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World Food Price Increase
Where Does the Buck Stop?

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Abstract

This paper tries to ascertain the crop specific causes for the recent global food price rise. This is an effort to not only identify specific causes for each crop but also to determine their geographic origins. The reasons for price rise vary from crop to crop – for wheat these were the crop failures in United States, Australia and Canada in various years and the slow growth in productivity, which led to production falling behind consumption at the beginning of the twenty first century, abetted by the rapid population growth and increase in per capita consumption in the African continent; for rice population growth in India was an abetting factor but it was the dramatic rice crop failure in the same country in 2002 which drove stocks to new lows that was the precipitating factor; for corn the gap between consumption and production at the beginning of this century and massive increases in per capita overall consumption of corn in the United States attributable to biofuel production were the main reasons; in the case of soybean the reasons were the massive increase in Chinese demand for soybean oil and soybean meal (the latter resulting from a rapid increase in demand for meat) attributable to that country's rapid economic development and changing tastes.

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Introduction

A continuous increase in food prices over the last couple of years has debilitated the world economy, plunging millions into hunger and starvation and prompting social disturbances and food riots in many countries. Academic or policy oriented studies have come up with a menu of factors which have probably contributed to this state of affairs – increases in demand prompted by economic and population growth, supply decreases caused by climate change and more temporary negative supply shocks in the form of droughts in different countries of the world, the fossil fuel crisis and the resulting resort to land intensive biofuels, etc.[1]

Whereas the menu looks comprehensive neither the relative importance of the various listed factors nor their geographic origin has been determined through rigorous or convincing studies. From here on government spokesmen have taken over to absolve their own countries of any blame and shift the burden of guilt to other countries. An unproductive blame game is in full swing instead of the meeting of minds needed to sort out the world's food problems. This paper makes an effort to identify crop specific causes of price rise as well as their geographic origin.

It must be pointed out here that price data are deceptive. Nominal price increases over time are nothing unexpected i.e. as incomes rise one would expect prices to rise too as a result of increasing purchasing power. It is only when the increase in prices of food items exceeds the rate of increase of the general price level significantly or when the rate of inflation itself is unexpectedly large is there any reason to be worried about the price rise. Thus, a general phenomenon of nominal price rise across a large number of agricultural commodities might mask the incidence of a malaise that might be specific to just a few crops. Thus, it is important to check whether the real price i.e. the nominal or current dollar price adjusted by the price index has actually risen sharply.

Theoretical economics is always based on assumptions. Before using it as a tool or lens to examine reality it is essential to verify the applicability or validity of these assumptions. For example, much of the debate about the world food price surge has assumed that this problem is an outcome of shortages. However there are other factors which can result in a price increase without there being any food shortage – export bans, speculation and hoarding by private companies, governments building up buffer stocks etc. There is also the possibility that the story of price rise is different across crops i.e. for some crops the reason indeed may be a shortage whereas for others it might be any of the other outlined factors. Therefore, an important hypothesis that should be tested for any given crop exhibiting a significant real price rise is whether this rise is due to scarcity.

If the above hypothesis is indeed true for a given crop then we can attribute the global shortage causing the price surge to the agricultural supply and demand situations in different countries. The technique used in this paper is to pin down the source of such shortage by identifying the major exporters and consumers of each crop, then focus on those which have exhibited a sharp decline/increase in exports/consumption and in the end try to find out the reason for such decline/increase.

[1] For a comprehensive review of these causes and their theoretical underpinnings look at CUTS briefing paper, "The Saga of Rising Food Prices," http://www.cuts-citee.org/pdf/BP08-DI-5.pdf.

Due to the lack of availability of sufficient data, we have restricted our study to 4 major crops – wheat, rice, soybean and corn. The period of analysis is 2000-07 for which there is complete data. The data used for this paper is based on a compilation by Shoichi Ito[2] from diverse sources such as the U.S. Bureau of Census (International Database) and US Department of Agriculture (PS&D Online).

[2] Shoichi Ito is Professor, Department of Agricultural and Resource Economics, Faculty of Agriculture, Kyushu University. The data is available at http://worldfood.apionet.or.jp/index-e.html (accessed during 15th to 24th June, 2008).

