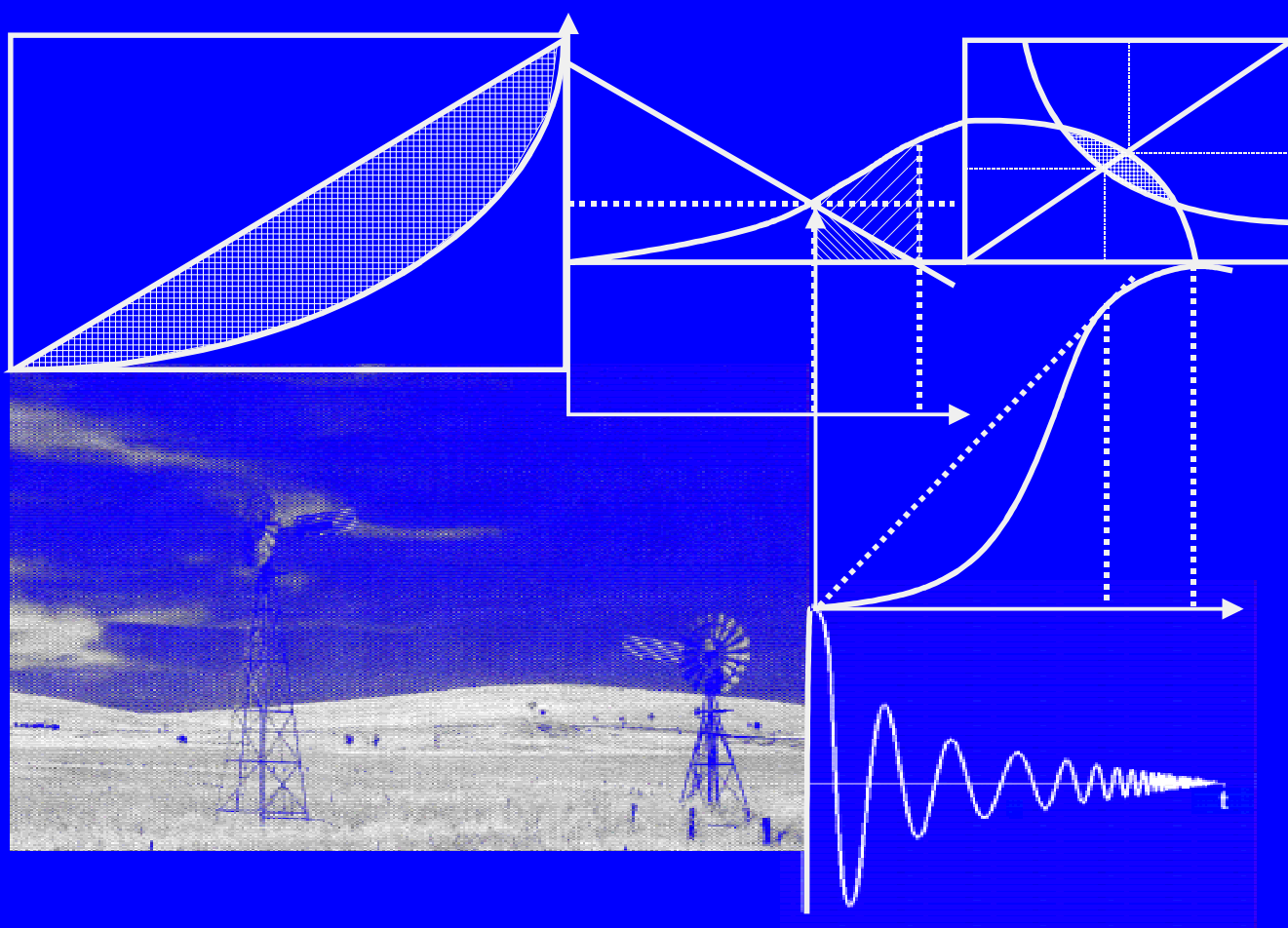


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**Location of Beef Production and Production Systems in China**

