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RECONCILING CHINESE MEAT PRODUCTION AND CONSUMPTION DATA

With more than one-fifth of the world's population and only 7 percent of the world's arable land, China has the potential to become a major importer of land-intensive products such as feed grains. This development would be of particular interest in the United States and Canada, which between them have more than 17 percent of the world's arable land but only 5 percent of the world's population.[1] Per capita private consumption has been increasing at an average annual rate of 6.8 percent in China over the last decade. Given the low average income level in China, consumption of feed grain-intensive products, such as meat, dairy products, and alcohol, can be expected to increase with continued income growth. These factors take on greater significance given the fact that China has applied to join the World Trade Organization, and trade liberalization may soon occur. Imports of grain-intensive products should increase if China liberalizes its agricultural markets. The combination of these observations has stimulated interest in China's agricultural data, and the research and policy prescriptions based on this data are greatly impacted by the data's quality.

To see why this is important, consider the following examples. Official Chinese (and U.S.) data show that per capita pork consumption in China is about five kilograms per person greater than in the United States.[2] If this is true, then it might be argued that Chinese pork consumption is reaching a saturation level. Alternatively, one might argue that the enormous increase in per capita pork consumption seen in the past several years implies a large expenditure elasticity. Any attempt to use this expenditure elasticity in conjunction with strong growth in projected per capita income would imply a large percentage increase in consumption from a base that is already very high.

Because feed grain consumption is directly dependent on livestock production, it is also important to consider the implications of meeting a large increase in Chinese meat consumption through domestic production. For example, in the decade from 1986 to

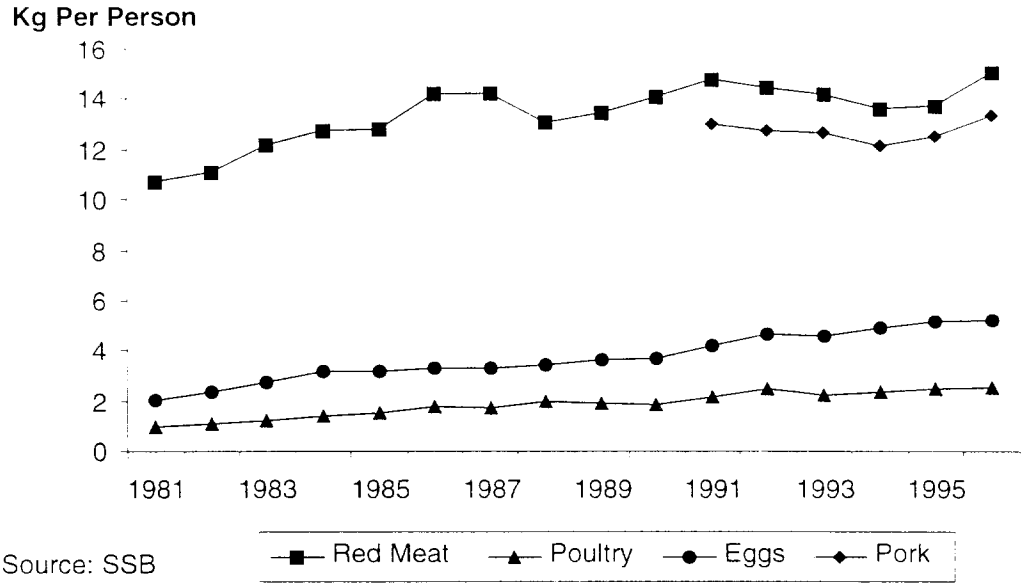
1996, Chinese production of red meat, poultry, and eggs increased by 186 percent. Over the same period, estimated grain consumption for feed rose a mere 87.7 percent. The existence of so much more additional meat production in the absence of a proportional increase in grain used for feed in the livestock sector implies a very favorable feed conversion efficiency. Projecting this marginal feed conversion efficiency of less than 1:1 forward could greatly underestimate future grain needs.

