The Chinese beef cattle industry[1]

Highlights

China is a major player in the word beef industry in terms of production, consumption and, in recent years, trade.

Unprecedented economic growth, industrialisation and urbanisation have reduced incentives for small-holders to raise cattle, who have not responded to higher prices, especially in the cow-calf sector. Bovine numbers have declined to 1990 levels of 100 million, but beef cattle production has become more commercialised and beef production has increased to 6.7 million tonnes.

Domestic production has been outstripped by higher consumption, which led to price increases of 21% per year between 2010 and 2013.

From a low base, imports increased in 2013-14 to around 300,000 tonnes of beef per year through formal channels, about one million tonnes through informal channels, and perhaps 70,000 tonnes in the form of live cattle in the border trade.

Consumption may have slowed over recent years due to tighter regulations on banqueting, prices have levelled off, and China has taken measures to increase imports and diversify import channels.

The Chinese domestic industry is becoming more segmented and specialised although there are constraints, especially in the viability of higher cost structures, and over-capacity of feedlots and modern abattoirs due to limited cattle supply and higher cost structures.

[1] Scott Waldron, Wang Jimin, Zhang Huijie, Dong Xiaoxia, Wang Mingli (2015), The Chinese Beef Industry in "Regional Workshop on Beef markets and trade in Southeast Asian and China", Ben Tre, Vietnam, 30th November – 3rd December, 2015.

1. National industry

1.1. Background

China is a major player in the world and regional beef industry in all sectors – production, consumption and trade. On the production side, China is the third biggest beef producer in the world, by far the largest in Asia, and produces three times more beef than Australia. Economic liberalisation during the 1980s and interventionist policy in the 1990s led to a rapid expansion of the Chinese beef industry. However, in the 2000s farmers exited the cattle production sector in droves to take up opportunities in other booming sectors of the economy, leaving a smaller but increasingly commercialised industry. At the same time, increased urbanisation and incomes have increased beef consumption, especially out-of-home consumption.

High increases in beef prices have opened up China's previously small trade sector to cattle and beef imports in many forms. Beef imports through formal channels increased from just 60,000 tonnes in 2012 to nearly 300,000 in 2012 from only three countries, the biggest of which is Australia. However to get these volumes in context, these formal imports make up perhaps one-third 30% of informal imports mainly from Basil, India and the US, and only 4% of domestic Chinese production. China is also a significant importer of live cattle in value terms – because formal imports are breeding and dairy cattle – but perhaps 350,000 head are traded informally across the southern borders.

The "pull effect" of China has impacted on trade flows and industries throughout the region, and can be expected to continue doing so, though in a different forms. In response to food safety, border conduct and food security pressures, China has taken measures to shut down informal channels and open up formal trade channels, including for beef (from Brasil and India) and cattle (including feeder and slaughter cattle from Australia). While transformation of the Chinese domestic industry and the opening up of the trade sector is widely discussed and opens up opportunities and challenges throughout the region, the process is not always linear, the scale is easily exaggerated and there are many dynamics at play.

1.2. Macro drivers of the industry change

China has of course undergone an economic transformation of historic proportions. With an average annual growth rate of 9.5% sustained over the last two decades, and a population of 1.3 billion, there have been major ramifications domestically, internationally and for the agricultural sector. Macro indicators of change in agriculture are shown in Figure 1. Economic growth has rapidly increased average incomes for both rural and urban residents (although rural residents' wages are just 33% of urban compatriots and China ranks 91 in the world in inequality (UNDP World Development Indicators, 2015)). Growth has also increased food prices at a rate above CPI, especially in 1994-5 and 2008-9. As elaborated in Section 10, beef (and mutton) prices have outstripped general food prices as superior products (where proportions in the diet increase with rising incomes).

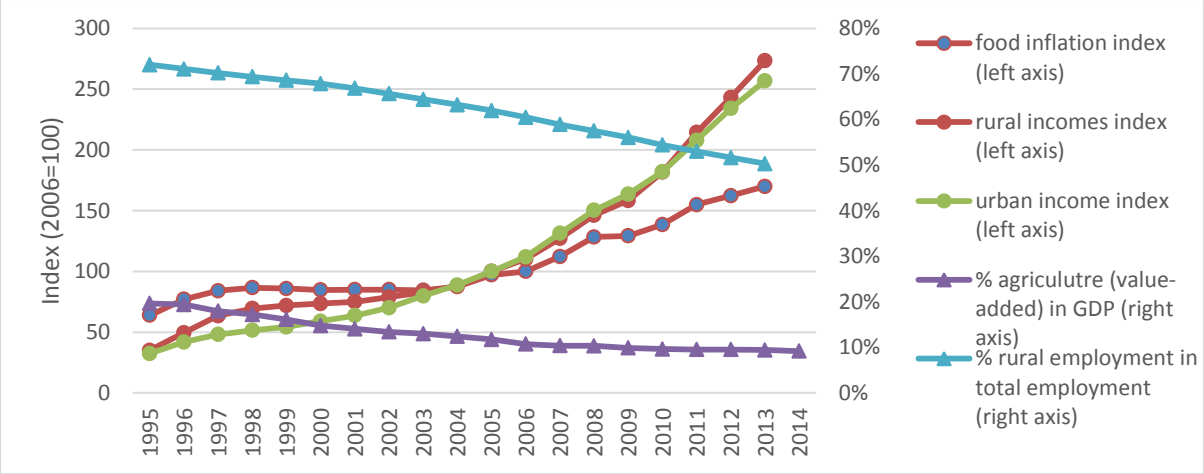

Figure 1. Indicators of agricultural transformation in China 1995-2014.

Source: Calculated from data reported in World Development Indicators (accessed 8/10/15) and China Statistical Yearbook (various years).

China also conforms to the "Iron Law of Development" which stipulations that as an economy develops, the proportion of the working population in agriculture and the proportion of GDP derived from agriculture diminishes (Schultz, 1968).

These economic trends are the primary drivers of change in the Chinese beef industry. Increasing urbanisation and urban incomes have increased demand and prices of beef, more so than other inputs into production like corn (see Figure 9). However, these favourable alignments have been outstripped by even higher relative increases in the value of rural labour i.e. the opportunity costs of labour for cattle production. Together with resource constraints (grazing land) and long cattle cycles (compared to smaller animals), the supply response to higher beef prices has been muted, especially from small-holders and in the cow-calf sector. There has, however, been a response from the feedlot sector and no shortage of investment and preferential policies in the slaughter and retail sectors. The diminishing role of agriculture (including cattle) in the rural economy, price inflation for beef (and mutton) and over-capacity in the feedlot and abattoir sectors, have meant that China has liberalised trade policy, and increased imports significantly.

Change in the Chinese beef industry into the future will be forged by macro developments (including revision to a more "normal" levels of growth") and a series of more "meso" level developments discussed in this section. The Chinese industry development trajectory may provide lessons for other countries that are undergoing rapid industrialisation and growth (like Vietnam) but there may be limits to the applicability of the China experience to other countries in the region.

1.3. Statistics

In the pre-1979 central planning era, China already had a large cattle herd. Cattle were owned by communes for draught purposes in agricultural areas, with bans on the slaughter of productive animals leaving only sick or injured animals available for consumption. Cattle were raised in larger herds in extensive pastoral systems in Western China (e.g. Inner Mongolia) for ethnic minority populations and cities in northern China. Decollectivisation in the 1980s – where households were able to lease land and own and sell animals – released

pent-up resources and incentives. Households responded by raising cattle for their own draught purposes in small-scale crop-livestock systems (average of one hectare per household) but also to periodically generate cash income.

Whereas growth was facilitated by liberalisation measures of the 1980s, it was driven by pro-active industry policy in the 1990s. The “Straw of Beef” program was introduced to utilise China’s 500 million tonnes of crop residues (especially straw) as feed for cattle (Waldron *et al.*, 2003). The program aimed to increase the incomes of farmers (by raising cattle), increase food supply for China (produce beef without displacing grain for human consumption) and bring environmental benefits (less burning of straw, more manure). Notwithstanding the low efficiency of conversion by which straw – even if ammoniated or ensiled – is converted into beef, the program was implemented across vast areas of China and millions of households.