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# Location of Beef Production and Production Systems in China<sup>1</sup>

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## ABSTRACT

The Chinese cattle and beef industry has made great progress in recent years with an 18-fold increase in total output of beef since 1980. China now ranks as the second largest beef-producing country in the world behind the United States. Not only has there been a rapid increase in cattle numbers and beef production, but also there have been major changes in the location and nature of cattle raising. The emphasis has shifted from cattle and beef production in the pastoral areas to central China (the so-called “Zhong-Yuang Beef Belt”) and the grain surplus areas in North-East China. For instance, four provinces in the Zhong-Yuang Beef Belt accounted for 50% of total Chinese beef output over the years 1994 to 1996. The new beef production systems are based on individual households raising cattle with high-roughage and low-concentrate inputs and longer-finishing-stage, complemented by small to medium-scale feedlots. The paper demonstrates that an understanding of the changing nature of these production systems is essential to an appreciation of what is happening in China’s cattle and beef industry.

**Key words:** China, location of beef production, beef production systems,

## Introduction

The Chinese cattle and beef industry has progressed greatly in the last sixteen years, particularly the last six years. Chinese bovine numbers have increased from 72 million head in 1980 to 103 million head in 1990 and to 140million head in1996. Chinese beef output has increased from

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269 thousand metric tons in 1980 to 1 256 thousand metric tons in 1990 and to 4 949 thousand metric tons in 1996, and China is now the second largest beef-producing country in the world behind the United States of America. Not only has there been a rapid increase in bovine numbers and beef production, but also there have been major changes in the location and nature of cattle raising in China.

## **I. The Developmental Course of the Chinese Beef Industry**

The developmental course of the Chinese cattle and beef Industry can be divided into three stages, as follows:

### **1. The Protected Draft Cattle Stage (1950s and 1960s)**

The People's Republic of China was established in 1949. Due to the destruction of war, the number of cattle (including buffalo) was less than 50 million head. During the Protected Draft Cattle Stage the level of agricultural mechanization was very low and cattle were used primarily as draught animals. There was one draught bovine per 1.3-2 ha of cultivated land. In order to assure sufficient draught animals for farming work, the Chinese government took several measures, including breed improvement, disease prevention and prohibiting the slaughter of sturdy young cattle. The major objective of breed selection and breeding was to increase the draught power of cattle. Only the old and disabled cattle could be slaughtered. By the end of the 1960s, the cattle number exceeded 70 million head.

### **2. The Breed Improvement and Beef Development Stage (1970s and 1980s)**

During the 1970s, China started to import some specialized beef breeds for improving local breeds and there was ongoing progress with farm mechanization. The cattle number remained at the level of 70 million head. With the setting up of the household contract and responsibility system after 1978, and with the freeing up and strengthening of prices for livestock products since 1985, the enthusiasm of households towards raising cattle/beef has greatly increased. The central government began to invest in the construction of the "beef production bases" in 1984. At the end of the 1980s, the cattle numbers exceeded 100 million head and the Chinese beef industry had achieved preliminary development.

### **3. The Great Development Stage (1990s)**

Since 1992 the central and local governments have increased their capital and material input into the cattle and beef industry, especially for the "Straw for Livestock Production Program" (mainly for beef cattle production). This programme entailed the full utilization of straw resources in agricultural areas, extension of straw-ensiling, straw-ammoniating and feeding technology, and supply of supplementary concentrates (including feed grains, bran and cotton-seed cake, rape-seed or soybean meal). The programme has propelled the beef industry forward, with bovine numbers reaching 140 million head and beef output 4.9 million metric tons by 1995.

## **II. Changes in Location of Beef Production**

There have been great changes in the location of Chinese beef production in the last 16 years. The first major trend has been the shift of beef production from pastoral to agricultural areas. The

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second major trend has been the concentration of the growth of the Chinese beef industry in the Zhong-Yuan Region (central China) and North-East China.