Immediate Causes of the World Food Price Crisis

In the case of wheat the real price rise took place from 2006 onwards. The ending stocks in 2006 were 21mn tonnes lower than that in 2005. A reduction in cropped area in the U.S coupled with a bad crop was responsible for exports from that country declining by 3mn tonnes from the 2005 level (see Table A1 in the appendix). In Australia there was a major crop failure and exports declined by 7.5mn tonnes (Table A1). In all, the total amount traded in the world market declined by around 6mn tonnes or 5.2 percent. Wheat being an essential commodity, the real price in terms of 2008 dollars rose from $168.35 per tonne to $205.18. 2007 saw no pick up in exports and stocks declined further. The reasons were a second poor crop in Australia, leading to an export decline from that country by a further 1 million tonnes and a level of exports which was around 9mn tonnes less than its usual levels; a crop failure in Canada accompanied by a decline in harvested area led to a decrease in its exports by 4.5mn tonnes. Even a production revival in the United States and a massive increase its exports could not shore up world trade. Thus, prices increased by around 25 percent from $205.18 to $265.67.

Table 1: Wheat – World Production, Trade and Stocks

Year	Nominal price($/Tone)	Real price ($/Tonne) in terms of 2008 dollars	Ending Stocks (million tonnes)	Production (million tonnes)	Exports million tonnes)	Consumption (million tonnes)
2001	126.80	154.56	203.36	583.1	105.7	587.8
2002	148.53	178.20	166.9	568.7	105.6	604.2
2003	146.14	171.39	132.09	553.8	108.6	580.8
2004	156.88	179.56	150.87	625.7	110.8	605.5
2005	152.44	168.35	147.02	620.9	116.3	618.5
2006	191.72	205.18	126.63	596.0	110.7	618.1
2007	255.20	265.67	115.1	610.8	110.7	619.7

Source: http://worldfood.apionet.or.jp/

In the case of rice the story is similar but slightly more complicated. 2002 saw a sudden dip in world production levels by around 20mn tonnes or about 5 percent. The main reason for this was a reduction in production by around 22mn tonnes in India (see Table A2 in appendix) – a major crop failure saw the area harvested and yield decline by 10 percent each. World rice stocks in the world reached new lows at 81mn tonnes by 2003; the panic that this probably caused led to a rise in rice prices. In 2008 dollars, prices increased by around $47 per tonne from 2003 to 2004; with stocks declining further to 73.11mn tonnes in 2004, prices rose by another $36 per tonne from 2004 to 2005 (Table 3). In the next few years (2005 - 2007) stocks remained almost stagnant at around 75mn tonnes while consumption climbed steadily by around 5mn tonnes every year. This level was a far cry from the levels of 133mn tonnes enjoyed in 2001; comfort levels were low and prices were bid up steadily from $ 318 to $ 346.

Table 2: Rice – World Production, Trade and Stocks

Year	Nominal price ($/Tone)	Real price ($/Tonne) in terms of 2008 dollars	Ending Stocks (million tonnes)	Production (million tonnes)	Exports (million tonnes)	Consumption (million tonnes)
2001			133.04	399.7	26.9	412.5
2002	191.83	230.15	103.33	378.3	28.7	405.7
2003	199.46	233.92	81.09	391.9	27.4	411.6
2004	245.78	281.31	73.11	401.3	28.5	406.5
2005	287.81	317.85	75.66	418.3	30.4	411.6
2006	303.52	324.82	75.69	420.1	30.8	416.7
2007	332.40	346.03	77.52	427.7	28.5	422.7

Source: http://worldfood.apionet.or.jp/

In the case of soybean the period 2001 – 2007 saw two major episodes of real price increase. The first episode was from 2002 to 2003 when a price increase by $47 per tonne from $ 226 to $273 was associated with a decline in production and stocks by 10 and 5mn tonnes respectively. Some of the insecurity caused by the decline in stocks persisted in the next year and led to a further rise of $43 per tonne from 2003 to 2004 despite a good harvest and an increase in ending stocks and production by 10 and 29mn tonnes respectively. The situation of relative plenty continued with ending stocks increasing by 6 and 9mn tonnes in the next two years – consequently prices fell by $70 per tonne from 2005 to 2006 and another 14 dollars in the next one year period. 2007 saw a massive decline in production levels from the 2006 level by 18mn tonnes or 8 percent. Because of the considerable enhancement of consumption levels in the 21st century (there has been an increase in consumption by about 50mn tonnes or 28 percent from the 2001 level of 184.5mn tonnes) and especially from 2005 to 2007 (18mn tonnes or 7.5 percent) this decline in production was associated with massive shortages. From 2006 to 2007 stocks declined by around 20 percent or 13mn tonnes and as a result price increased by around $98.