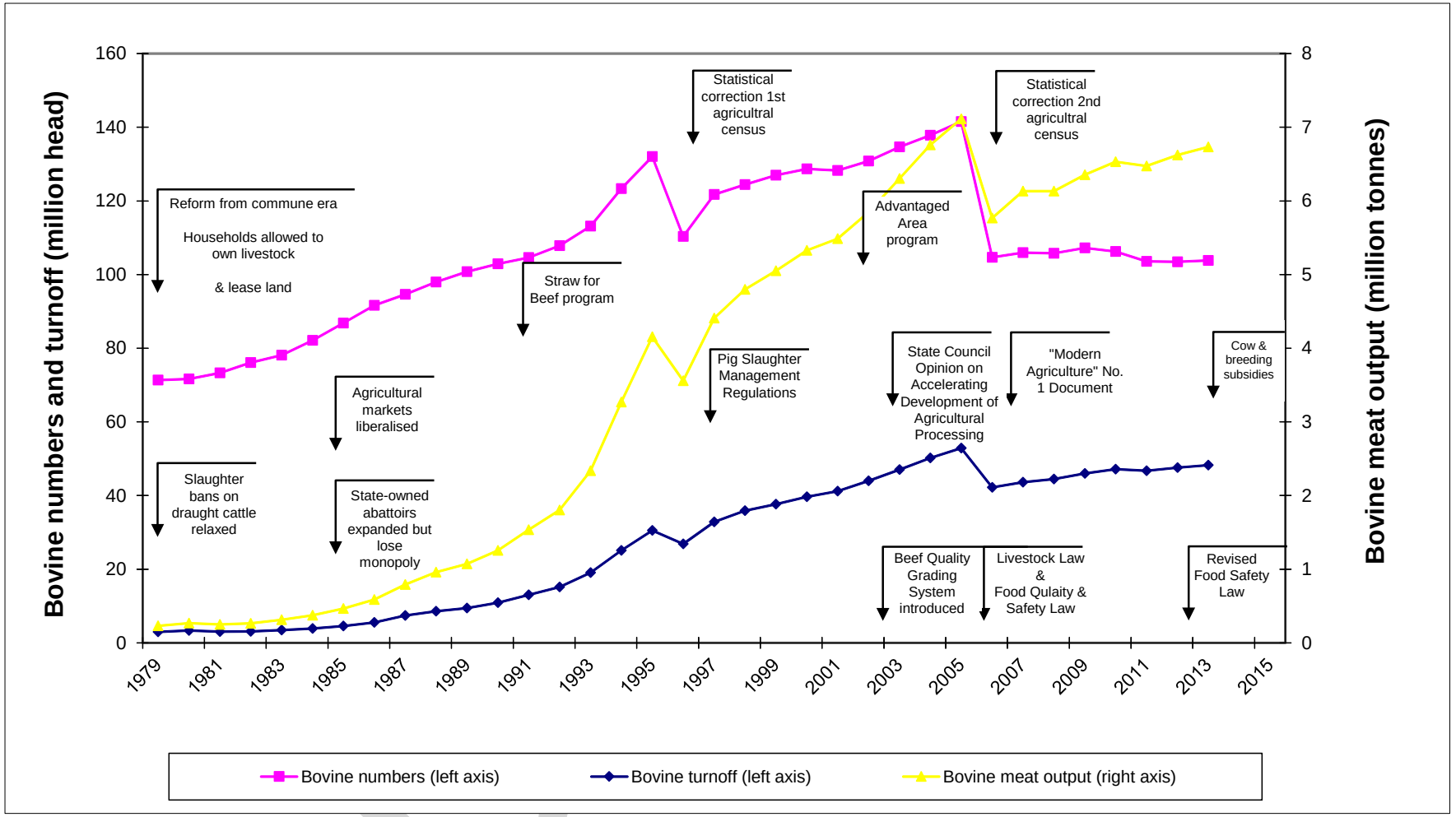

Figure 2. Production trends and policies in the Chinese beef industry, 1979-2013

Source: China Livestock Yearbook (various years) and authors

Caught up in the fervour of the Straw for Beef program, and to increase their chances of promotion, local officials reported inflated output figures. In China's "bottom-up" statistical collection system, this fed up into inflated national level statistics. The extent of the over-reporting was revealed in the First National Agricultural Census conducted in 1997, when survey teams descended down to the villages to independently collect data. In the wake of the census, cattle numbers were revised downward by 16.5%, turnoff by 28% and beef by 23%. The census figures were then used to retrospectively revise statistics for the preceding three years. Upward trending production indicators in the 2000s were revised down to an even greater extent in the Second National Agricultural Census of 2007, by 26% for cattle numbers, 20% for turnoff and 19% for beef. There are important implications for assessment of the international livestock sector, especially as the "international livestock revolution" (Delgado *et al.* 1999) was premised to a very large extent on inflated growth figures from China.

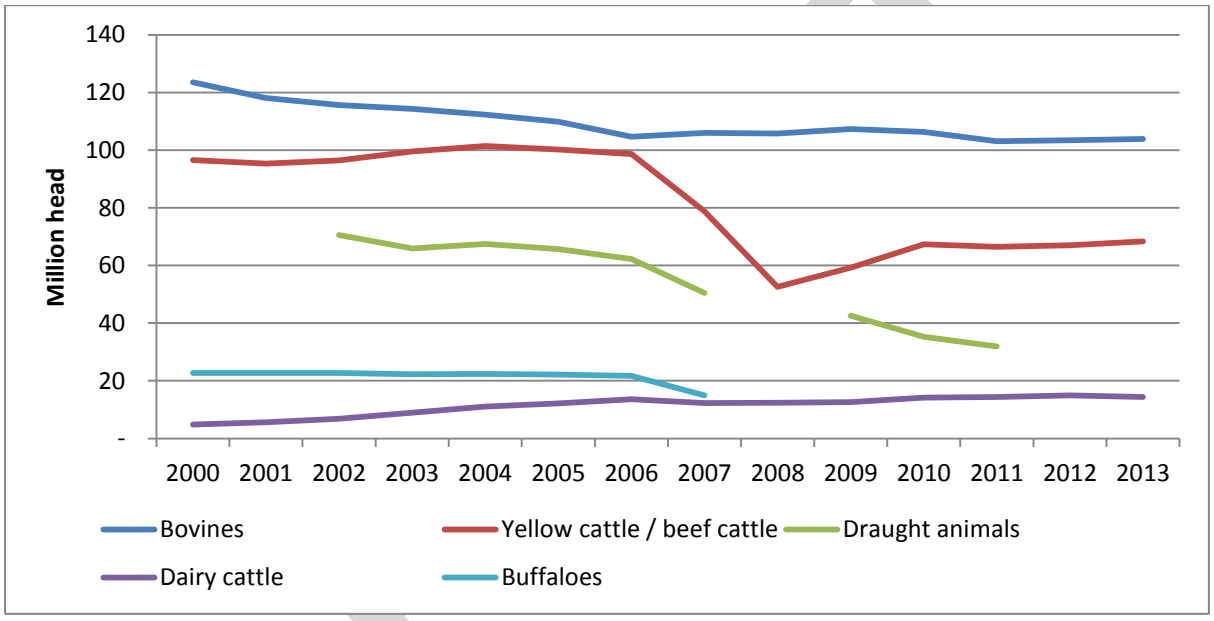

Figure 3. Composition of the Chinese bovine herd, 2000-2013

Source: China Livestock Yearbook (various years). Yak, buffalo (from 2008) and draught cattle (from 2012) were excluded from reporting. The large decrease in beef cattle numbers in 2007 was due to the revision in the 2006 Agricultural Census and the large decrease in 2008 was due to a reclassification of "yellow cattle" to "beef cattle".

One of the trends that emerged from (post-census) data is the declining bovine stock numbers, which by 2010 were back at around the levels of 1990. In addition to statistical anomalies, the declines are also real, as agricultural households that had entered the industry in the 1990s left in the 2000s and farm mechanisation reduced the need for draught cattle. The number of draught animals (of all types) in China dropped from 71 million in 2002 to 43 million in 2009 (China Livestock Yearbook 2010). Urban and work migration had a large effect on the industry – while 74% of China's population lived in rural areas in 1990, only 46% did in 2013 (NBS, 2011). Most working age farmers in eastern and central China have access to off-farm work in other sectors of China's burgeoning economy. Becoming increasingly conscious of the (opportunity) cost of their labour, households increasingly value the time they put into livestock production, which makes cattle production in small-scale systems unviable (Longworth et al. 2001; Waldron 2010). Of the 15.5 million

households that turned off 1-10 head per year, one-quarter exited the cattle production sector between 2003 and 2013 (China Livestock Yearbook various years).

Table 1. Key industry indicators for China 2000-2013

	2013	Compounded Annual growth, 2000-2013 (%)
Bovine numbers	103.8 million	-1.6%
Proportion of beef cattle (%)	66%	N/A
Turnoff numbers (head)	48.3 million	1.5%
Beef production (tonnes)	6.7 million	1.8%
Formal beef imports (tonnes)	294 thousand	34%
Turnoff rate (not accounting for trade) (%)	46%	3.2%
Average carcass weight domestic cattle (kg)	139kg	0.3%

Source: China Livestock Yearbook, various years

Importantly the cattle production sector that has emerged from the rationalisation is becoming more commercialised. Although bovine numbers *decreased* by an average of 1.6% per year between 2000 and 2013, bovine turnoff *increased* by 1.5% per year, up from 31% in 2000 to 46% in 2013. Similarly, beef production also increased by an average of 1.8% per year over in the period (to make up 8% of total Chinese meat production), higher than the rate of growth of turnoff due to increased beef yields (carcass weights, bone-in). However, average carcass weights in China are still low (139kgs) and have plateaued since 2007. The data suggests that producers have increased calving and survival rates and responded to economic incentives to turn cattle off at younger ages and lighter weights for slaughter or for fattening in more efficient households or feedlots.

2. Regional distribution and issues

In the context of national level trends, there are major spatial differences in the diverse Chinese cattle and beef industry. These can be partially captured by disaggregating the industry into beef zones. Figure 4 highlights the density of *beef cattle* n 2013 distributed by five zones and 25 provinces (some provinces such as Beijing and Tianjin are exclude). Cattle are concentrated in the intensive cropping areas especially in the Central Plains (Shandong and Henan) and the Northeast (Jilin and Liaoning). There are low densities of cattle in the “other” Southeastern provinces because of the low cattle numbers, while in the more extensive grazing systems of the Northwest large cattle herds are distributed over large distances. Beef cattle densities in the Southwest are formed by diverse areas of intensive crop-cattle systems and grazing systems on more mountainous areas.

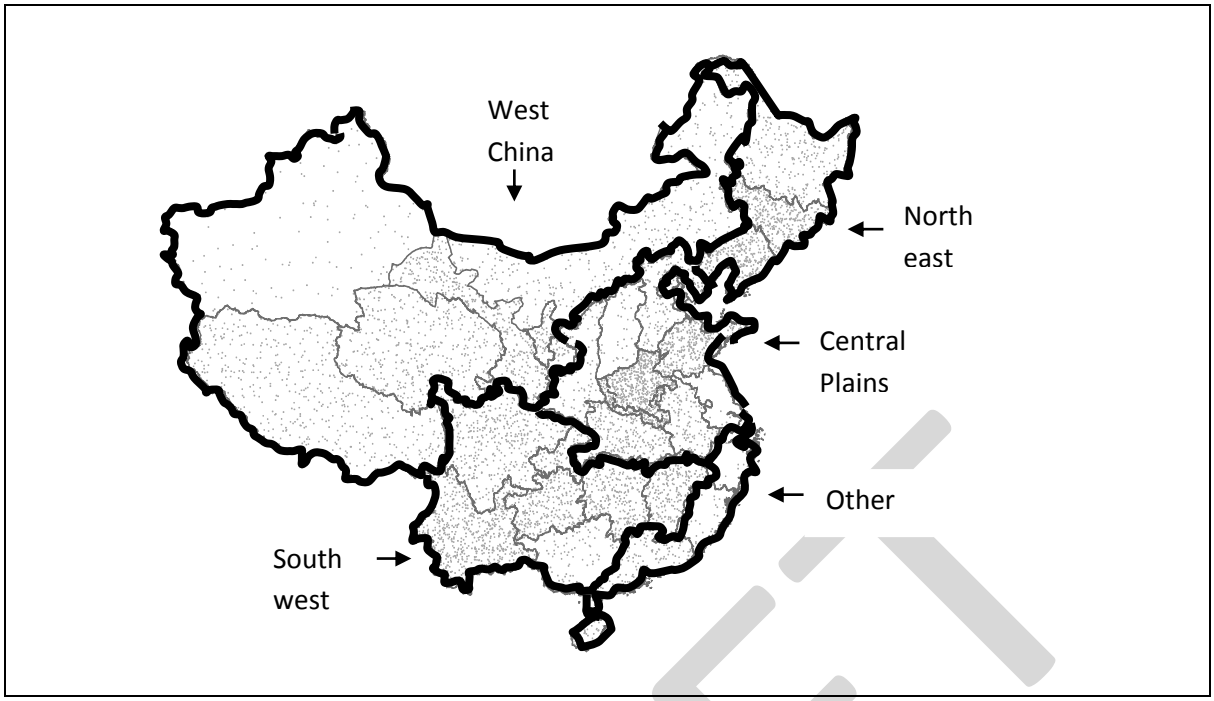

Figure 4. Beef cattle distribution by province in China, 2013

Source: Map generated by authors. Data from China Livestock Yearbook (2014). One dot equals 10,000 beef cattle. Bovine numbers are distributed evenly over the provinces in the map, whereas in reality they are usually concentrated in particular pockets in the province. Southwest provinces are Guizhou, Sichuan, Guangxi, Yunnan, Jiangxi, Hunan and Chongqing; Other provinces are Shanghai, Guangdong, Hainan, Zhejiang and Fujian; Western provinces are Tibet, Qinghai, Gansu, Inner Mongolia, Ningxia and Xinjiang; Central Plains systems provinces are Hubei, Henan, Anhui, Shandong, Jiangsu, Shanxi, Hebei and Shaanxi; Northeast provinces are Jilin, Liaoning and Heilongjiang.