## **1. Regional Determination of Beef Production**

The Chinese beef production can be divided into four major regions, according to location and agricultural production conditions.

**1.1. Western Pastoral Region (WPR)** The WPR is China's pastoral area and includes five provinces (Inner Mongolia, Gansu, Xinjiang, Qinghai and Tibet). Historically, Inner Mongolia, Gansu and Xinjiang were the three largest beef producing provinces and their beef was supplied to large cities throughout the whole country.

**1.2. North-East Region (NER)** The NER is a grain producing region, often referred to as "the Grand Granary of China", and includes three provinces (Heilongjiang, Jilin and Liaoning). Because of good initial conditions, in terms of feed production and cattle breeds, there is great potential to develop beef production in the NER.

**1.3. Zhong-Yuan Region (ZYR)** The ZYR is an important agricultural region in the temperate zone. It is centred around Henan Province and includes eight provinces (Henan, Hebei, Shandong, Anhui, Jiangsu, Hubei, Shanxi and Shaanxi). There are good conditions, in terms of climate, feed and cattle breeds, to develop beef production in the ZYR.

**1.4. South-West Region (SWR)** The SWR has a lot of mountain and hill country and includes four Provinces (Sichuan, Guizhou, Yunnan and Guangxi). This region possesses a large number of cattle, but the cattle size is small and meat productivity low. There is some potential to develop beef production through the improvement of cattle breeds and the grassland.

## **2. The shift from Pastoral to Agricultural Areas**

Although the Chinese beef industry possesses the above regional features, its regional distribution is continuously changing. Although in 1980 the WPR accounted for 25% and 42% of the national cattle stock and slaughtered cattle respectively, these proportions decreased to 20% and 25% in 1990, and to 15% and 12% in 1996. Prior to the 1980s, nearly half the beef output of the whole country came from the WPR, but this share declined to 23% in 1990 and to just 10% in 1996 (Table 1). This means that Chinese beef production is undergoing a shift from pastoral to agricultural areas. In 1996, 75% of national beef output was produced within the ZYR and NER. There is also the same trend within the five pastoral provinces, that is the share of beef output is decreasing in the pastoral counties and increasing in the cropland counties.

## **3. The Rise of the Zhong-Yuan and North-East Beef Belts**

### **3.1. The Zhong-Yuan Beef Belt**

The ZYR is placed in the Yellow, Huai and Hai River Plains of Eastern China. This region has a relatively warm climate, high rainfall and fertile soils, and is thus suitable for the growing of various crops, such as, wheat, maize, rice, sweet potato, soybean, cotton and rape. The ZYR is not only the largest wheat, maize and cotton producing region in China, but in recent years it also has had the fastest growing output of grain. Thus it has good natural and feed conditions for the development of the beef industry.

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The farming households in ZYR have centuries-old experience with raising cattle. China has five famous local breeds of cattle with large-frame and good meat characteristic, four of whose origins can be traced to the ZYR. These Breeds are Qinchuan (in Shaanxi), Nanyang (in Henan), Luxi (in Shandong) and Jinnan (in Shanxi). The ZYR is the earliest region in which breed improvement was undertaken and it is the most advanced region in this respect. Thus in terms of breeding resources, the ZR also has good conditions for the development of the beef industry.

Except for Jiangsu Province and a part of Shandong Province, the level of rural social and economical development in the ZYR is average compared with China as a whole. Township enterprises are not well developed and thus there is a large rural labour surplus that has not been fully absorbed by other industries. In recent years, governments at all levels have adopted some preferential policies to encourage the raising of beef cattle by households. Now, the raising of beef cattle has become a strategy for rural development and poverty alleviation in least developed areas.

The ZYR is relatively close to large urban markets, including Beijing, Tianjing and Shanghai, and originally was a communication and transportation hub for the whole country. Its communication and transportation infrastructure has improved greatly and agricultural and livestock products can easily be transported to the large cities.

