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# Reconciling industry policy and comparative advantage: the regional distribution of China's cattle and beef industry<sup>1</sup>

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## 1. Introduction

China's cattle and beef industry has changed dramatically in recent years. Not only has cattle and beef output expanded at a high rate but, as outlined in Section 2, the spatial pattern of production has also changed markedly. Part of the altered regional distribution is the result of factor endowments, but part is also the result of specific industry policies both at the central and local level. This paper examines the extent to which these forces explain the pattern of uneven regional growth in the Chinese cattle and beef industry, and the extent to which industry policy has complemented or distorted regional comparative advantage.

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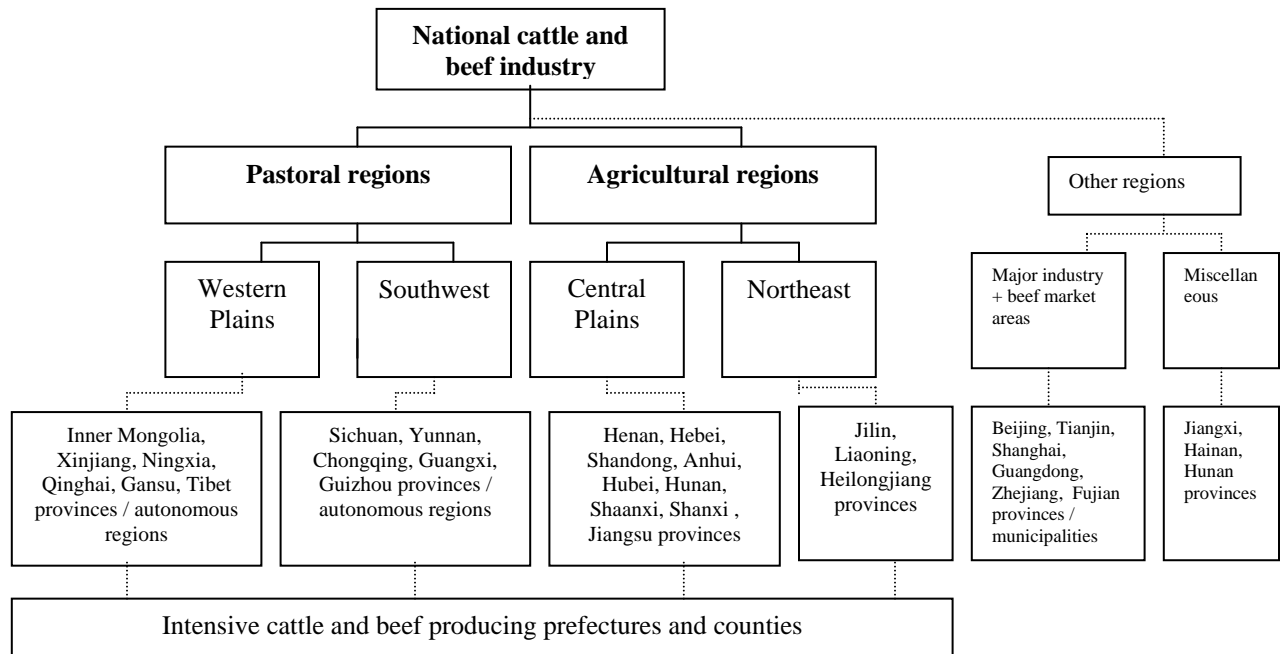
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<http://www.nrsm.uq.edu.au/nrsm/research/chinap.htm>

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## 2. Overview of changes in regional dispersion

Figure 1. Levels of regionalisation in China's cattle and beef industry



The regionalisation of the Chinese cattle and beef industry has taken place on a number of different levels as illustrated in Figure 1. At the broadest level, differentiation arises between pastoral regions characterised by extensive grazing and between agricultural regions characterised by intensive feeding. Cattle have long been associated with China's pastoral region. In 1980, one quarter of the 72 million head of cattle in China and 44% of the nation's beef came from the six pastoral provinces/autonomous regions of Inner Mongolia, Qinghai, Ningxia, Xinjiang, Gansu and Tibet (Zhang and Longworth 1998). Cattle numbers in the these six pastoral provinces/autonomous regions have grown significantly from 18 million in 1980 to 21 million in 1997. However, this increase is small compared to what has occurred elsewhere in China over this period. By 1997, the six pastoral provinces combined accounted for only 18% of cattle numbers in China and a disproportionately small 14% of national beef production (SSB, 1998). Beef cattle production in China is now firmly centred on the intensive production systems of the agricultural areas.

The pastoral and agricultural regions are not homogeneous regions and so the second level of differentiation is that the pastoral and agricultural regions can be broken down into distinct geographic regions or "beef zones" (see Map 1). At least two beef zones in the pastoral region can be identified. One is the temperate and often semi-arid dry plains and high plateaus of northern and western China (the Western Plains Beef Belt). The other is the steep-sloped grasslands of south western China that experience a wide range of agroclimatic zones from sub-tropical to temperate depending on elevation (The Southwest Beef Belt). The Western Plains regions has a long history of livestock grazing to the extent that many of these rangelands are now overstocked and the pastures severely degraded. Interest has turned to a more intensive use of the Southwest grasslands but there are also limits and many challenges to the further development of these areas.

Although cattle production occurs throughout the cultivated areas of China from the rice paddies of southern China to the cornfields of northern China, there are two, clearly identifiable, "beef belts" that are often referred to in Chinese literature. The most famous of these is the Central Plains (Zhongyuan) Beef Belt in central China. At the heart of China's human population and grain production, the Central Plains have seen a transformation of draught cattle production to small-scale beef cattle production. The collective outcome of this has been a massive growth in cattle numbers, turnoff rates and beef production, to the point

that it now far outstrips production in the pastoral areas. The other beef belt in the agricultural area, namely the Northeast Beef Belt, incorporates the grain surplus provinces of northeast China. From a much lower base than the Central Plains, growth in the Northeast beef belt has been as equally spectacular.

These four beef zones described above and listed in Figure 1 account for almost all of the cattle and beef produced in China. Table 1 outlines cattle and beef production within these zones for 1980, 1990 and 1996. The table not only highlights the Central Plains beef zone, but also the remarkable relative growth that has occurred in this zone as well as the Northeast zone, relative to the two pastoral region zones. The following section (Section 3) outlines in more detail the characteristics of each of these four zones including relative factor endowments and regional specialisation.

**Table 1 Changes in regional distribution of cattle and beef production**

Region	Year	Cattle numbers		Slaughter numbers		Weight (kg)	Beef production	
		(000 head)	% of China	(000 head)	% of China		(000 tons)	% of China
Central Plains	1980	16 140	22	505	15	79	40	15
	1990	29 571	29	4 804	44	126	604	48
	1996	52 985	38	18 670	51	149	2 788	56
Northeast	1980	3 460	5	256	8	113	29	11
	1990	5 762	6	899	8	135	122	10
	1996	14 041	10	6 319	17	144	910	18
Southwest	1980	22 780	32	745	22	72	54	20
	1990	22 790	22	1 565	14	96	149	12
	1996	34 239	24	4 389	12	101	443	9
Western Plains	1980	17 872	25	1 410	42	83	119	44
	1990	21 062	20	2 701	25	107	288	23
	1996	20 945	15	4 208	12	115	485	10
Other	1980	11 424	16	406	12	69	27	10
	1990	23 696	23	914	8	101	93	7
	1996	17 608	13	2 927	8	111	325	7
All China	1980	71 676	100	3 322	100	81	269	100
	1990	102 884	100	10 883	100	124	1 256	100
	1996	139 813	100	36 511	100	136	4 949	100

Source: China Agriculture Yearbook, 1981, 1991 and 1997.

