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I. Introduction

With the change in political leadership in the late seventies, China entered a period of substantial economic reform. The effects of this reform have been particularly pronounced in agriculture, where the demand for and supply of farm products have changed significantly. In response to government policies to raise incomes and improve the availability of consumer goods, the demand for farm products has shifted away from staple grains and toward meat, dairy products, eggs, and other secondary foods. Production has been affected not only by the return to household farming under the "responsibility system," but also by the increased role of private economic activity and revisions in production targets, commercial quotas, and planned prices.¹ The production of almost every important agricultural product has shown significant growth; gains have been most rapid for commercial crops, oilseeds and animal products.

The central objective of this paper is to clarify recent trends in China's grain and meat economy and to analyze their implications for China's grain trade. Between 1978 and 1982 China's net imports of grain expanded steadily, although at a decreasing rate. With bumper harvests in 1983 and 1984, net grain imports have declined somewhat; however, current levels remain considerably higher than at any time in the history of the People's Republic prior to 1978.² Two key factors underlie this trade pattern. First, domestic grain demand has increased rapidly, due in large part to growth in the indirect demand for grain in the form of animal feed. In the future, feed demand and developments in the livestock sector will probably emerge as the dynamic force driving China's grain trade.

Second, China's agricultural trade continues to be greatly influenced by imbalances between domestic production and consumption. Despite rapid growth in production, important imbalances

The author is assistant professor, Food Research Institute, Stanford University. The author would like to thank W.P. Falcon, A.E. Peck, D. Bachman, and L. Perry for their helpful comments, and Stephen McGurk for his assistance in the preparation of this paper. Financial support from the Ralston-Purina Company and the Rockefeller Brothers Fund is gratefully acknowledged.

¹ For a more detailed discussion of China's agricultural reforms, see Sicular.

² In Chinese statistics grain includes certain types of potatoes (converted to grain at a ratio of 4:1 before 1963 and 5:1 thereafter), soybeans, and certain other legumes. Also, statistics on grain consumption and trade are usually in "trade grain" equivalents, that is, in terms of husked grain, while production is reported in terms of "original" or unhusked grain. Unless noted otherwise, the data on grain presented in this paper follow these Chinese statistical conventions.

persist, especially in animal and aquatic products (State Stat. Bureau 1985, p. II). Reports of shortages of lean pork, fish, and dairy and poultry products appear regularly in the Chinese press; furthermore, the seasonal and regional balance between supply and demand for these products is uneven.

To some extent such imbalances are unavoidable when an economy undergoes rapid change. China's problems, however, are made worse because the mechanisms that signal production to respond to demand do not work well. In China most agricultural output is guided not by market prices (either domestic or international), but by planned prices, cash and material incentive schemes, production targets, and commercial quotas controlled by the state. The government's signals to producers do not adequately communicate domestic nor international demand, and furthermore can often have unanticipated side effects. In this environment the government frequently relies on trade as a buffer to make up domestic shortfalls or to dispose of surpluses. Although in early 1985 China announced a new set of reforms which includes a proposal to gradually increase the role of market prices in the allocation of food products, it is likely that future trade patterns will continue to reflect domestic food imbalances and be relatively insensitive to international prices.

The remainder of this paper describes in more detail the causes and nature of recent trends in China's food consumption and production. Examination of these trends reveals the shifting balance between demand and supply in China, illustrates the way that changes in demand are (or are not) conveyed to producers, and sheds light on China's trade behavior. The final paragraphs discuss possible future trends and trade prospects.

II. Rising Consumption of Grain and Animal Products

During economic development consumption of most foodstuffs rises, but the rates of increase are uneven for different foods. In particular, growth in per capita consumption of meat, poultry, eggs, dairy products, and other secondary foods is quite rapid, while that of staple grains is slower or even negative. Recent consumption trends in China appear to follow this general pattern. (See Table I.) Between 1978 and 1983 per capita consumption of pork grew at an average annual rate of 10%, fresh eggs 8.2%, and grains only 3.5%. Consumption of poultry, ruminant meats, and dairy products also increased, although national average consumption is probably still no more than 2-3 kilograms per year. Growth in consumption has been most apparent in rural areas, where consumption levels have been rising at rates nearly double those in urban areas. From the perspective of nearly two prior decades of slow consumption growth, the present rates are almost startling. These new trends in consumption have altered China's grain trade behavior and will continue to influence future food and feed imports.

