CHAPTER 9

Agricultural Productivity in China

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1. INTRODUCTION

Few scholars would question the positive and substantive role that agriculture played in substantially expanding the supply of food and fiber and spurring the broader economic development of the Chinese economy, beginning with the modern reforms of the agricultural sector that were first launched in the late 1970s (Rozelle, Huang, and Otsuka 2005). Based in part on the incentives embodied in the Household Responsibility System, farm output and productivity grew by 5% to 10% per annum between 1978 and 1985 (McMillan Whalley, and Zhu 1989; Lin 1992). Huang and Rozelle (1996) and Fan and Pardey (1997) showed that the output-promoting effects of these improved incentives were enhanced by new technologies. Input use also rose as farmers had greater access to fertilizer and other farm inputs (Stone 1988) and improved water control, especially because of the emergence of groundwater privatization (Nickum 1998; Wang, Huang, and Rozelle 2005).

During the mid-1990s, at a time when China's rapid growth was transforming people's livelihoods, another debate arose concerning China's ability to feed itself over the medium to long run. Brown (1994), among others, pointed out that the intensity of input use was already high in China and that

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continued growth in agricultural output would increasingly rely on growth in total factor productivity (TFP). The pessimists (e.g., Wen 1993) suggested that TFP had stopped growing and that the output of China's farming sector might soon stagnate. In response, several efforts (e.g., Fan 1997; Jin et al. 2002) used more rigorous methods and showed that while inputs in aggregate had indeed stopped growing (as labor shifted off the farm and sown area stagnated), output continued to grow, resulting in positive TFP growth at a respectable rate of around 2% per year. Although there were many challenges facing the Chinese agricultural economy, investments in agricultural research and development (R&D) over several decades contributed to a stream of new technologies (including new seed varieties) that was continuing to fuel TFP growth as the decade of the 1990s came to an end given the long lags linking R&D spending to productivity growth.

Somewhat surprisingly perhaps, little effort has been devoted to assessing the productivity performance of Chinese agriculture in recent years. The most recent relevant studies only covered the data up to the mid-1990s (e.g., up to 1995 in Jin et al. 2002; and up to 1997 by Fan and Zhang 2002). The task of meaningfully measuring China's agricultural productivity performance is especially challenging. There have been (and continue to be) tremendous changes within the sector, particularly, rapidly evolving institutional structures, that make it difficult to gauge agricultural productivity developments within China. For example, research spending has waxed and waned (Hu et al. 2007), policies to encourage the import of foreign technologies have been unevenly applied (Pray, Rozelle, and Huang 1997), and structural adjustment policies have also triggered wrenching changes in the sector (Rosen, Huang, and Rozelle 2004). In addition, horticulture and livestock production has boomed, while the output of other crops, such as rice, wheat, and soybeans, has stagnated or fallen (CNBS 2005). At a time when China's millions of producers are faced with complex decisions, the extension system is crumbling and farmer professional associations remain in their infancy (Huang, Hu, and Rozelle 2003). In short, there are just as many reasons to be pessimistic about the productivity trends in agriculture as to be optimistic.

The overarching goal of this chapter is to provide a better understanding of input, output, and productivity trends in China's agricultural sector during the reform era that began in the late 1970s, with an emphasis on the period 1990-2004. To do so, we pursue three specific objectives. First, relying on the

National Cost of Production Data Set—China's most complete set of farm input and output data—we chart the input and output trends for 23 of China's main farm commodities. Second, using a stochastic production frontier function approach we estimate the rate of change in TFP for each commodity. Finally, we decompose the changes in TFP into two components: changes in efficiency and changes in technical change.

To keep the assessment manageable, we limit the scope of our analysis to the major staple grains and oilseeds, cotton, several vegetable and fruit crops, and most of the major livestock commodities. In total, the commodities we include accounted for more than 65% of China's gross value of agricultural output in 2005 (CNBS 2006). Our analysis of TFP developments omits a consideration of several major commodities, including aquaculture, sugar, edible oils beyond soybeans, and many fruits, vegetables, and more minor livestock commodities. In addition, we measure productivity performance on a commodity-by-commodity basis. As deBrauw, Huang, and Rozelle (2004) and Lin (1992) suggested, if farm specialization is occurring in China, as more recent work by Rozelle et al. (2007) confirmed, then we would expect allocative efficiency gains. In this case our evaluation approach will underestimate the rate of growth in farm productivity within China since we will not pick up productivity gains that would arise from producers shifting crops. In our presentation of our results, we also ignore regional differences in productivity, even though our analysis was done at a provincial level and then aggregated to form the national totals reported here.

In the following sections we first present a brief review of our methodology. Then we discuss the data, followed by a brief review of recent changes in Chinese agriculture and how these might be expected to affect TFP. Understanding these trends will be helpful in interpreting the results. TFP growth results and their decomposition are then presented for the 23 commodities.

2. METHODOLOGY

Indexed, number-based studies of productivity growth in agriculture compute productivity as a residual after accounting for input growth. If an economy is (or its producers are) operating efficiently, the growth in productivity can be interpreted as the contribution of technical progress. However, this interpretation is valid only if firms are technically efficient and realizing the full potential of the technology. The fact is that for various reasons firms do not operate efficiently. When this is so, measured changes in TFP will reflect both technological innovation and changes in efficiency. Therefore, technical progress may not be the only source of total productivity growth, and it will be possible to increase productivity through improving the method of application of the given technology—that is, by improving technical efficiency.

To study production efficiency, the stochastic frontier production function approach introduced by Aigner, Lovell, and Schmidt (1977) and Meeusen and van den Broeck (1977) has been widely deployed, with more recent extensions to this basic approach described by Battese and Coelli (1995). Stochastic production function analysis allows for the possibility that firms may exhibit technical inefficiency, in so much as firms may operate below an envelope or efficient frontier. A host of theoretical and empirical studies of production efficiency/inefficiency have used stochastic frontier production approaches (see, e.g., Coelli, Rao, and Battese 1998, and Kumbhakar and Lovell 2000 for a review of the various approaches that have been used).

As panel data sets (i.e., a combination of time-series and cross-section data) permit a richer specification of technical change, and obviously contain more information about a particular firm than a single cross-section of firm data, recent developments in measuring changes in productive efficiency over time have focused on the use of panel data (Kumbhakar, Heshmati, and Hjalmarsson 1999, and Henderson 2003). Panel data also enable some of the strong assumptions related to efficiency measurement in a cross-sectional framework to be relaxed (Schmidt and Sickles 1984), and so we adopt a panel data approach to measuring and decomposing TFP growth for the 23 commodities included in our study.

Formerly (and following Kumbhakar 2000), a stochastic frontier production function for panel data can be expressed as

$$y_{it} = f(x_{it}, t)\exp(v_{it} - u_{it}) \tag{1}$$

where y_{it} is the output of the ith firm (i=1,2,$\cdots$,N) in period t (t=1,2,$\cdots$,T); $f(\cdot)$ is the production technology; $\mathbf{x}$ is a vector of J inputs; t is the time trend variable; v_{it} is assumed to be an independently and identically distributed random variable $N(0,\sigma_v^2)$, independently distributed of the u_{it}; and u_{it} is a non-negative random variable and output-oriented technical inefficiency term. There are several specifications that make the technical inefficiency term u_{it} time-varying, but most of them have not explicitly formulated a model for these technical inefficiency effects in terms of appropriate explanatory variables.[1] Battese and Coelli (1995) proposed a specification for the technical inefficiency effect in the stochastic frontier production function as

$$u_{it} = z_{it}\delta + w_{it} \tag{2}$$

where the random variable w_{it} is defined by the truncation of the normal distribution with zero mean and variance σ^2, such that the point of truncation is $-z_{it}\delta$, that is, $w_{it} \geq -z_{it}\delta$. As a result, u_{it} is obtained by truncation at zero of the normal distribution with mean $z_{it}\delta$ and variance σ^2. The conventional assumption that the u_{it}s and v_{it}s are independently distributed for all i=1,2,⋯,N and t=1,2,⋯,T is obviously a simplifying but restrictive condition.

Technical inefficiency, u_{it} , measures the proportion by which actual output, y_{it} , falls short of maximum possible output or frontier output, $f(x,t)$. Therefore technical efficiency (TE) can be defined as

$$TE_{it} = y_{it} / f(x_{it}, t) = \exp(-u_{it}) \leq 1\,. \tag{3}$$

Time is included as a regressor in the frontier production function and used to capture trends in productivity change—popularly known as exogenous technical change—and is measured by the log derivative of the stochastic frontier production function with respect to time (Kumbhakar 2000). That is, technical change (TC) is defined as

$$TC_{it} = \frac{\partial \ln f(x_{it}, t)}{\partial t}\,. \tag{4}$$

Productivity change can be measured by the change in TFP and is defined as

$$\dot{TFP}_{it} = \dot{y}_{it} - \sum{}_J S_{jit}\,\dot{x}_{jit} \tag{5}$$

where S_{jit} is the cost-share of the jth input for the ith firm at time t. Kumbhakar has shown that the overall productivity change can be decomposed by differentiating equation (1) totally and using the definition of TFP change in equation (5). This results in a decomposition of the TFP change into four components: a scale effect, pure technical change, technical efficiency change, and an input price allocative effect.

[1] See Kumbhakar and Lovell (2000, Chap. 7), and Cuesta (2000) for a review of recent approaches to the incorporation of exogenous influences on technical inefficiency.

3. DATA AND METHODOLOGY FOR CREATING TFP MEASURES

Historically, estimates of China's cropping TFP have been controversial, arriving at significantly different conclusions.[2] Poor data and ad hoc input weights that are constant over time may account for the debates and uncertainty over pre- and post-reform productivity studies (Fan and Zhang 2002). Researchers gleaned data from a variety of sources; they warn readers of the poor or questionable quality of many of the input and output series (Stone and Rozelle 1995).

In this chapter, we overcome some of the shortcomings of the earlier studies by utilizing a set of data that has been collected in a more-or-less consistent fashion for the past 25 years by the State Price Bureau. Using a sampling framework that includes more than 20,000 households, enumerators collected data on the farm-level costs of production of all of China's major crops. The data set includes information on the quantities used and total expenditures of all major inputs, as well as expenditures on a large number of miscellaneous items for farms in all provinces spanning the period 1985 to 2004. Farmers also report output produced and the total revenues earned from each crop. Provincial surveys by the same statistical unit also report unit costs for labor that reflect the opportunity cost of the daily wage forgone by crop farmers. During the last several years, these data have been published by the State Development and Planning Commission ("The Compiled Materials of Costs and Profits of Agricultural Products of China," SPB, 1988-2004). The same data have been used in analyses of China's agricultural supply and input demand (see studies by Huang and Rozelle 1996; Huang, Rosegrant, and Rozelle 1995; World Bank 1997; and Jin et al. 2002).

To facilitate comparisons with previous studies that mostly examined grain crops, we examine TFP developments for rice, wheat, and corn in addition to a wide array of other important crops in China. Because production characteristics of the major types of rice vary markedly, we provide separate TFP analyses for early and late indica varieties (or long grain rice) and for japonica varieties (short/medium grain rice). We also examine productivity trends for China's largest non-grain staple crops, namely, soybeans and cotton.

The rise of China as a major producer (and exporter) of horticultural crops, plus its evident comparative advantage in producing labor-intensive farm commodities led us to also include four vegetables (capsicum, eggplant, cucumbers,

[2]For example, in Stone and Rozelle (1995), studies by Tang and by Lin and Weins are reviewed. The different studies have arrived at strikingly different conclusions. Tang argued that productivity was stagnant; Lin and Weins demonstrated that productivity growth was positive.

and tomatoes) and two fruit crops (mandarins and oranges). Because cucumbers and tomatoes are grown in large quantities, both as a field and a greenhouse crop, we also examine TFP trends separately for these two crops.

The increasing importance of livestock products in China and the prospect for ever-increasing demand for these products motivated the inclusion of hogs, egg, beef cattle, and dairy in this study. Because of the substantial differences in the technologies used by China's backyard producers versus specialized households versus commercial sectors, we segregate our sample of farm households to enable TFP trends to be measured for these different modes of production. In particular, we formed separate TFP measures for hog production stratified by backyard producers, specialized households (those raising relatively large numbers of hogs), and commercial hog producers (called state- and collective-owned farms). We also stratified egg production into specialized household and commercial producers. Absent information on the different modes of beef cattle production, the TFP analysis for this commodity deals with beef cattle in aggregate. Finally, we examined TFP trends for two types of dairy producers: specialized household milk producers and commercial farms.

Data for the livestock sector were particularly problematic, requiring that we make a number of assumptions (e.g., about the relatively higher quality of the consumption statistics compared to production statistics) and resort to the use of external pieces of information (e.g., from China's 1996 Census of Agriculture) to construct a data set that facilitated an analysis at the province level. These general adjustments are described in detail in Appendix A. Some specific adjustments were also needed for the dairy sector, and these are described in Appendix B and in Ma et al. (2006).