As discussed in Section 3, there are often only subtle differences in factor endowments within each of these beef zones. Yet within these zones, there are specific prefectures and counties that have much larger cattle herds and beef production than neighbouring counties and prefectures. Table 2 shows that in 1996, five prefectures alone (Zhoukou and Zhumadian in Henan Province, Dezhou and Heze in Shandong province, and Fuyang in Anhui province) accounted for almost one quarter of the cattle raised and beef produced in the Central Plains<sup>3</sup>. These intensive cattle and beef producing prefectures and provinces provide the third

<sup>3</sup> Within these prefectures, there is also an uneven distribution of cattle. For instance, Lixin, Mengcheng and Guoyang counties account for a majority of the cattle and beef produced in Fuyang Prefecture (Zhang and Longworth, 1998). It is interesting to note in Table 2 that while the number of cattle held in the five major prefectures as a proportion of the Central Plains region as a whole increased by a small amount

level of regionalisation. As will be highlighted in Section 5, differences in the cattle and beef industry can not easily be explained by factor endowments but, instead, are more the result of specific industry policies at the local level.

**Table 2. Changes in cattle and beef production in the five largest beef-producing prefectures of the Central Plains Beef Belt**

Province/ Prefecture	Cattle No. (000 head)		Slaughtered No. (000 head)		Carcass Weight (kg)		Beef Output (000 tons)	
	1990	1996	1990	1996	1990	1996	1990	1996
<b>Henan</b>								
Zhoukou	1 442	2 415	285	949	99	138	28.3	130.7
Zhumadian	1 220	1 857	278	654	90	131	25.0	85.7
<b>Shandong/</b>								
Dezhou	749	2 034	161	650	167	181	26.9	117.4
Heze	835	2 385	253	815	158	153	40.0	124.3
<b>Anhui/</b>								
Fuyang	2 067	3 525	575	1 369	104	130	59.7	177.4
<b>Subtotal</b>	<b>6 313</b>	<b>12 216</b>	<b>1 552</b>	<b>4 437</b>	<b>116</b>	<b>143</b>	<b>179.9</b>	<b>635.5</b>
<b>% of the Central Plains</b>	<b>21.3</b>	<b>23.0</b>	<b>32.3</b>	<b>23.8</b>	<b>-10</b>	<b>-6</b>	<b>29.8</b>	<b>22.8</b>

Source: Fieldwork data

### 3. Inter-regional factor endowments.

Table 3 summarises the key factor endowments available to the five zones identified in Section 2. This table forms the basis on which regional comparative advantage in the cattle and beef industry can be addressed. In reading the table, a number of issues should be considered. Firstly, the table shows both the differences and the similarities between the regions. As discussed below, inter-regional similarities are almost as important as differences in discussing comparative advantage (or lack of it) in the national cattle and beef industry.

Secondly, the chart lists factor endowments that are both natural or resource-based, and those that are 'created', predominantly through capital utilisation and strategies through which it is utilised. For example, local cattle breeds have developed over time to suit the climatic conditions of particular regions while the proportions of improved cattle is largely a function of an AI network that has been developed. Both determine regional breeding bases and therefore cattle productivity. Access to inter-regional markets is a

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between 1990 and 1996, the proportion of cattle slaughtered and the proportion of beef produced actually decreased by significant amounts. This indicates that while the five major provinces have increased cattle numbers faster than other Central Plains prefectures, other prefectures have, from a lower base, increased the turnoff rates and carcass weights faster than the major five. That is, other prefectures were making the transition from draught to beef cattle between 1990 and 1996, where as maybe the five prefectures began doing this earlier and now meeting lower marginal growth rates.

question of geography but, obviously, also constructed transport infrastructure. A more complex example relates to value-adding capacity. Feedlotting is suited to some areas more than others, but much of the momentum to develop the sector derives from industry development strategies. Abattoir slaughtering and leather processing capacity is also suited to some regions more than others, but it has been ‘inherited’ by most regions as a product of central-planning measures (General Food Company abattoirs), while further development is also determined strongly by regional capital formation, including foreign investment.

**Table 3. Summary of resource endowments in four Chinese beef zones**

		Central Plains	Northeast	Western Plains	Southwest	Other – industrialised
<b>Fodder supply</b>	<b>Straw</b>	Large surplus	Large surplus	Winter feed	Winter feed, supplement	Often available locally
	<b>Grass</b>	Summer feed (roadsides, cut + carry)	Summer feed (roadsides, cut + carry)	Grazing (on increasingly degraded grasslands)	Grazing (on hilly grasslands, cut + carry)	Minimal
<b>Concentrate feed supply (Rmb / kg, July 1998 – July 1999)</b>	<b>Corn prices</b>	1.23	1.03	1.18	1.38	1.36
	<b>Soybean meal prices</b>	2.11	1.91	2.34	2.73	2.02
<b>Cattle productivity</b>	<b>Local cattle type</b>	Draught base, some suited to beef production	Draught base, some suited to beef production	Grazing history, suit harsh conditions	Smaller breeds, draught, suit hilly areas	N/a
	<b>Improved cattle (%)</b>	20-30% F1, some pockets 80%	20-30% F1, some pockets up to 70%	Up to 50%	10-20%	N/a
	<b>Diseases</b>	Minimal but no export protocol	Minimal but no export protocol	Minimal but no export protocol	Some	N/a
	<b>Parasites</b>	Minimal	Minimal	Yes – minimal, effects hides	Yes – effects hides	N/a
	<b>Mortality</b>	Minimal	Minimal	Feed shortages after severe winter	Some	
<b>Transport and cattle markets</b>	<b>Transport infrastructure</b>	Good rail and road	Good rail and road	Decent roads	Many remote areas, small roads	Good
	<b>Local cattle markets</b>	Many	Many	Fewer	Few	N/a
	<b>Inter-provincial cattle markets</b>	Some major markets	Some major markets	A few major markets	Few	N/a
<b>Proximity to major cities</b>	<b>Intra-regional</b>	Many large cities – mid/low value beef consumption	Many large cities – higher value beef consumption	Very few	A few major cities (Chengdu, Kunming etc.)	N/a
	<b>Inter-provincial (Shanghai, Beijing, Guangdong)</b>	Relatively close to Shanghai + Beijing	Some access to Beijing	Distant, IMAR some access to Beijing	Distant	Are major premium beef markets
<b>Proportion rural population : cattle 1996</b>		0.138	0.246	0.38	0.177	0.058

Sources: fieldwork data, SSB, Animal Husbandry and Veterinary Journal

Thirdly, some items usually important to discussion of comparative advantage are omitted from the table. Labour costs, for example, do not vary greatly across rural parts of the four beef zones (but are significantly higher in the ‘industrialised areas’, and are not an important variable in small-scale household cattle and beef production. As discussed throughout the paper, capital is a major resource for industry development but generalisations about its availability can not be made on a regional basis. Also, while it is possible to say that both pastoral regions generally have a less access to capital for industry development than the Northeast Beef Belt and especially industrialised areas, the sources of capital – state, public and private – generates complications about how it is used. The value and type of alternative industries to cattle and beef also is also usually an important determinant of inter-regional comparative advantage and opportunity costs of input items. Again, however, this issue has to be considered on a level lower than ‘region’. Moreover,

and as discussed below, the existence and potential of alternative industries that compete with cattle and beef for scarce resources do not always effect the current policy rationales applied to the cattle and beef industry in ways expected under the principals of comparative advantage. For example, many Shanghai companies want to build feedlots, and Shandong is the most ‘agro-industrialised’ province in China but places great emphasis on the cattle production.