Figure 5 shows changes in the relative importance in the number of all bovines (not just beef cattle) between 1980 and 2013. The broadest trends shown in the figure are that bovine numbers increased and then decreased rapidly in the Central Plains areas between 1980 and 2010, with inverse trends in Western areas. Developed parts of China (Central Plains and especially ”other” provinces play a small and diminishing role in the cattle industry, while relatively undeveloped areas play a significant and growing role. There have been more gradual changes in other regions. Interestingly, the relative importance of the regions appears to have stabilised since 2010 to 2013 (although this is a short period in the overall reporting period).

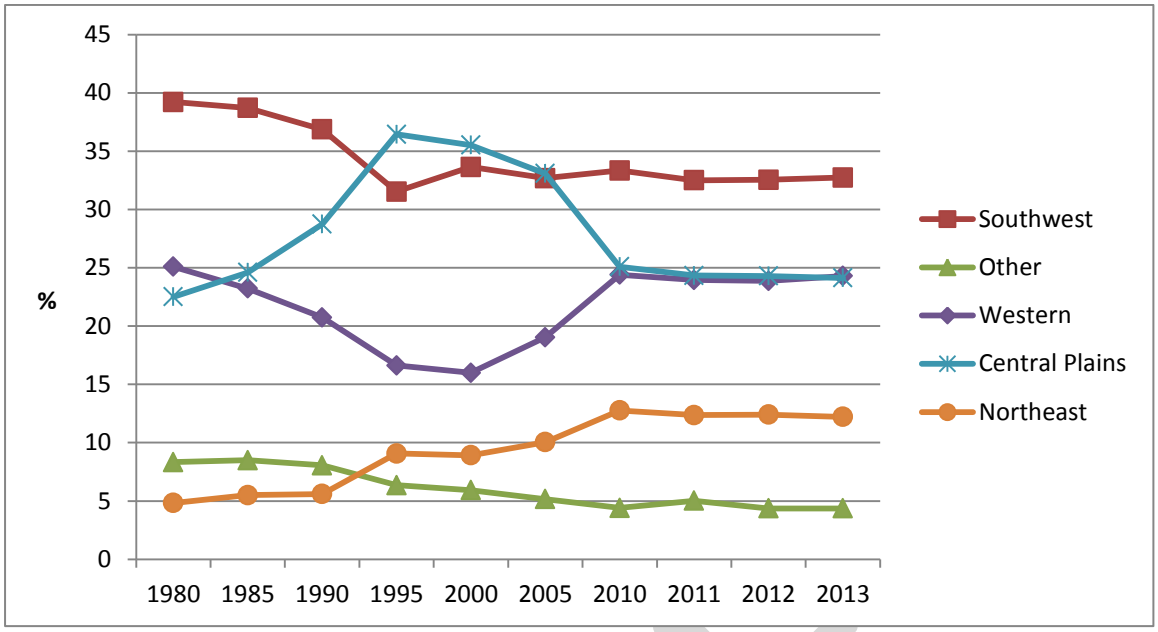

Figure 5. Percentage of Chinese bovine herd in five regional beef zones (1980-2013)

Source: Derived from China Livestock Yearbook (various years)

In the still relatively undeveloped zone of *Southwest China*, cows are still used for draught and transport purposes in cropping systems, which are often hilly areas not suitable for machinery or large framed cattle. The small cows are fed on a low grade diet which results in some of the lowest productivity (i.e. turnoff and carcass weight) indicators and the lowest scale of production indicators in China. While the relative importance of the region dropped from 1980 to 1995, the Southwest has maintained about one-third of the bovines in China over the last 15 years, although this includes a significant number of buffaloes.

From a small base, the *Northeast* zone has grown at the fastest and most consistent rate to account for 13% of China's bovines. This reflects resource advantages in the region, especially in feed grain (mostly corn). The Northeast has by far the highest average carcass weights and the highest scale of production, and a relatively high proportion of cattle are turned off through feedlots.

The Northwest zone and provinces like Inner Mongolia, Xinjiang and Tibet have traditionally been associated with extensive grazing systems. However few cattle are produced in "pure" extensive pastoral systems and even these pastoral areas have undergone intensification (i.e. pen feeding) due to grazing bans design to arrest grassland degradation in the region (Brown *et al.*, 2008). Most cattle are raised in semi-pastoral systems and in cow-calf systems and turned off to agricultural areas for further feeding or slaughter. The relative importance of the region has increased over the last decade (24%) due to an increase in beef cattle numbers in Ningxia and Gansu, and dairy cattle in Inner Mongolia and Xinjiang in the early 2000s.

Bovines are most densely concentrated in the *Central Plains zone*, especially in Henan, Shandong and Hebei. From a modest production base of draught cattle and crop residues, the region grew to hold 36% of China's cattle through the 1990s. However, farmers in the

region have relatively good access to labour and urban migration opportunities. This diminished the relative importance of the region to 25% of China's cattle in 2010. The farmers that remain are becoming increasingly commercialised, as suggested by the highest turnoff rates in the country.

Other provinces such as Guangdong and Fujian are abandoning cattle production, although peri-urban areas in cities like Beijing have significant abattoir and vertically integrated structures promoted in the name of local food security and safety. Hainan has sought to develop a local production and processing sector. However, some of these coastal provinces (Zheijiang, Hainan) with port facilities or with islands for quarantine are the mooted destinations for Australian live cattle exports.

3. Policy

Policy settings have both formed and responded to the industry development trajectory. For the purposes of discussion, policies are discussed with reference to Figure 2 and categorised into a number of policy (blurred) "eras".

Market liberalisation (1980-1990). The growth of the beef industry received its initial impetus from broader economic reforms in the 1980s, especially where farmers were allocated use rights over land and ownership rights over cattle, which by the mid-1980s became categorised as a commodity allowed to be traded on the free market. State-owned enterprise reform measures liberalised the slaughter sector, where the state stripped the General Food Company (GFC) network of their monopoly status, and allowed tens of thousands of slaughter households and areas to enter the sector. However about 450 prefecture/city-level GFCs emerged intact and the GFC network retains a powerful position in the slaughter sector in terms of slaughter numbers, cold storage capacity and policy roles.

Production-push (1990s). Policy attention then turned to building the "production base" of the industry by increasing cattle numbers. This was supported by a very large state network for feed, breeding and animal health inputs. Production was fervently pushed by the Ministry of Agriculture and many local states, especially in the Central Plains under the "Straw for Beef" program. The official subsidies and "encouragement" induced millions of farmers to enter the cattle production sector. One of the outcomes – for beef and other livestock products – were periods of over-production and stagnant prices, including a sharp market correction in 1996/97. With the reported success of the program, policy started promoting downstream sectors, especially through larger modern abattoirs, and the "value-adding" of by-products.

Industry rationalisation and modernisation (2000-2010). Shifting sectoral and market trends led to the relaxation of government policy away from Chinese staple foods (grain and pork) and toward other livestock products, in the so-called "strategic adjustment of agricultural structures". This was reflected in numerous policies (most notably the State Council "Number One Documents" including the Strategic Adjustment of Agricultural Structures of 1999). The most direct manifestation in the beef (and mutton) sectors was the "Advantaged Area" program of 2002, which can be seen as a (lower-level) continuation of the Straw for Beef program. Policy attention and subsidies were however overwhelmed by larger forces of rapid economic growth, industrialisation and urbanisation. As households

increasingly valued their own labour at market rates, they questioned the value of small-scale integrated cattle production, leading to rationalisation of the sector that continues today especially in more developed areas.

Policy toward the downstream sector (slaughter, marketing and integrated structures) had been pushed in the 1990s but gained momentum in the 2000s. The most conspicuous form was in preferential policy and subsidies from local government for "dragon head" modern abattoirs, especially those that link (through contracts) with production groups and households with supporting services (feeding, breeding). This led to over-capacity in the modern abattoir sector that continues today. Partly to increase market share for larger abattoirs – and partly for food safety reasons – local governments began to apply (at their own discretion) slaughter bans on small, unregistered slaughter units, which has become widespread but not complete today.

The 2000s were defined by an increasingly sophisticated approach to industry and market development. Through a series of guiding policies (e.g. 1999 Structural Adjustment, 2007 Modern Agriculture), the State and industry sought to move the industry away from the supply of bulk, generic "beef" to more differentiated product. This includes the issue of beef grades[2] and food safety standards[3] and the development of wholesale markets, and price reporting systems.

Supply-side constraints, price spikes, and increased trade (2010-). Even the most optimistic Chinese policy-makers did not envision the rate of China's economic growth – or the challenges created for the beef industry. Most notably, broad-based growth dampened incentives for small-holders to produce cattle, increased beef consumption and increased beef prices by 80% between 2010 and 2013 (see Section 10). However, small-holder cattle producers have not responded to these rising output prices through increased participation and production, partly because feed, fuel, labour and other prices increased at a commensurate rate, and partly because the nature of the cattle cycle.[4] Consequences include farmers selling their breeders and diminishing supplies of feeder and slaughter cattle for industry. Numbers of breeding females were reported to have decreased 10.2% between the 10th and 11th five plan (2005-2010) (China National Development and Reform Commission, 2013). Many large modern abattoirs promoted under previous policies are widely reported as operating at capacities as low as 30%.

For these reasons, industry experts (concerned about the cattle herd) and industry (concerned about cattle supply) had, since the late 2000s, lobbied government for production subsidies for breeding, that were already applied to pigs. The 2014 Number 1 Document paved the way for application to cattle, when government raised nearly Rmb1 billion for subsidies in the cow-calf sector. The subsidies are notionally available to 15

[2] These include: "Beef quality grades" (Ministry of Agriculture, 2003); slaughter standards (Ministry of Commerce for the General Food Company abattoirs); and the standard "Frozen Beef" by the General Administration for Quality Supervision, Inspection and Quarantine, 2004) and others.

[3] These include the Agricultural Products Quality and Safety Law of June 2006, Non Public Hazard (*wugonghai*) Foods, Green Food and Organic Food certification schemes).

[4] Even higher price rises for mutton led to increased sheep and goat production, partly because of the shorter production cycles and higher lambing rates (especially with multiple-birth breeds). Pig production are also relatively responsive.

designated provinces, counties that meet criteria (more than 300,000 breeders), and cow-calf producers with 10 breeding cows. In practice, subsidies are provided on the basis of Rmb500 per cow (which would cover 2 million cattle), but in some areas this can be up to Rmb2,000 per head and scale criteria can be applied. Pastoral areas are notionally not eligible but producers of dual-purpose beef-milk cows are eligible. With pastoral areas excluded, the high costs of purchased feed in agricultural areas, and with few small-holders that raise 10 cows, there are questions about the type of producers that could be eligible. The policies appear to have been revised in 2015 and extended to all larger scale cattle producers (not just for breeding). Producers with >30 head receive Rmb50 per head, >50 head, Rmb100, >100 head Rmb200, >200 head up to Rmb500.

Food safety has been a major problem in China for many years, especially the injection of water into beef at slaughter retail levels (to increase weight and juiciness) and growth promotants (e.g. Clenbuterol Hydrochloride). Concerns about food safety are ubiquitous in China, and have been the subject of numerous public cases (meat from other animals labelled as beef, expired meat for fast food outlets). In one case in 2015, A$500 million worth of aged, thawed and rotting meat including beef smuggled through Vietnam made a link between poor food safety and illegal imports.