Notwithstanding the considerable merits of this data set, it nonetheless has several important limitations. First, given China's "grain-first" emphasis in the 1980s, the coverage of non-grain crops is extremely spotty during this period. This limitation meant that TFP estimates for the 1980s could only be formed for rice, wheat, corn, soybeans, and cotton. For these five commodities and the remaining 18 commodities, we also report TFP estimates for the period 1990-2004 (or in some cases to 2003). Given that some of the required data for several commodities were unavailable for some provinces, we had no option in a number of instances but to use unbalanced panel estimation methods. The data coverage (i.e., the number of provinces and the number of years) for each commodity is detailed in Appendix C. Despite these limitations the commodities included in our analysis accounted for more than 62% of total gross agricultural value (excluding forestry and fishery) during the 2000-2005 period.

4. ECONOMIC FACTORS, STRUCTURAL CHANGE, AND PRODUCTIVITY

There are three major influences likely to affect the rate of change and the sources of those changes for our commodity-specific estimates of productivity growth: (a) investments in the domestic agricultural R&D system and the international trade and transfer of new ideas and new technologies, (b) the performance of the agricultural extension system, and (c) other economic factors that affect the incentives of farmers to choose different crop mixes and modes of production (e.g., backyard versus commercial operations) and different technologies (e.g., greenhouse versus field operations).

4.1. Technology Development

After the 1960s, China's research institutions grew rapidly, from almost nothing in the 1950s to a system that now produces a steady stream of new varieties and other technologies. China's farmers were using domestically produced semi-dwarf rice varieties several years before the release and uptake of such green revolution varieties elsewhere in the world (Huang and Rozelle 1996). Yields of Chinese-bred conventional rice, wheat, and sweet potato varieties were comparable to yields being achieved in some of the most productive agricultural economics in the world (Stone 1988).

Agricultural research and plant breeding in China are almost completely funded and conducted by the government (Huang, Hu, and Rozelle 2003). Reflecting an urban bias in most food policies, most crop breeding programs continued to emphasize small grains (specifically rice and wheat) until the 1990s. For national food security considerations, high yields were a dominant target for Chinese research and remain so, although in more recent years quality improvement has also become a target in the nation's development plans. As demand for agricultural output continues to diversify and average per capita incomes continue to grow, increasing attention has also been given to horticultural and livestock breeding.

A nationwide reform in research was launched in the mid-1980s (Pray, Rozelle, and Huang 1997; Fan and Pardey 1992). The reforms sought to spur research productivity by shifting funds from institutional support to competitive grants, supporting research deemed useful for economic development, and by encouraging applied research institutes to support themselves by selling the technology they produce. In addition, beginning in the late 1980s and early 1990s, a more open approach to the importation of new horticultural seeds, genetics for improving the nation's livestock inventories (Rae et al. 2006), and new dairy technologies (Ma et al. 2006) were instigated.

After waning for more than a decade—between the early 1980s and mid-1990s—investment in agricultural R&D finally began to rise (Pray, Rozelle, and Huang 1997). Funding was substantially increased for plant biotechnology, although only Bt cotton has been commercialized to any significant extent (Huang et al. 2002). Government investment in agricultural R&D increased by 5.5% annually between 1995 and 2000, and by more than 15% annually after 2000 (Hu et al. 2007).

4.2. Extension System

While the pace of spending on agricultural R&D has picked up considerably in the past decade or so and the efforts to restructure and reform the institutions engaged in R&D have met with some success, the country's extension system has seen few if any major successes of late. The extension system in China was once seen as an effective agency in moving technology from the experiment station to the farm and for giving cogent advice for dealing with pests and diseases and other production-limiting problems. A publicly funded system, extension had agents at the county and township levels, supported by ties to provincial research agencies that maintained experiment stations in almost every prefecture. Most villages (or in the pre-reform socialist era, most communes) appointed one or more representatives to be liaisons between the farmers in that village and the extension system.

After the mid-1980s, however, fiscal pressures at all levels of government induced local officials to commercialize the extension system. In most localities this meant partially privatizing the position of extension agents (Park and Rozelle 1998). In exchange for working part of the time doing traditional extension activities, extension agents were allowed to go into business, most often selling seeds, fertilizer, and pesticides. The profits from their business activities were supposed to cross-subsidize their extension activities. Many extension agents found their salaries reduced by half or more as a consequence of these changes, and in many areas, payments from the public purse eventually ceased (but often with no commensurate change in their public extension responsibilities).

As might be expected, these arrangements meant that extension agents eventually spent most or all of their time on their income-earning activities, and so the extension system almost completely collapsed. Surveys found that most cropping farmers rarely, if ever, saw extension agents. Other studies have documented extension agents "overselling" pesticides and providing farmers with inaccurate information when the emergence of new technologies (e.g., Bt cotton seeds) conflicted with their business practices, specifically the sale of pesticides (Huang, Hu, and Rozelle 2003). In fact, Jin et al. (2002) found that the greater the extension effort, the lower the productivity. A recent survey showed that dairy, livestock, and horticulture farmers received little if any support from the formal extension system (which is still staffed largely with agronomists trained during the grain-first years of China's agricultural policy).

4.3. Other Factors

There are other economic factors affecting the nation's agricultural productivity. Not least of these is the fact that China's agricultural economy has been steadily transforming itself from a grain-first sector to one producing higher-valued cash crops, horticultural goods, and livestock and aquaculture products. In the early reform period, output growth—driven by increases in yields—was experienced in all subsectors of agriculture, including grains. For example, between 1978 and 1984, grain production generally increased by 4.7% per year and production rose for each of the major grains, specifically rice, wheat, and corn. However, after the mid-1990s, with the exception of corn, which is now almost exclusively used for feed, the area sown to rice and wheat has fallen, as has the production of these two staple crops.. Although this may concern old-time grain fundamentalists inside China, in fact, the contraction in grain supply was preceded by a reduction in demand as increasing per capita incomes, rural to urban migration, and a reduction in government marketing controls have shifted the pattern of consumption away from staple food grains.

Like the grain sector, cash crop production in general and production of specific crops such as cotton, edible oils, vegetables, and fruits also grew rapidly in the early reform period compared with the 1970s. Unlike the grain sector (with the exception of land-intensive staples such as cotton), the growth of the non-grain sector continued throughout the reform era. For example, between 1990 and 2004, the increase in vegetable production capacity has been so rapid that China has been adding the equivalent of the production capacity of California every two years. Moreover, the share of cultivated area in China dedicated to fruit orchards (over 5% in 2000) is more than double the share of the nextclosest major agricultural producer (e.g., the share of fruit orchards in sown area is lower in the United States, the European Union, Japan, and India).

The growth in livestock and fisheries output outpaced the growth in output from the cropping sector in total and in most subcategories. Livestock production increased by 9.1% per year in the early reform period and has continued to grow at between 4.5% and 8.8% per year since 1985. Fisheries production has been the fastest-growing component of agriculture, increasing by more than 10% per year during the 1985-2000 period. Today, more than 70% of the world's freshwater aquaculture is produced in China. These differential growth rates are bringing about substantial structural shifts in the Chinese agricultural economy. After remaining fairly static during the socialist era, the cropping share of Chinese agriculture gross domestic product fell from 76% in 1980 to 51% in 2005. Over this same time period, the combined livestock and fisheries share increased to 45%, more than double the corresponding 1980 share (20%). Dairy demand is also rising extremely rapidly (Fuller et al. 2006), and so it is clear by the trends that within a few years crop-related outputs will account for less than 50% of the total value of agricultural output in China.

Simultaneously with these changes, China has also experienced an explosion of market-oriented activities (Rozelle et al. 2000). While the pace of policy change was gradual throughout the 1980s and 1990s, the role of the state in China's agricultural markets has diminished. In its place there has been a rise of private traders and wholesale markets staffed by private traders (Huang, Rozelle, and Chang 2004). Wang et al. (2006) have documented the emergence of competitive markets in the horticultural sector, and the dairy and livestock sectors have followed this trend as well.

5. INPUTS, OUTPUTS, AND PRODUCTIVITY BEFORE 1995

The slowdown in the rate of growth of output experienced in the 1985-1994 period compared with the pace of growth in previous years as the Household Responsibility System came into force (McMillan, Whalley and Zhu 1989; Lin 1992) raised concerns among policymakers that the underlying rate of TFP growth had also slowed after 1984.[3] Notwithstanding these broad input, output, and productivity trends, our evidence suggests the general patterns of growth

[3]The relatively rapid growth in aggregate output during the late 1970s and early 1980s was coupled with a much slower growth in total input use, not least because much labor left the sector, resulting in a rapid growth in TFP (see, e.g., Fan and Zhang 2002).

do not necessarily reflect commodity-specific developments. For example, between 1985 and 1994, output growth for early and late indica rice and soybeans fell to less than 1% per year (Table 9.1, Column 1), while the total production of early indica rice actually declined. At the same time, the rate of growth of input use for these three crops was in the range of 1% to 2% per year; thus, the corresponding crop-specific TFP growth rates were low to negative.

In contrast, for other staple grain crops, including japonica rice, wheat, and corn, the slowdown in the rate of growth of output during the 1985-1994 period was less pronounced (such that output for these three crops still increased at rates in excess of 2% per year) and exceeded the rate of increase in input use. However, to the extent there is suitable evidence available, it appears that many of the commodities for which we have comparable data experienced a slowdown in their respective rates of TFP growth from the mid-1980s to mid-1990s. Cotton production fell by 0.06% per year while input use soared (by more than 3% per year)—reflecting responses to widespread pest outbreaks—such that TFP fell (Table 9.2, row 1). Input use rose more rapidly than output for hog production as well during this decade (Table 9.3, rows 1-3).

The input, output, and TFP growth assessment just presented demonstrates that the policy concerns regarding the relatively poor performance by Chinese agriculture during the decade of 1985-1994 were justified. Tables 9.4, 9.5, and 9.6 provide estimates of the rate and source of TFP change using the stochastic production function method previously described (and assuming linear input and

Table 9.1. Annual growth rate of output and total cost of production, main grain crop, 1985 to 2004

	1985-1994		1995-2004	
Crop	Output	Input	Output	Input
	(percent per year)			
Early indica	-0.37	2.00	0.58	-1.78
Late indica	0.42	2.30	0.67	-2.00
Japonica	2.30	1.21	1.88	-3.52
Wheat	2.04	1.89	1.01	0.21
Corn	2.06	0.30	0.86	-0.92
Soybeans	0.57	1.18	1.07	-0.89

Source: Authors' calculations based on National Agricultural Production Cost Survey data. See data section for an overview and Appendix D for complete annual series of cost of production at the national level.
Note: Growth rates generated by regression method.

Table 9.2. Annual growth rate of output and total cost of production cash crops (cotton and horticultural crops), 1985 to 2004

	1985-1994		1995-2004	
Crop	Output	Total Cost	Output	Total Cost
	(percent per year)			
Cotton	-0.06	3.42	2.81	-3.93
Horticultural crops				
Capsicum	n.a.	n.a.	2.87	2.22
Eggplant	n.a.	n.a.	1.47	2.90
Field cucumber	n.a.	n.a.	-0.40	-1.79
Field tomato	n.a.	n.a.	1.36	1.94
Greenhouse cucumber	n.a.	n.a.	1.11	0.60
Greenhouse tomato	n.a.	n.a.	2.95	1.50
Mandarin orange	n.a.	n.a.	1.30	0.13
Orange	n.a.	n.a.	-1.77	0.30

Source and note: See Table 9.1.

Table 9.3. Annual growth rate of output and total cost of production of livestock and dairy output, 1985 to 2004

	1985-1994		Early or Mid-1990s-2004	
Commodities	Output	Total Cost	Output	Total Cost
	(percent per year)			
Backyard hog production	1.24	2.47	5.29	-5.12
Specialized hog production	3.80	5.53	5.54	-5.37
Commercial hog production	0.29	0.86	13.05	-4.60
Specialized egg production	n.a.	n.a.	1.95	-1.87
Commercial egg production	n.a.	n.a.	2.43	-0.57
Beef production	10.2	-1.29	9.30	-0.92
Specialized milk	n.a.	n.a.	2.02	3.21
Commercial milk	n.a.	n.a.	5.19	0.71

Source and note: See Table 9.1.

output trends). This analysis estimates that TFP growth rates for early and late indica rice and soybeans during the 1985-1994 period were 1.84%, 1.85% and 0.11% per year, respectively (Table 9.4, Column 1). TFP growth estimates for wheat and corn were also positive (although small). In contrast (and somewhat at odds with the aforementioned relative input and output growth rates) we estimated TFP growth for japonica rice to have fallen by 0.12% per year from 1985 to 1994.

Table 9.4. Annual growth rate of main grain crops production and total factor productivity (TFP), and decomposition into technical efficiency (TE) and technical change (TC) in China, 1985 to 2004

	1985-1994			1995-2004		
	TFP	TE	TC	TFP	TE	TC
Early indica	1.84	-0.03	1.88	2.82	0	2.82
Late indica	1.85	0.26	1.59	2.92	0.21	2.71
Japonica	-0.12	-0.37	0.26	2.52	0.15	2.37
Wheat	0.25	1.08	-0.83	2.16	1.06	1.10
Corn	1.03	0.61	0.42	1.70	-0.23	1.94
Soybeans	0.11	0.19	-0.09	2.27	-0.08	2.35

Source and note: See Table 9.1.