In addition, current government policy has also favored the development of cattle and beef production. Since 1992, the central and local governments have increased their capital and material input into the "Straw for livestock Production Program". The central government's capital input has risen from 10 million yuan in 1992 to 50 million yuan in 1996. There were about 208 pilot counties implementing the "Straw for Livestock Production Program" throughout the whole country during 1992-1996. More than half of these pilot counties are located in the ZYR. The above conditions contributed greatly to the formation and development of the Zhong-Yuan Beef Belt.

Over the last 16 years, the Zhong-Yuan Beef Belt in central China has developed rapidly. The number of cattle has increased from 16 million head in 1980, to 30 million head in 1990 and to 53 million head in 1996. The number of slaughtered cattle has increased from 0.5 million head in 1980, to 4.8 million head in 1990 and to 18.7 million head in 1996. The average carcass weight of the Zhong-Yuan Beef Belt reached 149-152 kg and exceeded that of the NER in 1995 and 1996. Historically, the average carcass weight of the NER was the highest in China. Beef output has increased by an even greater factor, with output increasing from 40 thousand metric tons in 1980, to 604 thousand metric tons in 1990 and to 2.8 million metric tons in 1996. The Zhong-Yuan Beef Belt accounted for 38% of China's cattle stock and contributed 56% of its beef output in 1996 (Table 1).

### **3.1.1. The Four Largest Beef-producing Provinces**

The development of the beef industry is not occurring evenly within the ZYR or in China as a whole. The four major beef-producing provinces in the ZYR are Henan, Shandong, Anhui and Hebei provinces, and these are also the four largest beef-producing provinces in the whole country. The changes in the beef production of the four largest beef-producing provinces are shown in Table 2. These four provinces had a 94-fold increase in beef output in the last 16 years. In 1980, their beef output accounted for only 9.7% of China's total output. By 1996, however, this share had risen to 49%. They are now playing a dominant role in the Chinese beef industry.

### **3.1.2. The Five Largest Beef-producing Prefectures**

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In the four largest beef-producing provinces, beef production is concentrated in only a few prefectures, such as Fuyang prefecture in Anhui Province; Zhoukou and Zhumadian prefectures in Henan Province; and Dezhou and Heze prefectures in Shandong Province. The above five prefectures in ZYR are also the five largest beef-producing prefectures in the whole country. The changes in the beef production of the five largest beef-producing prefectures are shown in Table 3. They had a 3.5-fold increase in beef output over the last 6 years and their beef output accounted for 35% of the total output from Anhui, Henan and Shandong in 1996.

Fuyang prefecture borders on Zhoukou and Zhumadian prefectures and these three prefectures are situated in the upper reaches of Huai River and possess the same natural, social and economical conditions. Their economical development level is relatively backward in relation to the rest of Anhui and Henan provinces. Their agricultural population makes up more than 90% of the total population and average per capita cropland is only 0.09 ha. Since the 1980s, particularly during the 1990s, the beef industry has achieved considerable progress in these prefectures. At present the households raising beef cattle constitute 90-95% of the total farming households.

### **3.1.3. The Three Largest Beef-producing Counties**

In Fuyang prefecture, there is a famous "golden Triangle" (raising "Yellow Cattle"), composed of the three largest beef producing counties in the whole country. They are Mengcheng, Guoyang and Lixing counties. In 1996, the cattle numbers of the "golden Triangle" exceeded 1.5 million head, which accounted for 42.9% of Fuyang prefecture's cattle stock, and its beef output reached 85.6 thousand metric tons, which made up 48.3% of Fuyang prefecture's total beef output (Table 4).

### **3.2. The North-East Beef Belt**

The NER is "the Grand Granary of China" producing maize and soybean, and it has become the second beef belt in China as a result of adopting plastic warm-shed technology for improving the control of ambient air temperature in winter. Over the last 6 years, the North-East Beef Belt has also developed rapidly. By 1996, its cattle numbers reached 14 million head, which accounted for only 10% of China's cattle stock, its beef output, however, reached 910 thousand metric tons representing 18% of China's total beef output.