One powerful agency (China National Reform and Development Commission, 2013), that will guide others, plans to expand the industry to 2020 through: breed improvement (Rmb400 million from central government 2013-20); increased scale of production (Rmb1.3 billion); corporatisation and links with agribusiness; disease control and disaster management; and promotion of the industry in the Central Pains, Northeast and West China (the latter through pens and storage). This is planned to increase Chinese beef output to 7.9 million tonnes by 2020 (an average annual increase of 1.9%), increase turnoff rates to 55% and producers that turnoff 50 head or more will make up 40% of turnoff. Beef consumption is estimated as 5.49kg per capita (a yearly increase of 1.13%), and with a population of 1.45 billion people, consumption would be 7.96 million tonnes. That is, the shortfall (imports) is estimated to be just 60,000 tonnes. These measures will impact on investment and activity in the industry, but are unlikely to revitalise the industry. The measures are either not new, or the amounts are not large compared to the broader economic forces or incentives at play. Trade policy is discussed in Section 11.

4. Domestic beef value chains

As suggested above, the Chinese industry has undergone significant changes, not just in output, but in the structure of the industry and composition of product. Drawing on analysis in Waldron (2009), Figure 6 distinguishes captures the process of industry segmentation, by distinguishing between low, mid and high value segments.

At the top of the figure, beef in China is becoming a more differentiated product where, for example, a premium eye fillet marketed by a famous country or company can be ten times the price of a low value brisket in a wet market. Different categories of industry actors are aligned to produce product with different attributes, which form different – but overlapping – supply chains. Through this process, chain actors down through the marketing, slaughter and production sectors are becoming increasingly specialised.

A series of drivers – including policy, economies of scale and food safety are – from a low base – moving the relative importance of the industry from low value (on the left) to higher value (on the right) segments. The process is however subject to numerous constraints, most fundamentally higher cost structures and more formal institutional structures required to meet higher value markets.

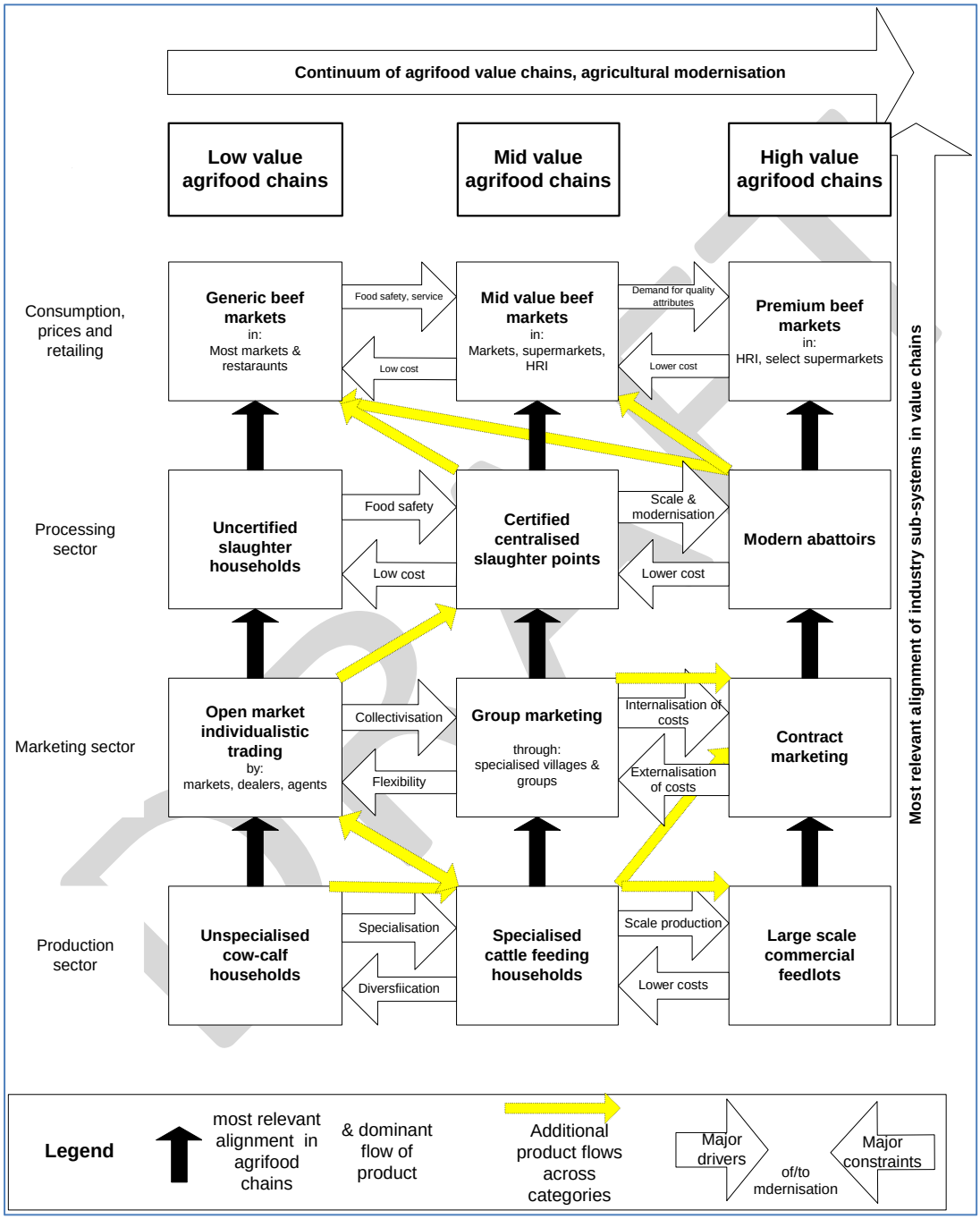

Figure 6. Segments of the Chinese beef industry

Source: Waldron (2009)

5. Inputs sector

5.1. Feed

Feed types in a country the size of China are of course diverse. However, the bulk of China's cattle herd especially in the Central Plains and Northeast China are linked with the cropping sector. Cattle are fed crop residues, especially straw and silage, from intensive cropping systems. Attempts to introduce straw treatment practices (silage and ammoniation) were largely abandoned by small household because of the extra labour demands, but are widely practiced in feedlots. All cattle fattening units in agricultural areas feed grain supplements – especially corn – but limited by escalating grain prices – see Figure 9 for corn. By-products from local crop processing (grain brans, soybean/cotton/canola meal/cake/oil) is widely available but cattle producers have to compete with other livestock industries (pig, poultry) in competitive markets. It is rarely viable for small cow-calf households to feed grains except in small amounts for supplementary feeding (early lactation etc.).

China has a very large and developed manufactured feed sector, mainly to cater for the pig and poultry sectors, and also produce compound and concentrate feeds. Most large feedlots buy feed in bulk – crop residues, corn and especially brewery or distillers waste and bagasse. Animal by-products (feather, fish, bone meal etc.) are common.

China has in recent years rapidly expanded forage (especially lucerne) production, accompanied by forage companies and processors, variety and seed improvement and storage and silage technologies. These are produced mainly by or for the dairy industry that, again, beef producers struggle to compete with.

China has around 400 million hectares of grasslands – more than Australia – and accounts for 42% of the country's land mass. There are several different classifications of grassland types, but the most fundamental is the distinction between the tropical and sub-tropical grasslands in the south, the temperate grasslands in the north, and the steppes on the Qinghai-Tibet plateau (see Brown et al., 2009). The (266) counties classed as pastoral or semi-pastoral (but that often also have cropping areas) held 29 million cattle in 2012 or 42% of China's beef cattle (and 15 million productive cows and 57% of China's sheep). Cattle are rarely grazed in extensive grazing systems, and even then are penned at night. Most cattle especially in the north are raised in transition zones to corn cropping areas (similar to cropping systems overviewed above). About 90% of China's grasslands are classified as degraded to some extent which, together with policy to destock, limits numbers of cattle, including breeders that can be raised on grasslands.

5.2. Breeds and breed improvement

As local cattle have been bred to provide draught power on a maintenance diet, they are relatively small, fine boned and produce "draught quality" beef. "Yellow" cattle breeds in Central Plains include Qinchuan, Nanyang and Jinnan and Luxi cattle. A large majority of the herd are cross-bred with Simmental, Limousin and Charolais breeds (the latter becoming less popular because of dystocia) and other lesser disseminated breeds.

Local village bulls were in the past used for breeding, but almost all breeding in the Central Plains is now done through artificial insemination and pellets have replaced straws. The

breeding system is dominated by the state system comprising of 159 beef cattle breeding stations (and 39 bull stations which must be national or province level), with 94,000 head (54,000 cows and 2,500 bulls) that produce 12,700 embryos and 17 million straws (China Livestock Yearbook, 2013). For many years, however, private companies have entered the breeding sector (often with contracts with households and integrated downstream) and this interest in breeding appears to have been sustained in recent years. State and private breeding companies are heavily subsidies by higher levels (central and provincial) government, as are AI dissemination and AI services for producers by local government. Central government funding for beef cattle genetic improvement was Rmb60 million 2012, and reported to have increased since then.

5.3. Disease and veterinary service

While the details is outside the scope of this report, China has incidences of several bovine diseases, including periodic outbreaks of Foot and Mouth Disease, Brucellosis, Anthrax and Bovine Tuberculosis. The country has several mechanisms to manage diseases. It has a large veterinary hierarchy from central level down to village levels. There were 32,600 livestock veterinary stations in 2013 – mainly at township and village levels. Local veterinary stations were funded mainly by county governments which have limited funding and the stations. Local veterinarians (the vast majority of staff have "basic" training and creditation) can charge for basic services including treatment of non-infectious diseases (parasites).

If Foot and Mouth Disease, Brucellosis or Tuberculosis is identified, then higher authorities (county level disease control station) are charged with slaughtering, burning and burying animals. Parts of Shandong have since the 1990s been routinely vaccinating for diseases like Foot and Mouth Disease (two or three times per year). China has sought to establish quarantine zones for beef – in the 11th Five Year Plan – in Jilin, the Liaodong Peninsular (in southern Liaoning), Chanqing and Jiaodong (in eastern Shandong). Hainan is a comprehensive livestock quarantine area. Disease status and issues plays major role in cattle and beef trade (import) policy (see below).

6. Cattle production systems

For the purposes of discussion, three categories of cattle producers can be identified; unspecialised households (small cow-calf households); specialised households (mainly fattening); and feedlots.

Unspecialised households raise cattle on a small scale and are diversified across a range of agricultural and off-farm activities.[5] In 2013, there were 11.8 million households that turned off 1-9 head per year in China that still dominate the cattle production sector in terms the number of producers and proportion of cattle turned off.

