China's Regional Feedgrains Markets: Development and Prospects

Summary

Rapid economic growth in China since 1980 has led to a significant increase in the consumption of animal products by both rural and urban residents. The steady increase in demand for animal products has so far been met by increased domestic supply. The rapid expansion of China's livestock industries in the past two decades has been most impressive and has brought about an increasing demand for feedgrain.

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Conclusions

In China, the majority of coarse grains is used as feedgrain. Coarse grains include corn, sorghum, millet, barley, oats and some other minor cereal crops. Corn is by far the most important feedgrain and some 80% of China's corn output is used for feedgrain purposes. In recent years, low quality rice and wheat have also been used as feedgrain, being approx. 6% of rice and 1% of wheat, respectively. Major users of feedgrain are located in China's south-east, east and south-west regions.

Corn production is most widely spread across China, covering almost all seasons and all regions. Major corn-producing provinces include Shandong, Henan, Hebei, Jilin, Liaoning, Heilongjiang, east Inner Mongolia and Sichuan, which together contributed to more than 70% of the national output in most years of the 1990s. Major feedgrain surplus provinces include Jilin, Heilongjiang, Liaoning, and east Inner Mongolia, which provided 60%-70% of corn supply to the rest of the country. Major feedgrain deficit regions include Sichuan, Hunan, Guangdong, Hebei, Henan, Anhui, and Fujian.

A number of projections predicted that China would import a large amount of feedgrain by 2000 and the import would become even greater after China's joining the World Trade Organization (WTO). In fact, China was a net exporter of feedgrain (as denoted by corn) in most years during the past decade. In 2002, the first year after joining the WTO, China still exported approx. 11 million tonnes of corn. China's trade volume in feedgrain varied greatly between years, largely in response to changes in the domestic market.

China exports grains due to large stocks. The government is anxious to reduce them in order to cope with the heavy burden on the fiscal budgets. China is likely to continue to export corn until the surplus is reduced to an acceptable level, as long as the world prices are high enough to allow unsubsidised export. In the longer term, China's domestic demand for feedgrain is likely to grow at a higher rate than supply. Hence China may turn gradually from its current net export to net import of feedgrain.

The amount of China's future feedgrain import will depend to a greater extent on how fast China is able to expand its animal production and China's economic growth. Assuming technological improvement in feedgrain production (elasticity of production 0.5), research and development (R&D) growth (4%) and income growth (4%) all maintain their current rates, China's demand for feedgrain and domestic production by 2010 will increase by approx. 25%-30%, depending on the size of income elasticity for feedgrain. If the income elasticity for feedgrain is 0.8, then feedgrain import will be approx. 3.7 million tonnes in 2010. The internal trade volume will be 41.6 million tonnes. The four northern provinces (Jilin, Liaoning, Heilongjiang and east Inner Mongolia) will ship out approx. 29 million tonnes of surplus feedgrain. The seven major feedgrain deficit regions (Sichuan, Hunan, Guangdong, Hebei, Henan, Anhui, and Fujian) will import approx. 30 million tonnes in 2010. If China's export of animal products to the world market increases, its demand for feedgrain import will be much larger. For example, holding everything else unchanged, with a 5% rise in animal product export, there will be an increase in imports by 2.6 million tonnes.

The sources of feedgrain imports will be mainly determined by the relative prices from different suppliers. China will import mainly corn because currently corn is the major ingredient of manufactured feed products. Import of corn in China in the 1990s was mainly from the USA, accounting for some 70%. Demand for other feedgrain, such as feed barley and wheat, is likely to be small and depends on their prices relative to those of other feedgrain.
Within China, several southern provinces (Guangdong, Fujian, Zhejiang, Hunan and Jiangxi) will be the major buyers from the world market, while the north-east region (Liaoning, Jilin, Heilongjiang and east Inner Mongolia) may supply corn to those feedgrain-deficit regions, as well as export to the nearby East Asian markets such as Japan, South Korea, North Korea, and Malaysia. Therefore, China may also compete with other major grain exporters in these markets.