Perhaps the most important factor influencing recent consumption trends is growth in incomes. Rural survey data show nominal per capita incomes growing at an average annual rate of 18% between 1978/79 and 1983, while rates in urban areas have been about 11%. Real incomes have, of course, risen somewhat more slowly, probably between 10% and 15% a year in rural areas and about 7% a year in urban areas.³ These income statistics are problematic because it is unknown how representative the survey statistics are, and because of potential bias in price deflators. In addition, the income statistics do not reflect numerous invisible subsidies, especially for urban residents. Nevertheless, the data do indicate substantial increases in income, especially for the large rural population.

Aside from income, two other factors have influenced consumption levels: food availabilities and food prices. Since 1978 the physical availability of supplies to consumers has risen. In the past, state rationing combined with suppression of private trade held consumption below desired levels. Such quantity restrictions have been eased in recent years, contributing to growth in consumption. Consumption patterns have also been affected by changes in the level of food prices and in relative prices among foods. Prices paid by urban residents have gone up with increases in state-planned retail prices for nonstaple foods and more frequent food shopping outside state stores at higher prices.⁴ Furthermore, the relative prices of certain secondary foods such as pork have risen in comparison to grain. The rise in pork's relative price has apparently not, however, offset income and availability effects, as urban per capita pork consumption rose a total of 32% over this period while grain consumption rose only 8%.

³ State Stat. Bureau 1984, pp. 425, 435, 453. This source gives real increases in survey data incomes between 1978 and 1983 of 15% for rural and 7% for urban areas. Both of these numbers implicitly assume prices rose 17%, an increase identical to the rise in the cost of living index for workers and staff on p. 425. Use of this index understates price increases in rural areas. Since much of rural consumption is produced on the farm, rural consumer prices are to a large extent determined by farm prices. In China, farm prices have risen more rapidly than urban retail prices: farm procurement prices rose 25% to 50% during these years.

⁴ Consumers are willing to pay higher prices on free markets for several reasons: to purchase extra amounts of goods subject to ration restrictions in state stores; because the variety and quality of products sold in free markets are better than in most state stores; and because of locational convenience.

In rural areas much of the food consumed is produced self-sufficiently, and farm prices reflect the opportunity cost of retaining items for own consumption. Between 1978 and 1983 the state above-quota procurement price for grain rose 40-50%, and the hog procurement price per kilogram rose 27% (Ag. Tech. Econ. Handbook Ed. Board 1983, pp. 741-742; State Stat. Bureau 1984, p. 434; author interviews). Relative price changes have thus reinforced income effects: rural per capita pork consumption rose 43% between 1978 and 1983, and grain consumption rose 21%.

Increase in per capita consumption of grain, pork, and other foodstuffs has translated into rapid growth in total consumption. Total direct grain consumption rose 27%, or from 188 to 238 million tons, between 1978 and 1983, while total pork consumption rose 71%. Since the population rose only 6.5% over this period, by far the major part of the growth in total consumption was due to the other factors mentioned above: changes in income, availability, and prices. Moreover, most of the growth is attributable to increased consumption in rural areas.

III. Production Trends

The growth in per capita and total consumption discussed above carries implications for the balance between the demand and supply of grain and meat in China. This balance depends also on trends in output and the responsiveness of production to changing demand. Although overall production has grown at impressive rates--over 4% annually for grain and 7% for red meat--several issues deserve further comment. In particular, given the importance of meat consumption and the use of grain as feed in determining China's grain imports, special attention should be paid to the livestock sector.

