

CHINA'S AGRICULTURE, SMALLHOLDERS AND TRADE

**DRIVEN BY THE LIVESTOCK
REVOLUTION?**

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“They labour at ploughing in the spring and hoeing in the summer, harvesting in the autumn and storing foodstuff in the winter...all the while exposed to the dust of spring, the heat of summer, the storms of autumn, and the chill of winter...No matter how hard they work they can be ruined by floods or droughts, or cruel and arbitrary officials who impose taxes at the wrong times or keep changing their orders....some as a consequence sell their lands”.

Chao Cou (200-154BC)

Introduction

- The “Livestock Revolution” has occurred most obviously in China
- Consumption of meat, milk & eggs have grown much faster in China than elsewhere
- What were consequences for China’s agri-food trade?
- How did China’s production sector respond?
- Might China be an exporter or importer of animal products and feedstuffs in the future?

Outline

1. Review food consumption levels & patterns in urban & rural China
2. China's trade in agri-food products: livestock products?
3. Developments in China's livestock production sector
4. Policy reforms & incentives to livestock farmers
5. China's possible future as international trader in livestock products & feedstuffs

Changing Food Consumption Patterns in China

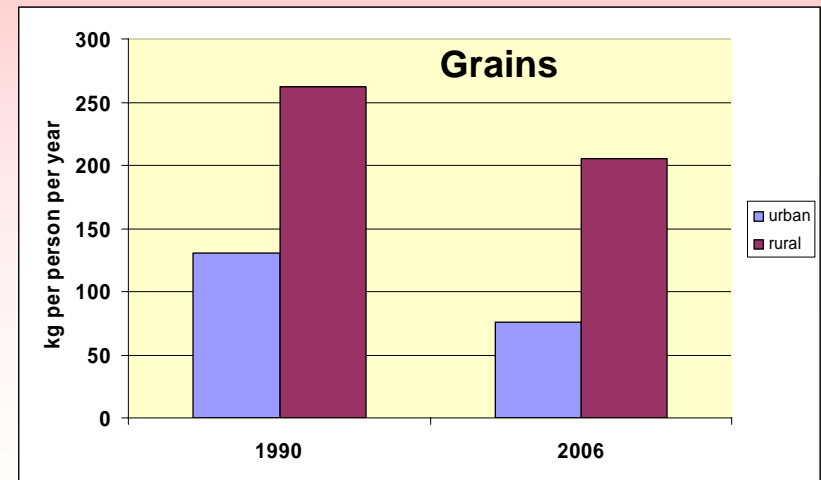
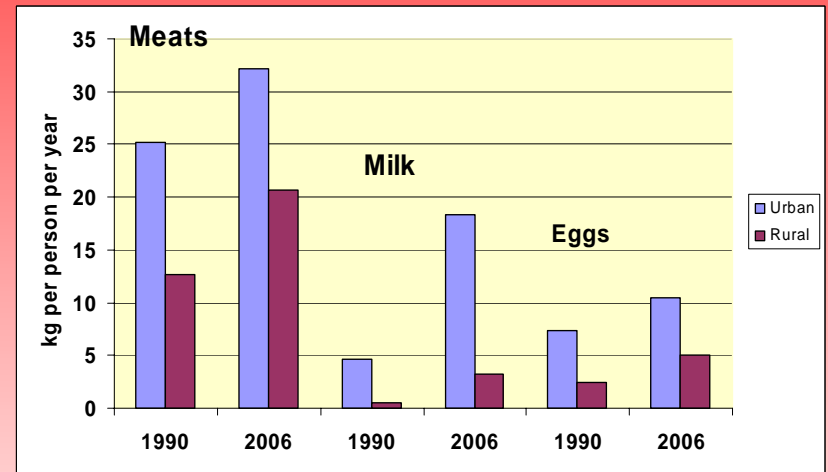
“Anything that walks, swims, crawls or flies with its back to heaven is edible”. Cantonese saying.

- Between 1992 and 2005:
China’s consumers accounted for:
 - 73% of global increase in egg consumption
 - 56% of global increase in meat consumption

Source: FAOSTAT

Rapid Consumption Increases for Livestock Products in China: (1990-2006: excludes eating-out)

- Urban & rural consumers operate in different market environments
- Rural are still 60% of population
- Urban consumption:
 - Rapid growth in dairy (296%) and poultry (144%)
 - Grains – almost halved
- Rural consumption :
 - Also rapid growth in dairy & poultry consumption



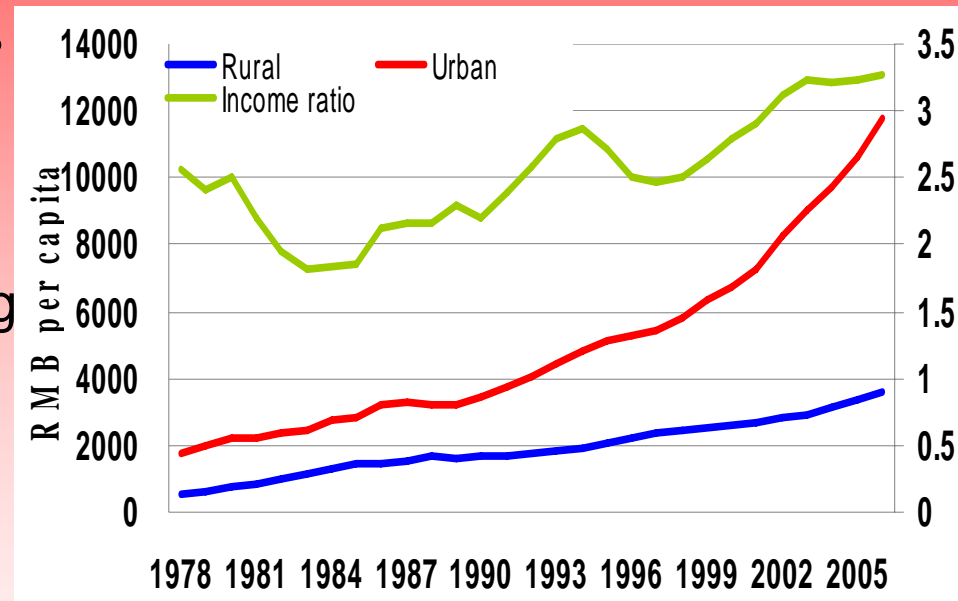
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Urbanisation a Major Driver of Livestock Product Consumption

- China's population has grown by 0.9% per year since 1990, but the urban population increased at the much higher rate of 3.5%.
- In-home meat & dairy consumption per person is higher in urban households
- Urban shoppers face greater choice – supermarket revolution – have better information (availability, nutrition) – homes more likely to have refrigerators – less need for energy-rich diets - higher incomes

Real Income Growth is Another Important Driver

- Urban real incomes have raced away from rural incomes since late 90s, as urban/rural gap widens
 - Since 1995, annual growth rates of:
 - Urban 7.9%
 - Rural 4.6%
- In China, animal products increasing their shares of food expenditures, in both urban & rural households
- Wide range of income elasticity estimates for China...but
 - Higher for animal products than staples
 - Decline over recent years as incomes rise
 - Relatively high for foods of superior quality or with desired attributes

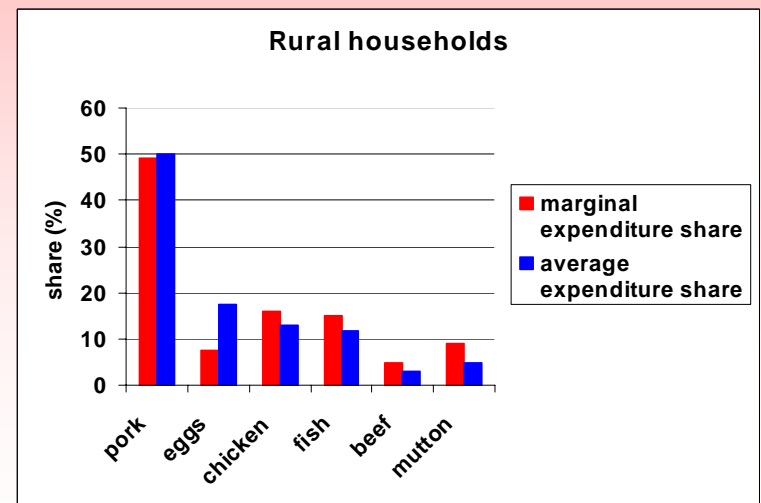
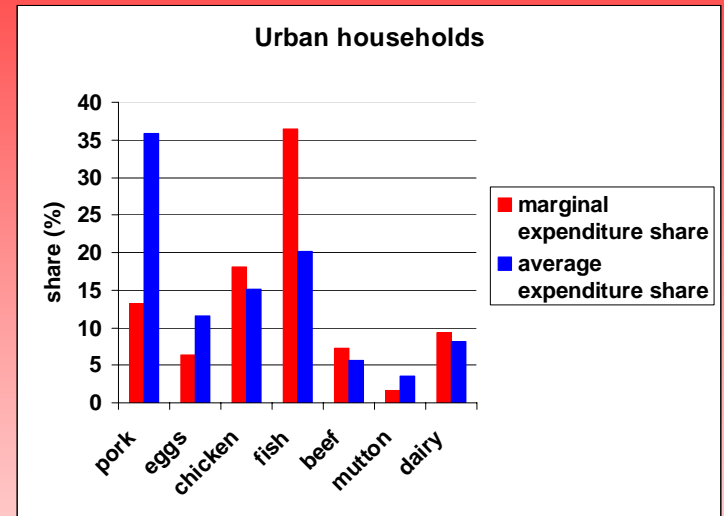


Source: Tian (2007)

Rural per capita income now similar to that of urban income around 1990

How Might Animal Product Consumption Patterns Evolve with Rising Spending?