## Differences in inter-regional factor endowments

The differences in resource endowments shown in Table 3 suggest that regional specialisation along the principles of comparative advantage could be based on the following descriptions:

### Central Plains

The high population density and the cropping intensity of the Central Plains region is conducive to small-scale household cattle production. That is, large numbers of households that produce feed on-farm take on cattle for dual purposes – draught and beef production – as a low opportunity cost activity. Producers can easily take cattle to nearby artificial insemination stations for breed improvement and veterinary stations although the latter are rarely required in intensive raising. As grain and straw are both readily available at median costs in China, cattle can be produced by households to suit a wide range of markets. Local cattle markets, slaughter households and abattoirs are often within walking / leading distance. Many counties also have live cattle markets, feedlots and abattoirs that service inter-regional markets of household producers. In intensive cattle-producing regions, there are large numbers of cattle dealers. As the Central Plains region covers a vast area, proximity to major city markets varies enormously. Regions such as Sanhe in Hebei have developed a concentrated cattle and beef industry to service both high and low value beef markets in Beijing. A smaller and lower-value parallel is found on the outskirts of provincial capitals (where slaughter households and meat vendors locate within a few hours of fresh meat markets). Although the major cattle and beef production regions in the Central Plains (like Fuyang, Zhoukou and Heze) are distant (at least 150km) from major provincial capitals and large cities like Shanghai, they do have a good transport infrastructure. Thus dealers can move cattle to Central Plains feedlots and abattoirs without having to unload the cattle for feeding and watering, and to transport pre-frozen meat to major cities in unrefrigerated trucks. Such low cost distribution channels are not as available to other production zones. From a feed input perspective, the Central Plains appears to have a comparative advantage in small-scale household production of cattle, either as a cow-calf activity or fattening on a long-term basis. However, grain and transport resources allows Central Plains producers and companies to access higher-value activities. Thus, a wide range of production activities are employed in the region.

### Northeast China

Northeastern provinces hold many characteristics in common with those of the Central Plains region. There are, however, several key differences. Most notably, concentrate feed prices in the grain-surplus provinces of Northeast China are relatively low. As could be expected, a relatively high proportion of cattle in the Northeast are therefore involved in cattle fattening – either as specialised households or feedlots. Unlike the Central Plains region, there is a more readily available market for this fattened beef within the region. Northeastern Chinese are well-known for their appetite for Hot Pot and fattened beef, consumed both at home and in restaurants of major cities. Another difference is that (northern) areas of Jilin and Heilongjiang are pastoral and semi-pastoral, and there is also a steady flow of cattle from Inner Mongolia to the Northeastern region. The combination of these forces suggest that the Northeastern cattle zone has a comparative advantage in cattle fattening and the production of quality beef although, like the Central Plains, a full range of cow-calf production and long term fattening are commonly undertaken.

### Western Plains

The Western Plains zone covers six provinces constituted primarily by pastoral, but also semi-pastoral, production systems. As cattle raising has traditionally been a central economic and social activity in the region, many parts of the Western Plains have an established resource and knowledge base. The embedded

practice of pastoralists on the Western Plains to try to produce cattle to slaughter weight appears ill-suited to the comparative advantage of the Western Plains, as well as contributing to the severe grassland degradation of the region. For both of these reasons, the pastoralists of the Western Plains appear to be best served by concentrating on cow-calf production, with feeder cattle turned off from the Western Plains more efficiently fattened in the semi-pastoral areas of the region or in neighbouring agricultural areas (Brown et al, forthcoming). However, this option appears to be most open to pastoralists in the southern and eastern parts of the Western Plains (IMAR) where transport costs are not prohibitive. The options of other Western Plains areas appears to be confined to producing slaughter cattle and beef for local markets, or for lower-value export (border trade) markets in Russia and the former USSR republics to the north.

## **Southwest China**

Pastoral and semi-pastoral cattle producers in Southwestern China face an even more difficult set of issues. Much rhetoric and some associated research has focused on the desirability of fully exploiting sub-tropical Southern grasslands through cattle and sheep/goat raising activities. Much of this land, however, is very steep, unimproved, and sparsely populated. With the important exception of the Central plains region, the Southwest has more bovines than all other beef zones in China. However, a low proportion of these are cross-bred cattle and local cattle in the region tend to be tough and small-framed. Moreover, the majority of cattle in the region are located in remote areas connected to major centres by poor roads. Cattle in these regions play an important role in local economies, many of which are poverty declared, but a negligible role in the national cattle and beef industry. Within the vast and diverse Southwest region, however, are pockets of improved grassland and semi-pastoral areas that produce cross-bred cattle. Indeed, provinces like Yunnan and Sichuan have paid a great deal attention to grassland and cattle improvement, and to disease prevention and veterinary care. Many of these areas are within a days' drive (along improving roads) of major cities (Chengdu, Chongqing, Kunming, Guilin). Local officials claim that beef consumers in these large cities have the capacity to absorb the developing beef production capacity in the Southwest. Combined with the fact that there are relatively small numbers of feedlots and abattoirs in the region, and that road and rail transport times to major cities like Shanghai and Hong Kong are substantial, suggest that much the cattle and beef trade will be an intra-regional affair. The exception to this are particular niche markets such as having beef registered as a "green product", in the production of yak meat and hides in the more remote areas near Tibet, and the opportunity to 'export' live cattle and genetic material inter-regionally given the mass of knowledge and stock of *Bos Indicus* cattle.

## **Other regions**

A number of provinces and cities are not categorised in either of the four beef zones and have relatively small and undeveloped cattle and beef industries. There are essentially two types of 'other' regions. The first are the relatively highly industrialised – rather than predominantly agricultural – provinces (like Fujian, Guangdong and Zhejiang) and province-level cities (like Beijing, Tianjin and Shanghai). These areas tend to be relatively wealthy, densely-populated and some attract large numbers of tourists. The province-level cities in particular are the major markets for higher-value beef. Because of the high costs – and opportunity costs – of land, labour and feed, together with relatively strict zoning and environmental regulations, these areas do not appear to have a comparative advantage in cattle, beef and leather production. Yet, for reasons discussed in Section 5, all of these areas have sought (to different extents) to move into production aspects of the industry. While intensive animal husbandry in China is becoming an increasingly urbanised industry, these areas would seem to have a greater comparative advantage in more elaborate processing. High skill levels are required for some forms of processing in the industry (medicinal products for example). More importantly, for some processes (slaughtering), it may be more efficient to move the raw material inputs (cattle) than the finished product (higher value beef) to more developed beef markets. A cattle market and a hide market in Zhejiang Province play an important role in the national industry because of the need of a national hub in that part of the country. In addition to these industrialised areas, agricultural provinces like Hunan and Jiangxi are also not included in the four beef zone classification. This is simply because they do not have large cattle and beef industries and are awkward to include in the four geographical zones.

The above discussion suggests that some clear demarcations can be made between regions based on their resource endowments and geographic locations. These differences help explain the significant movements of feeder, slaughter and breeding cattle and also higher-value beef between regions. They also help to explain differences in the *types* of cattle and beef industries established in different regions, as illustrated in key indicators like scale of production. Beef prices conform roughly to expectations, though the differences are small, partly due to significant inter-regional price integration<sup>4</sup>. All of these indicators are discussed in Brown et al. (1999). Other indicators like cattle prices are less illustrative<sup>5</sup>.

## Factor endowments not conducive to inter-regional specialisation

Despite the fact that different regions have different types of beef industries, the differences are of degree only and are small in context with the whole industry. A strong pattern of inter-regional specialisation has yet to emerge. The discussion below points to several resource-related factors that might help explain the lack of inter-regional specialisation.