With respect to grain production, high average annual growth masks considerable fluctuation in output since 1978. (See Table II.) These fluctuations in total output primarily reflect fluctuations in grain yields: sown area has, for the most part, been declining steadily at an annual rate of 1.2%. Output initially rose very rapidly at rates of 8 to 9% a year. After the peak year of 1979, however, grain production declined (although still remaining higher than in any year before 1979) and growth slowed temporarily. This slowdown had two causes. First, 1979 production was unusually large because of exceptional weather. Second, several policy changes in 1979, including a revision of state procurement prices and reforms of sown area production targets and commercial planning, encouraged diversification into cash crop production. In 1982 and 1983 grain output once again increased at rates exceeding 9% a year, slowing down to 5% in 1984. Improved incentives under the new household responsibility system are given credit for grain performance in these later years. It is worth noting that growth in recent years could be overstated. Pressures on households and local

governments to achieve rapid advances may have led inflated reports and hence some upward bias in official statistics (author interviews).

Pork production, which accounts for roughly 94% of all red meat output, has followed a somewhat different path than grain. Production of pork spurted ahead in 1979 and 1980, increasing 27% in 1979 alone and an additional 13% in 1980. Since 1980, annual increases have fluctuated between 4% and 7%. In the meantime, the year-end inventory of hogs declined. After an initial increase in 1978, the number of hogs fell substantially in 1980 and 1981, and then stabilized with no obvious trend up or down until 1984. Rising pork output between 1978 and 1983 therefore reflected not an expansion of the number of animals raised, but higher slaughter rates and heavier average weight at slaughter.

Hog inventories have been heavily influenced by government policies. In response to the initial liberalization in 1978 and favorable price revisions in 1979, both pork production and the stock of hogs expanded. The response was so great, in fact, that state commercial channels were unable to handle the quantity of animals farmers wished to sell. Farmers' difficulties in selling hogs were later compounded by unanticipated effects of decollectivization. As the role of collectives was reduced, certain incentives for raising hogs formerly provided by the collectives were eliminated. In particular, collectives previously assigned special plots of land for growing feed and allotted feedgrain and occasionally other items to households on the basis of the number of pigs raised. Households, moreover, earned work points by selling manure to the collectives. As the responsibility system spread, households found they were no longer eligible for extra land, received fewer benefits from manure collection, and were now forced to pay high market prices for feedgrain while receiving low state prices for the hogs they sold. The elimination of these collective-based incentives caused a rise in slaughter rates and a reduction in herd size. Reductions were particularly rapid in the stock of breeding animals.

The only region of China that maintained fairly steady growth in hog numbers during this period was Sichuan Province. Sichuan raises 17% of China's hogs and is by far the most important hog-producing province. Sichuan's impressive record is the result of aggressive, farsighted policies on the part of the provincial government. In order to offset hog-selling difficulties after the price increase in 1979, the province relaxed controls on private trade and slaughter of pigs, expanded state procurement, and temporarily lowered retail sales prices to move pork through state commercial channels; moreover, when the effects of decollectivization became evident, Sichuan implemented measures providing special incentives for hog raising. Land assignments to households now included a certain amount of land based on the number of hogs raised by the household, with larger plot

allocations for households raising breeding sows. Furthermore, the province began to award feedgrain for hog deliveries to the state; additional feedgrain awards and preferential access to loans and technical assistance were provided to households that specialized in hog raising ("How Sichuan's..."; Huang: "Speed Up the Development...").

Sichuan's policies attracted the attention of other provinces experiencing difficulties, and in April 1984 the central government issued a directive calling for nationwide implementation of similar measures ("State Council Directive..."). The slight increase in the national hog inventory observed in 1984 probably reflects the response to these new policies, and unless other recent measures have an offsetting effect,⁵ their positive impact should continue to be felt through the next few years.