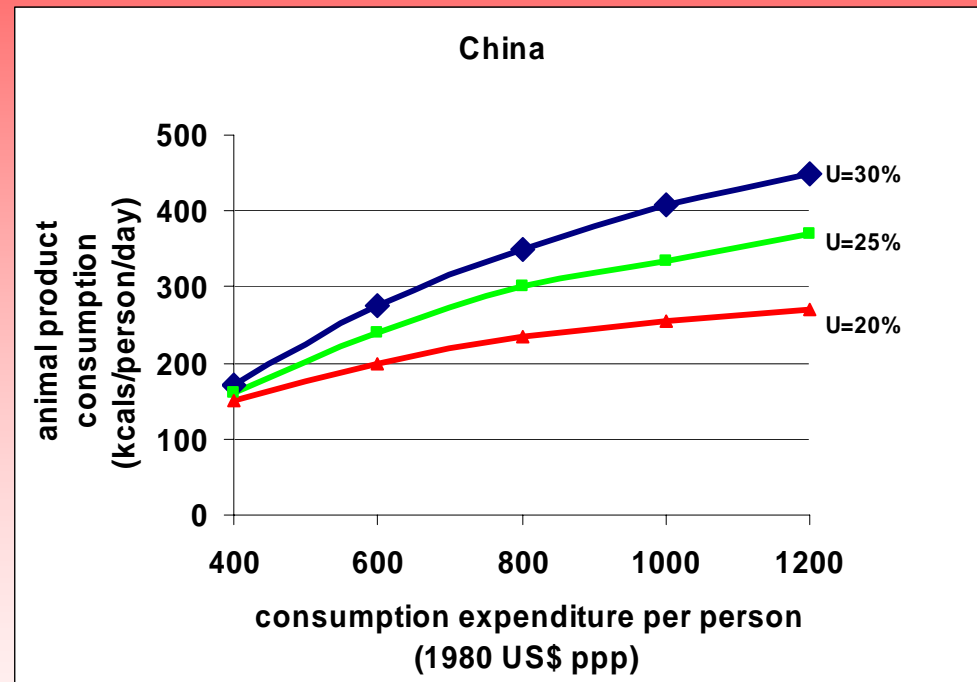
- Marginal expenditure shares (1999-2001) exceed the average shares of spending on animal products for :
 - Fish
 - Chicken
 - Beef
 - Dairy
 - And mutton in rural households
- So these products will increase their shares of spending on animal products, at the expense of pork and eggs



Source: Ma, Rae, Huang & Rozelle (2004)

Urbanisation Effect may be Stronger than that of Income Growth

- Urbanisation has a positive & significant effect on demand for animal products after controlling for price & income
- Urbanisation elasticity = 0.90
- Expenditure elasticity = 0.68
- The consumption response to marginal increase in expenditure is positively related to level of urbanisation (U)



Source: Rae (1998)

Away-from-home Consumption Booming in Urban Locations

- Urban consumers spent 9% of food expenditures away-from-home in 1993 but rose to 21% by 2005
 - Implies higher AFH consumption of livestock products (ice cream, pizzas, restaurant meals etc.)
- Driven in part by urban income growth:
 - 1% rise in urban household income generates a 1.74% increase on food spending outside the home
 - and a 0.98% rise in spending on meat away-from-home
- Household survey data can be very misleading for livestock products consumption, as doesn't accurately include AFH purchases
 - and biased downwards, especially for urban households

Sources: Tian (2007); Ma, Huang, Fuller & Rozelle (2006).

China's Agri-food Trade

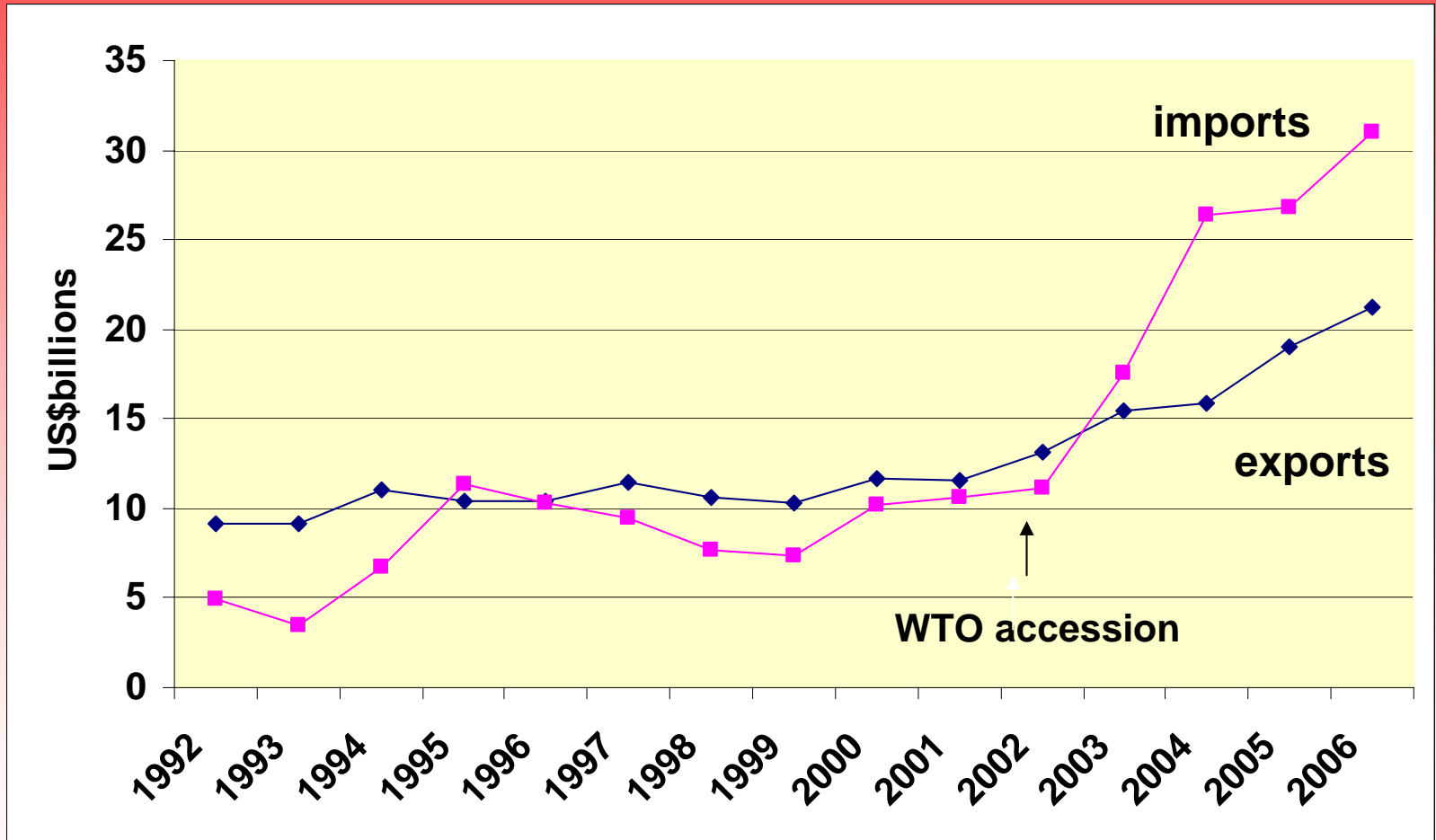
“We possess all things. I set no value on objects strange or ingenious, and have no use for your country's manufactures”

Emperor Qian Long (1736-1795) in a letter to the King of England.

A Perspective may be...

- That rising affluence and urbanisation in China has driven:
 - changing food consumption patterns
- Which in turn were drivers of
 - rising imports of protein-rich and value-added foods, including livestock products, largely from the developed world.
- **Is this the reality?**

China's Agri-food Export Growth has Increased, but Imports have Raced Ahead

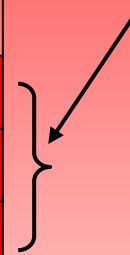


- China is now world's 4th largest importer and 5th largest exporter of agri-food products

Huge *Import Surge* 2002-2006 – What was Imported??

Commodity	Change 2002-2006	Share of change
	US \$million	%
All agri-food	19,848	100
Soybeans	5,006	25.2
Cotton	4,687	23.6
Natural rubber	2,335	11.8
Processed food other than dairy & meats	1,871	9.4
Palm & soybean oil	1,754	9.2
Horticulture	958	4.8
Raw hides & skins	727	3.7
Animal feeds	526	2.6
Wool	445	2.2
Cereals	339	1.7
Dairy	329	1.7
Meats	56	0.3

Just 3 commodities explain 60% of agri-food import growth



41% of the import growth demanded by non-food industry (Cotton, rubber, hides & wool)

ALL livestock products had a share of only 7.9%

- Livestock products have made only a very small contribution to China's post-2002 agri-food import boom
 - Meats & dairy account for just 2% of that growth
- But the livestock sector makes its presence felt through feedstuffs imports
 - 28% of import growth is soybeans and other feedstuffs
- Suggests China has been able to meet increased demands with local livestock production, along with increasing feeds imports
- Perhaps China is exporting livestock products?

Commodity Composition of China's Agri-food *Export* Growth: 2002-2006 Expansion is a Horticultural Story

Commodity	Change 2002-2006	Share of change
	U\$million	%
All agri-food	8,155	100
Fresh Horticulture	2,623	32.2
Processed horticulture	2,024	24.8
Meats	652	8.0
Beverages	493	6.0
Miscellaneous edible processed foods	450	5.5
Preparations of cereals etc	407	5.0

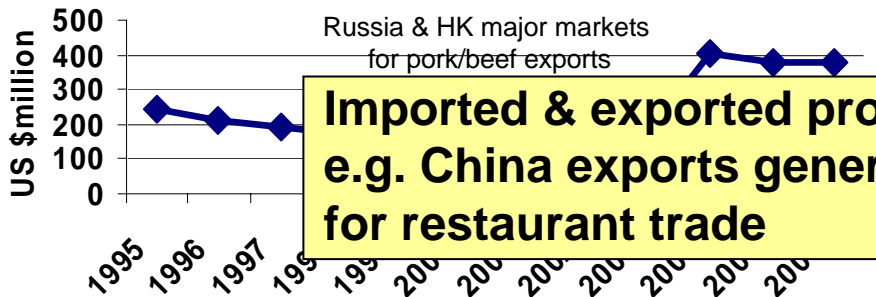
← **57% of export growth due to horticulture**

ALL livestock products had a share of 13.5%

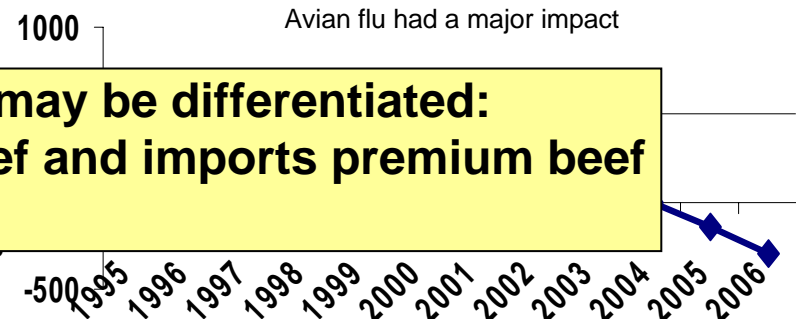
China is a Net Exporter of Meats, with a Trade Balance of US\$1.3 billion.