These apparent inconsistencies in the published statistics for China's livestock sector raise questions about the validity of the underlying data. The purpose of this paper is to illustrate the seriousness of this data problem and to provide a preliminary assessment of the magnitude of the discrepancies. We also consider the implications of using published statistics as the basis for research in China's livestock sector. In the next section we take a closer look at the survey and aggregate production data, pointing out stylized facts and potential sources for the apparent discrepancies. The stylized facts are used to construct two alternative data sets that may lie closer to actual production and consumption levels. In the third section the adjusted meat production statistics are used to construct estimates of Chinese feed use. The final section discusses the potential impact of inaccuracies in China's livestock statistics on projections of China's future meat and grain trade.

A Comparison of Survey and Aggregate Data

Since the 1950s, the State Statistical Bureau (SSB) in China has conducted surveys of the rural and urban economy, gathering information regarding production, income, employment, and expenditures. Initially, surveys were used to validate numbers reported by the collectives; however, with the advent of the Household Responsibility System (HRS), surveys have taken a more prominent role in the Chinese statistical system. The rural and urban household expenditure surveys conducted by the SSB are a primary source of information regarding the economic status of consumers in China.[3] Participating households record their expenditures for one year, and the aggregated results are reported annually by the SSB in the *China Statistical Yearbook*. Figure 1

shows the average consumption of red meat, poultry, and eggs in China over the last 15 years implied by aggregating urban and rural survey averages.[4]



Source: SSB

Figure 1: Average Surveyed Per Capita Consumption of Livestock Products

It is evident from Figure 1 that consumption of livestock products increased gradually until the early 1990s. The stagnation of meat consumption in the 1990s may have been the result of a number of factors. First, most government subsidies for staple foods were eliminated in urban areas by 1993, raising the cost of food relative to other purchases. Although price controls were reinstated in some cities as a consequence of rapid inflation in 1993 and 1994,[5] price subsidies reduced urban food expenditures by less than 5 percent in 1996.[6] Second, the sharp rise in the general price level in 1993 and 1994 slowed growth in the purchasing power of Chinese consumers and dampened meat consumption, particularly red meat consumption. From 1991 to 1995, red meat prices consistently rose more rapidly than the consumer price index and frequently more rapidly than chicken and egg prices. The responsiveness of Chinese consumers to rising red meat prices may explain the strong decline in red meat consumption shown in Figure 1 from 1991 to 1994. Third, rapid economic growth in the postreform era has increased the

disparity in incomes between China's rich and poor. Although average gross domestic product (GDP) per capita has continued to rise throughout the 1990s, there is evidence that a substantial segment of low-income urban residents in China experienced a decline in both nominal and real incomes in recent years.[7] Thus, consumption of livestock products may have slowed in response to weak income growth among consumers with high income elasticities for meat.