Table 9.5. Annual growth of cash crops (cotton and horticultural crops) production and total factor productivity (TFP), and decomposition of TFP into technical efficiency (TE) and technical change (TC), 1985 to 2004

	Growth Rate (1980s-1990s)			Growth Rate (1990/91-2003)		
	TFP	TE	TC	TFP	TE	TC
Cotton	-0.34	-2.54	2.21	4.16	-3.47	7.63
Horticultural crops						
Capsicum	n.a.	n.a.	n.a.	1.86	-0.42	2.28
Eggplant	n.a.	n.a.	n.a.	2.24	-3.14	5.37
Field cucumber	n.a.	n.a.	n.a.	5.15	-1.27	6.42
Field tomato	n.a.	n.a.	n.a.	3.23	-0.50	3.73
Greenhouse cucumber	n.a.	n.a.	n.a.	5.86	0.62	5.24
Greenhouse tomato	n.a.	n.a.	n.a.	4.02	-2.43	6.45
Mandarin orange	n.a.	n.a.	n.a.	2.33	-2.19	4.52
Orange	n.a.	n.a.	n.a.	4.31	-3.20	7.50

Source and note: See Table 9.1.

The estimated sources of TFP growth vary among the crops. Positive technology change (albeit less than 2% annually in all cases) was a major influence on TFP growth for early and late indica rice and accounted for about half the measured growth in corn TFP. In contrast, some or all of the modest rises in TFP for wheat, corn, and soybeans are accounted for by increased technical efficiencies. While we cannot pinpoint the underlying sources of efficiency gains, these rates of increase are consistent with the measurements of deBrauw, Huang, and Rozelle (2004), which showed that the gradual liberalization of China's grain markets after 1985 generated efficiency gains for producers.

Table 9.6. Annual growth of livestock and dairy production and total factor productivity (TFP), and decomposition into technical efficiency (TE) and technical change (TC), 1985 to 2004

	Growth Rate (1980s-1990s)			Growth Rate (1990/91-2003)		
Products	**TFP**	**TE**	**TC**	**TFP**	**TE**	**TC**
Backyard hog production	4.80	1.26	3.54	3.72	1.01	2.72
Specialized hog production	5.58	-0.14	5.72	5.35	-0.72	6.07
Commercial hog production	5.67	0.09	5.58	4.40	-0.38	4.78
Specialized egg production	n.a	n.a	n.a	3.78	0.32	3.46
Commercial egg production	n.a	n.a	n.a	4.83	1.44	3.39
Beef production	n.a	n.a	n.a	4.41	0.01	4.40
Specialized milk	n.a	n.a	n.a	0.48	-6.09	6.58
Commercial milk	n.a	n.a	n.a	1.31	-3.26	4.57

Source and note: See Table 9.1.

The record is mixed for non-grain crops. The fall in cotton TFP (Table 9.5, Columns 1 to 3) shows that China's cotton production sector lost its international competitive edge during the 1985-1994 decade (as described in Huang et al. 2002). Although the research system helped stem the fall by producing some new conventional cotton varieties, the efficiency of production fell (likely because of the uncontrolled rise in the myriads of pesticides that appeared on the market to control for the emergence of the cotton bollworm population that was becoming increasingly resistant to conventional pesticides). Some of the new pesticides appear to have been ineffective (such that for a given level of input, output fell short of the production frontier—which by definition is measured as inefficiency). According to our estimates, changes in TFP for hog production were driven largely by improvements in technology, and, contrary to the direct input-output estimate previously discussed, the frontier production function approach has TFP growing during this period.

6. INPUTS, OUTPUTS, AND PRODUCTIVITY AFTER 1995

The relatively slow rates of growth of output experienced in 1985-1994, compared with the pace of growth in previous years, raised concerns that the underlying rate of TFP growth had systematically slowed after 1984. Thus far, information has been lacking on the pace of productivity growth for the major grain crops for the decade after 1995. In addition, there has never been a systematic analysis of the productivity performance of rapidly emerging agricultural sectors, such as horticulture, poultry, and dairy.

6.1. Outputs and Inputs after 1995

Agricultural output growth for most commodities rebounded during the period 1995-2004. For 20 of the 23 commodities for which we have more-complete data, output grew at a faster rate than inputs (Tables 9.1-9.3), so the TFP growth was positive for all these commodities (Tables 9.4-9.6). This was so for all the grain crops as well as for soybeans. Other sectors within agriculture showed similar trends. Cotton production expanded by 2.81% per year, whereas measured inputs declined by 3.93% per year, so that TFP grew by an impressive 4.16% per year. Most likely, the widespread uptake of Bt cotton—which allowed farmers to dramatically reduce pesticide use and labor for spraying while increasing yields—is a large part of the story. Setting aside the specialized milk sector that is mostly made up of large commercial dairies, the livestock sector also saw output growing faster than inputs during 1995-2004.

The horticultural sector has a more mixed record. The pace of output growth exceeded the pace of growth in input use for five of the horticultural crops, namely, capsicum, field cucumbers, greenhouse cucumbers, greenhouse tomatoes, and mandarins, whereas the opposite held for eggplants, field tomatoes, and oranges. The fact that greenhouse tomatoes and other greenhouse vegetables experienced positive rates of TFP growth compared with negative TFP growth for field tomatoes and some other crops might reflect the greater efficiencies of those commercial farmers who adopted greenhouse technologies.

6.2. TFP and Its Sources, 1995-2004

TFP growth during 1995-2004 was positive for all 23 commodities and in all cases was greater than the measured TFP for the pre-1995 period (Tables 9.4, 9.5, and 9.6). With just a few exceptions, TFP growth for these commodities exceeded 2% per year after 1994. In fact, using the respective value shares of output as weights when aggregating these 23 commodities, the implied rate of growth of TFP for Chinese agriculture exceeded 3% per year between 1995 and 2004. Coupling these estimates with the corresponding TFP estimates for 1978-1994 implies that TFP growth in China over the period 1978-2004 sustained an average rate of increase in excess of 3% per year, a remarkable achievement over a quarter of a century (see also Jin et al. 2002).

Our estimates suggest that technical change was the dominant source of TFP growth during both 1978-1994 and 1995-2004. Technical change accounted for nearly all the TFP gains for soybeans and all the grain crops except wheat, and for wheat it accounted for about half the TFP growth (Table 9.4). These findings are consistent with the evidence presented by Jin et al. (2002), wherein the rate of uptake of locally bred varieties was substantial during the entire period 1978-2004.

The increasing share of TFP growth after 1995 in cotton and horticultural crops attributable to technical change is also indicative of the effects of domestic and foreign breeding efforts (Table 9.5). Notably Bt cotton varieties emanating from the Chinese Academy of Agricultural Sciences and foreign firms had measurable productivity-promoting effects in the Chinese cotton sector throughout this period (Huang et al. 2002). Similarly, the increased productivity-promoting effects of technical change in the Chinese horticultural sector appear to stem from the spread of new varieties, many of which were imported from foreign firms.

Foreign technologies also appear to have played a role in the rapidly increasing share of TFP growth in the livestock sector attributable to technical change in more recent times (Table 9.6). During the 1990s, China encouraged the importation of large amounts of new genetic material for the hog, beef, poultry, and dairy industries. The quality of the genetic stock in China's livestock industry has greatly increased through the introduction of new hog varieties from the United States and Japan; new beef and dairy cattle genetics from Canada, New Zealand, and Australia; and poultry technology from around the world, including the United States. Apparently these new innovations have found their way into individual farms in Chinese villages as well as in fledgling commercial operations.

Our evidence that an increasing share of TFP growth is attributable to changes in technology, be they new crop varieties, improved livestock breeds, or other innovations, nonetheless also exposes some serious weaknesses in Chinese agriculture. For more than one-half the commodities in our study (specifically 14 of 23), TFP growth would have been higher during 1995-2004 if producers had not become less efficient. Producers of corn, soybeans, cotton, seven of the eight horticultural crops, and half of the livestock commodities were less efficient in 2004 than they were in 1995. While the analysis cannot identify the specific sources of the fall in efficiency, we believe that the disintegration of the extension system may have contributed to the measured efficiency losses.

7. CONCLUSION

Our analysis shows that agricultural TFP in China grew at a relatively rapid rate since 1994 for a large number of commodities. TFP for the staple commodities generally increased by about 2% per year; TFP growth rates for most horticulture and livestock commodities were even higher at between 3% and 5% per year. The rate of increase in agricultural TFP in China over the quarter century 1978-2004 was high by historical standards and compared with corresponding rates of TFP growth reported for many other countries around the world. We ascribe much of this TFP growth to changes in the technologies flowing to and being used by these sectors. Both domestic and foreign technologies have played a role. Sustained and increasing support to Chinese agricultural research has been vital to this success, as has an openness to trade in technologies produced by public research agencies in foreign countries and foreign firms.

APPENDIX A: DATA DETAILS FOR THE LIVESTOCK TFP ANALYSIS

An ongoing problem for the study of livestock productivity in China is obtaining accurate data. The majority of studies of Chinese agricultural productivity have used data published in the *China Statistical Yearbook*. While this source disaggregates gross value of agricultural output into crops, animal husbandry, forestry, fishing, and sideline activities, input use is not disaggregated by sector. For this study we drew on additional farm-level data to facilitate the construction of a time-series of input use for livestock production, stratified by farm type. A further problem with livestock data from the statistical yearbooks is the apparent over-reporting of both livestock product output and livestock numbers (Fuller, Hayes, and Smith 2000). We also address this issue in this study.

We specify four inputs to livestock production, specifically, breeding animal inventories, labor, feed, and non-livestock capital. We describe in what follows our data construction methods as well as our approach to addressing the over-reporting of the count of animals on farm and livestock output.

Livestock Output

Concerns over the accuracy of official published livestock data include an increasing discrepancy over time between supply and consumption figures and a lack of consistency between livestock output data and that on feed availability. Ma, Huang, and Rozelle (2004—henceforth MHR) provided an adjusted series for livestock production (and consumption) that are internally consistent by recognizing that the published data do contain useful, albeit somewhat inconsistent, information. To adjust the published series, new information from several sources was introduced. Specifically, MHR used the 1997 National Census of Agriculture as a baseline to provide a more accurate benchmark estimate of the size of China's livestock economy for at least one time period. The census is taken to provide the most accurate estimate of the size of the livestock economy since it covers all rural households and non-household agricultural enterprises. The census also collected information on the number of slaughterings (by type) during the 1996 calendar year. A second source of additional information is the official rural Household Income and Expenditure Survey (HIES) that is maintained by the China National Bureau of Statistics (CNBS). Information collected in that survey includes the number of livestock slaughtered and the quantity of meat produced for swine, poultry, beef cattle, sheep and goats, and eggs. MHR assumed that the production data as published in the *China Statistical Yearbook* were accurate for the period 1980-1986. Beyond this date, the data are adjusted to both reflect the annual variation as found in the HIES data and to agree with the census data for 1996. Further details of these adjustment procedures can be found in MHR. The adjusted series includes provincial data on livestock production, inventories, and slaughterings.

Animals as Capital Input

Following traditional practices, we recognize the inventory of breeding animals as a major capital input to livestock production. Thus, opening inventories of sows, milking cows, laying hens, and female yellow cattle are used as capital inputs in the production functions for pork, milk, eggs, and beef, respectively. Provincial inventory data for sows, milking cows, and female yellow cattle are taken from official sources and adjusted for possible over-reporting as described earlier.

Additional problems exist with poultry inventories. China's yearbooks and other statistical publications contain poultry inventories aggregated over both layers and broilers. No official statistical sources publish separate data for layer hens. MHR (2004), however, provide adjusted data on egg production, and the State Development Planning Commission's Agricultural Commodity Cost and Return Survey provides estimates of egg yields per hundred birds. Thus, layer inventories, at both the national and provincial levels, are calculated by dividing output by yield.[4] A simple test shows that the sum across provinces of our provincial layer inventories is close to our estimate of the national layer inventory in each year.[5]

Feed, Labor, and Non-livestock Capital Inputs

Provincial data for these production inputs are obtained directly from the Agricultural Commodity Cost and Return Survey.[6] Thought to be the most comprehensive source of information for agricultural production in China, these data have been used in many other studies (e.g., Huang and Rozelle 1996; Jin et al. 2002). Within each province, a three-stage random sampling procedure is used to select sample counties, villages, and, finally, individual production units. Samples are stratified by income levels at each stage. The cost and return data collected from individual farms (including traditional backyard households, specialized households, state- and collective-owned farms, and other larger commercial operations) are aggregated to the provincial and national level data sets that are published by the State Development Planning Commission.