But in Dairy: Net Imports are Exploding from \$30m in 1995 to \$465m in 2006

Pigmeat trade balance

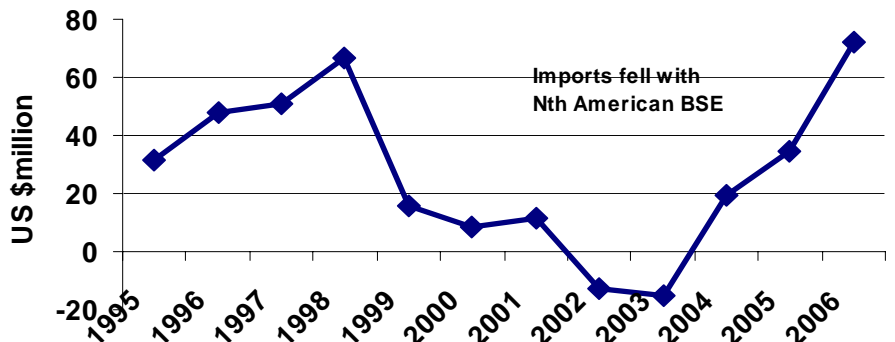


Poultry meat trade balance

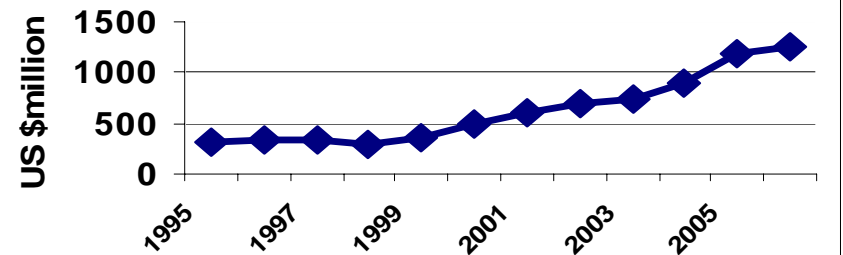


**Imported & exported product may be differentiated:
e.g. China exports generic beef and imports premium beef for restaurant trade**

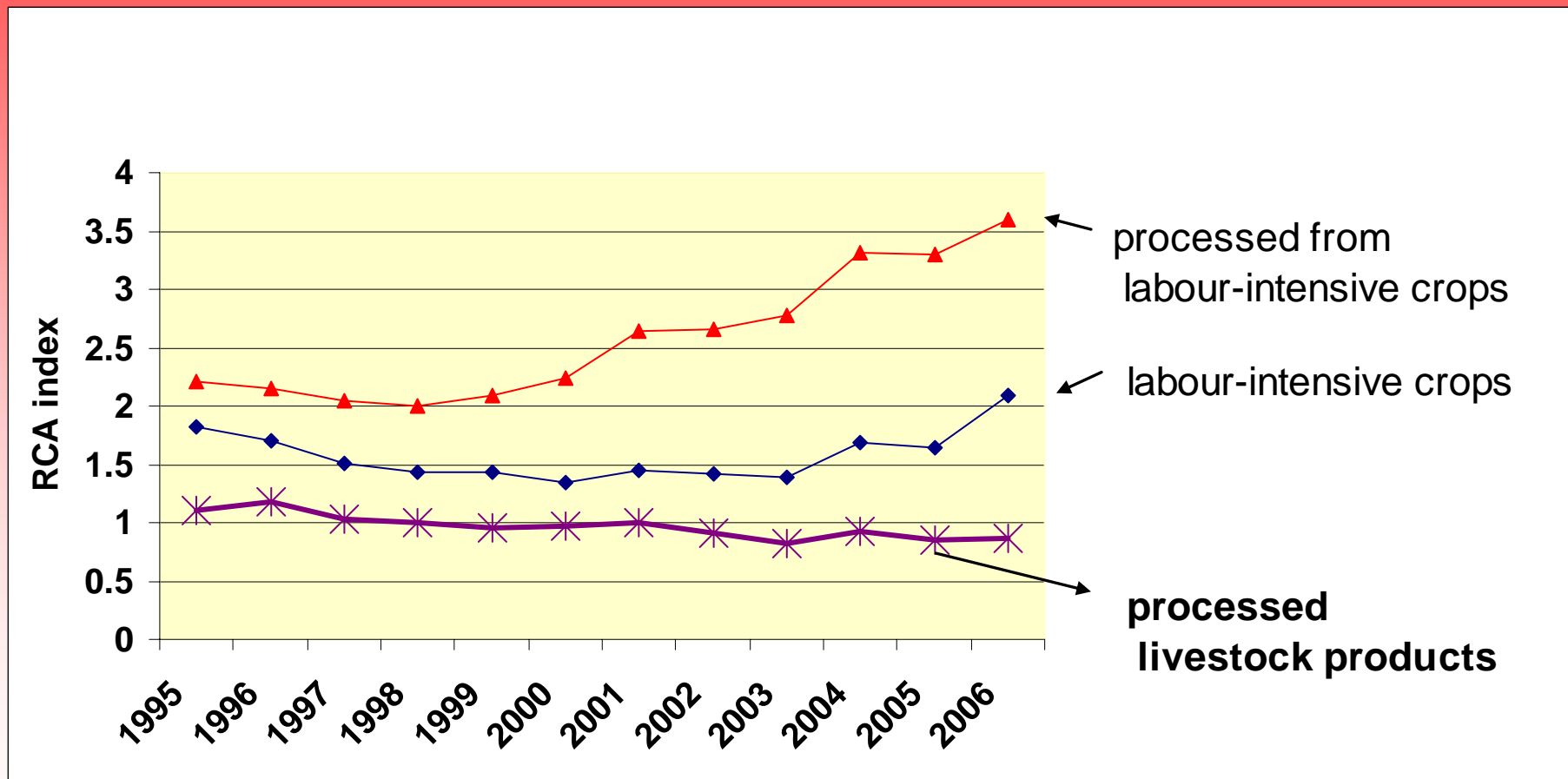
Beef, sheep & goat meat trade balance



Trade balance: prepared/preserved meats



Comparative Advantage in Livestock Products Trending Down



What's Been Driving China's Agri-food Imports?

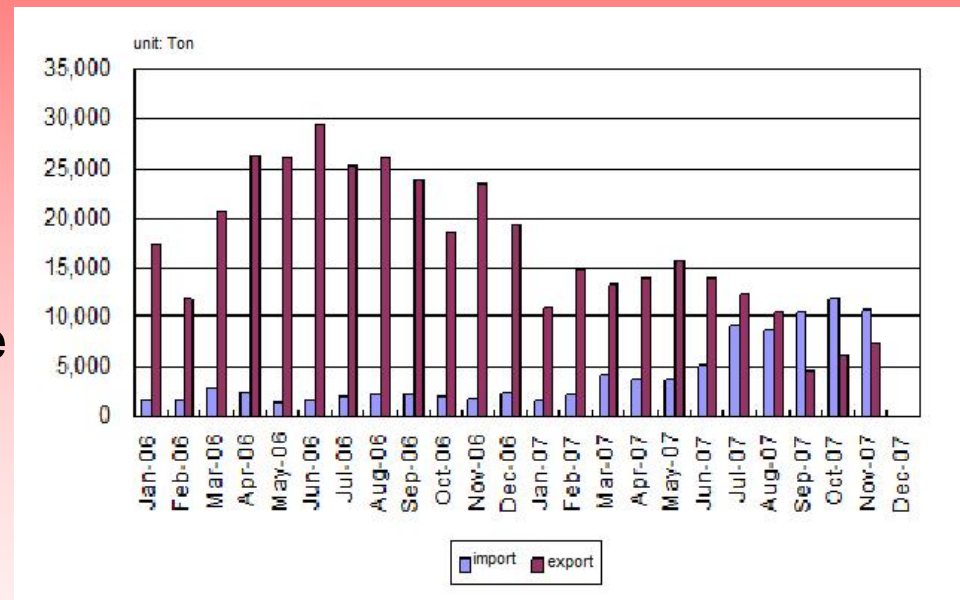
- Livestock revolution? demands for protein feedstuffs
- WTO accession – China's agricultural tariff cuts?
 - Average agricultural tariff cut from 45% in 1992 to 33% (1997) to 18.5% (2002) and 15% (2005). Most action well before accession date
 - Anderson projected only “modest” import impact of accession, equivalent to 1% annual imports
- WTO accession: part of TRQs opened to private traders: concerns crops rather than livestock products

- WTO accession: inwards FDI?
 - Liberalisation of FDI into pillar industries
 - Inwards FDI grew 8.5% p.a. 2002-2006
 - Compared with -0.4% p.a. 1997-2001
 - Contributes to industrial & construction growth
 - E.g. 2 million vehicles made before 2000, 6 million by 2005
- Removal of MFA quotas?
- Agri-food import surge driven by China's industrial growth and general reforms
 - Rather than by agricultural reforms

Recent Impacts of Biofuels & Pig Disease

- High global maize prices
 - encouraged higher exports from China: up 85% in 2007 vs. 2006
- Wholesale pork price up 86% over last year
- Food price inflation: export taxes & quotas on maize & some other crops
- Pork import growth in 2007
- And Exports down
- But still net exporter of pork in 2007
- 2008? BOABC predicts 200,000 tonnes imports

•Monthly Import and Export of Pork in China - 2006-2007



- Source: Weekly Report of Chinese Livestock and Feed, BOABC

Agricultural and Livestock Policy Reforms

- *“What are the real conditions among Chinese farmers?....nine out of ten farmers do not own their fields...of the food produced in the fields...only 40% goes to the farmer...if the food raised in the fields all goes to the farmers, the farmers will be more eager to farm and production will increase...unless we can solve the agrarian problem there will be no solution to the livelihood problem...”*

Livestock Policies in Early Years of the Republic

- Households selling in loosely-controlled markets (as is case now)
- Supply couldn't match demand growth & rising prices encouraged State intervention:
- State institutions monopolised livestock marketing from 1953
 - Managed supply & marketing of livestock products.
- State assigned targets to farmers and set prices at which State purchased
 - State bought 92% of pigs in 1957 (12% in 1953)
- Egg industry under State control by 1961
- State made all cattle purchases from 1961

But of Most Relevance are the Post-1979 Reforms

“White cat, black cat – either will do as long as it catches mice”.
Deng Xiaoping (1904-1997).

- Early 1980s: commune system gradually replaced with the Household Responsibility System.
- Farmers could sell surplus produce in free markets to increase income & diversify
- Policy focus shifted from cheap food to support urban development – to food grain security.
- Production & distribution gradually decentralised



Some Policies Specific to Livestock

- By 1984- State institutions completely monopolised meat production & distribution
- From mid-80s govt. began to decentralise production & distribution
 - Gradually liberalised fruit & vegetable markets, followed by fisheries, livestock & oilseeds
 - Quota systems abolished
 - Urban & rural free markets rapidly introduced
 - Most non-grain products liberalised by early 90s.
- The Vegetable Basket Program
- Govt. encouraged development of intensive feedlot livestock operations since late 80s. Some suffer from high costs, environmental concerns and instability of input/output prices – lack

Livestock & Feedstuffs Production: Taxed or Protected?