China's future feedgrain demand will become increasingly linked to and affected by the international market. If substantial reforms are carried out to the current market, such as in the form of tariff reduction and removal of agricultural subsidies and export support by developed countries, China will benefit and its demand for feedgrain imports is likely to be reduced. This is because such reforms will result in higher world prices which in turn will affect domestic supply potential, though perhaps not to a great extent.

Increased consumption of animal products reduces the demand for foodgrain. Per capita foodgrain consumption in China has been declining steadily in the past two decades. The share of foodgrain in total grain consumption is also declining, while that of feedgrain is increasing.

The decline of foodgrain consumption share is projected to continue in the coming years. That is, foodgrain consumption is projected to account for 43% and 38% of China's total grain demand in 2005 and 2010, respectively. In the meantime, the share of feedgrain demand will rise from 38% in 2001 to approx. 40% and 49% in 2005 and 2010, respectively. Thus, by 2010, China's demand for feedgrain is expected to exceed that of foodgrain.

Hence, increased consumption of feedgrain may reduce the need for foodgrain which in turn may reduce China's need for foodgrain import. China's increased feedgrain import may also lead to reduced need for foodgrain import in that some resources spared from feedgrain production may be used to produce more foodgrain domestically.

No single or simple strategy will work for Australia to seize potential opportunities in China's feedgrain market. In Australia, wheat (low grade) and barley (higher protein or low grade) are two major cereal feedgrain items. Australia has comparative advantages in producing wheat and barley. However, Australia's ability and potential to produce corn as feed are very limited, confined by agronomic conditions and the relative lower returns (e.g. compared to sorghum). Currently, feed wheat and barley are more expensive than corn in the international market, especially when the US continues to provide support to the American corn producers. Furthermore, if China increases the import of feedgrain, it is likely that some domestic resources may be spared to feedgrain production, leading to a decline in foodgrain import.

Thus, the direct benefit to Australia's grains industry resulting from China's increased demand for feedgrain is likely limited, unless Australia is prepared to shift strategically to produce feedgrain at competitive prices for the Chinese market. Otherwise, China's growing demand for feedgrain will be mainly met by corn exports from the US and a few South American exporters. However, China's imports of feedgrain from the world market will lead to an increase in total demand for cereal grain worldwide. Given the fact that the resources for cereal production in a given time are limited on the planet, increased feedgrain production in one region will place greater demand for foodgrain produced in another region. In this way, Australia is likely to benefit, indirectly, from China's entering into the world cereal market through increased foodgrain export to other regions.

Australia has a good reputation in China for high quality wheat and malting barley, although it is not regarded as a stable supplier. Australia should make a continued effort to secure wheat and malting barley export to China in the future. In addition, Australia should also explore and develop the feed wheat and feed barley market in China even though its ability to supply corn to the Chinese feedgrain market is limited. Currently the Chinese use a large portion of corn (approx. 65%) in manufacturing processed feed. However, feed wheat is not inherently nutritionally inferior to corn, though there are some differences in nutritional composition. Feed wheat can be used as an important ingredient for industrial processed feed in China should the price become acceptable. In fact, feed wheat has already been used in producing industrial processed feed in China. There is also a potential market for feed barley, particularly if China increases its production of higher quality animal products.

There are also other opportunity areas in the Chinese market that Australia may be able to capitalise on, although they are not particularly related to the grains industry but more so for other industries. However, different industries tend to have different interests in the Chinese market and some of the interests are in conflict, for example, between the grains industry (exporting feedgrain) and the livestock industry (exporting animal products), and between the livestock industry and service providers (services that can help China to produce more and higher quality animal products and to compete in the international market). Such issues should be looked at by concerned industries in a coordinated manner. Both short term and...
long term benefits and costs to individual industries and to Australia as a whole should be considered.

At the international level, development of a partnership between Australia and China, where possible and appropriate, will be a useful approach to harmonise the interests of the two countries.