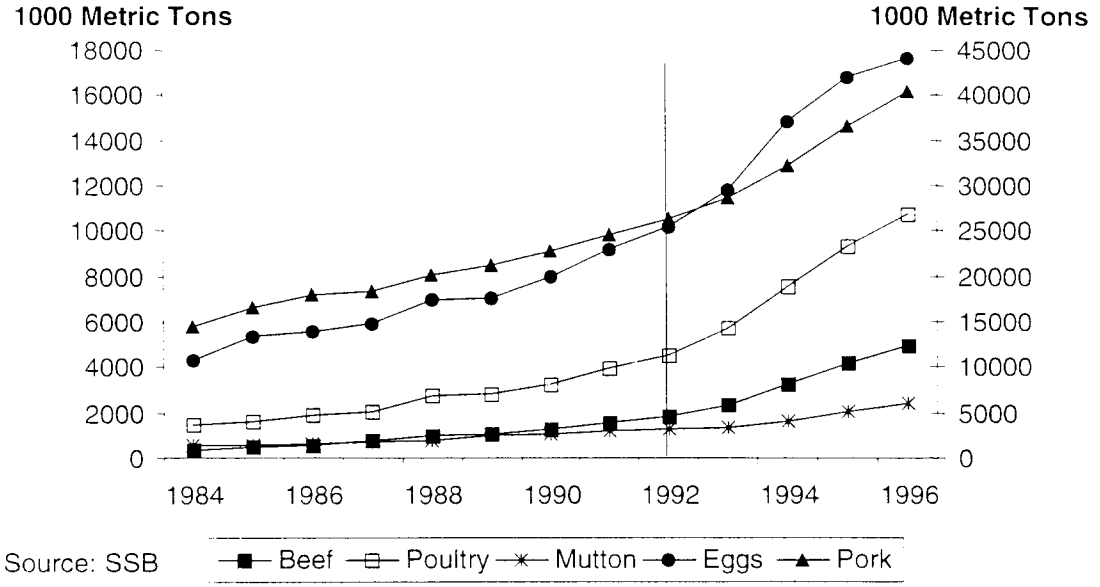


Figure 2: Chinese Livestock Product Output

In contrast to per capita consumption, livestock production exploded in the 1990s. Reading pork production from on units the right axis and production of other products from units on the left, Figure 2 shows that output of livestock products accelerated in the 1990s. Annual growth of livestock products averaged 13.5 percent from 1991 to 1996. The increase in aggregate output appears to be at odds with changes in production at the household level. Production statistics reported from the SSB's rural household survey indicate that household sales of livestock products increased an average of 3.6 percent annually over the 1991 to 1996 period. This growth included a 0.9 percent annual increase in the number of rural households. Moreover, household sales of hogs, cattle,

and sheep declined in 1994 and 1995, which is consistent with the reduction in red meat consumption discussed above.

Given the stagnation of consumption in the early 1990s and the consistent output growth observed in the aggregate production data, we would expect that either net exports or stocks would rise to absorb the excess meat production. Stock data is not available; however, China's net trade in most livestock products displayed a general decline in the first half of this decade. The result is that per capita disappearance implied by the production data diverges significantly from the reported survey data in the 1990s. We can calculate the average consumption per person implied by the official production statistics by subtracting net exports for each commodity from its total production. These differences are multiplied by the appropriate conversion factor[8] to obtain consumption in retail weight. Dividing retail consumption by total population yields the average per capita consumption of each product. Table 1 shows the ratio of these quantities relative to the comparable consumption figures from the survey data. We see that per capita disappearance is roughly equal to surveyed consumption for red meat and poultry until 1987. Although the ratio for eggs is greater than one, it too is relatively stable during this period. From 1988 onward, however, the two consumption series begin diverging rapidly, and by 1996 implied disappearance is at least twice as large as surveyed consumption for meats and eggs.

Table 1: Ratio of Implied Disappearance to Surveyed Per Capita Consumption

	Red Meat	Poultry	Eggs	Pork
1984	0.88	1.03	1.31	
1985	0.99	0.98	1.59	
1986	0.97	0.98	1.52	
1987	0.98	1.06	1.58	
1988	1.17	1.24	1.80	
1989	1.18	1.31	1.72	
1990	1.20	1.53	1.89	
1991	1.21	1.60	1.90	1.24
1992	1.34	1.58	1.87	1.36
1993	1.47	2.23	2.19	1.46
1994	1.75	2.74	2.51	1.69
1995	1.97	3.23	2.69	1.85
1996	1.99	3.62	2.77	1.89

One possible explanation for the discrepancy between the two series is the inability to account for changes in meat stocks. However, given the scarcity of refrigerated storage facilities, particularly in China's rural areas, it is unrealistic to assume that increases in stock holdings could account for the growing difference between the two series. A second possibility is that the surveyed consumption levels increasingly understate actual meat consumption because they do not adequately account for away-from-home consumption. In order for away-from-home consumption to explain the difference between the two series, Chinese consumers, on average, would have to consume almost as much meat away from home as they prepare in the home.