Unspecialised households in agricultural areas commonly hold one to several cows, fed on crop by-products in cut and carry systems or grazed on collective areas and roadsides and

[5] The Ministry of Agriculture formally defines specialised households as those that devote 60% of their resources toward a particular activity, but in although in practice output volumes (in the case of cattle, in stock or turnoff) is used.

supplemented with a few handfuls of grain. Calves are held and raised for variable periods. In the past they have been kept for long periods for draught or fattening (in “mixed systems”, but the turnoff age is becoming increasingly short, as farmers no longer need cattle for draught, and do not have the technical efficiencies or incentives to fatten cattle efficiently or profitably. Calves are therefore sold off to more specialised fattening (sometime intermediate / backgrounding) households, in a process of household specialisation.

A comprehensive economic analysis of unspecialised cow-calf production systems in China is provided in Longworth *et al.* (2001, Chapter 5) and Waldron (2009, Chapter 9). The farm budgeting done in 1998 indicates that unspecialised cow–calf production decreased net returns because revenues (from calf sales, culled cows, draught and manure) were lower than costs (especially feed and labour). With changes to the production system in the 2000s (e.g. three cows, higher calving and growth rates and sale of calves at 12 months old), the efficiency of the system improved substantially. However, households in most parts of the Central Plains have increased access to off-farm work and if opportunity costs of labour are included in budgets, then net returns are even lower than in 1998. Monitoring by the Chinese Academy of Agricultural Sciences of 750 farmers in 9 provinces found that costs of small-scale cattle production increased 7% in 2010-2011, and 15% in 2011-12.

Specialised households. There were 440,000 in China that turn off between 10 and 100 cattle per year, making up a significant and increasing percentage of China’s cattle production. The vast majority of cattle producers in this category are fattening households in cropping areas, but include a proportion of cow-calf producers in more extensive grazing (pastoral and semi-pastoral areas) areas.

Many hundreds of thousands of households leave the unspecialised cattle production sector every year, but tens of thousands have mobilised to become specialised fattening operations in agricultural areas. Specialised household fattening can sometimes be a step toward moving into cattle trading in flexible, speculative, entrepreneurial operations. There are also many cases where cattle fattening households moved off-farm into cattle slaughter and beef trading operations in family and group networks. Household specialisation is also nearly a pre-requisite to participation in group production (cooperative, association) and marketing systems (including contracts).

Budgeting of household fattening systems in Longworth *et al.* (2001, Chapter 5) and Waldron (2009, Chapter 9) showed several trends and sensitivities. First, with household specialisation in the Central Plains, the age at which feeders entered feeding households reduced substantially over the 2000s (i.e. from 12 to 24 months in some areas). As could be expected, higher growth rates on feed (with better breeding, feeds and management) have a large impact on profitability. Feed prices obviously impacted on profitability, but not as much as the relative prices between inputs (feeder cattle) and outputs (finished cattle). Entrepreneurial households skilled at trading and speculative (rather fixed regime) feeding tend to be most successful in the business, and play an important role in integrating cattle markets. Fixed supply arrangements with abattoirs that offer price premiums for cattle produced to specification are, on paper, attractive to specialised household.

Feedlots. Cattle feedlots are common throughout China, and account for a minor proportion of cattle turnoff, but feedlot numbers have increased substantially in recent years. Feedlots in China with a turnoff of more than 1,000 head (so on a 120 day feed regime could have a

capacity as low as 250 head) increased from 200 in 2010 to 1,085 in 2013; feedlot numbers in the in the next category down (500–999 head) increased from 1,000 in 2010 to 3,500 in 2013; and feedlots in the next category (100–499 head) increased from 10,000 in 2010 to 27,100 in 2013 (china Livestock Yearbook, 2014). While these feedlots together turned off only 7% of China's cattle in 2010, this number is likely to have trebled by 2013 (although data on turnoff numbers has been discontinued).

Like specialised households, the profitability of feedlots is sensitive to technical levels and feeder/finished cattle price alignments. Feedlots have higher scale and technical efficiencies and lower transaction costs, but can have higher input costs (feed, labour), capital costs and overheads. Feedlots have high incentives to buy good value feeder cattle, which means that large numbers of cattle are transported long distances, and that regional cattle markets are closely integrated, although large feedlots routinely struggle to source sufficient cattle at viable prices. An improving alignment between beef and feed prices in recent years (see Figure 9 for corn) has also favoured expansion of the feedlot sector.

Cow-calf production. There are several types of cow-calf producers in China.

- In cropping areas, the scale category of 1-9 head refers mainly – but certainly not exclusively – to cow-calf households. However, as discussed above, this sector is contracting and producers have diminishing incentives to engage in small-scale cattle production, which could be expected to continue with generational change.
- In more extensive grazing systems (e.g. North and South Western China) farmers hold larger herds of cows and may fall in to the 10-100 head range. However, cattle are not well adapted or widely grazed in temperate grasslands (more suited to sheep and goats) or high altitude pastures (yak and dzo). In any event, China's grasslands are already degraded and over-stocked, and cannot sustain significant increases in numbers (although policy-makers are promoting pen-feeding in grassland areas).
- Some state farms hold sizeable breeding herds, especially for genetic improvement and dissemination. However, the vast majority of state (and PCC) farms have been liberalised so that households on the farms make their own enterprise choices.
- Another source of feeders are males and culled cows from dairy cattle systems. China has 14 million dairy cattle, and produced 2 million male dairy cattle in 2012. There are reports that some many feedlots and some abattoirs rely heavily on dairy steers for inputs (including in Shandong and Beijing). Dairy culls decreased as dairies rebuilt up herds after the melamine incident of 2008, but increased with low milk prices in 2014/15.

Thus, there are only a limited number of categories of cow-calf producers, and all of these face limits in their capacity to expand. That is, China appears to have few under-utilised resources that could sustain or expand the cow-calf sector, and few sources of comparative advantage on an international level. There are concerns in China about the contraction of the cow-calf sector in central China, raising the question of who will produce China's cows and calves into the future.

Rationalisation and commercialisation. Shandong Province in the Central Plains zone provides a clear illustration of industry commercialisation in an intensive cattle production area. With once the biggest cattle herd in China, it has declined to sixth, although the bovine herd has stabilised at around 5 million head and the province remains the second biggest beef producer (after neighbouring Henan). Once a major cow-calf production area, the

province is increasingly importing feeder cattle from other provinces for feeding and slaughter to service provincial and nearby (e.g. Beijing) markets, as reflected in a turnoff rate of 89% and relatively heavy average carcass weights of 153kgs.

Scale of production data (China Livestock Yearbook, various years) reports the proportion of beef cattle turned off through farms or feedlots that fall into different scale categories. Extrapolation of data suggests that in Shandong, households that turn off 1-9 head per year was only 34% in 2013, a large reduction from 72% in 2005 (Figure 7). As discussed above, growth has occurred in larger feeding households and feedlots.

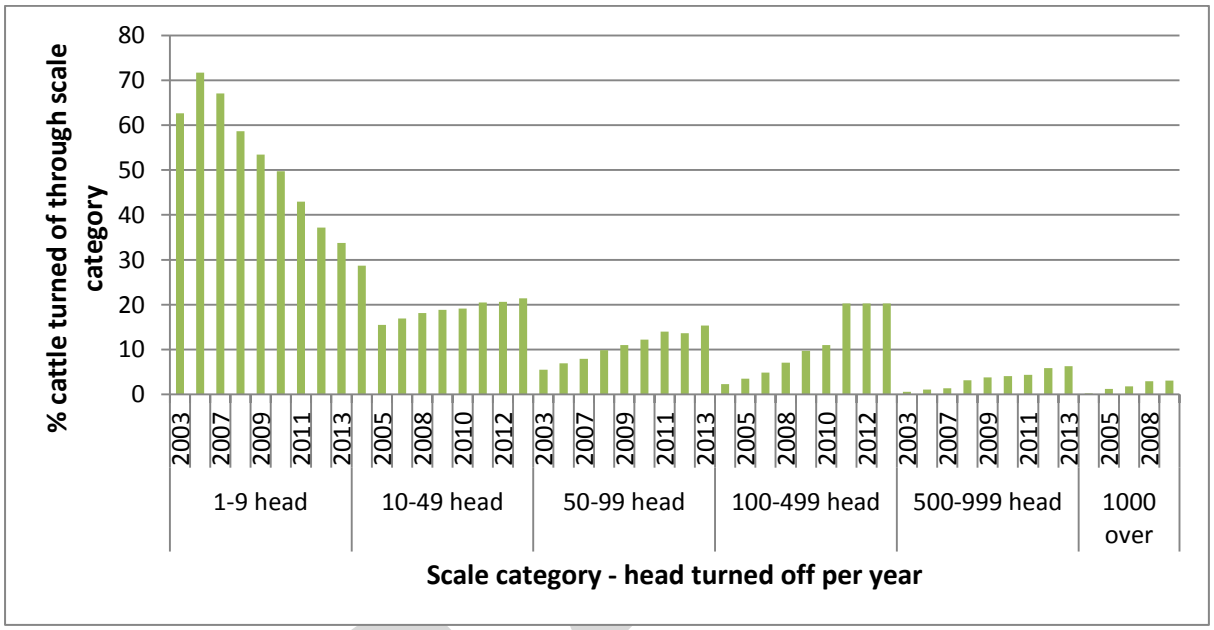

Figure 7. Scale of cattle production in Shandong Province, 2005-2013

Source: China Livestock Yearbook various years

7. Cattle marketing

The Chinese cattle marketing system is comprised of familiar structures – including spot markets and more formal systems (vertical integration, groups, contracts) – but there are some features of the Chinese industry that are different to other developing Asian countries.

Like other transition economies, the dismantling of state marketing agencies of the central planning were replaced by the proliferation of spot marketing systems. The density of cattle production in much of China means that there are many hundreds of rudimentary periodic markets in many provinces, but also numerous larger inter-regional marketplaces that provide a range of services (trucking, ties rails, inspection and documentation) to buyers and sellers. Unlike many areas of Asia, farmers in close proximity to markets take and sell their own cattle to markets. Trade in spot markets is conducted by a hierarchy of traders comprised of larger traders and slaughter households that provide cash outlays, down to local level collectors and brokers. The ethnic Hui control the vast majority of activity (90% in the mid-2000s) in the cattle (and sheep and goat) trading and slaughter sectors.

Spot markets consist of an enormous number of buyers and sellers, are generally competitive, with high levels of information (through informal channels). They therefore generally provide an efficient marketing system especially for the trade of generic and low value products. However, spot markets are less effective in terms of generating prices that accurately reflect the true value of more differentiated *forms* of product. This has led to the development of alternative marketing systems to service mid and high value supply chains.

One of the features of the Chinese beef industry is that a significant proportion of cattle are slaughtered in large abattoirs, where the abattoir (company) itself takes ownership of the cattle (as opposed to numerous small butchers in Southeast Asia that slaughter in service slaughter plants). The abattoirs require supply of cattle to specification, and have incentives to formalise the supply through formal linkages with producers. Thus there are large numbers of company–household linkages in the Chinese beef industry, often through supply contracts and the provision of backward services (feed, breeding, veterinary care). This opens up numerous opportunities for increased industry integration and rural development, but the sector also experiences problems including side-selling and price-grade discounting (see Waldron, 2010).

8. The processing sector

The continuum of actors in the Chinese slaughter sector includes: uncertified individual slaughter households; certified centralised slaughter points; and modern mechanised abattoirs.