The survey provides detailed cost items for all major animal commodities, including those covered in this chapter. These data include labor inputs (days), feed consumption (grain equivalent), and fixed asset depreciation on a "per animal unit" basis. We deflated the depreciation data using a fixed asset price index. We calculated total feed, labor, and non-livestock capital inputs by multiplying the input per animal by animal numbers. For the latter, we used our slaughter numbers for hogs and beef cattle, and the opening inventories for milking cows and layers since these are the "animal units" used in the cost survey. It is clear that this procedure, necessitated by the available data, excludes some input usage.

[4]The cost and return survey did not contain egg yields for every province for each of the past 15 years. Provincial trend regressions were used to estimate yields in such cases.

[5]Data on inventories of breeding broilers are available only from 1998, and we could not discover any way of deriving earlier data from the available poultry statistics. This severely limited our ability to analyze productivity developments in this sector.

[6]This survey is conducted through a joint effort of the State Development Planning Commission, the State Economic and Trade Commission, the Ministry of Agriculture, the State Forestry Administration, the State Light Industry Administration, the State Tobacco Administration, and the State Supply and Marketing Incorporation.

Livestock Production Structures

China's livestock sector is experiencing a rapid evolution in production structure, with potentially large performance differences across farm types. For example, traditional backyard producers utilize readily available low-cost feedstuffs, while specialized households and commercial enterprises feed more grain and protein meal. The trend from traditional backyard to specialized household and commercial enterprises in livestock production systems therefore implies an increasing demand for grain feed (Fuller, Tuan, and Wailes 2002). To estimate productivity growth by farm type requires that our data be disaggregated to that level. This was not a problem for the feed, labor, and non-livestock capital variables, since they are recorded by production structure in the cost surveys. However, complete data on livestock output and animal inventories by farm type do not exist.

Our approach to generating output data by farm type was to first construct provincial "share sheets" that contained time-series data on the share of animal inventories (dairy cows and layers) and slaughterings (hogs) by each farm category (backyard, specialized, and commercial).[7] Inventories of sows by farm type were then generated by multiplying the aggregate totals (see earlier section) by the relevant farm-type hog slaughter share. We note that this assumes a constant slaughterings-to-inventory share across farm types for hog production and therefore assumes away a possible cause of productivity differences in this dimension across farm types. However, it proved impossible to gather further data to address this concern.

To disaggregate our adjusted livestock output data by farm type, it is important to take into account yield differences across production structures. From the cost surveys we obtained provincial time-series data on average production levels per animal (eggs per layer, milk per cow, and mean slaughter live weights for hogs). This information was then combined with the farm-type data on cow and layer inventories and hog slaughterings to produce total output estimates by farm type that were subject to further adjustment to ensure consistency with the aggregate adjusted output data.

Information that enabled us to estimate the inventory and slaughter shares by farm type and by province over time comes from a wide variety of sources. These include the 1997 China Agricultural Census, China's Livestock Statis-

[7]We did not disaggregate beef data by farm type, since the cost survey presented beef information for just a single category—rural households.

tics, a range of published materials (such as annual reports, authority speeches, and specific livestock surveys) from various published sources, and provincial statistical Web sites. The census publications provide an accurate picture of the livestock production structure in 1996 (Somwaru, Zhang, and Tuan 2003). However, the census defines just two types of livestock farms: rural households and agricultural enterprises (including state- and collective-owned farms). We interpret the latter as "commercial" units, but additional information is used to disaggregate the rural households into backyard and specialized units. The agricultural statistical yearbooks and China's Livestock Statistics provide data on livestock production structure during the early 1980s, when backyard production and state farms were prevalent. These sources, plus the animal husbandry yearbooks and provincial statistical Web sites also provide estimates of livestock shares for various livestock types, provinces, and years. When all these data are combined with 1996 values from the census, many missing values still existed. On the assumption that declining backyard production and increasing shares of specialized and commercial operations are gradual processes that evolved over the study period, linear interpolations were made to estimate a number of missing values.

APPENDIX B: DATA DETAILS FOR THE DAIRY SECTOR TFP ANALYSIS

Since dairy sector official statistics face the same over-reporting problem as described in Appendix A and the data adjustments for the dairy sector were not included in Ma, Huang, and Rozelle (MHR 2004), we have to adjust data on milk output and dairy cattle inventories before estimating dairy sector TFP. To maintain the consistency with the livestock commodities, we use a similar approach to adjust milk output and the dairy cattle numbers. In order to adjust the published series, new information from several sources is introduced.

First, the 1997 National Census of Agriculture is used as a baseline to provide an improved estimate of the size of China's dairy sector economy in at least one time period. As described in MHR, the census is assumed to provide the most accurate measure of dairy cattle inventory in 1996 since it covers all rural households and non-household agricultural enterprises.

Second, we also used the official annual HIES. Information collected in that survey includes the number of cows producing milk output.

We also assumed that the dairy cattle numbers and milk output data as published in the statistical yearbooks are accurate from 1980 to 1986. Beyond this date, we assume that the data are adjusted to both reflect the annual variation as found in the HIES data and to agree with the census data for 1996.

The adjustment procedure for dairy sector production data is the same as described in MHR. The adjusted series includes provincial data on dairy cattle inventory and milk output.

APPENDIX C: SUMMARY OF DATA SAMPLE SIZE

Table 9.C1. Summary of data sample and size

Commodity	Time Periods Covered	Provinces per Year: Minimum Number	Provinces per Year: Maximum Number	Total Observations
Hogs				
Backyard households	1980-2001	15	27	491
Specialized households	1980-2001	3	25	285
Commercial	1980-2001	2	25	224
Layers				
Specialized households	1991-2001	10	22	160
Commercial	1991-2001	8	16	132
Beef				
Rural households	1989-2001	4	10	97
Milk				
Specialized households	1992-2001	5	16	91
Commercial	1992-2001	10	23	155
Crops				
Corn	1985-2004	19	22	418
Wheat	1985-2004	21	25	459
Early rice	1985-2004	7	11	179
Late rice	1985-2004	4	9	155
Japonic	1985-2004	14	17	313
Soybeans	1985-2004	13	18	302
Cotton	1985-2004	14	17	308
Horticulture				
Capsicum	1990-2003	6	28	260
Eggplant	1990-2003	12	28	306
Field cucumber	1990-2003	10	26	266
Field tomato	1990-2003	9	25	259
Greenhouse cucumber	1990-2003	6	21	186
Greenhouse tomato	1990-2003	5	20	193
Mandarin	1990-2003	2	6	118
Orange	1990-2003	3	11	160

Note: Vegetable data include only urban areas of provincial capital cities.

APPENDIX D: COST OF PRODUCTION TABLES (ALL COST FIGURES ARE IN 1985 PRICES)

Table 9.D1. Yield, total cost, and major cost shares for corn production in China

		Output	Total	Total Cost Share		Total Material Input Cost Share							
		Per Man	Production				Organic	Fertilizer	Plastic				
Year	Yield	Day	Cost	Labor	Materials	Seeds	Manure	Use	Sheet	Pesticides	Irrigation	Fence	Depreciation
	(kg/mu)	(kg)	(yuan/ton)	(percentage)					(percentage)				
1985	297	18	192	43.0	57.0	9.7	19.0	33.4	0.0	0.8	3.2	0.0	7.7
1986	311	19	178	41.2	58.8	10.3	10.0	38.6	0.0	1.4	3.9	0.0	7.8
1987	310	19	207	44.4	55.6	11.3	13.1	34.0	0.0	0.9	3.5	0.0	7.0
1988	313	19	198	43.2	56.8	10.1	12.6	36.4	0.0	1.0	3.2	0.0	7.6
1989	166	10	391	41.9	58.1	9.4	12.5	36.5	1.7	1.0	3.9	0.0	7.3
1990	358	21	200	42.5	57.5	12.2	11.8	38.1	2.5	1.6	2.8	0.0	6.1
1991	354	24	183	38.2	61.8	10.4	9.7	37.5	2.3	1.5	4.7	0.0	7.0
1992	351	21	198	44.0	56.0	10.3	8.9	38.4	3.5	2.0	4.3	0.0	7.3
1993	421	56	139	37.6	62.4	10.6	8.3	40.5	3.6	2.0	3.7	0.0	8.2
1994	367	25	199	41.8	58.2	12.3	6.4	39.6	1.5	2.4	5.7	0.0	6.7
1995	362	23	229	41.5	58.5	13.3	7.9	42.9	1.5	2.7	4.1	0.0	11.3
1996	381	24	232	45.3	54.7	13.4	7.8	43.8	2.4	2.4	4.3	0.0	10.6
1997	350	22	263	48.2	51.8	10.8	7.6	40.9	2.2	2.4	7.9	0.0	10.8
1998	384	27	219	47.8	52.2	11.8	8.5	43.9	2.7	3.0	5.7	0.0	7.9
1999	363	28	224	46.8	53.2	12.0	8.0	42.9	2.2	2.9	7.6	0.0	7.6
2000	351	28	226	47.3	52.7	11.1	7.3	41.9	1.8	3.0	8.3	0.0	6.6
2001	379	31	209	48.3	51.7	11.3	8.2	40.5	2.2	3.2	8.4	0.0	6.0
2002	393	34	206	46.2	53.8	14.6	7.4	40.7	1.8	3.3	6.7	0.0	5.8
2003	369	33	218	47.4	52.6	12.6	7.6	42.6	1.9	3.3	6.6	0.0	5.6
2004	424	42	205	46.4	53.6	12.8	6.6	46.0	1.1	3.5	5.7	0.1	4.7

Source: National Agricultural Production Cost Survey (various years).

Table 9.D2. Yield, total cost, and major cost shares for wheat production in China

Year	Yield	Output Per Man Day	Total Production Cost	Total Cost Share: Labor	Total Cost Share: Materials	Total Material Input Cost Share: Seeds	Organic Manure	Fertilizer Use	Plastic Sheet	Pesticides	Irrigation	Fence	Depreciation
	(kg/mu)	(kg)	(yuan/ton)	(percentage)					(percentage)				
1985	208	15	283	35.0	65.0	17.3	14.4	31.8	0.0	1.4	4.1	0.0	7.0
1986	203	15	313	39.8	60.2	18.1	14.1	31.1	0.0	1.5	5.0	0.0	6.6
1987	197	15	333	39.5	60.5	17.5	14.0	30.8	0.0	1.8	4.8	0.0	6.4
1988	215	16	301	40.0	60.0	16.7	14.1	31.0	0.0	1.7	4.9	0.0	6.6
1989	230	16	292	37.7	62.3	17.1	11.0	32.9	0.0	2.3	5.3	0.0	6.3
1990	217	17	312	33.6	66.4	17.9	10.1	34.7	0.0	2.8	4.5	0.0	5.5
1991	233	19	299	34.8	65.2	15.8	10.1	35.5	0.1	3.3	4.7	0.0	5.8
1992	256	20	298	38.5	61.5	14.8	9.0	34.8	0.1	3.3	6.3	0.0	6.0
1993	244	20	327	42.9	57.1	13.7	8.0	33.9	0.1	3.3	6.4	0.0	6.9
1994	153	6	365	13.5	86.5	15.0	7.3	34.6	0.1	3.0	7.2	0.0	6.4
1995	257	20	297	39.9	60.1	18.5	7.9	38.3	0.1	3.1	7.2	0.0	6.6
1996	261	21	338	39.5	60.5	18.0	7.1	40.0	0.4	3.8	7.3	0.0	5.4
1997	277	23	323	42.0	58.0	17.8	6.6	37.9	0.4	3.2	7.2	0.0	5.7
1998	246	23	337	40.3	59.7	17.1	6.9	38.4	0.6	3.3	8.2	0.0	6.1
1999	261	25	325	39.5	60.5	16.8	6.9	37.2	0.1	3.7	10.2	0.0	6.4
2000	261	27	310	37.5	62.5	15.6	5.7	34.1	0.1	3.2	10.5	0.0	5.5
2001	261	28	303	39.5	60.5	15.6	6.1	32.8	0.1	3.1	9.9	0.0	5.4
2002	262	28	311	39.7	60.3	15.2	6.1	34.4	0.1	3.6	10.0	0.0	5.3
2003	255	28	312	40.2	59.8	15.2	6.4	34.3	0.0	3.5	9.7	0.0	5.5
2004	340	42	251	37.8	62.2	14.0	5.9	36.3	0.0	3.7	9.4	1.1	2.4

Source: National Agricultural Production Cost Survey (various years).