A third factor that is of growing importance is the increasing number of migrant workers living in urban areas. These people are classified as rural residents, but they live in urban areas and adopt, to some extent, the more protein-rich diets of urban dwellers. These migrant workers are not accounted for in the regular consumption surveys, contributing to the underreporting of meat consumption in survey statistics.[9] Finally, the carcass-to-retail conversion factors used in this analysis may not be an accurate reflection of the cutting practices in China; nevertheless, the retail cut yield would have to decline over time to match the survey-based consumption levels. Such a result runs counter to the trend of technological improvement in livestock genetics and feeding practices observed in China.[10]

In combination, the above inaccuracies could account for a substantial portion of the apparent discrepancy between the two data series; however, "human errors" are more likely the cause for bulk of the difference. The Chinese government has frequently used production to assess the achievements of regional bureaucrats and political leaders. Prior to the agricultural reforms in the early 1980s, the statistics reported by local officials could be validated by checking production team and collective farm records. After 1984, the household became the primary production unit, and validating the statistics reported by low-level bureaucrats involved surveying the households and corroborating these numbers with village and township records. Therefore, it became prohibitively expensive to maintain the level of accuracy achieved previously under the collective system.[11]

Furthermore, domestic meat markets were liberalized during the mid-1980s. As a consequence, records kept by government marketing agencies were no longer representative of actual meat marketing levels. Without adequate checks on the accuracy of their numbers, it became less costly for local bureaucrats to inflate production numbers in their district to increase their own likelihood of promotion.[12] As officials attempt to maintain year-on-year increases in production, the inflation introduced in the production statistics grows.

Constructing an Adjusted Data Set

Until better livestock production statistics are collected in China, applied researchers and policy analysts must either adjust their results to compensate for the overreporting or create a corrected data set to use in their analysis. Creation of a corrected data set relies on a strong set of assumptions regarding the source and nature of the errors, as well as the appropriate technical parameters used to make adjustments. In this paper we construct two corrected data series based on alternative assumption sets regarding technological change and away-from-home consumption.

In our baseline data set, we assume that the proportion of total livestock products consumed outside of the household remains constant. Likewise, the yield of retail cuts from cattle, swine, and sheep carcasses remains constant over time. We also assume that the reported trade statistics are accurate and that stock levels remain constant. Finally, the ratio of production-based per capita consumption to survey averages over the 1985–1987 period is assumed to capture the inaccuracies introduced by away-from-home consumption and stock changes; thus, this ratio is held constant near the 1985–1987 average.

We construct the alternative data set using the baseline assumptions regarding carcass yields, stocks, and trade; however, the underreporting caused by away-from-home consumption in urban areas is assumed to increase after 1988. Per capita meat consumption in urban households is cumulatively adjusted upwards by an additional 6 percent each year from 1988 to 1992. After 1992, the adjustment for away-from-home

consumption in urban areas is held constant at 30 percent above reported consumption. Away-from-home consumption by rural residents is not adjusted.

Currently, the extent to which meat consumption is underreported in the household survey data is unknown. The adjustment used in this study is inferred from a comparison of the household survey data with consumption levels calculated from a nutritional study measuring daily intake. The comparison reported by Zhong indicated that in 1992 urban meat consumption levels derived from the nutrition study were roughly 30 percent above the household survey averages. Meat consumption in rural areas was almost identical for both data sets. We hold the adjustment fixed at 30 percent after 1992 because the factors responsible for the stagnation of meat consumption after 1991 are also likely to have inhibited the growth of away-from-home consumption.

Given these assumptions, we begin constructing the adjusted production data sets by calculating total consumption from the SSB's survey data. Per capita average consumption of each livestock product is multiplied by rural and urban population figures. Total consumption is then multiplied by the ratio of production-based per capita consumption to surveyed consumption during 1985–1987. The ratios used are 1.0 for red meat and poultry and 1.56 for eggs. The resulting product is converted to carcass equivalent and added to net exports to obtain the final production total.