IV. Issues in Animal Husbandry: Feedgrain Conversion and the Proportion of Lean to Fat Meat

The Chinese government has recognized two major technical problems in the production of pork. First, the efficiency with which feedgrain is converted into meat or other animal products remains low. Second, while consumer demand for lean pork has been growing rapidly and that for fat meat declining, the proportion of lean to fat meat in slaughtered hogs has not changed. Although the problems are referred to here as technical issues, to a large degree their causes are economic. That is, farmers typically have access to the relevant techniques but have not had sufficient economic incentive to employ them. Since both these issues influence how much feedgrain is required to satisfy the growing demand for meat, they have direct implications for China's grain imports.

In the past, western observers have often commented on the relatively low quantity of grain fed to animals in China. The average amount of feedgrain required to produce one kilogram of meat is, however, not significantly less than in other countries: Chinese sources indicate ratios of, on average, 4 kilograms grain per kilogram pork, 6 for ruminant meat, 2 to 2.5 for cow milk, 3.5 for eggs, and 2 for meat chicken (live weight).⁶ Livestock production in China is often thought to be grain

⁵ Such as the 1985 price reform, discussed below.

⁶ These numbers are taken directly or derived from data given by He, p. 29; Jin, p. 5; Li and Zhu, p. 35; Liu, p. 45; State Stat. Bureau 1984, p. 161; U.S.D.A., pp. 13, 18; Xu, pp. 11-12; and Zhang and Yang, p. 29. In the calculation of the grain:cow milk ratio, average annual milk output per dairy cow is estimated as roughly 2 to 3 tonnes. He, p. 29, gives 3 tonnes, and dividing total milk production by the number of dairy cows (State Stat. Bureau 1984, p. 161) gives 2 tonnes. This number is considerably lower than the figures of 4.5 to 5 tonnes given in some of the sources cited above, which imply a lower grain:cow milk ratio of roughly 1 to 1.3.

efficient despite these unremarkable grain to meat ratios because the quantity of grain fed to animals on a daily basis is low. The organization of production, where hogs and other animals are raised on a small-scale by farm households using labor-intensive methods, economizes on grain. Livestock are fed table scraps, millings and forage as substitutes for grain.

The apparent paradox between this grain-efficient daily regimen and China's high grain to meat ratios arises for two reasons. One is that mixed feeds carefully matched to animal nutrient needs are, by and large, unavailable. The modern feed industry is in an infant stage, and mixed feeds account for only 10% of animal feed. Expanded use of such mixed feeds, and improvement in the quality of available mixed feeds would raise the efficiency of grain conversion (He, p. 35; Xinhua). The high grain to meat ratios also reflect China's large stock of animals and low slaughter rates. Although the hog slaughter rate has risen in recent years (Table II), it is still only 70%, as compared to rates of over 120% in developed countries. The low slaughter rate occurs because hogs in China are often butchered at ages of one to two years, while ages of 6 months or less are common in developed countries. China's late slaughter age contributes to inefficient feedgrain conversion because meat gain per unit feed is higher earlier in the animal's life (Liu).

The late slaughter age for hogs also contributes to the second problem raised above, the large amount of fat in slaughtered hogs, since hogs gain proportionally more fat in later stages of development. Choice of hog breeds also contributes to the lean/fat imbalance: most hogs raised in China are traditional varieties that yield a high proportion of fat. For these reasons the percentage of lean meat on hogs at slaughter averages only about 40% (Hua, p. 203; Li and Zhu, p. 35; Liu, p. 48).

Some of the factors underlying inefficient grain conversion and the lean/fat imbalance are beyond the control of farmers. Nevertheless, noticeable improvement could be attained if farmers faced a different structure of economic incentives. One key factor causing inefficient feed conversion and high fat proportions has been the structure of state procurement prices. At least until 1985, procurement prices were fixed so that heavier hogs received a higher price per unit weight (Liu, p.44). This price structure encouraged farmers to raise hogs to older ages in order to achieve heavier weights, which in turn led to reduced feed conversion rates and low lean meat ratios. In addition, relative prices discouraged production of lean-meat hogs. Leaner hog varieties are generally marketed at lower weights, and thus receive a lower unit price from the state. Moreover, they require more expensive high-protein feed ingredients such as soybean cake and fish meal. Traditional hog varieties therefore have remained more profitable than the newer breeds, and farmers are accordingly unwilling to raise the new breeds despite government efforts at dissemination (Hua, pp. 203-204; Liu, p. 45).