Table 9.D3. Yield, total cost, and major cost shares for early indica production in China

		Output	Total	Total Cost Share		Total Material Input Cost Share							
Year	Yield	Per Man Day	Production Cost	Labor	Materials	Seeds	Organic Manure	Fertilizer Use	Plastic Sheet	Pesticides	Irrigation	Fence	Depreciation
	(kg/mu)	(kg)	(yuan/ton)	(percentage)					(percentage)				
1985	375	18	205	41.1	58.9	9.8	9.0	37.0	0.0	5.4	5.6	0.0	8.1
1986	372	18	195	39.8	60.2	10.1	9.0	37.1	0.0	5.3	5.3	0.0	8.2
1987	359	18	222	43.1	56.9	10.1	8.9	36.5	0.0	6.4	5.0	0.0	8.0
1988	351	18	230	39.3	60.7	9.0	9.5	39.0	0.0	6.1	5.2	0.0	7.4
1989	370	19	230	37.2	62.8	10.8	8.2	36.6	1.6	6.7	3.5	0.1	6.8
1990	389	21	223	37.1	62.9	9.8	8.8	36.3	1.5	6.9	4.6	0.1	7.2
1991	356	18	242	37.9	62.1	9.4	9.7	36.4	1.9	6.3	4.4	0.1	7.6
1992	360	20	223	42.1	57.9	9.7	7.5	38.5	1.8	6.2	4.4	0.3	7.9
1993	379	21	219	43.0	57.0	8.7	6.5	40.8	1.9	6.0	5.0	0.1	7.2
1994	359	21	263	47.2	52.8	8.8	7.4	36.3	1.8	5.6	4.9	0.1	9.2
1995	366	21	302	46.2	53.8	10.8	5.9	40.3	1.8	6.6	3.4	0.2	7.3
1996	398	21	318	50.2	49.8	9.4	5.6	39.2	1.9	6.5	4.9	0.2	6.4
1997	384	23	317	50.1	49.9	8.2	5.5	35.8	2.1	6.8	4.2	0.2	6.8
1998	351	24	296	49.1	50.9	8.9	6.1	37.8	2.5	7.3	5.0	0.4	7.7
1999	353	26	286	48.5	51.5	8.8	4.5	37.0	2.2	7.7	4.7	0.9	6.9
2000	373	29	261	50.1	49.9	8.4	4.7	35.2	2.3	7.7	5.8	0.4	7.2
2001	375	30	260	50.8	49.2	7.8	4.9	34.9	2.0	7.9	6.0	0.2	7.5
2002	364	31	264	50.4	49.6	8.4	4.1	34.5	2.0	7.5	5.5	0.3	7.6
2003	371	31	261	51.5	48.5	8.3	3.6	35.5	1.8	8.2	4.9	0.2	7.2
2004	393	34	263	46.4	53.6	7.5	4.3	33.4	2.0	9.4	4.8	0.0	7.8

Source: National Agricultural Production Cost Survey (various years).

Table 9.D4. Yield, total cost, and major cost shares for late indica production in China

Year	Yield	Output Per Man Day	Total Production Cost	Total Cost Share		Total Material Input Cost Share							
				Labor	Materials	Seeds	Organic Manure	Fertilizer Use	Plastic Sheet	Pesticides	Irrigation	Fence	Depreciation
	(kg/mu)	(kg)	(yuan/ton)	(percentage)		(percentage)							
1985	350	17	206	42.3	57.7	9.6	5.7	39.2	0.0	8.7	5.2	0.0	8.4
1986	333	16	213	41.2	58.8	9.2	5.9	40.3	0.0	7.7	3.7	0.0	9.1
1987	347	18	234	42.3	57.7	8.5	6.3	43.4	0.0	7.6	3.7	0.0	8.5
1988	315	16	269	38.0	62.0	7.7	6.3	43.5	0.0	8.6	3.6	0.0	8.0
1989	349	18	256	36.3	63.7	10.7	6.8	40.1	0.1	9.2	4.1	0.1	7.5
1990	374	19	235	39.4	60.6	10.2	6.1	37.6	0.0	10.0	4.6	0.3	7.6
1991	371	20	226	37.7	62.3	9.1	7.1	37.3	0.2	9.4	5.0	0.0	8.1
1992	364	20	229	41.2	58.8	9.0	6.4	37.7	0.1	8.9	4.4	0.0	9.6
1993	372	21	219	43.0	57.0	8.4	6.5	38.8	0.0	9.1	4.5	0.0	8.6
1994	356	21	259	43.6	56.4	9.7	6.1	36.6	0.0	8.4	4.9	0.3	8.8
1995	363	21	301	44.7	55.3	11.6	5.0	39.6	0.0	7.6	3.9	0.0	7.9
1996	361	21	317	50.7	49.3	9.7	4.6	40.4	0.1	8.8	4.2	0.0	7.9
1997	364	22	303	50.3	49.7	9.1	4.7	38.1	0.1	9.9	4.2	0.1	6.8
1998	380	26	264	49.9	50.1	9.2	5.0	37.5	0.3	9.8	4.6	0.0	9.4
1999	367	26	274	50.6	49.4	10.6	4.5	36.9	0.1	11.2	5.0	0.0	7.4
2000	365	28	266	50.8	49.2	9.3	4.4	35.3	0.1	11.1	6.0	0.1	7.0
2001	388	32	244	51.4	48.6	8.1	3.8	35.3	0.3	11.7	6.1	0.0	7.1
2002	370	31	231	46.2	53.8	9.3	3.8	35.5	0.2	11.1	5.0	0.0	7.5
2003	379	33	296	42.6	57.4	6.4	26.7	26.7	0.1	9.1	4.1	0.0	5.3
2004	398	35	265	43.9	56.1	7.6	3.9	36.2	0.3	12.6	5.3	0.0	6.7

Source: National Agricultural Production Cost Survey (various years).

Table 9.D5. Yield, total cost, and major cost shares for japonica production in China

Year	Yield	Output Per Man Day	Total Production Cost	Total Cost Share: Labor	Total Cost Share: Materials	Total Material Input Cost Share: Seeds	Organic Manure	Fertilizer Use	Plastic Sheet	Pesticides	Irrigation	Fence	Depreciation
	(kg/mu)	(kg)	(yuan/ton)	(percentage)					(percentage)				
1985	374	17	229	38.2	61.8	11.7	5.8	33.5	0.0	5.6	11.3	0.0	7.7
1986	419	19	196	36.9	63.1	12.3	5.3	30.4	0.0	6.8	11.0	0.0	8.0
1987	391	19	237	39.5	60.5	11.4	5.3	30.3	0.0	6.7	9.5	0.0	11.0
1988	406	19	220	38.7	61.3	11.6	6.0	34.2	0.0	7.4	11.4	0.0	2.7
1989	404	19	242	35.1	64.9	12.1	5.4	30.9	1.8	7.3	10.1	0.2	7.2
1990	435	21	234	32.9	67.1	12.0	5.3	31.0	2.0	7.2	10.1	0.3	6.1
1991	439	21	243	33.2	66.8	9.5	4.8	29.8	2.1	7.6	10.5	0.7	5.8
1992	435	22	249	33.9	66.1	10.1	4.6	28.9	2.6	6.9	10.2	0.6	6.3
1993	440	22	245	37.0	63.0	8.7	4.4	29.3	2.0	6.8	12.0	0.3	5.2
1994	449	23	280	37.2	62.8	9.4	4.2	29.1	1.9	7.2	13.1	0.5	5.0
1995	432	23	302	34.6	65.4	9.6	3.0	31.7	2.5	7.7	9.9	0.6	4.6
1996	463	24	305	38.4	61.6	10.4	4.8	31.1	2.1	6.9	9.6	0.3	4.7
1997	472	27	293	41.4	58.6	8.8	3.0	30.1	2.1	7.0	11.6	0.6	5.4
1998	722	55	157	37.5	62.5	7.9	3.9	31.7	2.4	8.4	15.4	0.5	5.6
1999	438	29	278	41.5	58.5	8.6	3.0	32.5	2.7	8.3	15.6	0.5	5.3
2000	451	30	258	44.3	55.7	8.1	2.9	30.4	2.1	8.6	17.0	0.4	5.6
2001	478	33	233	42.4	57.6	7.9	2.9	31.5	2.0	9.7	16.5	0.5	5.1
2002	482	36	233	39.9	60.1	7.8	3.4	30.0	2.0	8.9	19.0	0.6	5.6
2003	459	34	252	41.8	58.2	7.5	2.8	30.1	1.7	9.9	20.2	0.4	4.8
2004	507	49	235	37.6	62.4	6.6	2.8	32.9	1.8	11.3	13.8	0.1	4.5

Source: National Agricultural Production Cost Survey (various years).

Table 9.D6. Yield, total cost, and major cost shares for soybean production in China

Year	Yield	Output Per Man Day	Total Production Cost	Total Cost Share: Labor	Total Cost Share: Materials	Total Material Input Cost Share: Seeds	Organic Manure	Fertilizer Use	Plastic Sheet	Pesticides	Irrigation	Fence	Depreciation
	(kg/mu)	(kg)	(yuan/ton)	(percentage)		(percentage)							
1985	195	17	195	45.8	54.2	27.9	9.4	16.9	0.0	2.0	1.2	0.0	10.6
1986	199	17	183	44.3	55.7	30.1	5.7	18.7	0.0	1.7	1.7	0.0	10.5
1987	190	16	214	49.9	50.1	30.9	10.5	15.2	0.0	2.0	1.2	0.0	10.3
1988	191	16	211	46.8	53.2	30.3	8.9	17.3	0.0	2.3	1.4	0.0	9.9
1989	191	17	210	46.0	54.0	32.7	10.4	13.3	0.0	2.6	1.6	0.0	10.1
1990	201	17	216	48.5	51.5	30.1	10.0	17.8	0.0	2.8	0.8	0.0	9.6
1991	188	18	208	45.4	54.6	27.2	8.1	18.9	0.0	2.7	1.2	0.0	10.7
1992	191	18	219	48.0	52.0	30.3	8.4	20.2	0.2	3.7	1.7	0.0	8.8
1993	222	20	206	48.0	52.0	29.7	6.4	17.9	0.3	4.1	1.7	0.0	8.9
1994	217	20	208	49.6	50.4	26.2	6.4	22.1	0.3	4.3	3.5	0.0	8.5
1995	232	22	202	46.2	53.8	24.1	5.5	24.6	0.0	3.9	1.5	0.0	9.6
1996	242	21	236	48.8	51.2	25.5	6.6	24.5	0.0	3.6	1.9	0.0	7.5
1997	217	19	288	49.5	50.5	24.1	7.2	18.5	0.0	4.3	8.7	0.0	7.9
1998	258	28	184	54.3	45.7	29.9	8.4	25.3	0.0	5.2	5.3	0.0	13.6
1999	243	31	182	50.6	49.4	26.7	8.1	24.4	0.2	6.9	6.5	0.0	11.9
2000	242	33	181	46.8	53.2	26.1	4.2	21.1	0.0	7.1	5.2	0.0	9.8
2001	237	32	184	47.3	52.7	23.2	4.9	23.3	0.0	5.6	4.7	0.0	9.8
2002	267	37	165	48.4	51.6	23.1	4.0	24.2	0.0	6.8	6.1	0.0	10.2
2003	240	32	199	48.4	51.6	23.3	4.8	25.2	0.1	6.3	5.3	0.0	9.1
2004	260	50	201	40.7	59.3	21.1	1.9	27.4	0.0	8.2	1.6	0.2	7.9

Source: National Agricultural Production Cost Survey (various years).

Table 9.D7. Yield, total cost, and major cost shares for cotton production in China

Year	Yield	Output Per Man Day	Total Production Cost	Total Cost Share		Total Material Input Cost Share							
				Labor	Materials	Seeds	Organic Manure	Fertilizer Use	Plastic Sheet	Pesticides	Irrigation	Fence	Depreciation
	(kg/mu)	(kg)	(yuan/ton)	(percentage)		(percentage)							
1985	60	1.4	1978	53.8	46.2	6.2	17.2	29.1	0.0	11.9	3.4	0.0	7.6
1986	63	1.5	1744	52.2	47.8	6.5	15.8	29.4	0.0	12.0	4.2	0.0	7.3
1987	63	1.6	1979	54.8	45.2	6.8	12.8	30.7	0.0	12.1	3.8	0.0	6.9
1988	53	1.3	2325	53.7	46.3	6.3	11.8	30.6	0.0	15.6	3.9	0.0	7.0
1989	58	1.4	2207	51.5	48.5	6.6	12.0	30.0	0.0	22.0	3.8	0.0	5.6
1990	68	1.5	2145	53.5	46.5	6.3	11.8	29.5	5.5	18.2	3.3	0.5	6.6
1991	69	1.6	2188	49.8	50.2	5.8	9.3	28.9	6.5	17.7	4.8	0.4	6.1
1992	53	1.3	2867	50.7	49.3	5.1	8.9	28.8	7.2	20.4	5.1	0.3	5.1
1993	57	1.4	2667	53.1	46.9	5.9	8.5	29.4	7.3	20.2	4.8	0.3	5.0
1994	60	1.4	2942	56.9	43.1	5.9	7.7	30.6	6.2	21.2	5.1	0.3	5.0
1995	61	1.5	3006	54.2	45.8	6.0	7.9	32.5	6.0	21.7	4.6	0.2	4.5
1996	61	1.5	3312	60.8	39.2	6.1	8.2	34.9	6.4	18.5	5.0	0.3	4.6
1997	65	1.7	3111	60.9	39.1	6.5	5.7	33.5	6.4	18.2	7.3	0.2	4.2
1998	68	2.0	2732	58.4	41.6	6.9	7.6	30.7	6.7	19.9	7.0	0.3	4.6
1999	67	2.2	2495	57.5	42.5	8.2	7.4	33.4	6.2	17.4	8.1	0.2	4.7
2000	71	2.5	2265	57.7	42.3	8.3	7.0	33.9	6.4	17.7	8.2	0.2	4.8
2001	78	2.6	2070	58.6	41.4	9.5	6.4	33.1	7.1	16.6	8.7	0.2	4.4
2002	82	2.8	1995	58.9	41.1	9.6	5.5	36.4	6.2	15.4	9.7	0.1	4.4
2003	68	2.5	2425	56.3	43.7	10.1	6.2	35.1	6.9	15.6	9.1	0.1	4.3
2004	76	3.1	2350	56.9	43.1	11.6	5.0	37.9	6.9	12.1	8.3	0.0	5.5

Source: National Agricultural Production Cost Survey (various years).