Pork production from 1991 onward is derived using reported urban and rural consumption from the household survey.[13] Before 1991, pork consumption in rural areas was not reported. Consequently, the rural pork production from 1984 to 1987 is derived as the residual red meat consumption in rural areas once beef and mutton consumption is subtracted. Rural beef and mutton consumption is derived from the implied disappearance less urban consumption. This method invokes our assumption that production statistics are reasonably accurate during these years. From 1988 to 1990, rural pork consumption is estimated using a linear function of total red meat consumption. The share of beef production in total beef and mutton production is specified as growing from 0.36 in 1985 to 0.62 in 1996 along a linear trend. The starting share is calculated from the implied disappearance levels in retail weight. The slope of

the trend line is chosen so that the share reaches 0.6 in 1995, beef's share of reported beef and mutton consumption by urban residents in that year. We are assuming, therefore, that rural beef consumption has grown relative to mutton consumption in the same manner as in urban areas. Lamb and mutton production is calculated as the residual red meat produced once pork and beef are subtracted from the total.

Table 2 displays the SSB and the adjusted data sets. As one would expect, the production levels in the adjusted sets are drastically lower than the published data, particularly for pork and poultry. In 1996, pork production in the adjusted data sets is roughly 40 percent below the official statistics, and poultry production is between 70 and 75 percent lower. Pork production in the baseline data set grows at an annual rate of 2.4 percent from 1986 to 1996. Over the same period, beef, poultry, mutton, and egg production, respectively, increase 12.6, 3.2, 3.4, and 5.8 percent annually. Production growth rates in the alternative set are 1 to 2 percent higher than the baseline. These rates are 7 to 15 percentage points below the growth recorded in the official statistics.

Thus far we have been primarily concerned with livestock product output and have paid no attention to animal numbers. But China's animal inventory statistics are also suspected to contain a significant degree of error. Unlike the production statistics, inventory numbers may be inflated largely as a result of faulty accounting practices. When animals are sold from one province to another, they are frequently counted in the inventory data for both provinces. Double counting has made it difficult, if not impossible, to substantiate changes in animal births and slaughter from one year to the next.[14]

We can use the production data sets developed in this study to infer the animal inventories and slaughter numbers necessary to support meat output at the levels shown in Table 2. Slaughter numbers are calculated by dividing production by average slaughter weight and dressed yield. The average slaughter weight and dressed yield used for swine are 103.5 kg/head and 65.8 percent.[15] Based on information obtained from Dr. Hu Dinghuan, a livestock specialist with the Chinese Academy of Agricultural Sciences, the average slaughter weight used for cattle is 300 kg/head, and the carcass yield used is

Table 2: SSB and Adjusted Production Data Sets

	SSB Production Data					Baseline Production Data					Alternative Production Data				
	Beef	Pork	Poultry	Mutton	Eggs	Beef	Pork	Poultry	Mutton	Eggs	Beef	Pork	Poultry	Mutton	Eggs
	1,000 Metric Tons					1,000 Metric Tons					1,000 Metric Tons				
1985	467	16,547	1,602	593	5,347	467	16,677	1,638	593	5,239	467	16,677	1,638	593	5,239
1986	589	17,960	1,879	622	5,550	561	18,646	1,923	645	5,675	561	18,646	1,923	645	5,675
1987	792	18,349	2,194	719	5,902	731	18,752	1,927	771	5,836	731	18,752	1,927	771	5,836
1988	958	20,176	2,744	802	6,955	821	17,247	2,232	777	6,027	850	17,623	2,301	807	6,027
1989	1,072	21,228	2,820	962	7,198	922	17,988	2,176	803	6,379	983	18,790	2,304	860	6,379
1990	1,256	22,811	3,229	1,068	7,946	1,257	18,885	2,123	942	6,576	1,375	20,180	2,307	1,042	6,576
1991	1,535	24,523	3,950	1,180	9,220	1,642	19,750	2,465	1,115	7,579	1,812	21,535	2,786	1,248	7,579
1992	1,803	26,353	4,542	1,250	10,199	1,520	19,426	2,875	1,042	8,536	1,780	21,645	3,365	1,229	8,536
1993	2,336	28,544	5,736	1,373	11,798	1,515	19,573	2,533	908	8,412	1,766	21,819	2,901	1,074	8,412
1994	3,270	32,048	7,552	1,609	14,790	1,409	19,045	2,700	811	9,195	1,657	21,318	3,122	960	9,195
1995	4,154	36,484	9,347	2,015	16,767	1,288	19,863	2,735	664	9,721	1,501	22,274	3,163	782	9,721
1996	4,946	40,375	10,746	2,400	17,640	1,837	21,453	2,645	898	9,965	2,136	23,841	3,074	1,050	9,965