Liberalisation in the 1980s and 1990s saw the proliferation of uncertified household slaughtering in backyards and courtyards throughout peri-urban and rural areas of China. As late as the mid-2000s, there may have been 40,000 slaughter households in China that slaughtered the majority of China's cattle (although there are certainly many less than that that now). The slaughter households played an important role in providing low cost services to meet the demands of mass markets in short and direct supply chains (through family and kinship members) with a very large number of participants, the majority of which belong to the Hui ethnic minority. Slaughter households are generally viable under a range of scenarios.[6]

However household slaughtering can be rudimentary (bed slaughtering, poor water and drainage facilities, absence of cold chain facilities, materials that are not easily cleaned or sanitised) and policy-makers are increasingly concerned about effluent, food safety issues (diseases, residues, parasites and bacterial infection). Although slaughter fees have been abolished in most cities, business registration enable local government to tax economic activity and allow larger plants to capture cattle supply and markets. As a result, municipal officials in particular have increasingly applied national standards (designed for pig slaughter)

[6] Budget analysis of a representative slaughter household (2,000 head per year) reveals that profits are positive but slim, where beef sales are equivalent of the cost of cattle, but where margins are made on offal and by-products. Overhead costs are very low but would increase significantly if they conformed to registration standards which, together with inspection fees, reduce profitability by 40%. Even then, returns to household cattle slaughtering are higher than returns to specialised cattle fattening and average urban incomes.

required for registration (capital registration requirements, basic infrastructure and inspection regimes).

Thus, there has been a large shift toward slaughter into what are known as “designated slaughter points”, of which there were about 2,000 at county level and below (China Meat Association, personal communication, 2004). There are many different forms of certified slaughter units. Most cities (including Beijing) have large but basic state or collective facilities where butchers slaughter for a service fee, and then sell into wet markets in the cities. Certified plants also include larger corporate abattoirs with mechanised slaughter lines, cold storage, water treatment facilities, where the company takes ownership of the cattle. Many of the plants are state-owned or reformed companies that come under the General Food Company system, still overseen by the China Meat Association and the Ministry of Commerce.

However one of the features of the Chinese beef industry is the investment in modern mechanised plants that take ownership of cattle and beef. There are perhaps 20 large modern abattoirs in China that are large by Chinese (but not world) standards, and use international-level technology.[7] To build agro-industrialisation and dragon head enterprises, the sector has since the 1990s been heavily promoted by the state through numerous preferential policies. This has laid the foundations of a strong modern abattoir sector.

Budgeting of a representative modern abattoir in the mid-2000s revealed several major determinants of profitability including capital costs (for investment and working capital in cattle) and labour costs (which are increasing). Favourable input-output price relativities (access to higher value markets) are required for profitability. The ability to value higher-value beef to the domestic HRI trade on a consistent basis is a challenge for many Chinese abattoirs, and is major source of competitive advantage for imported (Australian) beef. Successful Chinese abattoirs seek to differentiate product and reputation through branding (rather than standards). Finally, capacity utilisation and therefore overhead costs are critical. Modern abattoirs have for decades operated well under capacity (20-80%) for the underlying reasons mentioned above. Low capacity utilisation is exacerbated today by limited supply (i.e. high price) of slaughter cattle. The import of Australian cattle is seen by industry in China as way of alleviating this constraint.

9. Beef markets and consumption

It is not straightforward to quantify trends in beef consumption, especially as official statistics on beef consumption are highly aggregated and incomplete. However cross-verification of sources provides a robust picture of increased beef consumption for nearly 30 years. Widely acknowledged factors include population growth, urbanisation, dietary diversification and income growth.

The National Bureau of Statistics collects data on in-home beef consumption for both urban and rural areas, derived and extrapolated from household surveys (Figure 8). The urban

[7] Fifteen “modern” abattoirs interviewed are: Sishui and Xisen in Shandong; Bangjie, Luohe and Shunaghui in Henan; Dexin and Haoyue in Jilin, Fucheng and Hu’an in Hebei; Kangda, Yuxiangyuan and Jinwei Furen in Beijing; Caoyuan Xingfa and Ke’erqin in Inner Mongolia; Hualing in Xinjiang; Yurn in Jiangsu; and Xin’ao in Sichuan.

consumption series was discontinued in 2010, and rural beef consumption and urban expenditure for beef and mutton (sheep and goat meat) were not been reported for 2013. Nevertheless, the data illustrates several features and trends.

In-home consumption of beef in rural areas is only perhaps one-third that of urban areas, which is significant given that the urban population increased from 300 million (26% of population) in 1990 to 750 million (54%) in 2013. Per capita increases in urban in-home consumption and demographic change accounted for 50% each of the increase in total beef consumption in China (of 59% between 2000 and 2010). This is considerably higher than growth in beef production (23% over the period).

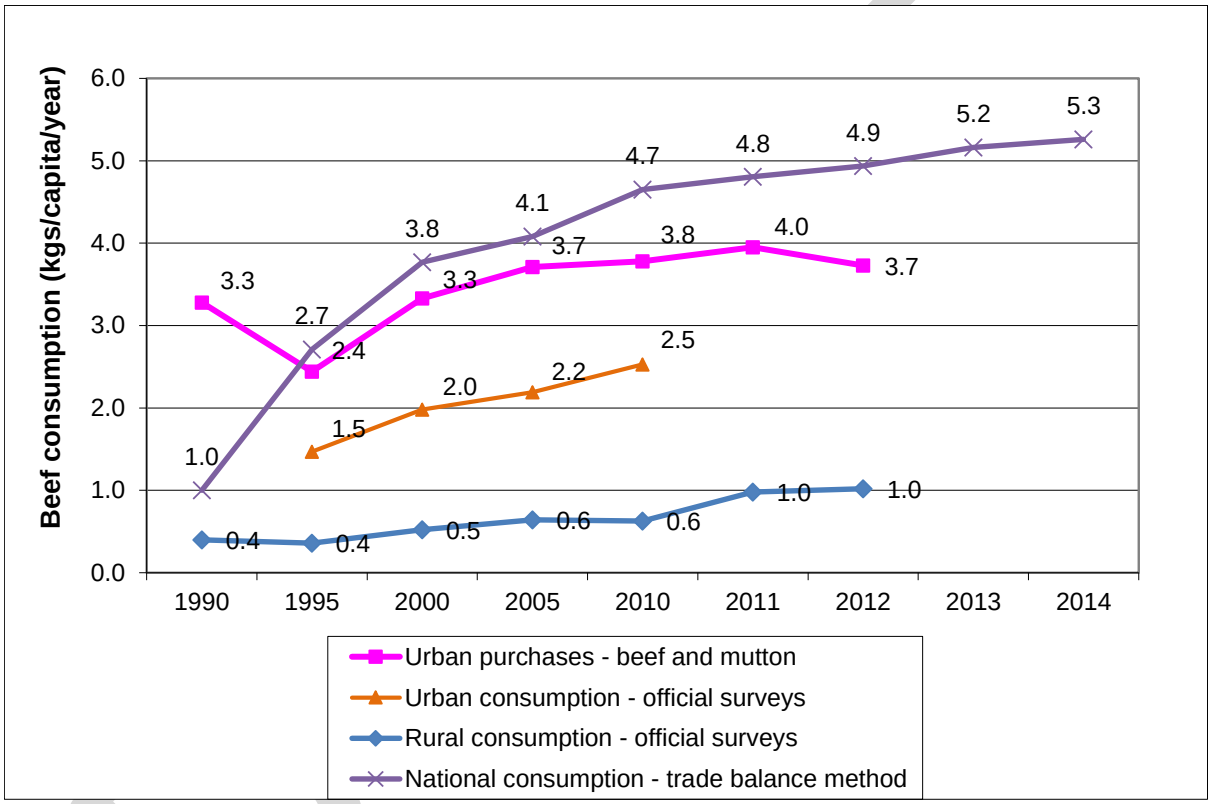

Figure 8. Per capita beef consumption in China based on different sources of official data.

Source: China Statistical Yearbook, China Livestock Yearbook, China Customs Yearbook (various years)

It is however also significant that the gap in urban and rural consumption have narrowed in recent years. Rural beef consumption increased rapidly in recent years to reach 1kg per person in 2012, no doubt due to increased rural incomes and access to wider food markets. Urban consumption of beef and mutton decreased in 2012 due to rapid price increases (suggesting that beef consumption is not income inelastic) and due to tightening guidelines on banquets from 2013.

The survey data reports on in-home household expenditures / consumption, but not on out-of-home consumption in the hotel, restaurant and institution (HRI) trade. With increasing expendable incomes and shifting Chinese consumption preferences, this represents a major gap in the data. Beef is served in increasingly diversified Chinese menus (such as “sizzling

iron beef"), in popular minority and regional dishes (hot pot, Xinjiang skewers, Hui Muslim noodles, Korean dishes) and in foreign restaurants in China (Japanese/Korean barbeque, Brazilian beef, American fattened beef), where beef is the major item on menus.

One way to estimate total consumption is through the "trade-balance method" (domestic beef production, plus net trade divided by the national population). There is shortcomings in the method because it is based on over-stated production figures and excludes informal trade. The calculations suggest national per capita consumption of 5.4kgs, and if illegal beef smuggling of 1 million tonnes is added to consumption, the figure would be 5.9kgs. That is out-of-home beef consumption is high, which conforms to expectations in China, especially for urban residents.

Some of these trends were tested in surveys conducted by several Chinese and US universities and reported in Bai et al. (2012) in Beijing in 2007, Nanjing in 2009 and Chengdu in 2010. The surveys were conducted in summer (which is not necessarily peak season), and in relatively developed cities (which may be higher than most cities). It suggests that overall beef consumption is high (6.5kg in Beijing, 4.5kg in Nanjing and 7.7kg in Chengdu) and that out-of-home consumption is significant (35% in Beijing, 34% in Nanjing and 31% in Chengdu). Overall beef consumption increases with income (is highest in the highest 1/3 quantile), but varies by place of consumption. In-home beef consumption is highest in the middle 1/3 quantile, and out-of-home consumption is far higher in the highest 1/3 quantile, suggested beef (and mutton) is popular amongst more wealthy Chinese when eating out.

Banqueting in China – where a lot of beef and mutton is consumed – was ubiquitous in the 2000s. Business people, government officials and indeed most upwardly-mobile Chinese can spend several nights of the week with banqueting. Activity in the food service industry (along with the luxury goods industry, foods like seafood, and border smuggling) has however dampened dramatically since anti-corruption measures were initiated by the Xi regime in 2013. There are now stricter regulations on the amount of banquets, invitees and business expense claims, that is reported in China to have dampened overall consumption, and may increase the relative importance of in-home consumption.

Beef market outlets, product and prices are of course highly variable. For example, generic beef may retail for Rmb50 in a wet market, fillets may retail for Rmb100 in a supermarket, and can easily convert into Rmb200 in a high-end restaurant (see Waldron, 2010). However, it is important to note that it is not possible to categorise beef outlets into discrete value segments. For example, larger wet markets often contain franchised stalls of abattoirs that sell more expensive branded product. There is an enormous range of restaurants and supermarkets, many of which buy generic beef from wet markets and then add services to mark up prices.