Table 9.D8. Yield, total cost, and major cost shares for capsicum production

Year	Yield	Output Per Man Day	Total Production Cost	Total Cost Share		Total Material Input Cost Share							
				Labor	Materials	Seeds	Organic Manure	Fertilizer Use	Plastic Sheet	Pesticides	Irrigation	Fence	Depreciation
	(kg/mu)	(kg)	(yuan/ton)	(percentage)		(percentage)							
1990	1543.2	51.2	318.0	28.3	71.7	25.8	16.8	9.1	21.8	3.6	2.5	4.0	5.7
1991	1243.9	54.7	335.6	27.6	72.4	20.9	15.6	10.8	22.0	4.3	3.3	7.0	4.8
1992	1545.3	155.2	561.2	51.7	48.3	18.4	14.5	11.6	18.8	5.2	2.6	3.8	4.8
1993	1970.4	73.3	364.7	39.6	60.4	14.5	18.2	12.0	18.0	4.7	8.8	0.6	5.7
1994	1421.7	62.1	321.6	45.2	54.8	24.7	14.9	15.4	16.5	6.1	3.6	3.5	4.2
1995	1540.8	54.8	341.1	42.9	57.1	16.9	20.3	13.5	18.2	7.6	2.8	3.5	4.5
1996	1793.3	66.8	424.0	53.2	46.8	17.8	19.2	16.6	15.2	7.4	4.0	3.0	6.3
1997	1692.4	64.4	405.1	52.7	47.3	9.9	13.4	17.1	20.6	6.9	3.3	5.9	8.4
1998	2021.7	58.2	382.2	52.7	47.3	15.8	17.5	21.3	18.4	7.7	3.1	6.4	5.6
1999	2206.0	57.4	413.3	53.4	46.6	12.4	18.5	18.6	18.3	10.3	4.0	6.1	6.1
2000	1971.9	49.9	368.4	49.9	50.1	14.6	17.4	18.6	17.1	10.7	4.9	5.4	4.5
2001	2067.9	46.0	393.6	51.9	48.1	14.2	23.0	18.0	13.7	9.9	4.6	4.7	5.0
2002	2227.4	44.9	397.4	53.6	46.4	13.8	19.6	20.0	14.8	10.2	4.5	6.3	4.9
2003	2312.3	45.8	424.5	53.5	46.5	12.6	19.1	20.3	14.7	10.9	4.8	6.3	5.2
2004	2408.8	44.1	390.5	46.5	53.5	12.9	18.5	24.4	6.9	10.5	5.1	2.8	2.8

Source: National Agricultural Production Cost Survey (various years).

Table 9.D9. Yield, total cost, and major cost shares for eggplant production

Year	Yield	Output Per Man Day	Total Production Cost	Total Cost Share: Labor	Total Cost Share: Materials	Total Material Input Cost Share: Seeds	Organic Manure	Fertilizer Use	Plastic Sheet	Pesticides	Irrigation	Fence	Depreciation
	(kg/mu)	(kg)	(yuan/ton)	(percentage)		(percentage)							
1990	2573.4	60.0	289.6	36.4	63.6	16.8	17.9	12.7	19.9	5.3	5.0	2.8	7.0
1991	2132.4	54.1	279.0	32.9	67.1	13.2	16.8	12.3	21.7	4.5	5.2	4.0	6.5
1992	2602.5	67.0	320.6	39.1	60.9	16.4	16.6	12.1	14.5	12.4	3.1	2.5	7.8
1993	2288.5	60.5	270.8	44.0	56.0	15.8	17.0	13.1	14.3	4.9	6.1	0.9	8.8
1994	1998.1	65.0	317.2	48.4	51.6	18.0	16.8	12.1	17.4	5.6	3.6	3.2	6.5
1995	2382.6	78.6	398.8	54.5	45.5	14.0	18.8	17.4	16.9	7.0	3.6	2.6	6.6
1996	2514.0	53.9	350.6	53.3	46.7	15.9	18.0	21.3	11.2	5.9	4.6	4.9	6.8
1997	2620.5	62.3	389.3	54.2	45.8	11.1	18.4	19.5	16.3	7.4	3.8	5.1	5.1
1998	2782.5	56.0	382.4	52.7	47.3	9.7	22.7	19.1	19.7	6.8	2.9	5.7	5.7
1999	3258.4	63.2	431.9	56.9	43.1	11.2	21.9	20.7	16.7	6.8	4.0	4.9	6.5
2000	2887.6	53.1	361.1	55.9	44.1	11.4	17.0	22.7	18.3	9.7	4.7	4.4	5.1
2001	3256.0	51.5	409.1	57.4	42.6	10.9	18.7	24.8	12.7	11.9	4.5	4.2	5.3
2002	3320.9	45.6	399.3	55.9	44.1	9.2	16.7	23.4	14.3	11.8	5.0	6.7	5.5
2003	3239.7	46.9	423.7	55.9	44.1	9.1	19.6	23.6	15.0	10.6	3.9	6.7	5.8
2004	3503.5	46.1	391.2	47.5	53.3	8.8	16.5	25.6	6.1	10.8	4.7	3.4	3.5

Source: National Agricultural Production Cost Survey (various years).

Table 9.D10. Yield, total cost, and major cost shares for greenhouse cucumber production

Year	Yield	Output Per Man Day	Total Production Cost	Total Cost Share: Labor	Total Cost Share: Materials	Total Material Input Cost Share: Seeds	Organic Manure	Fertilizer Use	Plastic Sheet	Pesticides	Irrigation	Fence	Depreciation
	(kg/mu)	(kg)	(yuan/ton)	(percentage)		(percentage)							
1990	4740.5	126.0	1,035.2	21.4	78.6	11.6	10.3	8.2	35.2	7.7	1.7	11.9	2.2
1991	4657.7	131.6	965.5	23.1	76.9	8.9	10.6	7.5	31.8	5.7	1.9	12.9	7.4
1992	3440.1	162.3	1,250.3	24.3	75.7	9.1	10.2	9.2	26.1	6.0	2.0	10.6	7.7
1993	3628.4	101.7	663.2	30.2	69.8	13.4	9.5	8.5	26.6	6.4	2.8	10.9	7.4
1994	3980.9	122.9	902.9	30.2	69.8	8.0	6.4	7.9	30.7	5.0	5.3	10.1	9.0
1995	4042.8	127.2	953.3	37.0	63.0	5.1	10.4	10.2	24.1	7.0	3.6	9.0	13.4
1996	4114.9	100.1	1,128.1	31.2	68.8	9.6	9.2	7.8	31.0	6.2	2.3	9.6	13.3
1997	4133.9	92.5	974.2	35.3	64.7	10.4	7.9	8.6	33.3	6.6	2.2	8.3	11.7
1998	4830.5	90.0	769.9	40.0	60.0	3.7	12.0	11.1	33.6	7.0	2.7	15.4	7.7
1999	4836.2	93.2	878.9	40.8	59.2	5.3	13.1	12.7	24.7	8.9	3.3	13.6	11.1
2000	4746.5	84.9	820.5	37.5	62.5	4.7	12.5	11.1	29.0	7.5	3.3	12.1	9.0
2001	4592.7	83.6	829.4	41.1	58.9	5.4	11.9	13.2	27.5	7.1	3.2	14.8	11.5
2002	4912.0	83.3	846.3	44.0	56.0	6.5	11.2	13.6	25.1	7.7	3.8	14.6	11.3
2003	4819.2	86.3	878.5	47.2	52.8	7.5	11.5	13.4	25.2	7.0	3.6	12.9	13.2
2004	4775.2	76.3	820.1	38.7	61.3	6.1	11.5	13.0	22.9	7.2	3.4	5.3	19.2

Source: National Agricultural Production Cost Survey (various years).

Table 9.D11. Yield, total cost, and major cost shares for greenhouse tomato production

Year	Yield	Output Per Man Day	Total Production Cost	Total Cost Share: Labor	Total Cost Share: Materials	Total Material Input Cost Share: Seeds	Organic Manure	Fertilizer Use	Plastic Sheet	Pesticides	Irrigation	Fence	Depreciation
	(kg/mu)	(kg)	(yuan/ton)	(percentage)		(percentage)							
1990	4147.9	120.7	732.8	28.9	71.1	6.2	13.6	7.4	35.5	6.4	2.0	8.5	5.0
1991	4127.8	128.4	820.5	26.6	73.4	11.4	11.9	7.9	37.3	4.9	1.6	8.8	6.8
1992	4171.0	146.1	788.7	34.7	65.3	8.6	10.0	8.7	32.1	4.5	2.0	11.8	8.4
1993	4365.0	132.2	863.9	30.1	69.9	9.1	8.5	10.0	25.7	5.9	3.7	14.9	12.2
1994	3997.1	141.2	909.9	37.1	62.9	9.6	8.2	9.8	30.3	4.4	3.2	11.5	8.6
1995	4268.7	125.9	913.8	36.8	63.2	5.9	10.0	9.3	31.7	6.1	2.1	10.1	13.5
1996	4676.1	108.7	961.4	40.8	59.2	9.4	11.9	10.4	30.4	5.2	2.4	12.4	5.9
1997	4643.5	115.1	1,015.4	42.4	57.6	3.5	9.0	9.2	29.3	5.6	2.8	8.6	16.7
1998	4575.0	90.4	772.4	43.8	56.2	4.8	12.4	11.5	30.8	6.7	2.1	15.6	11.6
1999	4658.7	92.2	816.0	44.8	55.2	6.6	11.5	12.7	27.7	6.1	2.7	11.1	15.2
2000	4907.1	90.0	850.2	39.0	61.0	4.2	10.5	10.9	28.0	5.5	2.7	13.0	15.3
2001	5074.4	88.2	891.5	40.3	59.7	4.7	12.3	11.5	28.0	7.1	3.0	15.7	13.6
2002	4796.1	85.6	852.3	45.5	54.5	5.6	12.7	12.9	25.7	6.9	3.6	15.7	12.5
2003	4761.2	84.9	876.4	46.6	53.4	5.7	11.9	13.6	25.0	7.9	2.8	13.6	15.0
2004	5088.7	79.5	966.3	43.9	56.1	5.6	10.7	14.3	22.0	7.1	2.7	6.0	21.9

Source: National Agricultural Production Cost Survey (various years).

Table 9.D12. Yield, total cost, and major cost shares for field cucumber production

Year	Yield	Output Per Man Day	Total Production Cost	Total Cost Share		Total Material Input Cost Share							
				Labor	Materials	Seeds	Organic Manure	Fertilizer Use	Plastic Sheet	Pesticides	Irrigation	Fence	Depreciation
	(kg/mu)	(kg)	(yuan/ton)	(percentage)		(percentage)							
1990	2850.9	79.0	377.7	36.7	63.3	12.3	14.5	8.9	17.8	6.3	3.4	18.1	5.7
1991	2656.6	69.5	356.6	33.1	66.9	11.0	15.5	8.7	22.0	7.4	3.0	15.7	3.6
1992	2872.6	86.2	483.2	33.4	66.6	12.9	11.8	9.7	19.8	6.0	2.9	14.3	5.7
1993	2742.6	72.7	386.2	37.0	63.0	9.2	14.5	10.1	15.0	7.5	3.7	17.6	6.5
1994	2698.5	76.6	387.2	46.0	54.0	13.2	15.5	12.8	15.0	6.4	2.7	14.5	4.7
1995	2561.6	70.9	390.6	50.7	49.3	8.6	16.8	12.0	13.7	9.2	3.6	16.5	3.0
1996	2700.2	67.8	430.8	55.0	45.0	8.9	21.8	18.6	6.3	9.4	2.8	14.6	4.1
1997	2653.9	65.5	406.8	52.5	47.5	9.2	14.2	17.4	9.4	10.6	5.8	12.2	4.1
1998	2897.0	54.8	349.9	54.9	45.1	7.9	15.5	22.1	6.8	8.3	4.1	21.9	4.8
1999	3281.1	59.1	407.6	54.0	46.0	10.0	17.1	26.5	8.7	8.5	5.0	15.4	4.7
2000	3235.5	52.8	363.5	51.8	48.2	10.3	16.5	20.4	8.1	14.4	4.4	15.7	3.6
2001	3396.3	46.8	392.4	52.6	47.4	10.0	20.4	20.4	6.1	13.8	5.0	13.0	4.3
2002	3527.6	49.7	414.5	55.1	44.9	10.1	19.5	20.1	7.2	13.2	5.6	13.5	4.7
2003	3413.7	47.3	418.0	54.4	45.6	10.7	17.5	22.5	7.1	13.6	5.3	14.1	4.1
2004	3661.8	48.3	426.3	46.3	53.7	8.9	16.2	23.2	5.3	13.5	4.8	8.7	3.3

Source: National Agricultural Production Cost Survey (various years).