57 percent. These numbers are comparable to those reported by Simpson for Chinese swine and cattle production in 1990.[16] An average slaughter weight of 30 kg/head for sheep is derived from a recent survey of specialized household producers,[17] and the dressed yield of 50 percent is the 1980–1990 average for sheep and lambs in the United States.[18]

Animal inventories are calculated using two different assumptions regarding the slaughter-to-beginning inventory ratio. The baseline assumes no technological change from 1987 onward; thus, slaughter rates are held constant at the levels indicated by the published production data.[19] The alternative scenario assumes that the slaughter rate increases over time as the industry evolves from predominately backyard to specialized household and commercial production. Based on observed trends in the published data for the years prior to 1987, slaughter rates in the alternative data set are increased 3.0, 9.0, and 5.5 percent annually for swine, cattle, and sheep. By 1996, slaughter rates are still significantly below levels observed in the United States or other countries using modern production technology.

Table 3 displays the official and calculated animal inventories for the 1990s. If we assume that the errors in the animal inventory statistics are largely independent of the errors in production reporting, then the results in Table 3 suggest that double counting caused reported swine slaughter and inventory to be overestimated by 50–67 percent and 8–35 percent, respectively. The discrepancies for sheep and goat inventories are much larger. It is likely that those officials responsible for reporting livestock inventory and slaughter numbers have attempted, at least in part, to adjust inventories to reported production. Consequently, the upward bias observed may not be caused entirely by double counting. Nevertheless, the results in Table 3 indicate that double counting may be a larger problem in the pastoral provinces where the majority of China's sheep and cattle are raised.

Table 3: Animal Inventories

	SSB		Baseline		Alternative	
	Ending Inventory	Total Slaughter	Ending Inventory	Total Slaughter	Ending Inventory	Total Slaughter
Swine			1,000 Head			
1990	362,410	309,910	373,504	277,298	361,844	296,319
1991	369,650	328,970	367,373	290,005	353,105	316,213
1992	384,210	351,700	370,153	285,245	345,577	317,834
1993	393,000	378,240	360,174	287,404	327,798	320,390
1994	414,620	421,030	375,637	279,655	332,531	313,024
1995	441,690	480,510	405,706	291,661	345,553	327,069
1996	457,130	526,510	422,748	315,008	338,353	350,074
Cattle						
1990	102,884	10,883	91,019	7,351	76,898	8,042
1991	104,592	13,039	118,911	9,603	92,931	10,594
1992	107,840	15,192	110,059	8,888	83,750	10,407
1993	113,160	19,037	109,688	8,858	76,270	10,330
1994	123,318	25,127	102,016	8,239	65,623	9,688
1995	132,060	30,497	93,278	7,533	54,556	8,779
1996	140,010	37,015	133,007	10,742	71,232	12,494
Sheep & Goats						
1990	210,021	89,314	187,041	62,778	176,333	69,496
1991	206,210	98,165	221,528	74,352	200,080	83,192
1992	207,329	102,667	207,004	69,478	186,745	81,918
1993	217,314	111,595	180,437	60,561	154,781	71,631
1994	240,528	131,249	160,992	54,035	131,148	64,032
1995	276,857	165,373	131,900	44,270	101,233	52,144
1996	304,150	190,000	178,319	59,850	128,775	69,979

Implications of Adjusted Data for Feed Consumption and Output Projections

Because China is essentially self-sufficient in livestock production, the greatest value of establishing a corrected data set is its impact on estimates of China's current and future feed use. In response to concerns about China's ability to meet its future food and feed grain needs, an extraordinary amount of resources has been invested in recent years on research to determine the future path of China's grain trade. Current projections of China's net grain imports in 2010 range from 22 million metric tons (mmt) to 155 mmt; however, most estimates fall in the 30–40 mmt range.[20] These estimates depend upon published livestock statistics, and as a result, even moderate growth in meat production can generate huge increases in feed demand and grain imports.