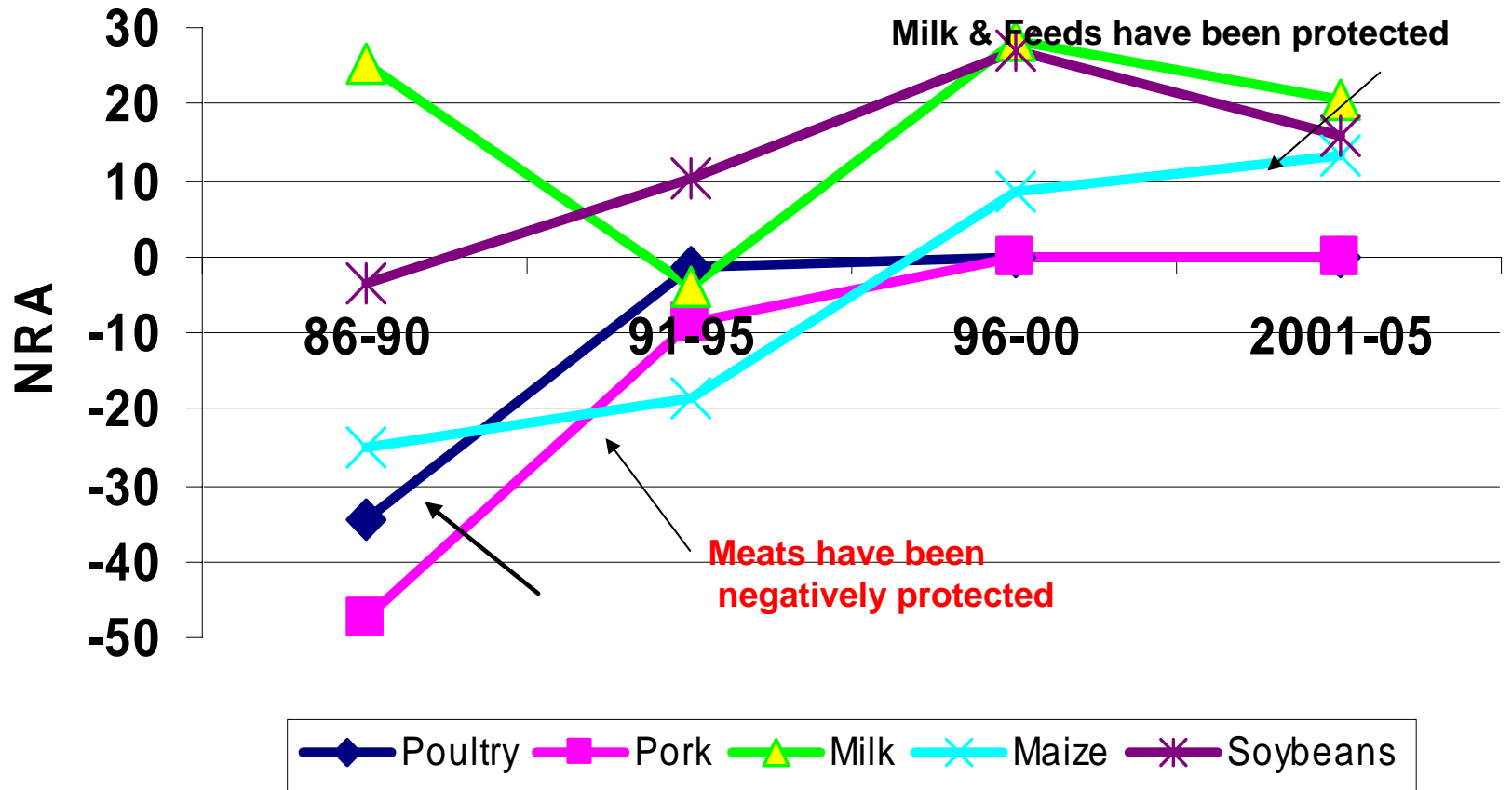
“Peasant families have long had no surplus of food. Even in a year of abundance they have to eat the chaff of the wheat. This evil is the result of surtax collections...If they abandon the land...they have no better way of making a living; if they keep it, the whole product yielded is not enough to pay the land tax”.

**Memorial at the end of the reign of Tao Kuang
(1821-1850)**

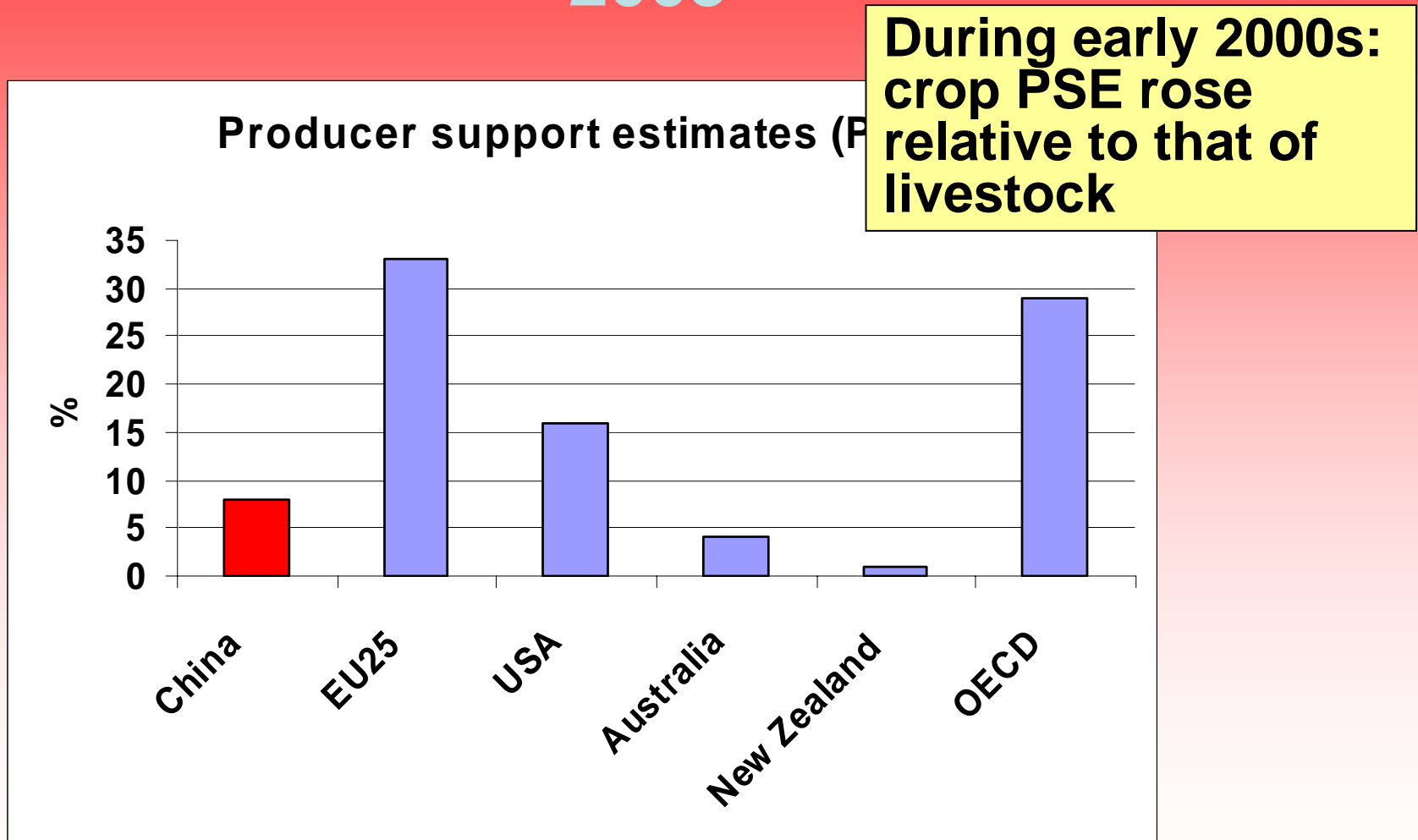
Trends in Livestock and Feeds Protection

- Direct taxation of agriculture has a 2000 year history in China – but abolished by 2006
- Grain procurement policies kept grain prices below world levels till mid-1990s.
- Since then has been positive nominal rate of assistance (NRA) for maize
- Liberalisation of soybean market saw NRA fall sharply since late 90s, but still positive
- Pork & poultry prices have since risen much closer to world levels over last decade but still below world prices due to foreign import barriers.
- Milk still protected – has been for much of the post-reform period
- Double-taxation of livestock producers

Nominal Rates of Assistance: Livestock products & feeds



China's Producer Support Very Low Compared with Developed Countries: 2005



China's Livestock Production Sector

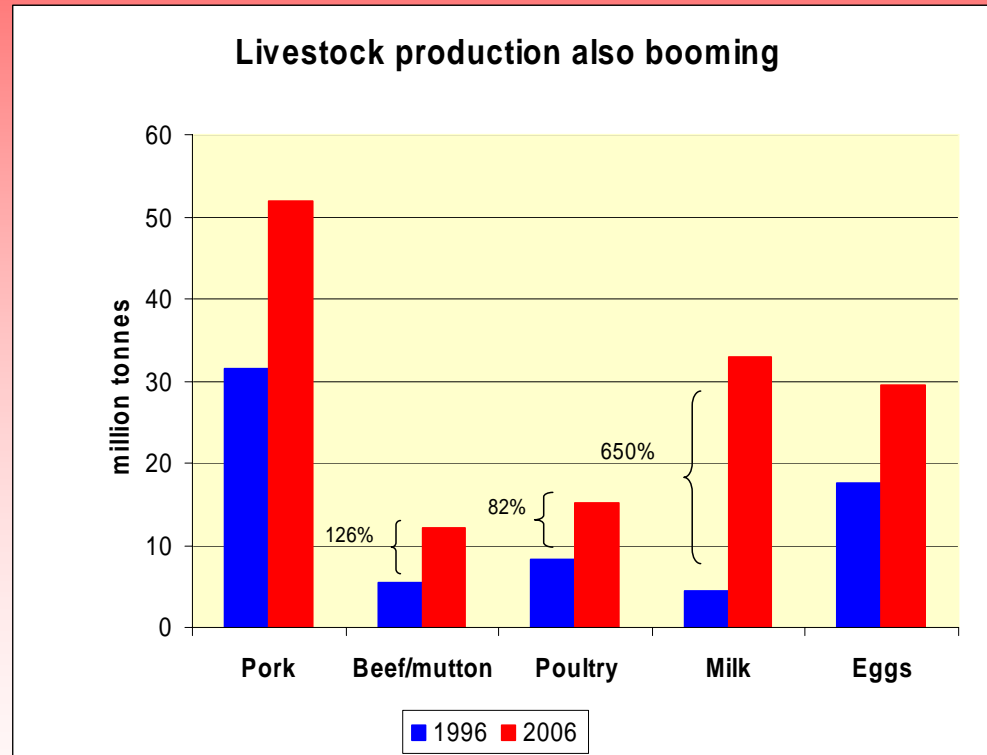
“A horse cannot gain weight if not fed with extra fodder during the night; a man cannot become wealthy without earnings apart from his regular salaries”.

Chinese proverb.

- Livestock products haven't been a major feature of China's recent trade growth
 - So rise in consumption met domestically
- 50% of world's meat production growth between 1992 and 2005 arose in China
- Livestock's share of value of China's agricultural output rose from 26% in 1990 to 32% in 2006