The first relates to cattle supply. With the exception of the Western Plains region, the cattle base of China is built on a history of draught and transport use. While breed improvement measures are taking effect in some regions faster than others, the vast majority of cattle in China – approximately 90% – are local breeds or at the initial stage of the breed improvement plane and are slaughtered old or at a low liveweights for their age. While fattening is common in agricultural areas in particular, fattened and specifically-bred cattle account for a small percentage of the turnoff in all regions. The alignment of cattle and feed prices in all regions makes fattening a generally unviable activity for feedlots and households without established marketing channels, as is grain supplementation in pastoral areas (Brown et al. 1999). Cattle diets, based on straw in agricultural areas and often degraded or hilly grasslands in pastoral areas, are rarely managed to allow cattle to reach growth or reproductive potential let alone to produce cattle specified by significant numbers of feedlots and abattoirs. Because of the limited national market for specific types of cattle, most cattle are turned off for low-value, local slaughtering. Thus inter-regional comparative advantage is relevant only to the small, higher-value, sectors of the Chinese cattle market.

A similar situation exists in the beef production sector. More than 90% of beef in China is produced by household slaughterers for local fresh meat markets. Household slaughterers produce low cost and low quality beef more efficiently than do abattoirs (Brown et al. 1999). While slaughtering is a relatively specialised activity often carried out by people of the Hui minority, there does not appear to be a shortage of households willing and able to enter the sector and meet the needs of local beef markets in any region. For regions looking to develop an abattoir-slaughtering sector, most rely on local General Food Company abattoirs that were built across the country during the 1980s and early 1990s using similar technology and slaughter techniques. Beef production has increased but most of this is a generic fresh beef product. Further growth efforts are in danger of flooding the market with generic undifferentiated product and creating further inter-regional replication.

The abundance of low cost feed supplies is also a common characteristic of all four beef zones. While the source of fodder is different between zones (extensive grazing on the Western Plains, grass in Southwest China and straw in both agricultural beef zones), the costs and nutritional values of fodder are roughly equal across regions. A priori, extensive, grass-fed cattle production practised in the pastoral regions usually implies lower production costs than more intensive production regimes in the key cost item of feed. However, this is partly offset by the abundance of straw in agricultural regions as a cheap and easily accessible source of cattle fodder. Moreover, the costs of herding, grazing fees, taxes, and the risks of cattle under-nourishment and death in dry and cold conditions pose relative disadvantages for pastoral areas. As highlighted in Table 3, there are significant differences in grain (corn and oilseed) prices across regions. As

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<sup>4</sup> Average beef prices between July 1998 and July 1999 were as follows: Central Plains, Rmb/kg 12.79; Northeast, Rmb/kg 13.13; Western Plains, Rmb/kg 12.93; Southwest Rmb/kg 12.77; 'other' agricultural areas, Rmb/kg 12.89; 'other' industrialised areas, Rmb/kg 15.15.

<sup>5</sup> Cattle price data does not conform to expectations based on production input costs. One explanation is that price data relates to average rather than specific types of cattle.

grain is used as a supplementary feed by nearly all producers in all regions, this has an effect on the profitability of cattle production in different regions and a large effect on regional cattle fattening activities. As discussed above, however, a low percentage of cattle in China (less than 10%) are turned off through feedlots and fattening households or fed intensively on concentrate feed.

The culmination of the preceding issues points to a situation where, at present, producers of both cattle and beef operate from a similar production base, for largely undifferentiated markets in which producer margins are low. Thus, the low level of development of the Chinese cattle and beef industry *as a whole* – which is generally low-value, undifferentiated and *localised* – has had an inverse impact on regional specialisation along the lines of comparative advantage.

Another important point is that relative cost advantages can also ‘cancel out’ across beef zones. For instance, lower production costs in remote agricultural regions are often offset by higher transport costs. Conversely, low transport costs in areas like Shanghai are offset by high land values for cattle production and high labour and cattle transport costs for abattoir slaughtering.

While the bulk of China’s cattle and beef are often subject to hazy notions of comparative advantage and resource endowments, this appears to be less true of the ‘higher (quality) end’ of the industry that accounts for approximately 10% of the industry. If that proportion grows, or the low returns to producers result in large-scale industry rationalisation, regional specialisation might change from the ‘current / existing’ system to one based on more on comparative advantage suggested in Table 4. Indeed, the table suggests that in many respects, this process is already well underway. More specific examples include: companies in Sanhe County in Hebei province that are integrating cattle feeding and slaughtering because of the advantages of locating close to the high value market of Beijing; cattle fattening is most prevalent in the grain-surplus Northeast region; medium-value slaughter cattle are turned off and sold out of many intensive cattle-producing regions of the Central Plains, and; a high volume of cattle are traded in Weichang County which lies at a transport interface between the Western, Northeast and Central Plains regions<sup>6</sup>.

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<sup>6</sup> Qipanshan Township in Weichang County, Hebei Province has become a nationally-significant cattle trading area, because of its geographical location. This county has sought to develop its live cattle market as a major source of income for both government and individuals. Around this market are large numbers of cattle dealers and agents, individuals specialised in cattle transport operations and, perhaps most markedly, speculative cattle fatteners. As Weichang is semi-pastoral, fattening households are able to source most grain locally. That is, accidents of geography that have led to a natural development of a particular activity, have had flow-on effects for associated industry activities.

**Table 4. Regional distribution of existing cattle, beef and by-product capacity and vis-à-vis system based on comparative advantage**

		Central Plains	Northeast	Western Plains	Southwest	Other
Existing production system [industry structure]	Cattle	Small-scale production, straw-based diets, feeder + slaughter cattle, feedlots common	Higher scale of production, straw + grain, feeder + slaughter cattle, feedlots common	Grass-fed, usually to slaughter weight, few feedlots	Mixed feed-grazing system, usually to slaughter weight	Some feedlots
	Beef + slaughter (GFC=General Food Co. JVPM=Joint venture premium market abattoirs)	Variable quality beef, dominated by household slaughtering, strong GFC base, some established JVPMS	Variable quality beef, household slaughtering, GFC base, many JVPMS under construction	Low value beef, small GFC base, no JVPMS	Low to medium value beef, a GFC infrastructure, no JVPMS	Low grade beef in suburbs + bought in, a few GFCs, JVPMS located nearby
	Numbers of leather processing enterprises	Highest	Some	Very few	Relatively few	Some
Comparative advantage	Cattle	Straw-based diets, long-term fattening, household production	High levels of grain supplements, shorter-term feeding, household fattening and feedlots	Grazing, grain supplements in winter, cow-calf + feeder production, speculative fattening in market + semi-pastoral areas	Bos-indicus breeds, mixed production systems	No
	Beef	Household slaughtering for local markets, JVPM abattoir slaughtering around major markets, GFCs for low value export markets	Medium grade beef production for regional markets, few JVPMS (distance)	Household slaughtering for local consumption, Green / pastoral product labelling	Limited green product labelling opportunities, GFCs for intra-regional cities	Low quality beef bought in, JVPMS located nearby
	Leather	Yes	To a degree	No	To a degree – lower value	No

#### 4. Influence of Central government on regional distribution

The previous section outlined the types of cattle and beef industries that currently exist in different regions of China and how this compares, and might change, to a regional distribution based on inherent comparative advantages in a more developed industry of the future. However, this discussion did not take into account the impact of government policy. This leaves a large analytical gap because, although the beef industry in China is notionally ‘free’ and ‘open’<sup>7</sup>, virtually every aspect of the Chinese cattle and beef industry is influenced by government in one way or another. The Central government has taken a major interest and been a major player in the development of the cattle and beef industry, and has impacted on the regional distribution of the industry that is implicit in Tables 1 and 2. This section explores further the influence of the central government and whether its actions in developing the industry have consolidated regional comparative advantage or distorted it.