Recent reforms in pricing and marketing policies could reduce these incentive problems, as well as help overcome persistent seasonal and regional imbalances in pork supply. In early 1985 the government announced its intention to gradually decontrol prices for fish, poultry, eggs, vegetables, and other perishable foods. The ultimate effects of this reform remain unclear, but if meat prices are eventually determined by market forces, the ratio of lean to fat meat supply could improve; moreover, farmers might have greater incentive to slaughter animals at earlier ages. Efficiency of feedgrain use, however, depends not only on meat prices but also on grain prices, which to a large extent will continue to be fixed by the state.⁷

V. Supply, Demand, and Foreign Trade

The production of animal products has not always matched domestic consumption trends. Although consumption has grown at a slightly faster rate than production in recent years, meat production has for the most part continued to exceed consumption by a margin of 6 to 7%. Exports of live hogs and frozen and canned pork have, in fact, shown some increase since 1978. Despite this overall balance, the mix of lean and fat pork cuts has become increasingly skewed and exports of lard have risen. Also, certain other animal products remain in short supply. Chinese reports frequently discuss shortages of milk and dairy products. Eggs, chicken, beef, and mutton scarcities are also mentioned, although it is unclear how widespread or persistent they have been. Imports of small quantities of powdered milk, beef and mutton have occasionally been used to ease these shortages. The Chinese have also shown some interest in the use of isolated soy protein to increase supplies of meat and dairy-type products.

In the case of grain, the balance between supply and demand depends not only on the direct demand for human consumption, but also on the indirect demand for grain in the form of feed. Between 1978 and 1983 grain production on average grew slightly faster than total direct consumption. Over the same period, however, indirect demand for grain as feed grew considerably faster than either direct grain consumption or production. Estimates of feedgrain use indicate average growth rates exceeding 10% per year between 1978 and 1983. This explosive growth in the use of grain as feed was responsible for grain deficits and rising grain imports in the late 1970s and early 1980s. Bumper crops in 1983 and 1984, however, have apparently cut the size of that deficit substantially (Table III), and furthermore have caused excess supply and overflowing warehouses in some areas. These developments prompted China's cutbacks on net grain imports in 1983 and 1984.

⁷ For a summary of these reforms, see Du.

Recent evidence suggests that the Chinese government still uses imports and exports as a buffer against domestic agricultural shortages and surpluses rather than structuring farm production to exploit China's international comparative advantage. In other words, food trade flows are to a large extent treated as residuals. Under these circumstances, imbalances caused by the absence of well-functioning mechanisms linking domestic supply to demand will continue to affect trade directly.

VI. Future Prospects

In the coming years China's food balance and position in world agricultural markets will largely be determined by the factors driving consumption and production. With respect to consumption, the most critical variable is per capita income. If real per capita income continues to grow at its recent rapid pace, demand for meat and the total of direct and indirect demands for grain will expand considerably. Even if real income growth slows down to its planned rate of 6% a year, by 1995 total pork demand could more than double and grain disappearance increase by 35% to 56% over 1983 levels. (See Table III.) In order to keep up, pork production would have to grow 6.6% and grain 2.5% to 3.8% annually. These growth rates are slightly lower than the rates of growth in recent years; nevertheless, they are quite high by world standards and would require either an extended period of dynamic agricultural growth or expanded imports.