## **III. Changes in Beef Production Systems**

Over the last 16 years, there have been great changes also in the beef production systems following the changes in location of beef production and the increase of beef consumption and demand.

### **1. The Pastoral Areas**

The pastoral land in the WPR has been seriously degraded. Consequently, the WPR will not be able to increase its beef production capacity and regain its traditional status as a major beef-producing region in China. However, cattle are both sources of income and sustenance for herdsmen in pastoral areas. Each household, in general, will keep 1-2 cows to produce both calves or feeders to be sold and milk for the family to drink. Beef production systems in the WPR have undergone some changes as follows:

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**1.1.** Historically, cattle and beef production in pastoral areas relied fully on grazing without supplementary feeding. Since the 1980s, herdsmen have adopted supplemental feed for their cattle and beef production, particularly in winter.

**1.2.** Cattle produced in pastoral areas used to be slaughtered directly without fattening. Since the 1990s, the pastoral area has become a major supplier of feeders to cropland areas. The shift to the sale of young feeder cattle can reduce the over-wintering cattle population and hence the pressure upon the fragile pastures.

**1.3.** Breed improvement and the use of cross breeding to utilize heterosis have been introduced into the beef production systems in pastoral areas.

## **2. The Agricultural Areas**

Over the past 16 years, some great changes in beef production systems have occurred in agricultural areas following the shift of the focus of beef production from pastoral to agricultural areas.

**2.1.** The major change has been the switch from keeping cattle primarily for draught purposes to beef and milk production systems.

**2.2.** With the shift away from raising cattle as draught animals have come major changes to the traditional cattle feeding systems. According to the traditional feeding systems, a beast would take a long feeding cycle of 3-5 years or more under the lowest level of nutrition to grow from a calf to slaughter weight. For the new feeding systems, the same animal takes only 2-3 years under a middle-low level of nutrition. Such new systems are different to both the grass-fed beef production systems and the grain-fed systems in the developed countries. These systems possess a common feature of full utilizing local feed resources. Since the latter 1980s, FAO and Chinese experts have carried out some scientific experiments concerning the use of treated straw for beef production in Henan and Hebei provinces. The results of these trials show that the a long-cycle beef production system based on the use of treated crop residues as the main feed is the most feasible type of 'straw for beef' production system. On the basis of the trials, it was concluded that with treated crop residues as the basic diet and a supplement of  $1.5 \pm 0.5$  kg cottonseed meal daily, growth rates among 600-700 gms can be achieved and 450 kg slaughter weight reached before the animal is 2 years old.

**2.3.** Although smallholder's cattle and beef production systems are still a major regime in agricultural areas, some small scale and middle feedlots are developing. Within the provinces of Henan, Shandong and Anhui, for example, the beef production system is generally based on smallholders raising cattle/beef (cows, calves and feeders) with high-roughage and low-concentrate input and longer-finishing-stage, complemented by small scale intensive feedlots. In the case of Hebei Province, however, although there are smallholders raising cattle/beef, there are also very many small to middle-scale intensive feedlots. The largest feedlot in China (nearly 10 000 head sold per year) is also located in Hebei Province, in Sanhe County, between the cities of Beijing and Tianjing. The feeders fattened in this feed lot come from Inner Mongolia, Shanxi and other neighbouring provinces.

**2.4.** Some new technologies, such as artificial insemination, straw ensiling, ammoniating and feeding technologies, have been introduced to the agricultural areas. The crossbreeding between local breeds and exotic beef breeds has greatly increased meat-producing ability. Most provinces in the

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ZYR and NER have good breeding systems and have set up their breeding centers for local breeds and exotic beef breeds.

**2.5.** Households that are raising beef cattle have higher incomes than those households that are not. The direct economic benefits to household from raising beef cattle have been a major reason for the rapid growth of the Chinese beef industry. According to our household survey in the two largest beef-producing prefectures, feeding a beef animal from calf to 300-350 kg live weight generally would take about one year or more. After deducting feed and labour costs, the net income was 600-1 000 yuan per animal. This is significant, considering that the average rural net income is less than 1 200 yuan per capita, and explains why households have enthusiastically adopted beef cattle production.