<sup>7</sup> As a relatively recent industry, the beef industry does not have the legacy of many of the regulated marketing and production arrangements experienced by the longer-established (wool) or staple (grain) agricultural industries in China. There are, for example, no official barriers to the movement of cattle or beef across regional or administrative borders. Unlike some grains, there are no set production quotas or price controls. Unlike pork, beef is not stored at all to stabilise prices (although this is not a strong lever for pork prices anyway).

Central government impacts on the regional distribution of the cattle and beef industry in three major ways: through the ‘Straw for Beef’ program, through service areas such as breeding, veterinary care and extension, and through other macro-policies.

## Straw for Beef program

One of the major central government initiatives aimed at building cattle production capacity across China has been the “Straw for Beef” program<sup>8</sup>. Objectives of the program from a national perspective have been to save grain, to utilise crop residues, and to achieve environmental benefits (Li et.al 1999). The main components of the Straw for Beef program have been in the areas of feeding, breeding and veterinary services. Implementation of the program is backed by the provision of tangible resources like capital, low-scale subsidisation of key inputs and extension personnel. These resources are provided by the central government level and matched by lower-level administrative units to reach the household level. Less tangibly, but no less importantly, incentives are built in to encourage lower level officials in targeted areas to expand cattle and beef production figures.

The model or demonstration counties (*shifanxian*) and prefectures that are targeted under the Straw for Beef program are designed to act as ‘spark points’ (*huodian*) that will expand the industry to other parts of the targeted region and, ideally, across the country<sup>9</sup>. This might happen by regions ‘looking over the fence’ to the development model employed by Straw for Beef counties and following it if deemed desirable. In addition, the development of an infrastructure in targeted counties and prefectures is also able to be utilised by non-targeted counties (at low diminishing marginal costs). For example, liquid nitrogen plants (necessary to store and transport semen straws) are normally located in prefecture capitals and can be utilised by both targeted and non-targeted counties.

Has the Straw for Beef program distorted regional comparative advantage of the industry? An answer in the affirmative would assert that the program has been applied in a discriminatory way, with an inherent bias toward the agricultural regions and the Central Plains region in particular. This is reflected in the number of counties targeted under the Straw for Beef program in each region (see Table 4). The regional distribution of targeted counties is a function of the Straw for Beef selection criteria. Recipient counties must, for example produce a minimum amount of crop residue (able to be reached by agricultural and some semi-pastoral but not pastoral counties) and also have a large and already-established cattle herd (usually draught cattle but must reach specified turnoff rates). The bias of the Straw for Beef program toward agricultural areas is consistent with the objectives of the Straw for Beef program. The Central Plains is an intensive cropping region with a large straw surplus that will play a major role in determining China’s grain balance into the future, along with having a dense rural population of potential cattle producers and beef consumers. Many counties in the Central Plains also had large draught cattle (not buffalo) herds that were able to be improved with relatively low marginal costs to beef cattle through the breeding program. Northeastern China, because of its straw surplus, has been targeted secondarily by the Straw for Beef program. For opposing reasons, pastoral and more industrialised provinces are under-represented<sup>10</sup>.

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<sup>8</sup> Details of the Straw for Beef program including objectives, measures, implementation and review can be found in Li et al. 1999.

<sup>9</sup> This replicates the way major policies are trialed and introduced in China, namely from ‘points’ to ‘lines’ to whole regions to national coverage. The open door policy, State-owned enterprise reform, and on-leasing of land are examples of this. The Straw for Beef program has recently been expanded beyond the year 2000 and to more than 400 counties giving current non-Straw for Beef counties strong incentives to pursue beef and cattle industry development. Some 13 prefectures constituted by cattle-intensive counties have been already been targeted.

<sup>10</sup> While areas of the Southwestern region in particular have high cattle numbers and densities, most are not intensive cropping areas.

**Table 4. Number of Straw for Beef Project Counties by Province (by 1997)**

Province	No. of Project Counties			Province	No. of Project Counties		
	Total	Cattle	Sheep		Total	Cattle	Sheep
Shandong	37	25	12	Guangdong	7	7	
Henan	31	23	8	Xinjiang	7	3	4
Hebei	21	16	5	Jiangxi	6	6	
Anhui	16	14	2	Zhejiang	5	2	3
Jilin	14	13	1	Guizhou	4	4	
Heilongjiang	14	13	1	Gansu	4	4	
Sichuan	13	13		Ningxia	4	2	2
Liaoning	12	11	1	Hainan	3	2	1
Guangxi	12	12		Fujian	2	2	
Inner Mongolia	10	5	5	Yunnan	2	2	
Jiangsu	9	3	6	Chongqing	2	1	1
Shaanxi	9	8	1	Shanghai	1		1
Shanxi	7	7		Beijing	1	1	
Hubei	7	6	1	Tianjin	1	1	
Hunan	7	6	1	<b>Grand total</b>	268	212	56

Source: Li et. al., 1998

Table 4 also shows that Straw for Beef funding has been provided to counties in all provinces of China with the exception of Tibet. This is because Central government is most interested in developing a localised industry across the country. The national cattle herd should, for example, be capable of consuming large amounts of crop residue that cannot be transported economically between regions. Similarly, because manure, meant to displace inorganic fertiliser on cropland, is rarely transported across regions, it needs to be produced on-farm to be fully utilised. Moreover, as nearly all meat is consumed fresh, meat markets are very localised in China, and so a large number of regions need to have a local cattle and beef industry if it is to displace more grain-intensive meats. The localised, low-value cattle and beef industry encouraged under the Straw for Beef program contributes to the demise of regional specialisation, as discussed in Section 3.

While the Straw for Beef program has certainly emphasised industry development in agricultural rather than pastoral regions and also encouraged an unspecialised industry, there are a number of reasons why this has not necessarily distorted (gone against the grain of) forces of comparative advantage. First, straw and draught cattle have always been abundant in agricultural areas of China and provide a valid resource base on which to build a cattle and beef industry, particularly a low-value industry suited to Chinese resource endowments and economic conditions. The Straw for Beef program has effectively drawn attention to these pre-existing resources and provided short-term initial incentives to facilitate their utilisation in a way that is consistent with a resource-based comparative advantage.

Moreover, expansion and commercialisation of national cattle and beef capacity – seen as desirable for grain-saving and other reasons – could not have been achieved based on the regional industry distribution of 1980 (or even 1990) (see Table 1). The Western Plains region appears to have already reached and indeed over-extended its cattle production capacity, as evidenced by increasingly severe grassland degradation. Development of the Southwestern beef zone would have involved more resources and time to reach growth rates seen in the agricultural areas. In addition, the national cattle and beef industry has not

necessarily expanded to the detriment of the pastoral areas. While a larger national production capacity might exert downward pressure on prices and some feedlots around Beijing might, for example, choose to source cattle from agricultural areas rather than IMAR, the industry expansion in agricultural areas might provide opportunities for pastoral regions. A larger national feedlot industry, for example, might provide a larger market for feeder cattle that some parts of the pastoral region could best exploit. It might also help develop consumer awareness of beef across the country and thereby provide opportunities for pastoral areas to fill niches like 'green labelled' and cooked beef. That is, the Straw for Beef program has not only cut the pie in different portions, but also made it bigger.

Finally, the implementation of the Straw for Beef program as a means of expanding the cattle and beef industry has been chosen over other means like price support mechanisms, the setting of quotas for all regions or the provision of large subsidies of production inputs. Such price-distorting measures could be expected to have eroded the force of comparative advantage far more than the Straw for Beef program has.