The factors influencing future production trends are complex, and the fact that government policies will play a critical role makes the future somewhat unpredictable. Several important issues should, however, be kept in mind. First, the structure of farm prices appears to have a significant effect on certain aspects of production behavior, and until farm prices are allowed to reflect changing demand, reports of surpluses and shortages will continue. Second, the use of nonprice or quasi-price production incentives has been widespread, and these incentives have as great an effect on production in China as prices. The impact of feed land allotments and other incentive awards on hog inventories is an important example. Third, since much of future growth in grain disappearance will be caused by rapid increases in the consumption of livestock products, technical change promoting improved efficiency in grain use by the livestock sector could play an important role. Techniques for reducing feed requirements exist and are already being employed in some localities. Widespread dissemination of these techniques will only occur when incentives are redesigned to make them profitable to farmers.

The 1985 announcement of new policies, in particular the initiative to gradually remove controls on nonstaple food prices, indicates that Chinese leaders recognize the importance of communicating consumer wants to producers. If successfully implemented, these policies could

eliminate certain imbalances between demand and supply, or at least translate imbalances into price rationing rather than quantity rationing. Even with the announced price reforms imbalances may continue. The proposed price decontrol is only partial: planned prices will continue to be used for contract procurement, and state grain retail prices will remain unchanged. In addition, China's transport, storage, and processing industries are underdeveloped. Without substantial investment in these sectors, price decontrol can only have limited success in solving China's marketing problems, and trade will continue to reflect domestic imbalances.

In light of the above factors, China's trade in grain and other agricultural products is not easy to predict. Nevertheless, the key variables determining future trade flows can be understood. To the extent that trade is pulled by demand side factors, trends in personal incomes and the efficiency of grain use in the livestock sector will play a major role. On the production side, increases in grain output will rely largely on improved yields, and government policies will continue to influence the responsiveness of agriculture to both domestic and international demand trends. In my judgement, however, the factors causing dynamic growth in total grain demand are of a longer run nature than those underlying recent production growth. For this reason, China is unlikely to turn into a major grain exporter. Exports of particular grain varieties may emerge, but on balance net imports will continue.

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Table I

Per Capita Consumption of Grain and Pork in China
(kilograms)

Year	Grain: ^a			Pork:		
	National Average ^b	Urban ^c	Rural ^c	National Average ^b	Urban ^c	Rural ^c
1957	203.06	196.00	204.50	5.08	8.98	4.35
1978	195.46	205.50	193.50	7.67	13.70	6.37
1979	207.03	211.00	206.00	9.66	17.40	7.95
1980	213.81	214.00	214.00	11.16	18.98	9.39
1981	219.18	216.00	220.00	11.08	16.98	9.73
1982	225.46	217.50	227.50	11.76	17.56	10.41
1983	232.23	221.50	234.50	12.35	18.05	11.00
1984	230.00	na	na	12.50	na	na

^a Grain is in trade grain equivalents and includes potatoes (converted into grain equivalents using a ratio of 4:1 in 1957 and 5:1 in the other years listed), soybeans, and other legumes.

^b State Statistical Bureau 1981, p. 439; 1983, p. 507; 1984, pp. 477-8; and Beijing Review 28(16), April 22, 1985, p. 16.

^c Ministry of Commerce Economic Research Institute, p. 509. Figures for 1983 provided through author interviews. These are State Statistical Bureau data, not survey data.

Table II

China's Grain and Meat Production^a

GRAIN ^b				MEAT				
Year	Production (1,000 tonnes)	Sown Area (1,000 ha)	Yield (tonnes/ha)	Red Meat Production (1,000 tonnes)	of which: Pork (1,000 tonnes)	Year-End Hog Stock (1,000 head)	Hog Marketing/ Slaughter Rate	Meat per Head Hog Marketed/ Slaughtered (kg.)
1957	195050	133633	1.460	3985	na	145900	0.49	na
1977	282730	120400	2.348	7800	na	291780	0.58	na
1978	304770	120587	2.527	8563	7890	301290	0.53	49
1979	332120	119263	2.785	10624	10010	319710	0.59	53
1980	320560	117234	2.734	12054	11341	305430	0.65	57
1981	325020	114958	2.827	12609	11884	293700	0.66	61
1982	354500	113463	3.124	13508	12718	300780	0.67	63
1983	387280	114047	3.396	14021	13161	298540	0.69	64
1984	407120	na	na	15250	na	306090	0.71	na

^a Data are taken from State Statistical Bureau 1984, pp. 141, 159-161; State Statistical Bureau 1985, p. II; and U.S.D.A., p. 1

^b Grain production is measured in "original" units, and includes potatoes (converted into grain equivalents at a ratio of 4:1 in 1957 and 5:1 in the other years listed), soybeans and other legumes.