**2.6.** The development of beef production has also encouraged the growth of related industries, such as feed, food processing, medicinal, mushrooms, and leather industries. Two large leather processing factories have been set up in the two largest beef-producing prefectures. Thus the sustainable growth of these upstream and downstream industries is intertwined with the growth of beef production. In 1995, the output value of the beef industry and its related industries in Fuyang Prefecture reached 6.8 billion yuan.

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**Table 1 Changes in the Regional Distribution of Beef Production**

Region	Year	Cattle No.		Slaughtered No.		Carcass		Beef Output	
		(000 head)	% of China	(000 head)	% of China	Weight (kg)	(000 tons)	% of China	
<b>ZYR</b>	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	
<b>NER</b>	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	
<b>SWR</b>	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	
<b>WPR</b>	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	
<b>Other</b>	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	
<b>All China</b>	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 Agricultural Statistics Yearbook, 1981, 1991 and 1997.

**Table 2 Changes in the Beef Production of the Four Largest Beef-producing Provinces**

Province	Cattle No.		Slaughtered No.		Carcass		Beef Output	
	(000 head)	(000 head)	(000 head)	(000 head)	Weight (kg)	Weight (kg)	(000 tons)	(000 tons)
	1980	1996	1980	1996	1980	1996	1980	1996
<b>Henan</b>	3 396	13 845	98	5 252	71	139	7	730
<b>Shandong</b>	2 178	14 345	88	4 564	101	176	9	802
<b>Anhui</b>	2 409	7 247	79	2 299	76	129	6	296
<b>Hebei</b>	1 207	6 396	54	4 004	75	152	4	608
<b>Subtotal</b>	9 190	41 833	319	16 119			26	2 436
<b>/Means</b>					82	151		
<b>% of the ZR</b>	56.9	79.0	63.2	86.3			65	87.4
<b>/+(-)</b>					3	2		
<b>% of China</b>	12.8	29.9	9.6	44.1			9.7	49.2
<b>/+(-)</b>					1	15		

Source: China Agricultural Statistics Yearbook, 1981 and 1997.

**Table 3 Changes in the Beef Production of the Five Largest Beef-producing prefectures in Zhong-Yuan Region**

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>								
<b>Zhoukuo</b>	1 442	2 415	285	949	99	138	28.3	130.7
<b>Zhumadian</b>	1 220	1 857	278	654	90	131	25.0	85.7
<b>Shandong/</b>								
<b>Dezhou</b>	749	2 034	161	650	167	181	26.9	117.4
<b>Heze</b>	835	2 385	253	815	158	153	40.0	124.3
<b>Anhui/</b>								
<b>Fuyang</b>	2 067	3 525	575	1 369	104	130	59.7	177.4
<b>Subtotal</b>	6 313	12 216	1 552	4 437			179.9	635.5
<b>/Means</b>					116	143		
<b>% of the ZR</b>	21.3	23.0	32.3	23.8			29.8	22.8
<b>/+(-)</b>					-10	-6		

Source: Survey data collected by the authors.

**Table 4 Beef Production of the Three Largest Beef-producing Counties in Fuyang Prefecture**

County	Cattle No. (000 head)		Slaughtered No. (000 head)		Carcass Weight (kg)		Beef Output (000 tons)	
	1995	1996	1995	1996	1995	1996	1995	1996
Mengcheng	608	646	215	251	120	132	25.8	33.1
Guoyang	417	435	133	151	121	135	16.2	20.4
Lixing	512	431	205	247	130	130	26.6	32.1
<b>Subtotal</b>	1 537	1 512	553	649			68.6	85.6
<b>/Means</b>					124	132		
<b>% of Fuyang P.</b>	44.0	42.9	46.1	47.4			45.7	48.3
<b>/+(-)</b>					-1	+2		

Source: Survey data collected by the authors.