In this section we use two sets of feed coefficients to generate feed demands consistent with published and adjusted livestock production data. We compare these numbers to published estimates of feed use in China and draw inferences about the accuracy of these estimates. Finally, we discuss the implications of adjusting China's livestock production for projections of feed use and imports.

As a consequence of China's relative grain scarcity, most livestock producers do not feed as much cereal grain to animals as is common in modern intensive operations. Farmers often supplement their animals' diets with whatever feedstuff is readily available. The great diversity of feeding practices among Chinese farmers has given rise to a wide range of feed efficiency estimates. Moreover, the tendency of Chinese producers to use large quantities of nontraditional feeds, such as water hyacinth and household waste, makes the task of appraising cereal grain demand that much more difficult.

In order to span the range of likely feed consumption levels, we use the two sets of feed coefficients shown in Table 4 to derive our estimates of feed use. The low feed use scenario coefficients were obtained from a recent feed study conducted by the University of Arkansas and the Research Center for Rural Economy in China's Ministry of Agriculture.[21] The high feed use coefficients are unpublished estimates calculated by

Table 4: Feed Conversion and Industry Structure Parameters

	Low Feed Use Scenario	High Feed Use Scenario	Production Share in 1991	Production Share in 1996
	Kg Grain/Kg Live Weight		Percent	
Backyard Producers				
Beef		2.00		
Pork	2.08	2.40	88.5	81.0
Poultry		1.44	64.0	59.0
Mutton		1.50		
Eggs		2.03	69.0	64.0
Commercial and Specialized Household Producers				
Beef	1.97			
Pork	2.06	3.25	11.5	19.0
Poultry	1.64	1.95	36.0	41.0
Mutton	0.80			
Eggs	1.96	2.47	31.0	36.0

researchers in the Chinese Academy of Agricultural Sciences. The use of grain feeds is generally more prevalent in specialized household operations and also for pork, poultry, and egg production. We attempt to account for the rapid change in China's livestock industry structure by using different feed coefficients for the different types of producers. Furthermore, we assume that the structure of livestock production in China has changed according to a linear trend with the start and end points shown in Table 4. Where coefficients were not available for either backyard production or production share, the specialized household or backyard feed conversion ratio was assumed to be valid for both types of production. Finally, the feed demand estimates were increased by 10 percent to account for grain used in the dairy and aquaculture industries.

Estimated feed demands are given in Table 5. Figures from two published sources of feed use in China are given in the first two columns of Table 5. United States Department of Agriculture (USDA) estimates were taken from the Production, Supply, & Distribution (PS&D) database maintained monthly by the Foreign Agricultural Service.[22] These figures include cereal grains only but do not contain estimates of rice fed. The second set of feed consumption estimates was obtained from a study conducted by the East-West consulting firm.[23] The East-West numbers are also limited to cereal feeds; however, they do include rice consumed for feed. Neither source provides clear documentation of how their estimates are derived.