## Breeding programs

Like the veterinary and extension systems, the national breeding program is controlled by central government and, as a 'top-down' affair, and implemented through lower administrative levels. The centrally determined and funded breeding system in China has been very successful in increasing numbers of improved stock throughout the country. Semen from imported bulls is available at local levels and cows are artificially inseminated at grassroots level, at a very low cost. This would not have been possible without high levels of central government subsidisation. Alternatively, local government or companies might have undertaken breed improvement measures but with highly variable results. Many would not have had the capital or the knowledge base to import quality breeding stock and high costs would have deterred farmers from improving cattle.

Central government provides funding and services to regions in a roughly equal and non-discriminatory way. Breed centres are located and managed from provincial capital cities, and semen (from the bulls in the centres) is distributed through lower administrative levels and ultimately to village AI stations. However, provincial breeding authorities are restricted in their capacity to direct the provincial breeding program, while more local-level authorities and farmers are in an even more passive position. Besides controlling most of the funding directed to the breed centres, Central government must approve the operation of all breed centres and must approve the breeds and the specific bulls imported to the centres. Even if they could get approval or import desired breeding stock, local stations or private breed companies would find it very difficult to compete against the highly subsidised government stations.

At present, Simmental, Limousin and Charolais breeds are emphasised in the national breeding program. Those imported are chosen on the basis of size and growth characteristics, rather than their suitability to specific regional agroclimatic conditions or ability to produce specific types of beef. Thus, genetic material of a similar type is crossed with cows throughout the country. Again, inter-regional differences exist but patterns of specialisation in breeds have not really developed. For example, some provinces, particularly those that have generated their own funding, hold a relatively large number of breeds at the provincial breed centre. However, the numbers are small in comparison to numbers of Simmental, Limousin and Charolais bulls. Provincial and prefecture breeding strategies also differ, but usually only in the order (of rotation) by which these three breeds are used to improve local breeding stocks over generations. Some provincial breed officials complain about constraints placed on their breeding strategies, in particular their inability to try new breeds that might be better suited to local conditions, that might differentiate their breeding stock from the rest of the country and might also provide opportunities in the sale of genetic material.

Central government funding is provided to local levels to help preserve local breeds. This is a recognition of the need to maintain stock that have adapted to local conditions over long periods of time. However, breed preservation measures are not emphasised to the extent that breed improvement is, as the main aim is to develop a national large beef cattle herd. Thus, there is a danger that breeding characteristics will

become increasingly divorced from local conditions. Moreover, this makes it more difficult for regions and localities to differentiate their cattle and beef products.

As a result, it is clear that more could be done to develop more region-specific breeding strategies. This might not be best achieved by completely delegating management powers to provinces or by reducing or removing subsidies built in to the system. Certainly, however, a strong argument could be made that provinces should have a larger input into decisions on the types of cattle held by their breed stations and the semen that is distributed throughout local AI networks. Nearly all provinces have a strong knowledge and research base with regard to breeding, and have personnel with a greater familiarity of local conditions (than do central personnel). Regardless, central government should develop strategies, organisational structures and regulations that are more conducive to the development of more specialised regional breeding programs. This would also involve greater inter-regional movements of genetic material, rather than the generally self-sufficient nature of provincial breed systems.

## Reporting and grading systems

Discussion above suggests that, through the Straw for Beef program and breeding system, central government has taken a relatively interventionist approach to encouraging national industry development. Central government has placed less emphasis on less tangible forms industry support like the provision of information that might help industry participants make decisions. In particular, while much has been written in China about different types of cattle and beef, a national grading system has yet to emerge. Inter-relatedly, price reporting in China is at a low level of development. Monthly cattle and beef prices, for example, are collated by province but only for one type of generic beef and one price for 'yellow cattle'. An argument could be made that central government should play a more active role in developing a national beef grading system and a more sophisticated cattle and beef price reporting system. This would help local officials and companies develop industry development strategies on key issues like cattle production targets and on value-adding. Of most relevance here, it would also contribute to regional specialisation on the basis of comparative advantage.

This section has argued that Central government policies have indirectly distorted notions of inter-regional comparative advantage. This is because Central government policy – through intervention in production aspects of the industry and a reluctance to develop information systems – has promoted a largely undifferentiated, localised and unspecialised cattle and beef industry across the country. Central government has not sought to build a regionally specialised industry. Indeed, the development of a grain-intensive cattle industry in the area that has a comparative advantage in this activity – the grain-surplus Northeast region – is contrary to the straw-saving objectives of the Straw for Beef program. Instead, Central government has effectively left the process of 'fine-tuning' industry development strategies, building downstream activities and specialisation to local government. The way in which local government has responded to this challenge is discussed in Section 5.

## 5. Influence of local governments

Sections 3 and 4 examined the influence of resource endowments and the Central government on the regional dispersion of the Chinese cattle and beef industry. This section concentrates on industry development at a more 'local' level – namely that at provincial, prefecture and county levels. Local government plays an all-pervading role in determining industry development patterns in their regions and, therefore, for the national industry as a whole<sup>11</sup>. Section 5 begins by explaining why some localities have developed cattle and beef production capacity at a rate much higher than other localities that have an identical set of resource endowments. Explanations provided relate mainly to government policy rather than to comparative advantage as many local areas exhibit only subtle differences in relative factor endowments. Discussion then turns to an analysis of how localities that have developed an intensive cattle

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<sup>11</sup> This is not only because producers are located at local levels. Local government owns or has invested in the vast majority of enterprises active in the industry.

production sector further pursue industry development policies. It is argued that these regions generally follow similar development strategies but do so largely independent of other localities. The section concludes with an analysis of the implications for regional specialisation at a local level.

## Formation of intensive cattle-producing localities

As discussed in Section 2, some localities have developed cattle and beef industries at a much faster rate than others within the same beef zones. This pattern of uneven local growth can not often be explained by access to different resource endowments<sup>12</sup>. In fact one county might have double the number of cattle of another county but have identical resource endowments like feed, cattle bases, proximity to major markets and transport infrastructure.

An obvious explanation of why some counties have developed faster than others is that they have been targeted as model regions under the Straw for Beef program. Yet, many counties in the Central Plains region for example, are able to fill the selection criteria to participate in the program – that is, they have a large straw surplus and large numbers of (draught) cattle. The difference is that some counties have applied for the funding and undertaken to fulfil the objectives tied to it, while others have not. Further, of those Straw for Beef counties and prefectures, some have exceeded the production targets and, as shown below, gone on to develop a more elaborate industry activities not part of the Straw for Beef program.

The major determinant is that local officials have decided to target the cattle and beef industry. Indeed, this is an important Central government criteria for extending Straw for Beef funding to counties and prefectures. Key officials – county governors, party secretaries and Animal Husbandry Bureau Heads - in Straw for Beef localities are expected to participate directly in industry development policy-making activities and to ensure that targets are met. Thus, local officials aware of the Straw for Beef program have made an assessment of the costs and benefits of developing a beef industry. As mentioned above, resource endowments of the locality do not explain the differences in the rationales of different local officials. Responses to the following questions appear to provide better explanations. What are the alternative development strategies to a cattle and beef industry? Some localities have already chosen and committed resources to specialisation in other agricultural industries (cash crops for example). How important is Central government grant money to the county? For some counties, the size of the grant is small compared to the expenditures of time and resources required to secure and implement Straw for Beef measures. For others, it is a substantial amount and, more likely, provides a useful means of mustering local resources to match the grant. There are other more subtle factors such as the effect the decision-making rationales of local decision-makers. Does the development of a Central government supported industry improve the likelihood of promotion of local leaders? Are decision-makers aligned with particular people or groups that have a special interest in the industry? Do they have a background or experience in the industry? Do they see characteristics of the cattle and beef industry as similar to other successful industries that they have overseen or heard about in other regions? Are some localities better connected and more able to influence the providers of Straw for Beef funds (at higher levels)? More fundamentally, do local officials simply interpret the costs and benefits of industry development in different ways not because of factors specific to their regions but because of the way specific decision-makers think and because of their relationships and association with other groups?