**Recommendations**

The direct benefit to Australia's grains industry resulting from China's increased import of feedgrain is likely limited (unless Australia is prepared to shift strategically to produce corn and other feedgrain at competitive prices for the Chinese market). However, Australia is likely to benefit indirectly from China's increased feedgrain import through increased foodgrain export to other regions.

Recommendation:
Australia should continuously monitor how China's imports of feedgrain affect the total supply of cereals from other parts of the world and be prepared to seize opportunities for increased foodgrain export to other parts of the world.

Australia has a good reputation in China for high quality wheat and malting barley.

Recommendation:
Australia should make a continued effort to secure wheat and malting barley export to China and improve its supply stability.

Feed wheat can be used as an ingredient for industrial processed feed in China. There is also a potential niche market for feed barley. Price is a key factor affecting China's demand for such feed wheat and barley from Australia.

Recommendation:
Australia may consider developing a niche market in China for Australia's feed wheat and barley (subject to Australia being able to provide a reasonably stable supply).

In the longer term, it is likely that China will transform its current animal production system into a new one that can respond to demand for higher quality and differentiated products. This may generate demand for specific feed materials needed in production of certain products.

Recommendation:
Australia may explore niche markets for some other non-grain feed materials such as feed lupins, canola meal, fishmeal, and meat and bone meal.

An extra crop (forage crop) in the rotation pattern between wheat and barley on south-eastern Australian farms helps to control weeds and prevents the development of herbicide resistance in weeds. Further, deep-rooted perennials can grow over summer and hence lower the water table, thus helping to reduce any salinity problem. However, at the moment there is no ready market for these forage crop harvests. Hay exporting helps to dispose of such harvests.

Recommendation:
Australia may consider the possibility of exporting hay products to the Chinese market in the longer term and market promotion activities are carried out to educate the potential Chinese users about the values of such products.

When tapping opportunities in the Chinese market, Australia faces strategic choices between the trade of commodities (e.g. feed and animal products) and services (e.g. technology, management, and marketing expertise). There are conflicts of interest between industries.

Recommendation:
Australia should consider both short term and long term benefits and costs to individual industries and to Australia as a whole when tapping into the Chinese market and encourage concerned industries to explore the Chinese market in a coordinated manner.

China's need for some feed materials is a long term business. There is a possibility for Australian and Chinese firms to form long term partnerships in supplying some feed materials such as hay products, feed lupins and canola meal to the Chinese market.
Recommendation:
Australia and China may consider forming a longer term partnership in supplying feed materials to China where a reasonably stable supply can be maintained by Australia.

Outcomes

Expected Outcome (benefits)

Environmental Outcomes

If an export market is developed in China for hay products, then an extra forage crop in the rotation pattern between wheat and barley on south-eastern Australian farms can help to control weeds and prevent the development of herbicide resistance in weeds. Further, if deep-rooted perennials are grown, it will help to lower the water table, thus helping to reduce the salinity problem.

Achievements/Benefits

Overview of Project Achievements

In recent years, China's demand for feedgrain has been increasingly recognised as an important issue and many believe that any future increase in total grain demand in China will be mainly caused by an increasing demand for feedgrain. On the other hand, it seems that, in the longer term, China will not be able to supply enough feedgrain with its domestic resources.

There is also a significant regional imbalance in the supply of and demand for feedgrain in China. While northeast China has a huge surplus, the relatively wealthier southeast China in contrast has a major deficit. Large quantities of feedgrain are currently shipped from northeast to south China. The market-oriented policy reforms after WTO accession may lead to notable changes in the feedgrain and livestock production and trade patterns.