10. Beef prices

Underlying demand-supply forces have exerted strong upward pressure on beef prices in recent years, including in Beijing (Figure 9). The data is collected by the Ministry of Agriculture in "observation points" (wholesale markets) throughout China based on daily sales but averaged over monthly periods to province level to represent the monthly average

prices for generic types of livestock products, including bovine meat. Prices are for generic "beef" and don't reflect premiums or discounts in differentiated markets, but nevertheless provide a good indicator of overall price levels.

Generic beef (and mutton) prices remained low and stable through the 1990s and the first half of the 2000s, but began to increase rapidly in 2006 to 2008 in line with food price spikes in China and internationally, and expansionary monetary policy and wages. Beef prices peaked in 2013, before stabilising in 2015. At Rmb54/kg, this equates to approximately US$12/kg of generic, undifferentiated "beef". Subdued prices are now being reflected in lower cattle prices. Mutton prices climbed with beef and peaked higher and later, but then corrected sharply in 2014-15, due partly to a supply response (with shorter breeding cycles and higher lambing rates). Pork prices declined over the period for the same reasons, and because of state storage and production (sow-breeding) subsidies. Corn prices have declined in relative terms to beef prices from in 2012-13, spiked in mid-2014 and have since declined (with volatility) in over 2015, which may have had short term impacts on the viability of cattle fattening.

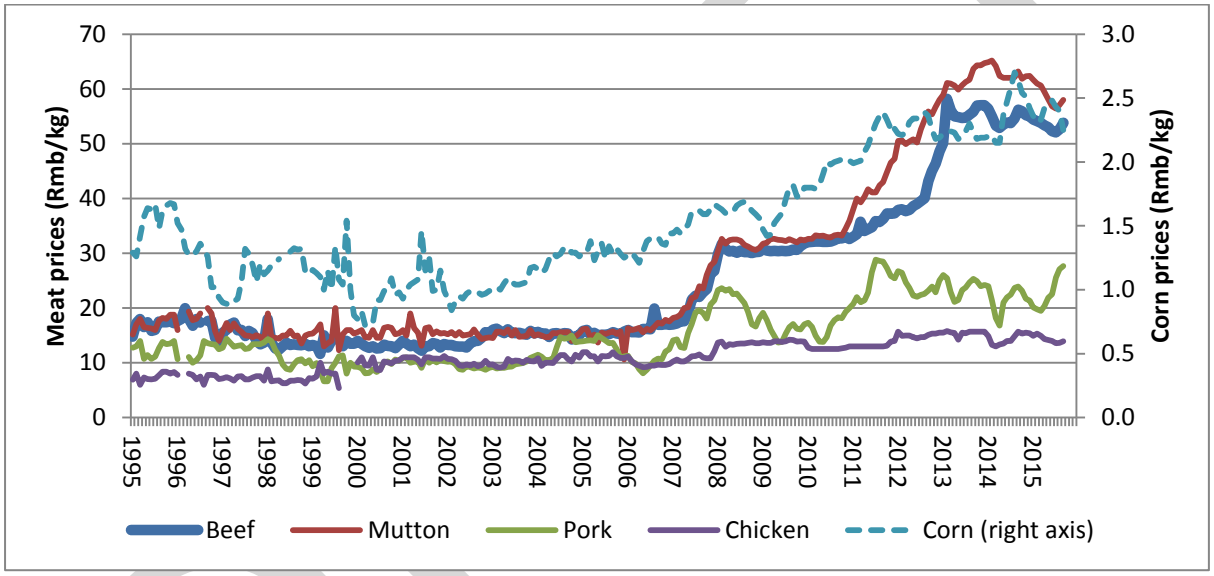

Figure 9. Monthly meat and corn prices in Beijing (1995-2015)

Source: China Livestock Yearbook (various years), Ministry of Agriculture

Price increases for beef and mutton sparked attention and concern at many levels. China has a recent history (1989) of political instability due to inflation, food prices are a hot topic for Chinese and beef and mutton is a staple food for some ethnic minorities especially in Western China (Inner Mongolia, Xinjiang, Tibet). Measures flagged by the State to reduce prices included an early warning price information system, strengthening market supervision on product hoarding and collusion, curbs on exports and increased use of storage reserves and accounting,[8] but the major outcome of the high prices was import liberalisation – discussed below. This measures however are likely to have only a modest effect on beef supply. Administrative measures and the domestic supply response to rising prices have

[8] In areas with high Mongolian and Muslim populations, municipal government run State program to hold reserves of frozen beef and mutton, and distribute to major wet markets at subsidised prices.

been overwhelmed by more powerful markets forces, while (formal) imports derive from only a handful of medium-sized beef producing countries. Thus, demand-side factors mentioned above appear to be the major driver of price trends.

11. International trade

11.1. Trade statistics

Compared to the domestic sector, China has historically had a very small beef trade sector – both for imports and exports. However, the import volumes increased rapidly from 2012 to 2014 due to increased consumption and domestic beef prices (see above). Import trends are discussed here through data reported in UNComtrade data for broad categories of bovine meat (fresh/chilled and frozen, carcass forms and cuts, bone in and bone-out).

Mainland China has for nearly all of the past 20 years been a net exporter of beef Southeast Asia and the Middle East, but exports trailed off to only 7,000 tonnes in 2014. This has traditionally been low value frozen beef but has increased in value to US$9.13/kg in 2014 (possibly a niche trade).

China has historically imported only modest amounts (tens of thousands of tonnes) of beef, but volumes increased to nearly 300,000 tonnes in 2014. Of total beef imports, 99% are frozen at an average value of $US4.30 in 2014. The other 1% of fresh or chilled beef (3kt), virtually all from Australia, sold for an average of $US7.20, significantly lower than the US$18/kg in 2011. On an aggregated level, this suggests China is still a price-sensitive market and that a significant proportion of beef is destined for mass markets or processing.

Imports are limited to countries declared free of foot and mouth disease (FMD) and BSE, of which Australia, New Zealand and Uruguay are the major exporters to China, with small volumes from Canada, Argentina and Costa Rica. The application of total country bans excludes major beef producers including Brasil the US and India. In addition to 13% VAT, China applies import duties that range from 25% for frozen carcasses to 12% for most beef and offal products for countries with most favoured nation (MFN) status. These policy settings, together with high demand and prices, sets the scene for very large volumes of the informal imports, estimated at up to 1 million tonnes, and certainly higher than formal imports.

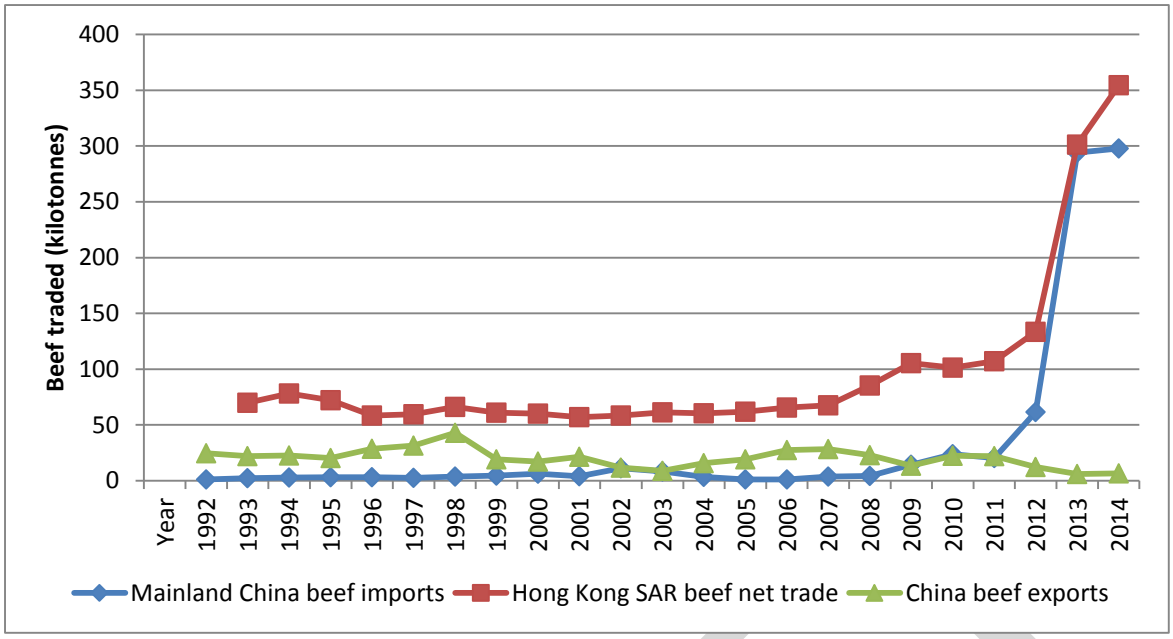

Figure 10. Beef imports and exports, mainland China and Hong Kong Special Administrative Region (SAR), 1992-2014.

Source: UNComtrade (2014)

Hong Kong is major channel for informal beef imports, and volumes can be estimated through trade data. Volumes of imports into Hong Kong have increased roughly in line with direct imports to the mainland, almost all of which is frozen and from countries without access (Brazil, the US) or with partial access (Canada) to the mainland market, but which can export to Hong Kong. Part of this increase in beef imports can be explained by decreases in modest live cattle imports into Hong Kong and official re-exports of beef to other Asian countries, especially Vietnam. However, domestic consumption in Hong Kong is unlikely to have changed much (around 60,000 tonnes per year). Thus, up to 300,000 tonnes of beef imported into Hong Kong may have been smuggled from Hong Kong into mainland China in 2014 (although are reported to have declined in 2015 with the crackdown on illegal smuggling). Informal imports from Vietnam are likely to be higher as discussed below.

Beef offal is formally imported directly into mainland China (20,000 tonnes from the same countries that export beef to China) but much larger volumes flow through Hong Kong. In 2014, Hong Kong imported 300,000 tonnes of offal, re-exported 92,000 tonnes, leaving more than 200,000 tonnes of local consumption and smuggling to China (Figure 11). Offal comes both from countries that can't export directly to the mainland (the vast majority from Brasil, but also Argentina, US, and Europe) and that can (Australia, Uruguay, New Zealand).