These factors suggest that the cattle and beef industry has developed in particular localities for a range of highly variable and seemingly unrelated reasons. However, once a particular county has established a sizeable production capacity, other nearby counties tend to also turn attention to the industry. Concrete reasons why this might happen include the following. As discussed above in the case of liquid nitrogen production and AI networks, counties that develop a cattle and beef industry bring with them an infrastructure that can also be used by other counties. Thus, neighbouring market entrants (counties) are faced with relatively low ‘market entry’ costs. Similarly, some towns have been successful in attracting cattle buyers from other regions (or developing large cattle markets), for example. This provides

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<sup>12</sup> Although counties like Sanhe have obvious advantages / resource endowments that provide a good explanations as to why they have the type of industry that they do.

neighbouring counties with an opportunity to ‘piggy-back’ on a developing local market. Alternatively, prefecture-level officials might have been influential in persuading a significant number of counties under its jurisdiction to develop their cattle and beef industries. Certainly, Straw for Beef funding has been applied beyond county level to a number of prefectures. As hubs of transport and communication, prefecture capitals often provide an infrastructure that counties can sometimes take advantage of. For a combination of these reasons, intensive local cattle and beef industries sometimes spread beyond county borders to prefecture levels, in a process not unlike Porters’ (1990) notion of ‘clustering’. In some cases, these groups of counties or prefectures have become significant actors in the national cattle and beef industry.

## Local industry development strategies

While discussion above proposed reasons why certain counties and prefectures have developed intensive cattle and beef industries, particularly in production aspects of the industry, this sub-section discusses the types of industry development strategies, particularly in ‘downstream’ activities, pursued by different localities.

In this context, the influence of the Straw for Beef program is minimal. While counties and prefectures can exercise some discretion in the way these funds are utilised – by emphasising breeding over feeding activities or by using the funds to construct a demonstration feedlot for example – they are not used to develop processing capacity. In fact, the Straw for Beef program has induced localities to form a similar production base and left the process of differentiation and value-adding in the hands of local planners. More importantly, the Straw for Beef program might provide a trigger for development of a production base but the value of resources that derive from localities far outstrips – by 27 times according to Li et. al (1999) – that provided by central government.

### Differences in local development strategies

Among the localities that have been targeted under the Straw for Beef program – and developed a similar cattle production base – there are substantial differences in the industry development pursued. That is, there are differences in the ways by which localities have used their cattle production bases. In some localities, industry policies have been based on an assessment of comparative advantage<sup>13</sup>. However, resource endowments are not usually an important determinant of local industry strategies.

A more important determinant is the ability of local officials to muster and collectivise capital-based resources. In some counties, local officials have been able to persuade township governors to organise households under their jurisdictions to invest and specialise in cattle and beef production or to utilise collectively-owned resources like land and buildings for industry development. Tax and fee policies are frequently used as inducements. Some counties have particular capital facilities available to them. For example, many pastoral and semi-pastoral areas visited were recipients of poverty alleviation funds. These funds were used in one area of Hebei Province to build a large feedlot. In one area of Yunnan Province, poverty-alleviation funds are used to help large individual households to develop integrated cattle grazing and orchard production systems. Some regions have been able to secure much larger amounts of capital to invest in more elaborate industry development schemes. For example, in the Northeastern regions of Changchun (Jilin Province) and in several areas of Liaoning Provinces, enormous amounts of capital have been invested in breeding, abattoir slaughtering and other ‘downstream’ activities and facilities. These are relatively prosperous agricultural areas but, equally importantly, have a long history of state-supported development. That is, local officials have continued the practice of committing public funds and utilising state-owned enterprise facilities to help realise industry development objectives. While nearly all regions use local public funds and SOE infrastructure to pursue industry development objectives, some regions are

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<sup>13</sup> See for examples in Section 3 – Sanhe County in integrated fattening / abattoir operations, cattle fattening in the Northeast, Dezhou Prefecture in the production of medium-grade slaughter cattle and Weichang County in cattle trading and fattening.

less well endowed in these resources than others. These areas are simply not able to build high-grade abattoirs for example while wealthier regions can.

That is, as discussed below industry development objectives between regions are often similar, but some regions are more able to generate the resources to achieve the objectives. Local capital resources and policy commitment are more important determinants than natural resource endowments. While capital is usually regarded as a major factor endowment in comparative advantage literature, it is accumulated and utilised in different ways in local areas of China where economies are based on collective and state-led systems.

Beside the major factor of public capital formation, other skills-based factors have contributed to differences in local industry strategies. One example is that research facilities have promoted beef and cattle development in particular regions. In Sichuan Province for example, a major agricultural college in Ya'an has contributed to a relatively specialised beef industry in the same prefecture. While the agricultural college researches a full range of agricultural industries, of which cattle and beef production is just one, a critical mass of skills have been developed in areas such as grassland management and ruminant production. Thus graduates and researchers are more able to identify and exploit opportunities in relatively new industries (like cattle and beef) and might be able to convince local officials that these should be added to local agricultural systems in appropriate ways. Alternatively, graduates of provincial, central or international universities and colleges with specialisations in cattle production might return to their 'home towns' or might be posted to particular areas (a ruminant production specialist in Zhoukou Prefecture in Henan Province provides a good example of this process at work). Some cattle and beef technicians actually become decision-makers and planners in the local animal husbandry or agriculture hierarchies, and sometimes into higher levels of the local government hierarchy. Indeed, industries are often developed in specific areas of China because they have been 'grabbed' (*zhua*) by particular influential individuals.

The convergence of the factors discussed in this sub-section often lead to the development of industry policies that are appropriate to their own local regions. In these cases, local planners have made realistic assessments of the development options open to them based on available resources and the associated risks and advantages of industry development to both the local economy and themselves. A crucial factor in this assessment is that more privatised entities – particularly households but also more profit-maximising companies – need to have clear economic incentives to participate in these industry development strategies. That is, development options also need to be market conforming, particularly in the longer term. For these reasons, most regions have developed low and mid level cattle and beef industries to service nearby markets, in which there will almost certainly be at least one sizeable city that provides opportunities for higher future returns<sup>14</sup>. Specialised slaughterhouses and small to mid-size abattoirs, for example, can more efficiently service these markets than larger abattoirs. Localities that are able to more muster resources usually have more ambitious plans to service inter-regional and international markets.

### **Factors not conducive to local-level specialisation**

While discussion above discusses the factors that differentiate local industry development strategies in appropriate ways, this sub-section discusses factors that lead to an opposing situation. Many localities follow (or have ambitions to follow) very similar industry development paths. Moreover, these localities often pursue their policies in isolation with each other, in an unintegrated or uncoordinated way. The discussion below raises factors that have led to this situation.

The first reason has already been discussed and relates to the base from which local industry is developed. Most regions build their industries on similar cattle stock, feed resources, on household cattle and beef production, a basic General Food company slaughter capacity, and service similar local beef markets.

In seeking to develop from this basic industry structure, localities have generally shown a common propensity to enter into large-scale processing activities. Officials spend large amounts of time and resources to aid (directly or indirectly) the development of large-scale enterprises to play larger roles in

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<sup>14</sup> There are analogies in the wool processing industry, where many counties chose to take up wool scouring which involves mid-level technical facilities and skills inputs (Longworth and Brown, 1995).