Like Consumption, Livestock Production has also been Booming

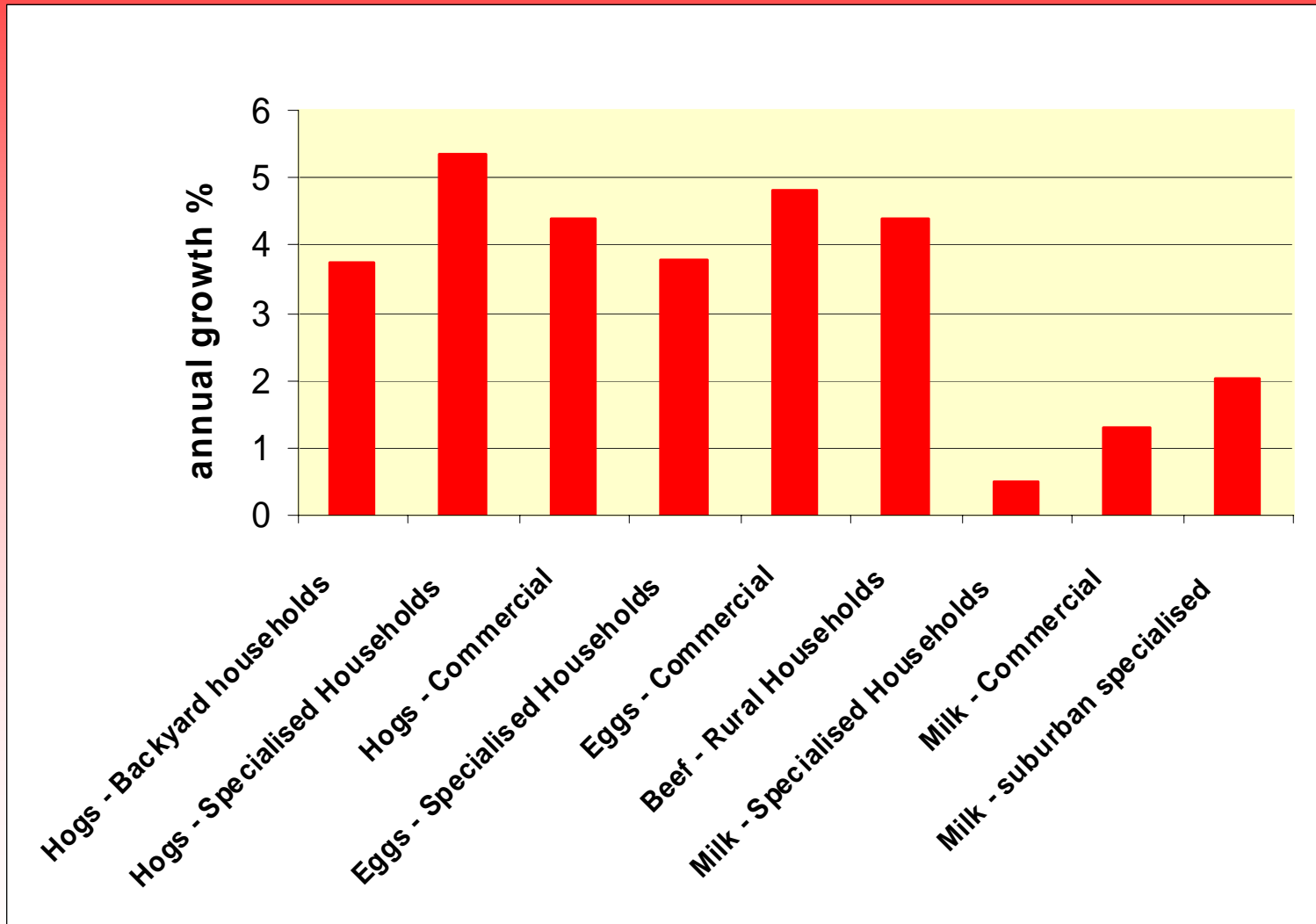
- Over past decade production of meats, milk & eggs in China all increased rapidly – some more than doubled
- Increased output achieved primarily through increases in animal numbers.
- But productivity growth also played a role



Livestock Production in China is Mainly Smallholder, Part-time

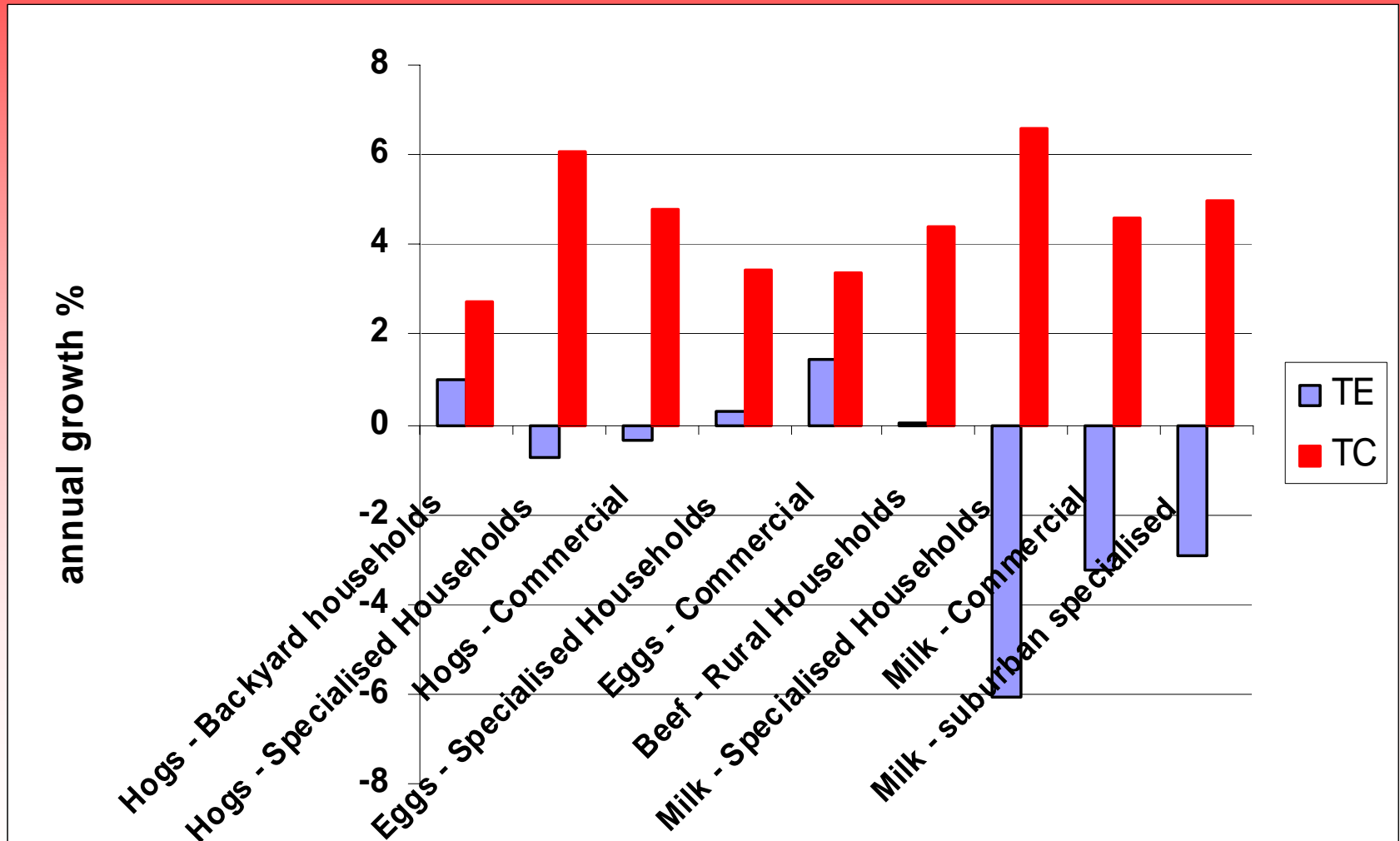
- Smallholders raised:
 - 73% of hogs
 - 82% of cattle
 - 60% of poultry
 - 73% of sheep
 - 65% of dairy cattle in 2003.
- Millions of smallholders dominate production
- For most smallholders, significant proportion of household income comes from other than livestock
- But recent structural changes:
 - Decline in proportion of rural households that raise livestock
 - Emergence of specialist household producers and
 - commercial large-scale units, especially in suburban areas

Rapid Productivity Growth in China's Livestock Sector during 1990s

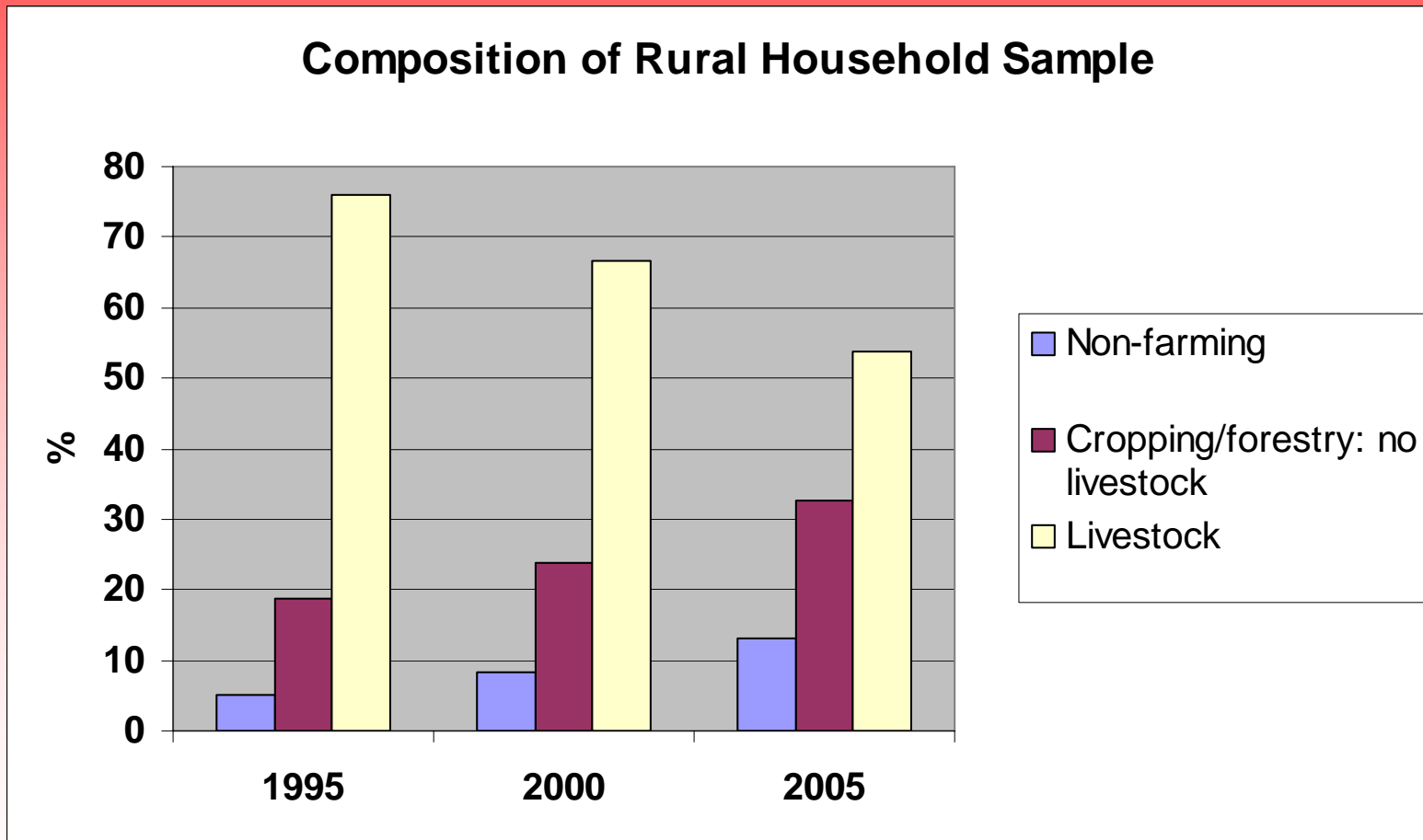


Source: Rae, Ma, Huang & Rozelle (2006); Ma, Rae, Huang & Rozelle (2007)