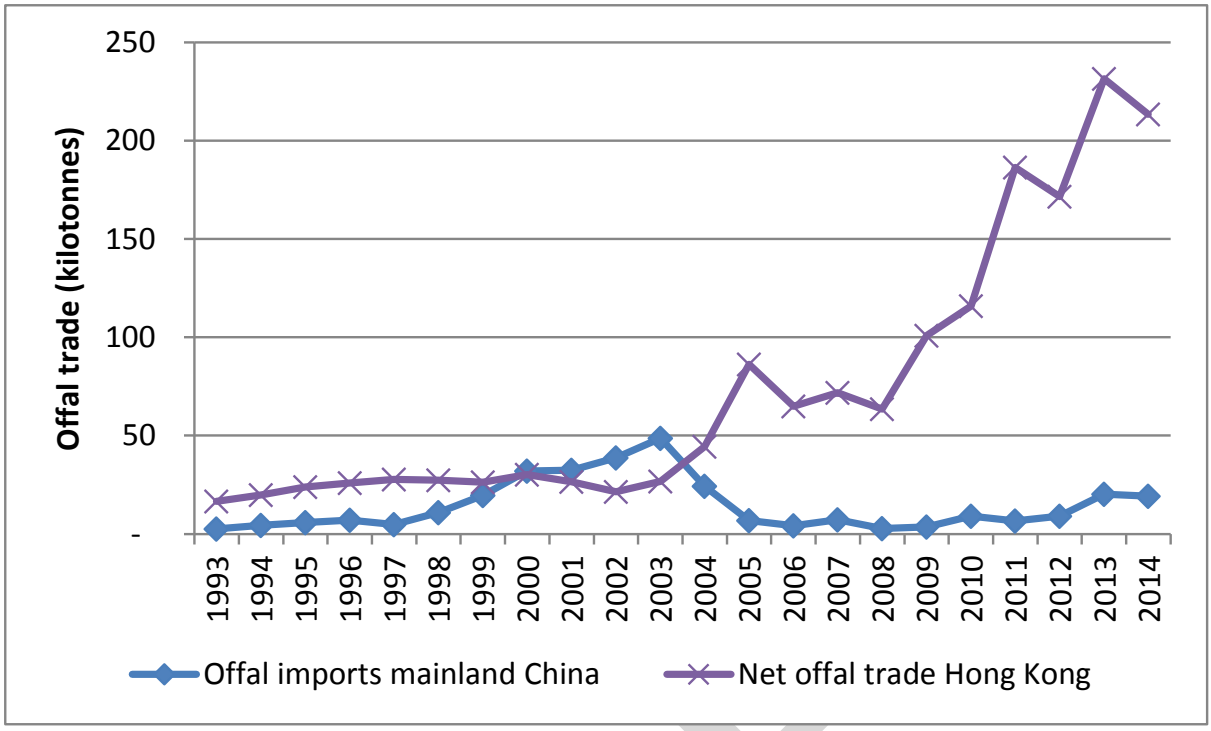

Figure 11. Beef offal imports into mainland China and Hong Kong, 1992-2014

Source: UNComtrade accessed June, 2011

11.2. Beef and cattle smuggling

There are divergent estimates on the volume of informal import (smuggling) of beef into China but the volumes were clearly very high. Claims of one million tonnes of beef per year are common, but can range up to two million tonnes of meat (including by CAU and the China Meat Association), although these are likely to be exaggerated (Wang Jimin, CAAAS).

Beef (and in the case of India, carabeef) derive from these countries not permitted to export directly to mainland China, but are cost competitive given rising Chinese prices and appreciation of the Renminbi against the US dollar for most of 2013-14. A government document cited by Guo and Liang (2014)[9] claims that Brazil's informal exports to China in 2013 were 430,000 tonnes, India 470,000 tonnes[10] and the US 90,000 tonnes (which conforms to estimates of one million tonnes of smuggled beef)

Exports are transhipped through the main intermediate countries/regions of Hong Kong and Vietnam, but also Cambodia and Laos. Importers incur import duties when entering those countries but these are lower if treated as re-exports, but smuggling circumvents VAT and import duties into China. While the costs of smuggling – transport across sometimes long

[9] The document was a joint report of the Anti-Smuggling Bureau of China Customs, MOFCOM China Chamber of Commerce of Foodstuffs and Native Produce Import and Export Association and COFCO.

[10] Tariffs on products from India to Southeast Asia including buffalo meat were eliminated under the India-ASEAN Free Trade Agreement came into effect in January 2010. India exported 248,000 tonnes of bovine met to Vietnam in 2012, 533,000 tonnes in 2013 and 622,000 tonnes in 2014. The bulk of this was destined for China. India also exports hundreds of thousands of tonnes to Thailand and Malaysia.

distances and pay-offs to border authorities – are said to be increasing, they are still lower than import duties and taxes. Beef is distributed all over China, including into the far north.

From Vietnam, the main smuggling route is through Mong Cai, which lies over the Beilun River from Dongxing in Guangxi Province. Mong Cai is only 135kms from Hanoi and Hai Phong international port, and is reportedly one of the wealthiest cities in Vietnam. Along with a large number of other products, frozen bovine meat is taken across the narrow river crossing by small boats and picked up by a plethora of Chinese traders in small cars and vans. Product can be plain packed in India, or re-labelled in Vietnam or China. Smuggling requires the direct or tacit assistance of authorities from both countries.

In one highly-publicised raid on smuggled beef from Vietnam, 100,000 tonnes was seized said to be worth $0.5 billion in 14 provinces (from Guangxi and Guandong to Jiangsu, to Chongqing and Hunan) involving 20 smugglers (CCTVNet, 2014). In another small but unusual case, 100 tonnes of beef from Japan was smuggled through Cambodia and Laos to Yunnan and Shanghai.

The informal cattle trade. As recently as 2008, live cattle flowed out of China, but the flow has since reversed at scale. Feeder and slaughter cattle enter China especially from Vietnam, Burma and Laos. Estimates below suggest that in recent years 100,000 cattle may have entered China from Vietnam in 2014, 100,000 directly from Burma and perhaps 150,000 indirectly from Burma through Thailand and Laos. If 350,00 cattle entered China through border trade, at (a generous) assumption of 200kgs carcass weight, this may equate to 70,000 tonnes of beef (bone-in), which is clearly much smaller then grey trade for beef.

As overviewed in the Vietnam profile, the main border post in Vietnam is in Cao Bang City on the Bang Giang river, about 30 km away from the border with China. Cattle are sourced from Tra Linh market and walked across the border (nearby to the official border post). For an idea of the magnitude, Tra Linh market trades 500 to 1,800 cattle per market day, open eight days per month (so perhaps 50,000 to 170,000 head per year).[11] Many of the cattle are from Laos and Cambodia, and are trucked to Cao Bang through provinces like Nghe An and Thanh Hoa.

It is probable that larger numbers of cattle are sourced from Burma. According to a feedlot company in Malong County in Yunnan, more than 100,000 head were sent directly across the border at Ruili into Yunnan in 2013. Thailand officially imported 204,000 head from Burma in 2013 (see Burma profile). According to one report (Ainsworth, 2015) about 120,000 head of cattle and buffalo passed through Mae Sot on the Burma/Thai border. Large numbers are transported to Vietnam (through Cambodia and Laos) but probably the majority are re-exported to China, through the Mekong to Xishuangbanna in Yunnan Provinces. Other cattle enter through Laos.

Crackdowns on the informal trade. China has sporadically considered and actually interrupted the informal beef and cattle trade for years, but not in a concerted way, possibly due to price inflation concerns. However pressures to act mounted due to high profile food

[11] By 2015, the volumes had increased up to 1,800 per market day and remained uninterrupted. In addition to Cao Bang, there are two other crossing borders including Quang Ninh and Lang Son that trade mostly buffaloes and pigs, and smaller number of cattle.

safety cases and the anti-corruption campaign of the Xi regime, which extended to border and inspection authorities. Crackdowns on smuggled beef (and other goods) were conducted on the Hong Kong trade (January 2015) and then Vietnam (April 2015) in an environment of strained relations between Vietnam and China. The crackdowns extended from border areas to domestic wholesale markets. The trade of live cattle from Burma and Thailand is also periodically interrupted due to prices, crackdowns and the security environment.

11.3. China's trade policy

A potent mix of forces have led China to liberalise the beef trade, though in a strategic way. As established above, forces includes stagnant domestic supply, increased consumption especially from out-of-home consumption, leading to rising prices, and measures to address food safety problems, corruption and smuggling. At a broader level, broader economic growth patterns (Figure 1) means that government faces fewer pressures to support rural industries, employment and incomes. This especially the case for beef that is not a staple commodity (except of some minority areas on the consumption side) and, unlike wool, is not important to the livelihoods of ethnic minorities on the production side.

While China has adopted a more liberal approach to beef and cattle trade for several years, this was ratified at the highest levels in September 2014, when the State Council – led by Premier Li Keqiang – announced that China will increase imports of beef and mutton.[12] This coincided with a series of bilateral measures, especially related to disease protocols. China only permits imports of beef from countries (on a national basis) that have freedom from FMD status with the World Organisation for Animal Health (even though FMD is endemic in China and very large volumes of beef from these countries enters China informally). China appears to be taking measures to relax these policies, including permitting imports from *zones* where disease is "free with vaccination".

Brasil's formal access to the Chinese market was embargoed during the boom import years, due to disease status. Brasil has traditionally been blocked from exports due to incidence of FMD in the main production areas. By 2012 these major areas were declared FMD-free zones with vaccination, but vaccinations stalled in some areas in the drought of 2012 and FMD appeared near the Brasil-Paraguay border. There were cases of atypical BSE in 2012 and 2014. One (small beef producing) state is declared FMD-free without vaccination and Brasil aims to become FMD-free on a national basis. Brasil was said to gain access to the Chinese market in mid-2015 with up to 26 plants to be accredited (Beef Central, May 21 2015), but there have been ongoing delays, raising some claims of delay on non-scientific grounds (in a more deflationary price environment). When and if significant plants are

[12] An announcement was made by the State Council, which coordinated between relevant agencies including the Ministry of Commerce (MOFCOM), the General Administration of Quality Supervision, Inspection and Quarantine (AQSIQ) and the Ministry of Agriculture (MOA). A government communiqué said that the meeting discussed ways to "determine the import policy measures to strengthen and promote the further opening [of trade]" and that import promotion strategies needed to "strengthen technology, products and services imports…meet the demand of domestic production and consumption, improve product quality, and promote entrepreneurship and innovation" (Reed and So, 2014).

accredited, Brasilian imports could be expected to be rechannelled from the informal to the formal trade.

In May 2013, China and India countries signed a memorandum of understanding (MoU) to facilitate the export of buffalo meat from India to China, although no tangible measures appear to have emerged. India is classified as FMD endemic and controls the disease by vaccination, but is reported to lack sufficient vaccine and programs (International Meat Secretariat, 2012). In 2014 India was the world's largest bovine meat exporter with 1.5 million tonnes.

Australia has been a major beneficiary of China's liberalisation policy in the sector. In the China-Australia Free trade Agreement signed in 2015 a relatively liberal final position was reached for beef, where tariffs of 12-25% are to be eliminated over nine years with safeguard trigger of 170,000 tonnes. Beef and mutton were not major sticking points in the decade-long negotiations compared to some other agricultural commodities (wool), where Australian wool is imported at a scale that is perceived to pose a threat to the domestic production sector, located predominantly in ethnic minority areas. The negotiations were also conducted in a period of rising prices (2014), although Chinese agencies started reconsidering positions when prices moderated.

The long-awaited slaughter and feeder cattle protocol with Australia also signed in 2015, especially with measures to manage bluetongue risks (quarantine rules based on source, destination and season). Some stakeholders in China endorsed the protocol on the grounds that it would reduce pressure on slaughter of China's breeding herd, while others were alarmed about (over-stated) reports from Australia that the agreement could lead to the import of one million head per year. The commercial feedlot and abattoir sector is also very interested in live cattle imports to increase supply and capacity-utilisation of facilities. Animal welfare / ESCAS systems that will be imposed in the trade will mean that large certified plants will capture supply, and not compete with smaller slaughter units as they do for domestic cattle. However, few current large feedlots or abattoirs are located close to ports and quarantine facilities.

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