Table 9.D13. Yield, total cost, and major cost shares for field tomato production

Year	Yield	Output Per Man Day	Total Production Cost	Total Cost Share		Total Material Input Cost Share							
				Labor	Materials	Seeds	Organic Manure	Fertilizer Use	Plastic Sheet	Pesticides	Irrigation	Fence	Depreciation
	(kg/mu)	(kg)	(yuan/ton)	(percentage)		(percentage)							
1990	2841.2	84.7	397.2	37.4	62.6	18.0	11.6	8.2	26.8	4.8	2.3	11.4	6.4
1991	2504.7	68.7	331.1	35.2	64.8	14.9	16.1	9.9	21.9	4.6	3.3	13.4	5.0
1992	3342.3	83.4	426.6	36.6	63.4	12.0	15.1	12.4	21.3	7.8	2.2	10.1	4.4
1993	2804.8	91.0	427.7	41.9	58.1	13.9	15.7	9.9	19.7	5.3	3.1	9.2	5.2
1994	3062.0	85.7	387.5	49.3	50.7	12.8	13.6	13.8	15.3	7.0	2.8	10.4	5.8
1995	3001.3	78.6	448.2	46.3	53.7	13.0	15.4	19.2	9.8	7.9	2.7	7.9	5.1
1996	2955.2	83.6	507.8	54.4	45.6	13.1	15.4	19.9	9.3	6.7	3.1	13.6	4.1
1997	3700.9	83.7	505.5	54.7	45.3	8.5	15.5	19.1	9.0	9.0	3.8	10.8	5.1
1998	3320.4	63.5	398.7	54.4	45.6	9.4	17.6	24.1	5.5	10.4	3.1	18.0	4.8
1999	4036.6	65.5	445.3	53.6	46.4	8.6	19.1	22.5	9.7	9.1	3.4	15.7	5.8
2000	3828.4	65.6	452.6	52.5	47.5	9.2	15.1	24.0	8.8	13.3	5.6	13.7	4.1
2001	4236.5	65.2	497.7	57.7	42.3	8.9	15.6	22.5	6.6	15.5	5.7	13.8	4.7
2002	4086.7	57.4	457.7	58.4	41.6	10.8	16.6	21.6	6.3	12.9	5.2	15.2	5.2
2003	4078.3	54.3	466.8	56.3	43.7	12.2	16.3	24.1	6.2	13.8	4.0	13.8	3.9
2004	4425.4	56.6	482.2	47.7	52.3	10.1	16.3	20.6	5.8	12.6	4.4	6.0	3.0

Source: National Agricultural Production Cost Survey (various years).

Table 9.D14. Yield, total cost, and major cost shares for mandarin (Guanggan) production

Year	Yield	Output Per Man Day	Total Production Cost	Total Cost Share: Labor	Total Cost Share: Materials	Total Material Input Cost Share: Seeds	Organic Manure	Fertilizer Use	Plastic Sheet	Pesticides	Irrigation	Fence	Depreciation
	(kg/mu)	(kg)	(yuan/ton)	(percentage)		(percentage)							
1985	1463	13	427.0	39.5	60.5	0.0	33.1	18.5	0.0	17.7	1.2	0.0	7.0
1986	1155	12	362.1	37.9	62.1	0.0	30.7	17.1	0.0	18.5	1.3	0.0	9.5
1987	1569	16	455.8	37.6	62.4	0.0	37.4	14.2	0.0	20.9	0.9	0.0	6.2
1988	995	11	424.9	35.1	64.9	0.0	34.5	13.1	0.0	24.2	1.0	0.0	7.6
1989	1585	16	471.9	33.7	66.3	0.0	22.7	22.6	0.0	28.8	0.9	0.0	8.1
1990	-	-	-	-	-	-	-	-	-	-	-	-	-
1991	1379	16	410.4	34.7	65.3	0.0	14.1	33.3	6.4	20.0	0.9	0.4	9.2
1992	1492	19	400.7	37.1	62.9	0.0	8.6	36.5	2.3	22.3	1.5	0.6	12.2
1993	1280	21	346.9	34.5	65.5	1.5	13.2	33.1	3.4	28.0	1.8	0.4	3.9
1994	1165	22	281.8	45.8	54.2	0.6	17.5	36.9	1.2	19.3	2.3	0.2	4.6
1995	1136	22	316.6	41.2	58.8	0.4	12.4	33.0	0.0	19.5	1.7	0.4	8.5
1996	1131	23	372.8	43.7	56.3	2.7	12.0	36.0	0.1	17.6	1.4	0.5	5.3
1997	1540	29	358.1	47.3	52.7	0.1	19.3	38.8	0.1	19.4	1.6	0.1	2.0
1998	1292	22	386.1	51.9	48.1	2.0	16.1	40.2	3.3	29.6	1.0	0.2	3.0
1999	1731	38	340.7	48.5	51.5	1.6	14.0	43.8	0.3	30.2	1.8	0.1	4.1
2000	1383	32	338.5	47.2	52.8	1.3	21.4	37.0	1.3	28.7	2.0	0.0	4.4
2001	1699	39	374.8	45.3	54.7	0.6	19.0	32.7	0.6	26.4	1.9	0.0	8.5
2002	1601	26	570.6	46.0	54.0	0.3	21.0	36.8	0.6	26.4	1.1	0.0	8.8
2003	2387	34	702.8	41.2	58.8	0.2	12.7	42.9	0.2	24.7	2.0	0.0	8.5

Source: National Agricultural Production Cost Survey (various years).

Table 9.D15. Yield, total cost, and major cost shares for orange (Juzi) production

Year	Yield	Output Per Man Day	Total Production Cost	Total Cost Share: Labor	Total Cost Share: Materials	Total Material Input Cost Share: Seeds	Organic Manure	Fertilizer Use	Plastic Sheet	Pesticides	Irrigation	Fence	Depreciation
	(kg/mu)	(kg)	(yuan/ton)	(percentage)		(percentage)							
1985	1348	16	282.0	45.0	55.0	0.0	19.1	2.3	0.0	12.9	3.9	0.0	5.8
1986	-	-	-	-	-	-	-	-	-	-	-	-	-
1987	-	-	-	-	-	-	-	-	-	-	-	-	-
1988	946	12	307.8	41.2	58.8	0.0	40.4	4.8	0.0	20.8	0.8	0.0	8.6
1989	1902	19	420.7	38.0	62.0	0.0	13.2	30.4	0.0	23.8	1.0	0.0	7.6
1990	-	-	-	-	-	-	-	-	-	-	-	-	-
1991	1823	27	319.1	36.0	64.0	0.1	9.5	31.9	1.2	24.9	0.4	0.0	9.5
1992	1751	24	396.8	35.0	65.0	1.6	12.3	27.4	0.0	19.1	2.5	0.0	9.0
1993	1963	23	396.8	43.1	56.9	0.7	10.7	29.0	0.1	33.6	1.4	0.5	4.3
1994	1673	24	360.3	51.0	49.0	1.0	12.8	31.9	0.0	24.9	0.7	0.3	5.6
1995	2035	29	350.3	50.1	49.9	2.8	5.3	36.3	0.6	22.3	1.3	0.2	3.0
1996	1557	29	381.0	51.6	48.4	0.9	4.2	45.0	0.1	25.9	1.0	0.1	8.0
1997	1963	45	260.6	53.1	46.9	0.2	10.3	35.6	0.4	26.3	9.8	0.3	5.8
1998	1239	43	181.1	50.6	49.4	2.3	14.5	44.3	0.1	23.0	1.1	0.7	6.2
1999	1676	33	425.6	49.4	50.6	1.1	14.8	38.6	0.8	33.2	0.4	0.0	6.7
2000	1193	32	255.1	54.7	45.3	0.2	16.8	38.1	0.0	30.4	2.1	0.0	7.2
2001	1240	32	332.2	50.0	50.0	7.7	11.8	35.0	0.0	33.9	1.0	0.1	6.4
2002	1521	37	380.8	49.0	51.0	0.6	15.6	37.2	0.0	35.8	0.4	0.0	6.5
2003	1819	42	383.2	52.4	47.6	0.4	14.0	40.7	0.0	35.2	0.4	0.0	4.9

Source: National Agricultural Production Cost Survey (various years).

Table 9.D16. Yield, total cost, and major cost shares for backyard hog production

				Total Cost Share		Total Material Input Cost Share				
Year	Yield	Output Per Man Day	Total Production Cost	Labor	Materials	Baby Animal	Fine Feed	Fodder	Feed Process	Depreciation
	(kg/per animal)	(kg)	(yuan/ton)	(percentage)				(percentage)		
1985	112.3	5.3	190.9	16.9	83.1	25.0	44.6	18.9	5.9	1.4
1986	109.2	5.2	194.7	16.4	83.6	19.7	50.1	18.7	5.3	1.6
1987	106.7	4.9	218.5	19.5	80.5	20.5	48.0	20.6	5.2	1.8
1988	121.1	5.4	271.5	15.8	84.2	24.8	52.2	13.8	2.7	1.2
1989	112.5	6.0	247.9	12.4	87.6	24.8	52.2	13.8	1.8	1.2
1990	114.1	5.3	224.5	17.9	82.1	24.3	50.9	15.0	1.5	1.4
1991	112.5	6.2	224.4	16.7	83.3	26.8	51.7	13.1	1.2	1.4
1992	116.1	6.0	214.7	19.1	80.9	27.6	49.4	12.9	1.7	1.3
1993	109.2	6.4	202.9	16.5	83.5	25.6	53.3	11.3	1.5	1.4
1994	106.6	5.2	255.1	19.4	80.6	27.1	53.2	10.9	1.5	1.2
1995	107.0	6.1	267.6	15.7	84.3	25.3	57.8	9.6	1.1	1.0
1996	105.3	8.3	229.2	15.7	84.3	26.8	54.4	10.5	1.0	1.2
1997	109.2	6.4	246.7	20.0	80.0	33.1	47.1	10.9	1.8	1.1
1998	109.2	7.1	227.5	20.0	80.0	29.7	50.9	11.1	1.6	1.2
1999	105.1	7.7	182.8	22.6	77.4	23.3	55.0	12.1	1.5	1.6
2000	105.9	8.3	179.3	21.5	78.5	27.4	52.1	11.3	1.6	1.5
2001	107.6	8.3	187.2	22.5	77.5	28.2	52.4	10.4	1.4	1.8
2002	105.5	9.1	178.6	21.6	78.4	27.0	54.6	9.5	1.4	1.7
2003	106.7	8.8	192.1	21.6	78.4	26.5	56.2	9.3	1.5	1.3
2004	107.4	9.7	230.6	18.9	81.1	31.2	53.1	8.2	1.2	1.1

Source: National Agricultural Production Cost Survey (various years).

Table 9.D17. Yield, total cost, and major cost shares for specialized hog production

Year	Yield	Output Per Man Day	Total Production Cost	Total Cost Share		Total Material Input Cost Share				
				Labor	Materials	Baby Animal	Fine Feed	Fodder	Feed Process	Depreciation
	(kg/per animal)	(kg)	(yuan/ton)	(percentage)				(percentage)		
1985	95.7	9.5	143.4	11.2	88.8	27.1	54.1	9.8	2.6	1.8
1986	95.7	10.4	156.8	8.7	91.3	23.7	58.3	9.4	2.2	1.8
1987	94.8	12.0	175.9	9.8	90.2	24.3	56.3	9.9	1.8	2.2
1988	106.4	7.9	233.1	11.0	89.0	19.2	42.5	7.0	1.1	1.5
1989	105.7	10.0	195.3	9.1	90.9	23.8	50.3	7.7	0.9	1.7
1990	105.1	13.8	187.7	7.4	92.6	27.1	56.0	8.2	0.8	1.8
1991	102.1	20.1	194.4	5.4	94.6	31.4	50.8	7.2	0.6	1.7
1992	107.4	11.3	197.7	10.1	89.9	28.6	54.3	6.5	0.9	2.3
1993	101.4	11.9	178.5	9.4	90.6	25.6	56.7	6.6	1.1	2.6
1994	94.2	10.9	229.2	9.3	90.7	28.6	57.5	3.5	0.8	1.4
1995	103.7	13.1	247.1	7.3	92.7	25.8	59.5	6.6	0.7	1.4
1996	103.0	15.1	229.5	8.8	91.2	28.0	58.5	6.0	0.4	1.5
1997	104.8	16.4	237.3	8.5	91.5	36.9	50.3	5.1	0.8	1.5
1998	99.8	21.7	204.1	6.9	93.1	29.0	61.2	2.8	0.8	2.1
1999	96.1	22.2	162.6	8.8	91.2	25.1	62.5	4.7	0.8	1.9
2000	101.7	16.4	156.4	12.2	87.8	28.8	56.0	7.2	0.9	1.6
2001	-	-	-	-	-	-	-	-	-	-
2002	95.8	21.3	153.8	9.3	90.7	27.2	59.9	4.9	1.1	1.7
2003	98.9	16.8	170.3	11.8	88.2	26.7	61.5	4.7	1.1	1.5
2004	102.5	18.4	217.9	10.6	89.4	31.2	57.8	3.7	0.8	1.5

Source: National Agricultural Production Cost Survey (various years).