Table III

Grain Disappearance
(1,000 tonnes)

Year	Direct Human Consumption ^a	Red Meat Feed ^b	Dairy Feed ^c	Poultry Feed ^d	Seed., Ind., Waste ^e	Total Disappearance	Estimated Net Trade and Stock Charges	Actual ^f Net Trade
1978	226684	35598	1810	611	30477	295180	9590	-838
1979	243297	43724	2259	790	33212	323281	8839	-1290
1980	254266	49642	2395	1669	32056	340028	-19468	-1423
1981	264256	51886	2711	1902	32502	353257	-28237	-1633
1982	275825	55612	3407	2207	35450	372500	-18000	-1791
1983	286776	57804	3877	2521	38728	389706	-2426	-1382
1984	287095				40712			
1995 projections ^g	335000 to 412000	129000		61 to 71		525000 to 612000		

^a Calculated as the product of per capita consumption (Table I) and population (State Stat. Bur. 1984, p. 81), converted to original grain equivalents using a ratio of 0.83 units trade grain per unit original grain.

^b Assumes 4 kg. feed grain are required per kg. pork produced and 6 kg. per kg. ruminant meat produced. Figures through 1983 are based on meat output statistics (Table II); 1995 forecast is calculated using projected consumption figures (see note g).

^c Assumes 2 kg. grain are required to produce one kg. cow milk, and 0.5 kg. grain per kg. goat milk. Calculated using milk production statistics (State Stat. Bur. 1981, p. 164; 1984, p. 161).

^d Poultry production and consumption data are very incomplete. For lack of better data, this is estimated using household survey data on poultry meat consumption from State Statistical Bureau 1984, pp. 469, 474; 1983, p. 496; and 1982, p. 430.

(continued)

(For years where no urban survey data are published, urban per capita poultry meat consumption is assumed to be 2.5 times rural.) These per capita consumption levels are multiplied by rural and urban population sizes (State Stat. Bur. 1984, p. 81) to find total poultry meat consumption. Poultry feed use is estimated by assuming each kg. poultry meat consumed required 2 kg. feedgrain; eggs are assumed to be a joint product, requiring no extra feed.

^e Estimated to equal 10% of grain production (Table II).

^f State Stat. Bureau 1984, pp. 397, 412. Converted to original grain equivalents using a ratio of 0.83 units trade grain per unit original grain.

^g The high projection assumes income elasticities of 0.8 (1.1) for rural (urban) red meat consumption, and 0.3 for both rural and urban grain consumption. These income elasticities are estimated using a simple least-squares regression of the logs of per capita consumption for each item against the logs of urban and rural real income for the six years 1978-1983. Absence of adequate data prohibits inclusion of prices or ration levels and prevents use of a more satisfactory methodology. The projections also assume that real per capita incomes grow 6% a year in both urban and rural areas and population grows 1.3% annually, that rural population is equal to 76.5% of the total, and that the proportion of dairy feed, poultry feed, seed, industrial use grain, and waste in total disappearance remains unchanged at its 1983 level (11.6%). Projected 1995 per capita consumption is as follows: grain 286 kg. (urban 274 kg., rural 290 kg.), and pork 24 kg. (urban 39 kg., rural 19 kg.). Since Chinese sources discussing per capita grain consumption in the year 2000 (Wang; "Consumption Changes...") often project no increase (and even a decline) in per capita direct grain consumption, I have calculated a low-end projection based on the same assumptions except that per capita direct grain consumption remains at its 1983 level of 232.23 kg.