Rapid Frontier Growth but Little Catching-up



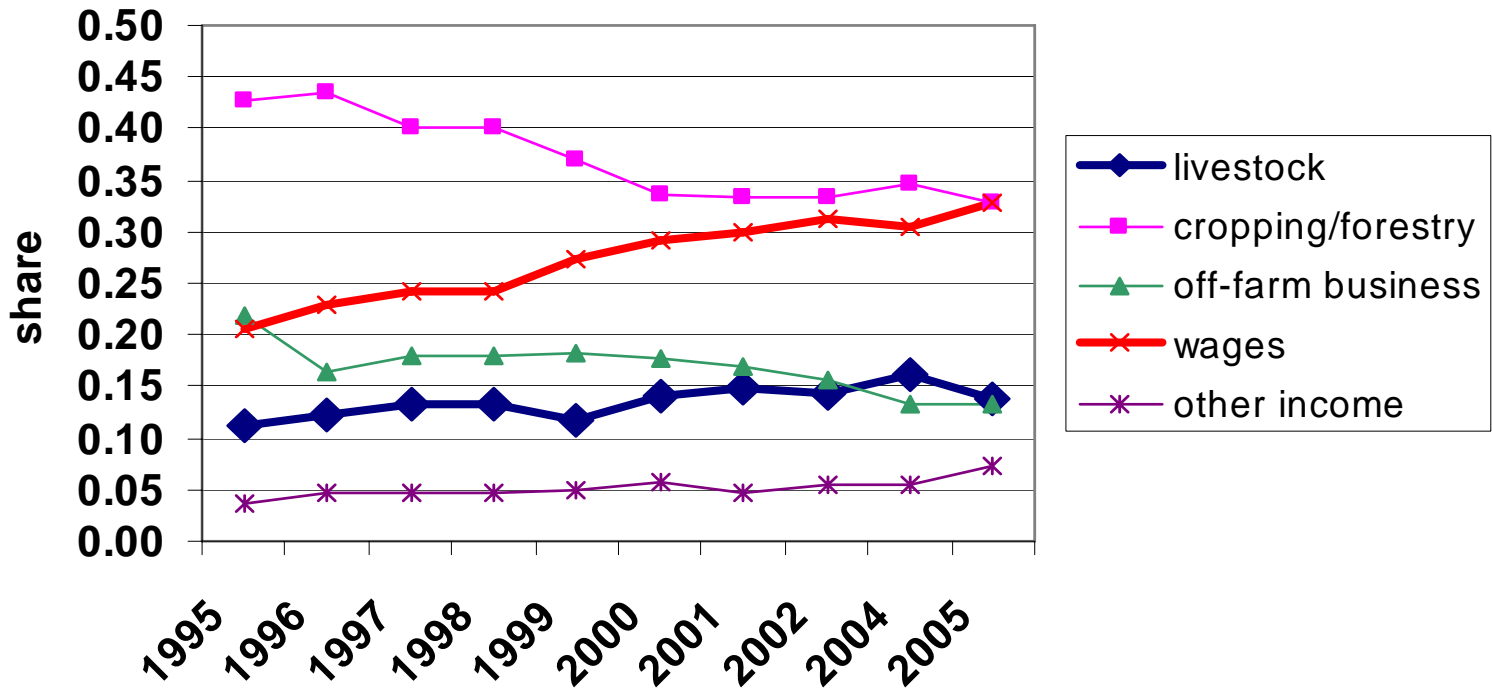
Proportionately Fewer Rural Households are Raising Livestock



Source: RCRE rural household surveys

... Off-farm Work is Becoming Increasingly Important

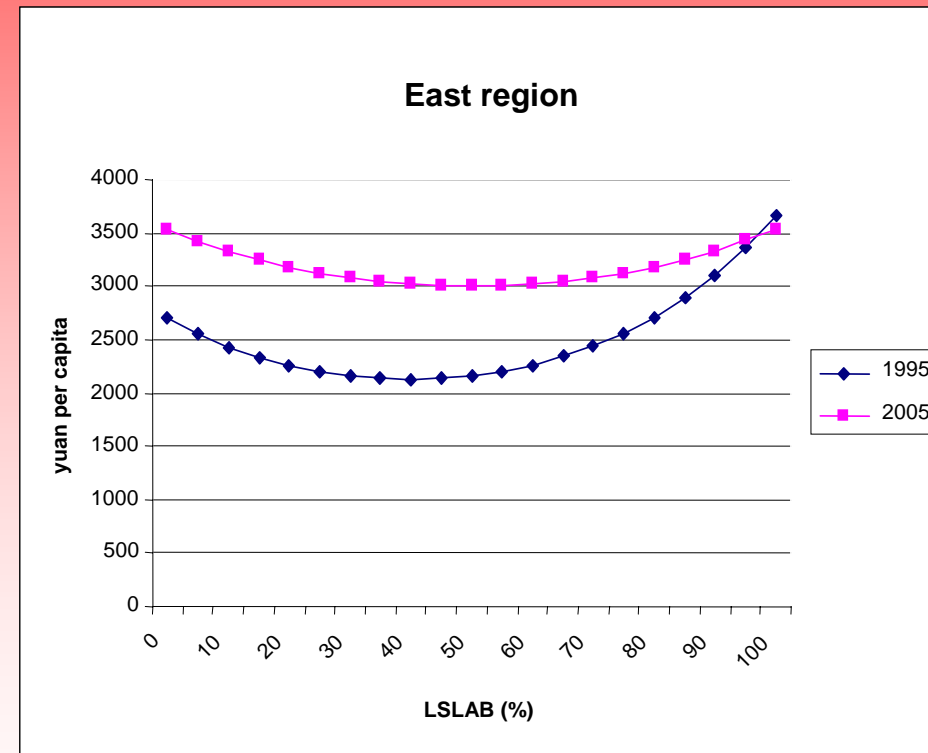
Livestock rural households: Composition of real income



Source: RCRE rural household surveys

Both Decreasing & Increasing Livestock Specialisation Contributes to Rising Household Incomes

- Tested by regressing household net income per capita on a measure of livestock specialisation
- Measured specialisation as share of the household's labour that they allocate to livestock raising
- For most of sample, predict higher incomes if allocate labour away from livestock—except for very specialised households especially in the East



The 'Rise & Fall' of Backyard Hog Production

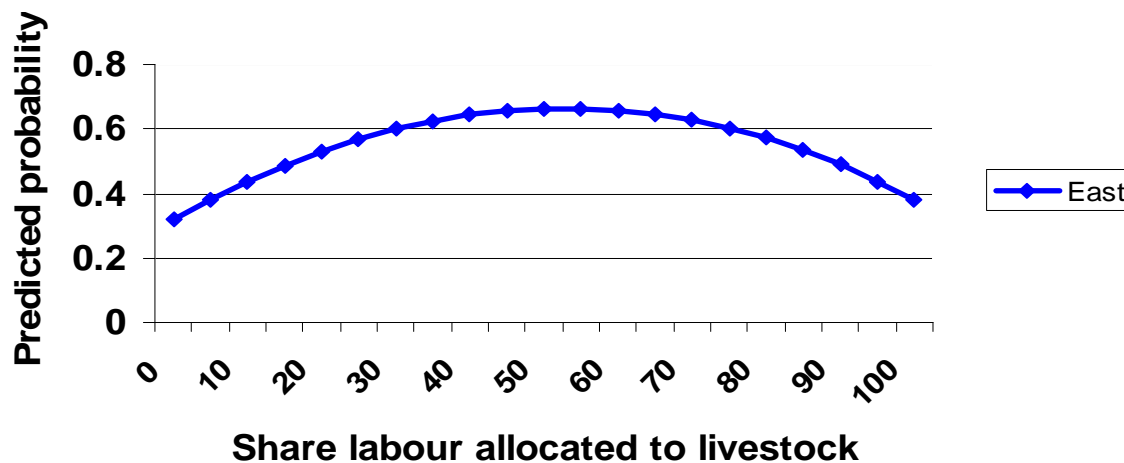
- Backyard hog production had been growing in poorer inland areas over last two decades
- but contracting in richer inland & coastal provinces
- Chen & Rozelle (2003) say emergence of efficient grain markets inland facilitates hog production
- Improved labour markets in coastal regions increases opportunity cost of farming and encourages exit
- They use RCRE data to support notion that poorer households increase livestock production, but decrease this activity once reach certain income level

Over Past Decade Many Rural Households Have Given Up Livestock Production

- Unstable livestock markets during 1990s
 - Over-supply & price corrections: e.g. eggs, beef & pork
 - E.g. hundreds of thousands of households quit beef production in the late 1990s (Waldron, Brown & Longworth 2003)
 - Impacted more on specialised than diversified households
 - Due to greater risk exposure and dependence on commercial markets for inputs such as feed (Longworth, Brown & Waldron 2001)
 - Insurance against livestock risks not well-developed in China
- Examined with a logit model
 - Explain the exit/stay decisions between 1996-2005 using livestock specialisation & other characteristics

Predicted Probabilities of Remaining in Livestock Farming were Lowest at Very Low AND Very High Levels of Specialisation.

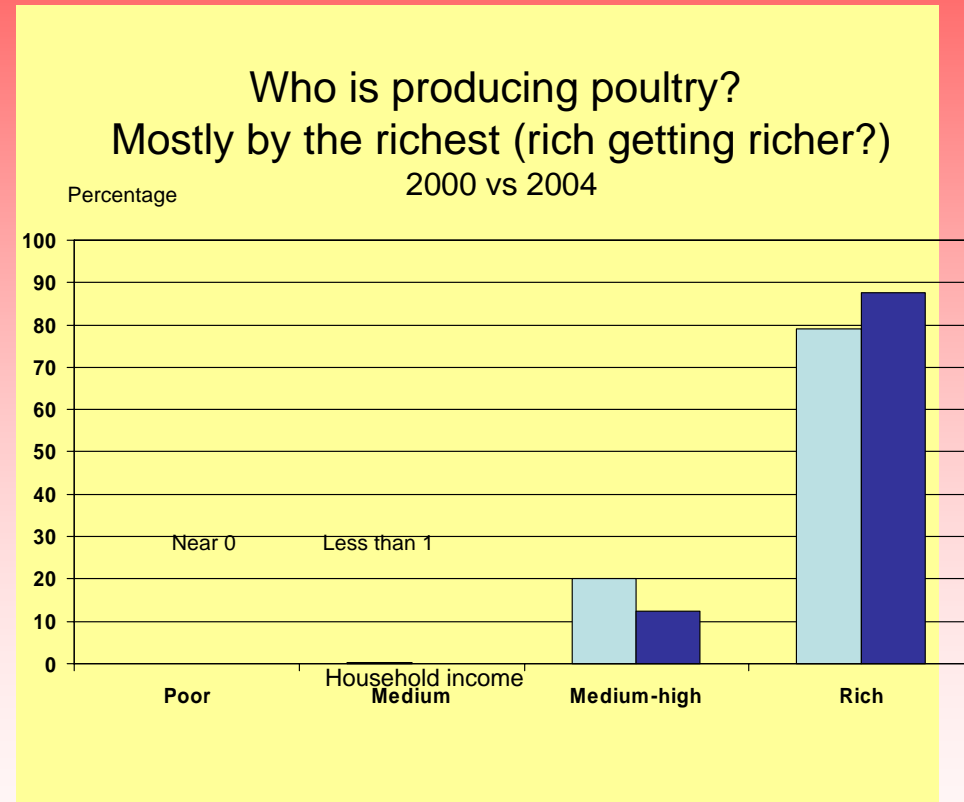
Predicted probability of remaining in livestock production between 1996 & 2005, by livestock specialisation



Specialised cattle-raising households found to be more profitable than diversified households under normal market conditions, but reverse found to apply when markets are adverse (Longworth, Brown & Waldron 2001)

Development of Modern Supply Chains : a likely reason why highly-specialised livestock households in the East earn high incomes

- Others (e.g. Reardon et al. 2004) find that these developments benefit richer & larger farmers.
- In China find this may be the case with poultry producers in the East, where modern supply chains are most developed
 - But not for hog producers who make greater use of traditional markets



Source: Bi (2007)

