated that GM corn commercialisation be approved before 2020.

Future priorities for agricultural scientific R&D include development of plant and animal germplasm resources, and of plant breeding science and technology; promotion of biotechnology research; research into water-saving and energy-saving farm practices; and the development of more sophisticated agricultural chemicals. A fundamental underlying goal is to use long-term scientific R&D in order to accommodate the needs of a more sustainable agriculture in China.

**Implications for the EU**

**Foreign trade**

Recent years have seen strong growth in EU-China agricultural trade (see Figure 4), and China has become the fastest-growing major market for EU farm products. Since 2005, EU27 agricultural exports to China have increased by almost 26 per cent per annum, while annual growth of imports has been 9.4 per cent. As of result of surging exports, which have more than doubled since 2009, not only has bilateral farm trade reached a record high, but in 2011 the EU’s previous deficit in its agricultural trade with China was transformed into a surplus (€408,000 million, Figure 4).
The importance of agriculture in bilateral trade is captured in the finding that the EU27 is now the third largest export market for Chinese farm products, while the EU is China’s fifth largest source of agricultural imports. The EU’s single most valuable export product is wine, which now accounts for about one-quarter of all EU exports to China; next in importance are milk and milk products, and pork meat. The composition of exports reflects the changing nature of Chinese diets under the impact of rising incomes (see above). EU farm imports from China are dominated by intermediate and final products (for example, China is the EU’s most important source of processed vegetable imports, worth €674 million in 2011).

Figure 4: EU-China agricultural trade (€ billion)

Source: EUROSTAT.

Food security will be a major factor governing future EU exports to China. In particular, growing affluence among wider sections of the Chinese population seems certain to generate further significant rises in demand for high-value farm products, such as wine, meat and dairy products, offering favourable opportunities for European producers. Changes in taste among urban Chinese consumers also offer good prospects for EU exports of organic food products, which rose by 25 per cent in 2011. However, the EU’s capacity to supply basic food commodities to China – above all, grain (including soyabean) – will remain severely constrained. In 2011 wheat was the only cereal grain exported on a significant scale from the EU. For the foreseeable future, the focus of cereal import demand from China will be corn – a product of which the EU is also a significant overseas purchaser, with net imports of around 2 million tonnes in 2011. There seems little prospect of the
EU27 emerging as a supplier of corn to China – at least until enlargement incorporates major corn producers (e.g. Ukraine and Belarus) in the EU. As for soyabean meal, China and the EU will also continue to be competitors in international soya markets: in 2011 purchases of soyabean meal accounted for 11 per cent of all EU27 agricultural imports.

**Agricultural cooperation**

The EU-China Dialogue on Agriculture was established in 2005. The six meetings that have since taken place have facilitated enhanced mutual understanding and laid the foundation for strengthened cooperation in key areas of shared concern affecting agriculture. From the beginning, food security and related issues – for example, food safety and the environmental implications of changing dynamics of food demand and supply - were identified as core issues. Most recently of all, in June 2012 China and the EU signed a ‘Cooperation Plan on Agriculture’, designed to give a new impetus to on-going discussions. Among the priority areas identified for future cooperation were food security, organic farming and food safety.

Other institutional initiatives that promise to enhance EU-China cooperation include the ‘Task Force on Food, Agriculture and Biotechnologies’ and the G20 ‘Action Plan on Food Price Volatility and Agriculture’ (both launched in 2011). The EU has rich expertise and experience, which can be harnessed to help formulate policies designed to facilitate sustainable output growth and diversification across all branches of food farming activities in China – cereal and other forms of crop cultivation, livestock husbandry and fisheries. As a matter of urgency, the EU should maximise the opportunities inherent in the existing institutional framework to pursue constructive collaboration with China.

In the end, the extent to which China’s pursuit of security impacts on the EU and the rest of the world will depend on its ability to raise domestic levels of farm productivity and efficiency. China’s record in this regard is impressive, but the potential contribution of cooperation with the EU is also great. The EU has much to offer in terms of the development of GM crops, biotechnological development, as well as in terms of farm organisation and the use of mechanised practices. Helping enhance China’s capabilities in all these areas will not only help meet China’s own needs, but also serve the interests of the EU and the rest of the world by mitigating the possible detrimental effect on international prices and global food security arising from China’s potential dominance of relevant international product and farm input markets.

Collaboration also has a commercial dimension, and China’s pursuit of food security offers a host of opportunities for foreign companies. The global economy is dominated by firms in high-income
countries. Agriculture is no exception. To take one example, just three firms account for about 70 per cent of the global market share in farm equipment manufacturing. Major global companies, including European agrifood companies (e.g. Bunge, Danone, Nestlé SA, Nutreco, Unilever, etc.) have a significant and expanding presence in China. Opportunities for profitable collaboration are by no means limited to sectors directly related to food and agricultural production. Rather, they embrace a large range of ancillary activities and extend across the entire food supply chain, linking producer, distributor and retailer, and consumer. As such, they embrace infrastructural construction, transport provision, processing, retail distribution, finance, storage, food hygiene and food safety, as well as production. It is revealing that China has only one agriculture-based in the Fortune Global 500 list – COFCO (China National Cereals, Oil and Foodstuffs Corporation), which is ranked 393rd in the latest list. Moreover, in the face of competition from multinationals, its share in international trade in grain and edible oils has declined. In terms of revenue, profits and assets, it lags well behind its global rivals. COFCO’s own Chairman has described his company as a ‘small fish in a big pond’.

COFCO’s experience is revealing. It highlights the fallacy of believing that, as a source of supposedly ‘low technology’ products, agriculture is a sector in which Chinese firms can more readily compete on the global stage. The truth is that not only do farming practices increasingly embody high technology, but so too does the entire value chain of the agrifood business. Organising, developing and realising the benefits of this value chain are huge challenges for Chinese firms. No less a challenge is that of creating trusted global brands. For the foreseeable future, it is the multinationals - not indigenous Chinese firms – that will remain best placed to meet these challenges.