Table 5: Feed Use Estimates

	Published Estimates		Using SSB Production		Using Baseline Production		Using Alternative Production	
	USDA	East-West	Low	High	Low	High	Low	High
	1,000 Metric Tons							
1991	64,571	90,758	124,067	145,397	100,325	117,841	108,285	127,275
1992	67,960	94,869	135,292	158,925	101,701	119,567	112,056	131,843
1993	73,371	101,189	151,742	178,285	100,813	119,048	110,885	131,082
1994	84,306	121,882	179,198	210,402	100,499	118,849	110,755	131,115
1995	89,224	139,010	207,633	244,335	103,868	123,252	114,434	135,940
1996	97,050	146,969	230,424	272,161	112,259	133,910	123,136	147,003

Comparing the SSB, baseline, and alternative feed demands with the published estimates shows that the SSB feed consumption numbers are 37 to 57 percent above the East-West estimates, even assuming fairly low grain feed inputs per kilogram of meat. Both the high and low estimates for the baseline and alternative scenarios fall within the bounds of the published estimates, suggesting that these estimates of feed consumption are consistent with likely livestock production trends in China, despite the potential bias created by the overstated production statistics.

Researchers projecting China's future grain imports frequently start from a published estimate of feed consumption such as those estimates listed in Table 5. However, if feed demand projections are based on future livestock production generated from official production statistics, the analyst must adjust the feed conversion ratios downward by 30 to 60 percent to match feed consumption in the base year. If we assume that this downward adjustment remains constant in the projection period, estimates of China's future feed demand may not be radically different when the lower production numbers in this study are used.

For example, suppose two sets of feed demand projections are calculated starting from the same base quantity but using different livestock production estimates. If livestock production changes by 10 percent in both scenarios, changes in feed demand will be the same in both projections. Thus, feed demand projections will be most affected by differences in the estimated supply response as a result of correcting the production statistics. It is likely that new estimates of supply elasticities will be significantly lower than estimates from current studies using published data. Changing these parameters in policy and projection models for China could greatly alter the projected growth path for meat production and feed consumption.

Conclusions

Most econometric studies of Chinese consumer demand use pooled cross-sectional and time series data from surveys administered annually by China's State Statistical Bureau. Estimates of production functions, however, rely on aggregate data reported up from township and county officials. Some of these local leaders may have inflated the

production numbers they reported to further their own interests. This human error in Chinese livestock statistics may be extremely large, possibly doubling the reported projection figures for 1996.

In this paper we constructed two alternative data sets for China's livestock sector using the information available at this time. Our analysis indicates that official meat production statistics may overreport pork production in China by as much as 40 percent and poultry production by up to 75 percent. Similarly, average annual production growth for beef, pork, and poultry is at least 7 percentage points below those numbers implied by published data sources. Using the production data computed in this paper, we also find that animal inventory and slaughter numbers may be grossly overstated.

Overreporting of livestock production and inventories has important implications for estimates of China's current and future feed demand. Our revised meat production statistics generate feed demands that lie within the bounds of published estimates of current feed use, lending some credibility to the published feed use data. More importantly, the feed demand estimates derived from the production data constructed in this study are consistent with existing estimates of feed conversion ratios. Thus, China's livestock industry appears to be much more grain intensive than published production and inventory statistics would indicate. As China continues to develop economically, the demand for livestock products could rise rapidly, significantly increasing the need for greater domestic feed production and grain imports. As policymakers prepare for the future, they should be aware that an error in China's agricultural data of the potential magnitude described in this paper is capable of skewing agricultural trade policies in many nations by biasing the projected production and trade estimates that influence their policymaking choices.

ENDNOTES

1. Food and Agriculture Organization (FAO), FAOSTAT Statistics Database, (On-line database, http://apps.fao.org).

2. FAO pork production data for China is about the same as the official U.S. estimate, implying that the FAO also agrees with the U.S. per capita consumption number derived from the production estimate.

3. Ziping Wu, "An Analysis of Supply Response of Grain Crops in China, with Specific Emphasis on Impact of Rural Reforms in 1980s" (Ph.D. dissertation, The Queen's University of Belfast, Belfast, Ireland, 1995).

4. SSB data displayed in figures and tables were obtained from various volumes of the following two primary sources. China State Statistical Bureau, Zhongguo Tongji Nianjian (China Statistical Yearbook) (Beijing: State Statistical Bureau). China State Statistical Bureau, Zhongguo Nongcun Tongji Nianjian (China Rural Statistics Yearbook) (Beijing: State Statistical Bureau).

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