Looking Ahead

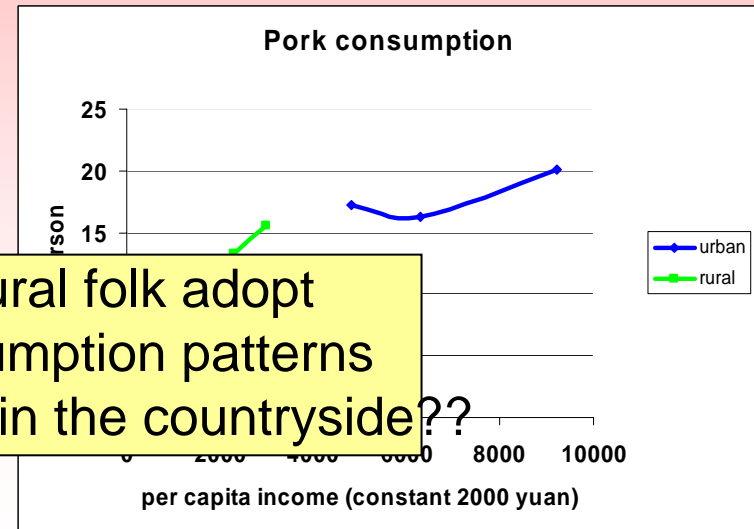
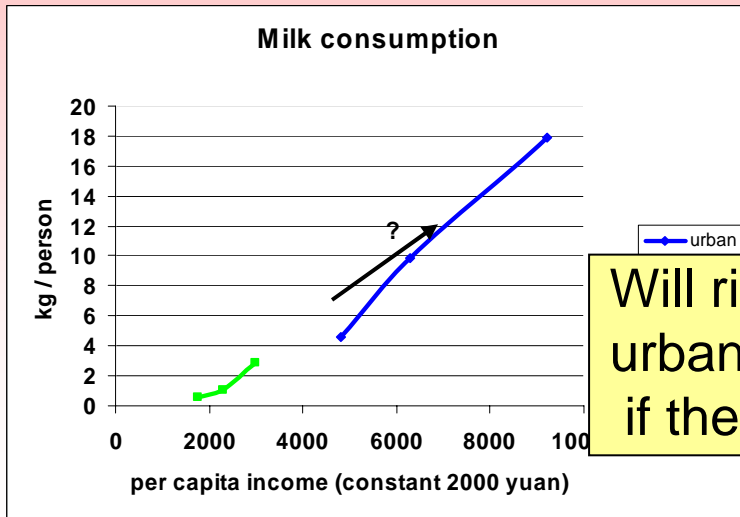
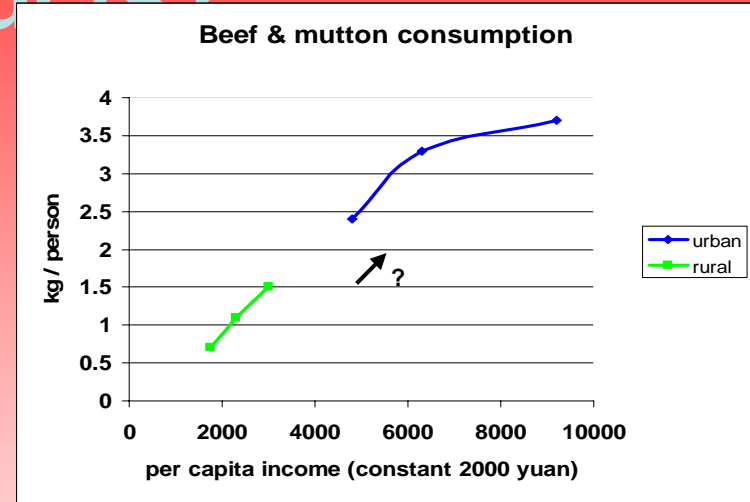
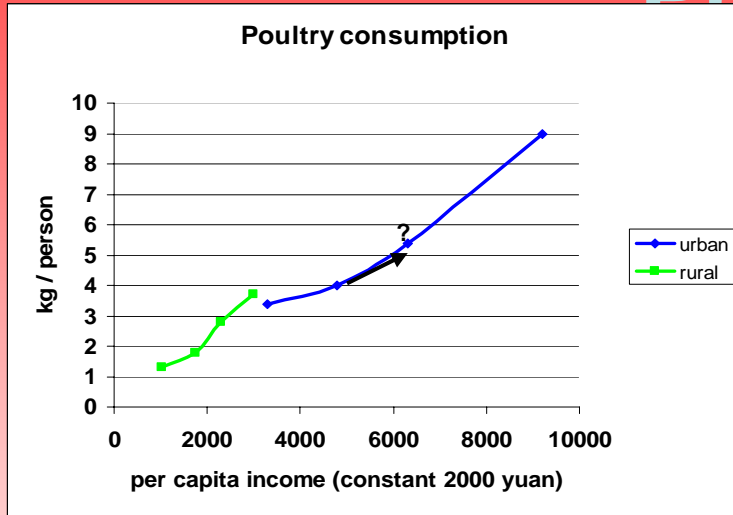
*Consider the past and you
shall know the future.*

Chinese Proverb

China's Demand for Livestock Products: Will it Continue to Grow?

- What will happen to income growth in China?
- Possible slowdown in GDP growth may have less impact on consumption growth if:
 - Consumption can take a larger share of GDP
 - Govt has an objective of strengthening domestic consumption as a major source of growth
- Closing the gap by increasing rural incomes is a key to increasing consumption of livestock products
- Government has objectives of developing rural society

What is the Scope for Higher Rural Consumption of Livestock Products?



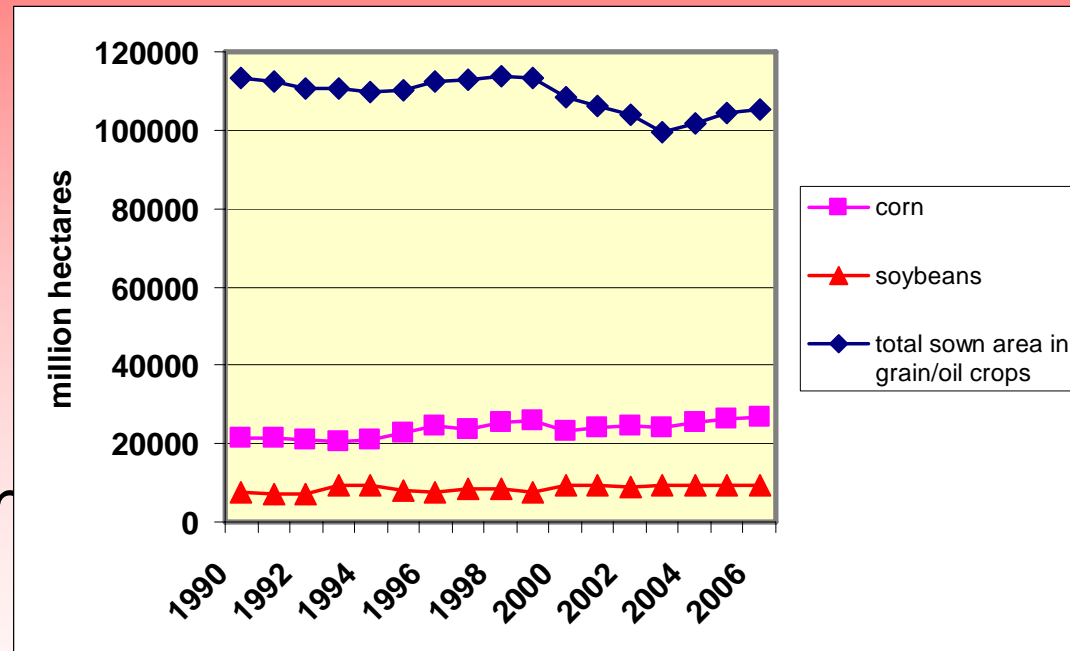
Will richer rural folk adopt urban consumption patterns if they stay in the countryside??

Feeding the Livestock

- Up to now rapid growth in demand for feedstuffs has helped drive China's agri-food trade into deficit
- This despite considerable growth in domestic feedstuffs production
 - Encouraged by maize subsidy program & those of the 'soybean rehabilitation program'
- China is world's leading soybean importer
- But remains a net exporter of maize

...against a Backdrop of Tight Land Constraint:

- Soybean area rose 23% between 1990-2006
 - Maize area rose 26%
 - Over the same period output rose by more
 - Maize 50%
 - Soybean 45%
 - BUT Maize TFP growth declining:
 - 6.2% 1979-85
 - 2.4% 1985-95
 - 1.7% 1995-04
- Source: Rozelle 2007



When Might China Become a Net Importer of Coarse Grains?

- For some time, researchers have predicted this
- , OECD (2005) projected coarse grain imports of 12 mt in 2006
- Actual (Comtrade) was *exports* of 3.11 mt, and net exports of 0.88 mt in that year
- Feedgrain demand growth may slow if China increases efficiency of feed use, and emphasizes poultry rather than pigs in production, & as production growth of both these slows down
- In 2006 further use of maize in ethanol prohibited
- Government controls over maize exports
- Large-scale maize imports doesn't seem to be on horizon

How Might Bio-fuels Impact on China's Feedstuffs Supplies?

- Should grain & oilseed prices continue to escalate – livestock farmers will look to alternative feedstuffs
- These include by-products from biofuels industry
- China targeting sweet sorghum for bio-ethanol: co-products (crushed stover and stillage) projected to reduce China's protein feed imports by 21% by 2030 (Simpson 2007).
- So growth of soybean imports may slow
- Might this also provide boost to smallholder livestock production with its emphasis on local feedstuffs and water?

Meeting China's Growing Livestock Product Demands: Imports of Feed or Final Product?

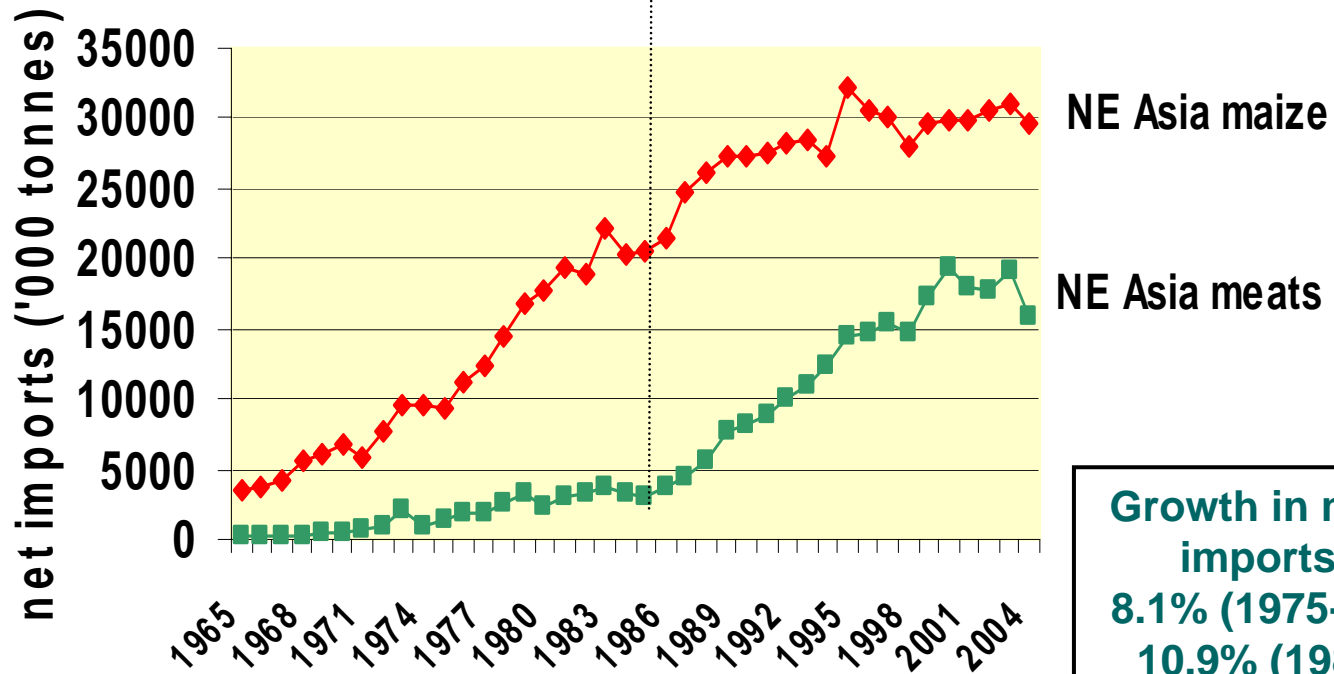
- In NE Asia, increased demand for meat was met from domestic production and feed imports – once supply constraints bite, imports of livestock products took over.
- But China has met growing demand largely from domestic sources
- As land, water & environmental constraints are approached, might feed imports be replaced by those of final products?