As a major grain exporter, it is thus imperative for Australia to gain improved understanding of China's feedgrain issues. However, while studies on China's feedgrain market at the regional level are scarce in general, studies of this kind with particular reference to drawing implications for Australia's grains industry are virtually non-existent. The discussion which is available in studies on China's grain carried out by institutions of Australian origin is preliminary and aggregate in nature. For example, Garnaut and Ma (1992, Grain in China), while anticipating 'feed grain demand is likely to account for most of the growth in China's future aggregate demand for grain', offered no details of the feedgrain markets in China at the regional level. Discussion on feedgrain in Findlay (1998, Grain Market Reform in China: Global Implications) is also limited. This project was conducted in order to provide the Australian grains industries with greater insights into the developments and prospects in the Chinese feedgrain market, particularly at the regional level.

This project was funded by the GRDC with in-kind contribution from the University of Sydney and China Agricultural University. It was conducted collaboratively by researchers from the University of Sydney and China Agricultural University. A few researchers from other Australian and Chinese institutions also contributed to this project at the later stage.

This project was designed to:

1. Assess China's current feedgrain demand and supply situations and the potential of feedgrain production at the regional level.
2. Predict China's regional feedgrain and livestock trade patterns under various policy scenarios.
3. Examine, through simulation analyses, the impacts of different policy options on feedgrain trade within China and China's international feedgrain trade and to draw trade implications for Australia's grains industry.

The list below provides an overview of project achievements:

- Review of existing literature related to China's feedgrain issues. This review identifies the major factors that affect China's feedgrain demand and supply and pinpoints why previous studies have generated vastly different projections and why some of these projections have significantly deviated from the realised actual observations. The review thus helped to lay a solid foundation for the accomplishment of the objectives of this project.
- Evaluation of China's current animal product consumption and production development and trends. Demand for feedgrain is a derived demand. Hence, a good understanding of the source of the demand for feedgrain is crucial to
understand China's feedgrain demand, particularly the future demand.

- Identification of China’s regional feedgrain production, consumption and trade patterns. The importance of feedgrain was not recognised in China until recently. Hence, there were no adequate data on feedgrain production, consumption, and trade available at the regional level. This project pioneered construction of a feedgrain balance sheet for China which helps to identify China’s major feedgrain producers, users, importers and exporters at the regional level.

- Surveys of household animal raising practices. The majority of China’s animal products (approx. 95%) are produced by rural households. Yet an understanding of their animal raising practices is limited. The surveys conducted in several representative regions provided important parameters and information for understanding or verifying various issues in other parts of the project.

- Assessment of China’s feed industry and its demand for feedgrain. As China’s dominant small-scale household animal raising evolves into more intensive animal production, demand for industrial processed feed is expected to rise. An examination of China’s current feed industry helps to establish its use of feedgrain and various other ingredients in the production of industrial feed.

- Projection of China’s feedgrain supply and demand at the regional and national levels. Simulations were carried out to examine the likely changes in supply and demand under various scenarios.

- Regional-level feedgrain trade pattern projections. Simulations were carried out to examine the likely changes in regional feedgrain trade under different scenarios.

- Examination of China’s demand for feedgrain imports in relation to likely international agricultural market reforms. Simulations were conducted to examine the likely impacts on China’s demand for feedgrain imports should international trade reforms be carried out under various scenarios.

- Drawing implications for Australia. Likely opportunities and challenges resulting from China's feedgrain market development to Australia’s grains industry are highlighted. Whether Australia can potentially match China’s feedgrain import demand is evaluated. Possible opportunities for Australia’s other industries are also discussed.

This project has been able to provide a vast array of information about China’s feedgrain market to Australia’s grains industry and other related industries. Such information has been continuously disseminated through various means such as presentations at workshops and conferences, TV and radio interviews, and scientific papers. While the nature of this kind of market intelligence research dictates that its findings may not lead to immediate tangible benefits to the users, their availability will benefit the grains industry and some other industries in their future industrial strategic planning and international marketing activities. It is understood that some participants at the 2002 July workshop have highly regarded the outcomes of the project and found the findings very useful to them (e.g. delegates from Meat and Livestock Australia (MLA) and Louis Dreyfus Australia).