(perceived) value-adding activities like cattle fattening, slaughtering and leather and other by-product processing activities. There are a number of reasons for this. At the most basic level, it is a response to the recent central government push to agro-industrialise<sup>15</sup>. One outcome of this is that the construction of large enterprises increases the reputation of local officials and their chances of promotion. A more tangible reason is that local government is more able to control, tax and redistribute income of enterprises than they are of small, dispersed households. Another reason is that small private operators generally produce low-quality products. Larger companies are generally thought to be able to utilise technology to produce better products. This is particularly true of the slaughter sector. Interviewees often also stress the importance of having local companies that possess ‘market power’. A particularly important advantage of these ‘Dragon Head’ companies is that they have the resources to enter into more distant markets (quality, quantity and continuity of supply, ability to conduct marketing, in outside markets etc.). These companies are thought to be particularly important to the local industry because they provide a market for local raw material (cattle) producers. Similarly, the development of large local cattle markets are thought to attract inter-regional buyers and sellers. In some sectors, policy has forced the pace of corporatisation. In the leather industry, for example, tanneries with a capacity of less than 30,000 hides per year have been shut down or amalgamated for environmental reasons. Similarly, slaughtering is expected to become a more centralised activity in China in the future for food safety reasons (and already is in Changchun)<sup>16</sup>.

The inherent bias toward ‘big is better’ raises questions about appropriate economies of scale. Large-scale abattoirs, for example, are often thought to be best able to service premium beef markets. However, the high-value beef market in China is relatively small and becoming highly competitive. Some cities have restaurants and hotels that sell premium beef (in menus) but only in small quantities. Thus, medium-sized abattoirs that market aggressively and implement a quality assurance program would seem to be the most efficient form of abattoir for regional premium beef markets. For the mass beef market, however, slaughter households appear to be the most efficient type of slaughter unit.

The above discussion provided a number of reasons why localities generally hold a strong preference to develop large-scale enterprise processing capacity. Of most importance to the discussion here, this bias is held by almost every local official in regions visited and, as discussed above, constrained only by the availability of resources. Not only is large-scale processing often an inappropriate scale of development, but it also fails to build an industry development strategy that is substantially different from other local regions.

Local officials are often also constrained in their ability to develop unique and appropriate development strategies through lack of market information. As discussed above, price information for disaggregated cattle and beef products is scarce. Official information that is provided is not generally sufficient or reliable enough to base management decisions on<sup>17</sup>. More importantly (and socio-economically), Chinese officials and company managers do not undertake or use independent market research or viability studies to the extent seen in Western countries. Rather than quantifying development and management options, Chinese decision-makers tend to make decisions on a more intuitive basis. While decision-makers have variable sources of information, there is a tendency to copy the experience of other successful local development strategies and companies. This leads to very fast replication of ideas and approaches across regions.

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<sup>15</sup> ‘Agro-industrialisation’ or agricultural industry integration has been emphasised by central government and researchers in recent years. For details, see Waldron, 1999

<sup>16</sup> In discussing why some nations have built a competitive advantage in particular industries, Porter (1990) points to policy and legal issues as one factor. There are problems in projecting factors like this to an inter-regional level within countries. In the examples of the slaughter and leather-tanning sector provided above for example, policies are generally enacted on national basis, meaning that individual regions have not been forced to develop particular types of industries before other regions.

<sup>17</sup> Besides official statistics, information on market developments is collected by local regions in other ways. The first is through meetings – for animal husbandry specialists for example – at provincial or central levels. Another is through sales outlets of local companies in larger cities. There are also other more informal networks.

Other factors that detract from specialisation (on the basis of comparative advantage) are bound up in issues of government-business relations and corporatism at local levels. Local administrative regions are in many ways managed like corporate firms, with government officials acting as their corporate managers, and utilising local resources to pursue specific objectives (Oi, 1999). While the private economy is growing fast in almost all regions of China, the collective and state sectors are still the dominant form of ownership at local levels. In the cattle and beef industry, nearly all enterprises (rather than households) are invested in and managed by local level government (from townships and villages to county, prefecture and provincial government). This effects regional specialisation in several ways.

Firstly, local corporate firms do not act in the same way as more privatised, border-less companies. While the latter can generally be expected to locate in regions that possess the most advantageous set of factor endowments, local government obviously looks to develop industry within their own administrative boundaries. Furthermore, while local-government companies are usually independent legal entities, they are expected to participate in the local economy and redistribute benefits within their administrative regions. For these reasons, provincial state-owned enterprises might invest in the most viable place in the province (but usually around provincial capitals), but prefecture-invested enterprises are most likely to invest around the prefecture capital and county-level enterprises within the county<sup>18</sup>. The same applies to town and village enterprises. This is particularly the case as enterprises usually look to utilise pre-existing facilities, land and to provide employment opportunities to local constituents and shareholders. While the ownership structures of local enterprises largely dictates the location decisions, local officials and managers obviously make decisions about what industries they target within that administrative region.

Government also often actively organises local enterprises – along with households – into beef development projects as a means of achieving industry integration within the administrative region. Conglomerates with cross-ownership structures in associated enterprises also achieve the same end. However, there are usually low levels of industry integration across administrative boundaries. That is, local government is interested mainly in building production, processing and marketing capacity inside its boundaries, rather than specialising in particular industry segments and co-ordinating with other localities to fill other segments<sup>19</sup>. A partial explanation of this tendency is a lingering philosophy of self-sufficiency<sup>20</sup>

Thus, localities tend to develop cattle and beef industries within their own regions but not co-ordinate with other localities, regardless of relative resource endowments and efficiencies that might be bought by specialisation. An outcome of this is inter-regional replication on a large scale, intense inter-regional competition and wasted resources (from a national perspective). These factors appear to have contributed to problems of over-capitalisation in the industry and over-supply that led to drastic cattle and beef price corrections in 1996.

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<sup>18</sup> State-owned enterprises run as national entities have a much greater scope to invest in areas with the most advantageous set of resource endowments. Indeed, the Hua'an Beef Company, a foreign-invested company originally established under the national-level Animal Husbandry Bureau, appears to have made some astute locational decisions. Its main feedlot/abattoir plant is close to the premium beef market of Beijing and has recently established a subsidiary abattoir in a cattle-intensive region of Shandong Province. Some semi-private provincial investment companies have also invested in the cattle and beef industry outside of their own provinces.

<sup>19</sup> Clustering takes place in the Chinese cattle and beef industry along similar line as outlined by Porter (1990). However, this takes place largely through the replication of industry functions.

<sup>20</sup> This is not only a legacy of the central-planning era. The 'Vegetable Basket' and 'Rice Bag' projects and the 'Governor Responsibility System' currently in place, for example, are designed to encourage provinces and municipalities to produce agricultural goods within the regions that they are consumed that could contribute to patterns of uneven regional economic growth along an industry – agriculture divide.

## 6. Conclusions

This paper suggests that factor endowments act as important determinants of the regional distribution of the Chinese cattle and beef industry. Although the industry is very localised, principals of comparative advantage help explain significant inter-regional cattle and beef flows and regional specialisation in particular industry segments. However, industry policy has also played a key role. Central government extension programs have effectively re-defined the way production inputs are used and have further reinforced the localised nature of the industry. In areas such as breed improvement, central government policy has contributed to the erosion of inter-regional comparative advantage and specialisation. Local governments have acted as agents of this process. Independently of central government, most local governments with intensive cattle and beef industries have sought to build production and processing capacity with little emphasis on product differentiation. Institutional and socio-economic factors are perhaps as important as the assessment of market signals in the formation of local industry development policies.

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