Net Imports of Maize vs Meats

(grain equivalents)

NE Asia = Japan, Korea & Taiwan

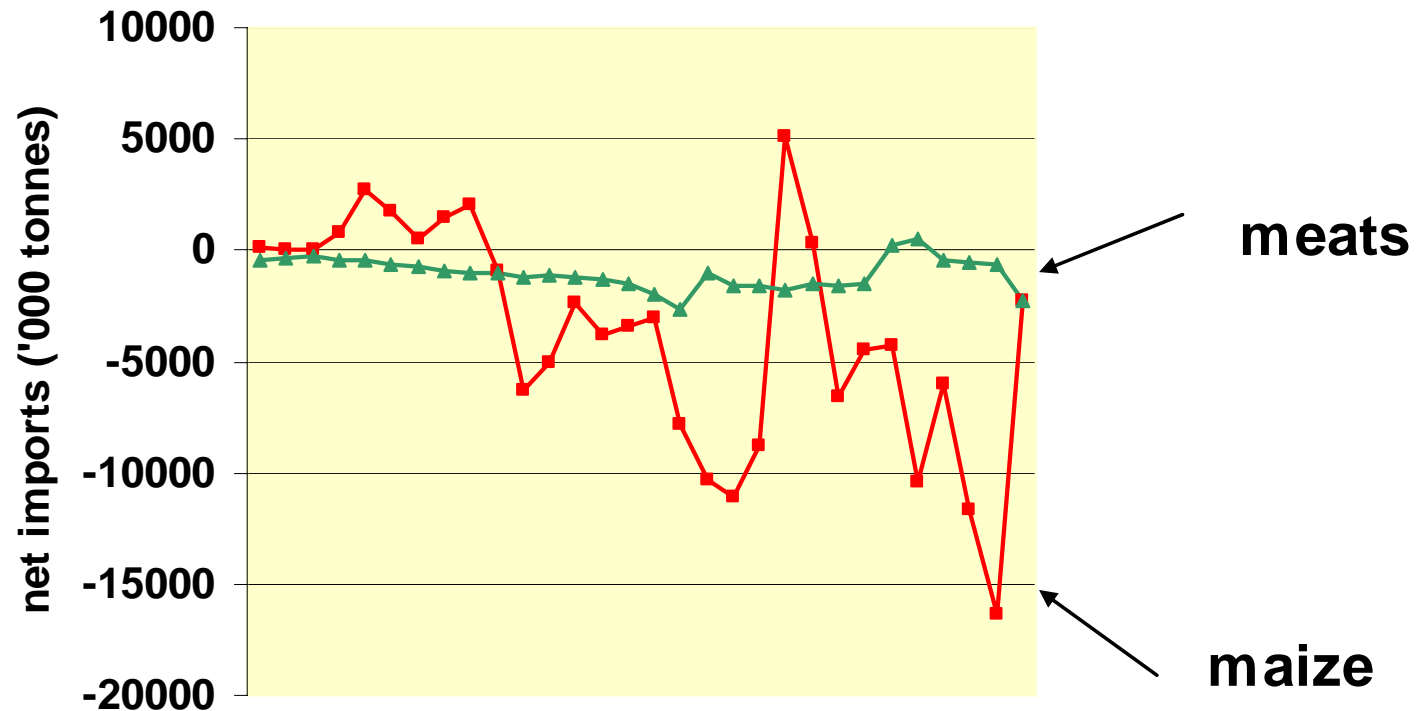
**Growth in maize imports:
7.9% (1975-85); 1.7% (1986-2000)**



**Growth in meat imports:
8.1% (1975-85);
10.9% (1986-2000)**

But China has been a persistent net exporter of meats & maize

• In 2005, 2006, China's net exports of maize : 8.6 and 3 mt

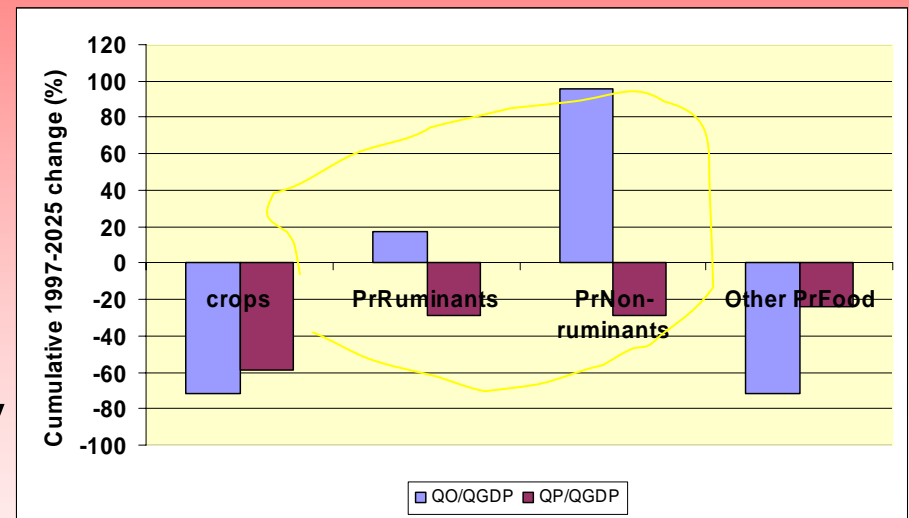


Recent Research Project Linking Agri-food Trade Projections with (*inter alia*) livestock productivity growth & convergence

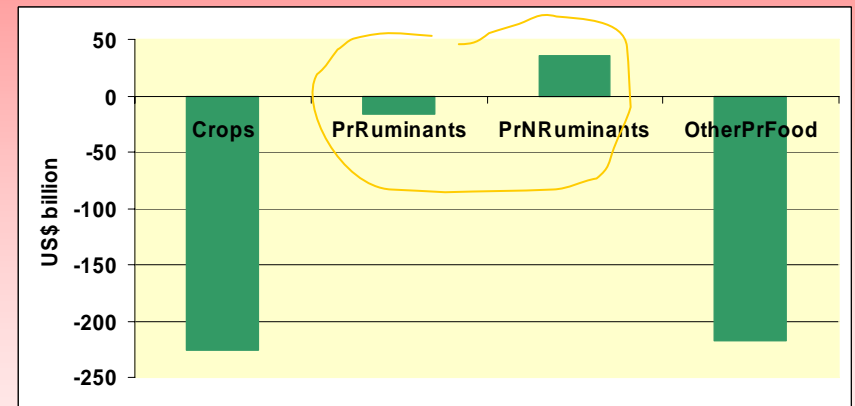
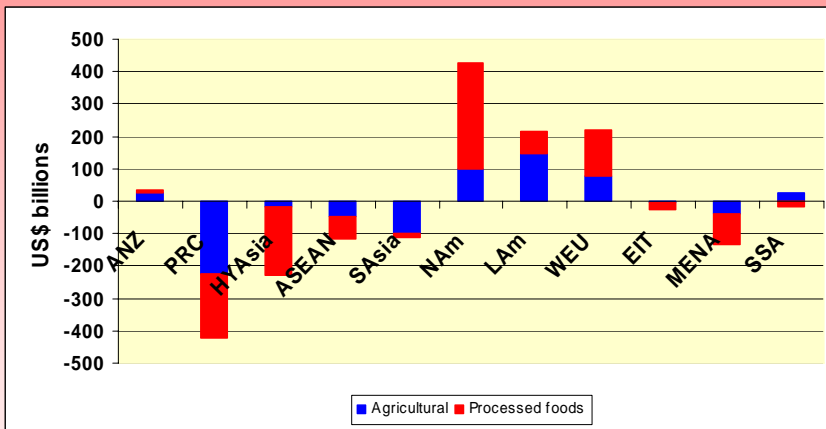
- Develops a baseline projection to 2025 using a dynamic cge model
- Recognises some major demand and supply side drivers
- Projects declining agri-food trade balances for China and rest of Asia
- Source: Hertel, Ludena, Golub and Rae (2007)

China: Changes in Output & Consumption Shares of real GDP: Agri-food Commodities (1997-2025)

- Consumption as a share of GDP falls for all commodity groups, but less so for processed foods & animal products
- Outputs of livestock products increase their shares of GDP, especially non-ruminants
- Reflects underlying changes in comparative advantage towards labour-intensive commodities



Projected Change in China's Agri-food Trade Balance: 1997-2025



- China projected to increase agri-food net imports by \$425 billion by 2025.

Largest share of increased agri-food imports is land-intensive crops

China increases net exports of non-ruminant meats – we project high rate of tfp growth & unconstrained by land

Concluding Points

- Has the livestock revolution driven China's agriculture and trade?
 - Yes in terms of agricultural sector growth
 - But in trade, limited to imports of protein feedstuffs
- China has succeeded in expanding livestock production in line with demand growth
 - And provided diversification options for millions of smallholders
 - Specialist & commercial operations now becoming more prevalent as others depart the sector for non-farm employment
 - Livestock farming remains risky - market instability, disease outbreaks and lack of insurance tools – especially for specialist producers
 - Some smallholders unable to increase scale, or connect to modern supply chains

- Migration and Income growth – especially rural – will continue to expand domestic demand for livestock products but at a slower rate than previously
- Growth in demand for feedstuffs likely to slow, including demand for protein imports
- Likely to remain largely self-sufficient in aggregate livestock products over the medium term – but are threats...

...but...

- **China's low-cost production:** will continue to restrict the growth of livestock product imports
 - Low cost advantage: but for how long?
 - Wages rising rapidly: and not only of skilled labour?
 - Further erosion of livestock comparative advantage
- **Environmental problems** are emerging
 - Over-grazing of grasslands
 - Water pollution
 - Methane
 - Relocation of hog/dairy farms from suburban locations
- **Quality/safety concerns** will continue to restrict export opportunities for such products
 - Yet China's demand for these attributes will also surely increase
 - 2007 No. 1 agricultural policy paper emphasised improvements in these areas
- **Human health**
 - Obesity
 - Disease transmission from animals



Thank you