The realisation of the full benefits of the project outcomes to the grains and other industries depends on the understanding and use of them by industry personnel, which in turn rests on their awareness of these research findings. Hence, wider dissemination of the findings from this project is critical and worthwhile. The project leaders are therefore keen to work together with GRDC to deliver the information to industry personnel.

Other research

In the past decade or so, the Chinese grain economy has experienced a number of significant changes. Having enough foodgrain for China’s huge population is no longer a major concern. For the first time in history, direct consumption of grains by the Chinese has started to decline, not only in urban areas but also in rural areas. On the other hand, the use of grains for feed purposes has been on the increase. Added to this, there have also been changes in the patterns of grain production and trade within China. Southern China used to be the location of China’s major grain producing centres and grains used to be transported to northern China. This pattern, however, has been reversed in the past few decades - some northern provinces have become major grain producing regions and grains are now transported from the north to the south.

These changes pose various important questions related to the future development of the Chinese grain economy:

- Is the present abundance of the grain supply in China temporal or will it be lasting?
- How is China’s grain productivity evolving? How will China’s grain production be constrained by its limited agricultural resources?
- Will the rate of grain productivity be sufficiently high to sustain China’s own domestic grain production to offset the decrease in agricultural resources?
- How will China’s grains industry respond to changing demand for different types of grain crops?
China's joining the WTO at the end of 2001 has prompted more questions:

- How will the further opening up of the grain market affect China's grain production?
- How will grain imports affect crop composition and the regional distribution of grain production?
- Will the import of grains to China affect its long term grain production capacity and to what extent?
- How will the WTO accession affect China's international grain trade and in turn the overall international grain market?

While there is no shortage of literature on China's grain issues, studies that incorporate recent important developments and examine the many issues such as those above from a systematic perspective are scarce. Studies with up-to-date assessment on the Chinese grain economy will be useful. Such studies can look into possible scenarios of Chinese grains in the new era and their likely ramifications on China's food security and trade, which in turn has important impacts on the overall international grain trade.

Recognising the importance of continued market intelligence to feed into the grains industry, in the future, one approach of conducting research work on China's grains market is for GRDC to support PhD projects on issues that are of interest to GRDC. This approach can be most cost effective. It ensures a very high probability that the study is carried out successfully with greater research depth, due to the desire of the PhD candidates to accomplish their own degrees. In addition, this approach has the ability to provide GRDC with continued updates on developments of the Chinese grains industry and market as this can be built into the PhD program requiring the candidates to feed GRDC with the latest intelligence obtained during their course of studies on a regular basis.

Additional information

To date, a number of publications have been produced and some of them have been disseminated in various ways.

Final reports

- Feedgrains Market Development in China and Implications for Australia, a 12-page flyer summarising the project's key findings for industry personnel, 2003.

Papers presented at the 2002 July International Workshop on China's Regional Feedgrains Market

- Research Methodological Issues in Projecting China's Feedgrains Demand and Supply.
- Animal Product Consumption in China.
- China's Feed Industry: Development and Trends.
- China's Feedgrain: Production, Trade and Its Usage in the Feed Industry.
- Demand for Feedgrain in China: Implications for Foodgrain Consumption and Trade.
- Agricultural Trade Liberalisation and Development of World Feedgrains Market: Implications for China and Australia.
- Regional Feedgrains Demand and Supply in China: Possible Scenarios after the WTO Accession.

Working papers in the Asian Agribusiness Research Centre's Working Paper series (AARC WP)

Papers presented at conferences

- A spatial equilibrium model for China's feedgrain economy, paper presented at the International Conference on 'China's Economy: Confronting Restructuring, Stability and International Competitiveness', the University of Wollongong, Australia, 14-15 July 2001.

Papers published in journals


Paper submitted for publication


Posters presented at conferences


Attachments

1. China's Regional Feedgrains Market - report to GRDC.
2. ABARE Outlook paper.
3. Changing patterns of feedgrain production and marketing in China.