Table 9.D18. Yield, total cost, and major cost shares for state-collective hog production

Year	Yield	Output Per Man Day	Total Production Cost	Total Cost Share: Labor	Total Cost Share: Materials	Total Material Input Cost Share: Baby Animal	Fine Feed	Fodder	Feed Process	Depreciation
	(kg/per animal)	(kg)	(yuan/ton)	(percentage)				(percentage)		
1985	105.4	12.2	186.2	8.8	91.2	28.1	55.9	8.4	1.4	1.9
1986	107.7	14.6	217.1	6.6	93.4	31.1	56.1	5.3	1.0	1.7
1987	110.7	19.7	255.1	4.7	95.3	33.6	56.2	2.7	0.7	1.6
1988	113.0	26.2	247.9	3.7	96.3	34.8	56.3	1.4	0.5	1.5
1989	98.7	28.0	214.9	2.7	97.3	34.8	56.3	1.4	0.5	1.5
1990	99.7	29.5	201.7	3.2	96.8	30.4	58.5	1.9	0.5	1.7
1991	96.6	32.3	197.4	3.3	96.7	38.7	50.3	1.5	0.7	1.5
1992	103.8	16.6	214.6	6.3	93.7	28.1	59.3	2.1	0.3	2.3
1993	105.0	20.0	187.4	5.5	94.5	20.6	67.7	0.9	0.4	2.3
1994	95.3	16.0	228.7	7.5	92.5	23.2	63.2	3.3	0.5	1.8
1995	99.5	16.5	255.0	6.8	93.2	25.2	63.0	3.0	0.3	1.8
1996	98.0	16.9	253.6	7.7	92.3	24.1	64.1	0.6	0.5	2.2
1997	96.2	18.2	257.4	7.7	92.3	31.9	56.8	0.9	0.4	2.2
1998	94.4	23.4	212.0	6.7	93.3	29.7	59.4	2.6	0.7	2.5
1999	94.1	48.3	173.7	4.2	95.8	28.9	61.0	0.8	0.6	3.0
2000	97.6	28.6	165.6	7.0	93.0	26.9	61.4	3.0	0.8	2.6
2001	97.8	36.7	172.2	5.4	94.6	28.4	61.9	1.8	0.8	2.0
2002	96.2	42.3	162.6	5.6	94.4	28.1	62.6	1.3	0.7	2.2
2003	98.2	42.6	178.1	5.1	94.9	28.3	63.2	1.2	0.7	1.9
2004	100.3	44.4	220.4	5.7	94.3	31.8	59.0	1.4	0.7	1.6

Source: National Agricultural Production Cost Survey (various years).

Table 9.D19. Yield, total cost, and major cost shares for special household egg production

Year	Yield	Output Per Man Day	Total Production Cost	Total Cost Share: Labor	Total Cost Share: Materials	Total Material Input Cost Share: Baby Animal	Fine Feed	Fodder	Feed Process	Depreciation
	(kg/per animal)	(kg)	(yuan/ton)	(percentage)				(percentage)		
1991	1256	13.9	2641.1	5.8	94.2	15.6	71.8	0.3	1.0	3.2
1992	1022	12.0	2484.9	6.4	93.6	16.8	68.5	3.2	0.5	3.3
1993	1226	19.3	2534.1	4.9	95.1	13.9	73.0	0.9	0.6	3.2
1994	1260	23.2	2501.0	4.5	95.5	10.4	80.0	0.2	0.5	2.4
1995	1350	31.0	2730.9	3.3	96.7	11.4	80.4	0.2	0.3	1.8
1996	1357	31.5	2390.1	4.6	95.4	9.3	82.6	0.8	0.5	1.6
1997	1448	39.9	2570.4	3.9	96.1	13.6	76.3	0.4	0.6	1.8
1998	1535	42.0	2454.3	4.5	95.5	13.9	79.5	0.2	0.7	1.5
1999	1463	50.5	2014.3	4.3	95.7	13.6	79.2	0.8	0.7	1.2
2000	1487	58.1	1962.6	3.9	96.1	20.5	73.3	0.2	0.7	1.4
2001	1545	60.4	2015.0	4.0	96.0	21.1	72.9	0.2	0.6	1.5
2002	1570	68.6	2055.3	3.8	96.2	19.6	73.7	0.1	0.6	1.7
2003	1551	68.6	2195.0	3.7	96.3	17.8	75.9	0.1	0.2	1.6
2004	1604	54.5	2360.7	4.9	95.1	20.5	75.3	0.0	0.3	0.9

Source: National Agricultural Production Cost Survey (various years).

Table 9.D20. Yield, total cost, and major cost shares for state-collective egg production

Year	Yield	Output Per Man Day	Total Production Cost	Total Cost Share: Labor	Total Cost Share: Materials	Total Material Input Cost Share: Baby Animal	Fine Feed	Fodder	Feed Process	Depreciation
	(kg/per animal)	(kg)	(yuan/ton)	(percentage)				(percentage)		
1991	1222	35.3	2637.0	2.2	97.8	19.9	64.8	0.6	0.4	4.6
1992	1256	33.2	3016.5	2.3	97.7	17.6	65.5	2.3	0.4	3.8
1993	1232	35.9	2856.5	2.4	97.6	12.5	73.7	0.1	1.2	2.8
1994	1426	36.2	3008.9	3.6	96.4	14.2	72.7	0.0	0.1	2.8
1995	1425	52.4	3228.5	2.5	97.5	12.7	76.7	1.2	0.2	2.0
1996	1481	58.8	3185.0	2.5	97.5	12.2	77.6	0.6	0.8	2.3
1997	1445	56.8	2716.6	3.3	96.7	15.3	73.8	0.1	1.1	2.4
1998	1469	58.3	2727.4	3.3	96.7	18.0	73.5	0.3	0.6	2.0
1999	1495	57.3	2318.0	4.3	95.7	20.4	70.5	0.0	0.6	2.7
2000	1523	77.3	2263.9	3.2	96.8	16.2	73.5	0.3	0.6	3.1
2001	1541	89.0	2273.8	3.1	96.9	19.0	72.5	0.0	0.5	2.7
2002	1581	114.6	2213.1	2.4	97.6	17.9	74.0	0.1	0.7	2.7
2003	1611	109.6	2437.6	2.5	97.5	18.4	73.4	0.0	1.0	2.6
2004	1600	95.4	2492.4	3.7	96.3	19.6	75.3	0.0	0.3	1.4

Source: National Agricultural Production Cost Survey (various years).

Table 9.D21. Yield, total cost, and major cost shares for beef cattle production

Year	Yield	Output Per Man Day	Total Production Cost	Total Cost Share: Labor	Total Cost Share: Materials	Total Material Input Cost Share: Baby Animal	Fine Feed	Fodder	Feed Process	Depreciation
	(kg/per animal)	(kg)	(yuan/ton)	(percentage)				(percentage)		
1985	218	2.8	528.1	22.6	77.4	55.4	15.9	0.0	0.0	0.0
1986	244	3.4	515.1	19.6	80.4	60.7	16.2	0.0	0.0	0.0
1987	256	4.6	489.5	20.7	79.3	66.7	16.5	0.0	0.0	0.0
1988	285	4.1	486.2	28.4	71.6	65.5	16.5	0.0	0.0	0.0
1989	297	5.9	395.5	20.7	79.3	64.5	16.4	11.0	0.6	3.9
1990	320	5.7	422.9	23.5	76.5	59.9	14.0	17.8	0.8	2.8
1991	366	7.7	484.0	16.7	83.3	73.6	11.1	10.9	0.5	1.7
1992	268	5.2	432.0	22.2	77.8	66.0	15.1	12.4	0.8	2.1
1993	330	6.9	429.0	22.1	77.9	65.3	14.3	11.4	1.2	3.2
1994	359	6.2	635.7	18.0	82.0	63.7	17.1	10.8	1.1	1.9
1995	370	7.6	553.6	17.3	82.7	50.4	25.6	11.0	1.1	3.2
1996	317	7.8	536.7	16.8	83.2	56.6	21.4	12.4	1.3	2.5
1997	360	10.2	451.4	20.0	80.0	61.1	18.6	11.0	1.5	3.1
1998	336	12.0	444.8	16.9	83.1	60.0	18.7	13.2	1.2	3.7
1999	356	11.5	514.8	16.4	83.6	63.5	16.5	8.9	0.8	2.3
2000	339	18.1	448.2	11.7	88.3	66.2	16.2	12.3	0.8	1.9
2001	350	15.3	463.3	13.5	86.5	66.6	18.5	10.0	0.8	1.6
2002	351	14.1	524.4	14.1	85.9	69.1	17.2	8.8	0.8	1.9
2003	379	12.4	592.0	15.7	84.3	69.0	18.2	7.7	0.7	2.0
2004	350	15.2	538.1	17.0	83.0	63.2	21.3	9.8	0.8	1.7

Source: National Agricultural Production Cost Survey (various years).

Table 9.D22. Yield, total cost, and major cost shares for special household milk production

Year	Yield	Output Per Man Day	Total Production Cost	Total Cost Share		Total Material Input Cost Share				
				Labor	Materials	Baby Animal	Fine Feed	Fodder	Feed Process	Depreciation
	(kg/per animal)	(kg)	(yuan/ton)	(percentage)		(percentage)				
1992	4335	42.2	1621.6	11.8	88.2	11.0	50.1	22.3	0.7	4.0
1993	4234	32.4	1700.0	15.1	84.9	10.7	54.2	20.5	1.5	2.5
1994	5159	48.5	1842.9	12.2	87.8	9.6	61.1	17.7	0.4	3.1
1995	4998	41.1	2039.5	11.5	88.5	7.2	64.9	19.3	0.4	1.8
1996	4705	64.9	1852.8	10.2	89.8	8.7	66.7	17.6	0.4	1.7
1997	5071	60.4	2344.2	10.3	89.7	6.8	50.2	22.5	0.6	4.5
1998	4602	65.7	1794.1	11.6	88.4	9.9	57.6	18.9	0.6	2.9
1999	4421	67.1	1690.6	11.0	89.0	8.3	62.7	15.9	0.8	3.5
2000	5032	64.4	1802.7	12.8	87.2	11.6	56.6	16.5	0.7	5.7
2001	5121	78.4	1910.1	10.7	89.3	11.6	58.9	16.5	0.4	5.0
2002	5226	68.4	2131.0	11.4	88.6	10.9	58.7	16.7	0.5	4.6
2003	5342	88.4	2120.0	10.0	90.0	11.8	58.8	18.0	0.4	4.0
2004	5159	109.6	2438.7	9.5	90.5	9.9	49.1	15.2	0.6	17.9

Source: National Agricultural Production Cost Survey (various years).

Table 9.D23. Yield, total cost, and major cost shares for state-collective milk production

Year	Yield	Output Per Man Day	Total Production Cost	Total Cost Share		Total Material Input Cost Share				
				Labor	Materials	Baby Animal	Fine Feed	Fodder	Feed Process	Depreciation
	(kg/per animal)	(kg)	(yuan/ton)	(percentage)		(percentage)				
1992	4744	35.9	2204.3	11.2	88.8	7.9	40.0	22.8	0.5	5.8
1993	4736	49.0	2233.9	8.5	91.5	6.8	45.8	23.0	0.2	4.5
1994	4477	47.8	2333.2	10.1	89.9	4.6	50.8	20.2	0.1	4.8
1995	4757	60.9	2711.0	8.2	91.8	6.5	52.4	20.0	0.2	5.0
1996	5139	55.1	3002.9	9.9	90.1	5.1	47.9	22.1	0.6	4.4
1997	5155	63.8	2775.7	9.3	90.7	5.0	47.2	23.8	0.8	5.2
1998	5435	86.9	2790.4	7.7	92.3	4.6	45.1	25.3	0.4	6.4
1999	5889	89.9	2890.0	8.2	91.8	7.9	43.1	26.2	0.5	6.4
2000	6019	92.9	3041.7	7.4	92.6	8.3	41.6	24.0	0.4	7.4
2001	6000	93.5	3006.4	6.7	93.3	6.4	44.2	25.1	0.4	8.7
2002	6032	93.7	3035.6	8.0	92.0	7.4	41.4	24.7	0.8	10.4
2003	6091	97.6	3227.0	7.6	92.4	7.5	44.1	24.3	0.6	8.8
2004	5868	139.0	3107.4	9.9	90.1	7.9	45.8	23.0	0.5	13.6

Source: National Agricultural Production Cost Survey (various years).

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