Table 3: Soybean – World Production, Trade and Stocks

Year	Nominal price ($/Tone)	Real price ($/Tonne) in terms of 2008 dollars	Ending Stocks (million tonnes)	Production (million tonnes)	Exports (million tonnes)	Consumption (million tonnes)
2001	168.75	205.69	35.57	184.8	52.9	184.5
2002	188.75	226.45	42.86	196.9	61.0	191.5
2003	233.25	273.54	37.89	186.6	56.2	189.5
2004	276.83	316.85	47.44	215.8	64.8	204.8
2005	223.17	246.46	53.25	220.5	63.6	215.2
2006	217.42	232.68	62.37	236.6	71.2	225.2
2007	317.30	330.31	49.24	218.8	73.8	233.5

Source: http://worldfood.apionet.or.jp/

In the case of corn, 2006 saw a large increase in consumption outstripping by far the increase in production. As stocks reached a twenty first century low, price increased by $21.5 (20 percent). Inadequate recovery of the level of stocks due to booming demand matching a healthy increase in production implied that prices continued to rise by $40 (30 percent) to $170 per tonne in 2007.

Table 4: Corn – World Production, Trade and Stocks

Year	Nominal price($/Tone)	Real price ($/Tonne) in terms of 2008 dollars	Ending Stocks(million tonnes)	Production (million tonnes)	Exports (million tonnes)	Consumption (million tonnes)
2001	89.61	109.23	151.23	600.3	74.6	621.6
2002	99.33	119.18	126.55	603.6	76.7	626.6
2003	105.19	123.36	105.25	627.6	77.3	648.1
2004	111.78	127.94	132.05	715.8	77.6	688.0
2005	98.41	108.67	125.08	699.0	81.0	704.4
2006	121.59	130.13	110.12	713.1	93.1	725.6
2007	163.30	170.00	121.27	789.8	98.6	775.3

Source: http://worldfood.apionet.or.jp/

Price Rise as an Outcome of Global/Country Specific Consumption and Production Trends: A Comparative Analysis

The genesis of a food crisis can often be attributed to imbalance between production and consumption: that is, the world not producing enough to meet its consumption needs and drawing down stocks. However, even when production exhibits an upward surge to meet consumption levels, the consequences of the 'production deficit years' might still be felt due to low, albeit non declining, food stocks. Given that this is the case, the consumption and production trends over the entire period 2000-07 may be considered to be important. Our treatment of the food problem in this section is in two steps: to find out whether in any sub-period consumption needs were not met by production and if that was the case then identify large consumers which exhibited growth rates of consumption that were above the world average. The intuitive reason for adopting the second step is that demand from such countries would have contributed to consumption attaining high levels, and thus either led to supply deficits or prevented a recovery in food stocks.

Table 5: Wheat Consumption and Production – Average Levels and Percentages

	Average Annual Production (million tonnes)	Average Annual Consumption (million tonnes))					
Period	World	World	EU	USA	China	India	Russia
2000 -03	572.13	589.09	119.22	32.89	107.18	68.62	37.01
2004-07	622.63	624.83	123.80	31.03	102.38	73.00	37.60
Percentage change	8.83	6.07	3.84	-5.67	-4.48	6.38	1.58

Note: Calculated from data provided in http://worldfood.apionet.or.jp/

The first half of the period 2000-07 (2000-03) saw average annual world consumption of wheat exceeding production by 17mn tonnes. In other words, net world stocks were drawn down by around 68mn tonnes during this period. And even though the increase in average annual production from the first half to the second half led to a decrease in the gap between consumption and production it still remained positive on an average in the second half, further drawing down stocks and leading to an upward pressure on prices.

The above table shows that all the major players on the demand side, with the sole exception of India exhibited a rate of increase in aggregate wheat consumption which was lower than the world average. The rate of increase in demand for wheat in India was only fractionally above the world average and at best increased the consumption growth in percentage terms by 0.05 percentage points or only around 0.3mn tonnes every year. Therefore, the average percentage growth of 6.07 percent for the world as a whole, in spite of much lower percentage growth among most of the major consuming countries/regions (EU, USA, China and Russia) and growth only very marginally above the average in India, can be attributed to the aggregate effect of much larger growth among the other consumers of wheat. Foremost among these other consumers were African countries. The percentage growth of consumption of wheat in the African continent between the two mentioned periods was 20.67 percent and was driven by a growth in per capita consumption of wheat which was around 0.6 kgs per annum and a rate of population growth which was 2.2 percent per annum.

In the case of rice even though world production grew at a higher rate than world consumption (the percentage growth is defined in this case as the percentage difference in the annual averages of 2000-03 and 2004-07), for the period 2000-03 world consumption remained higher than world demand leading to a depletion of stocks (Table 6). The pick up in world production in the second period was not high enough to counteract the severe depletion of stocks in the first period. The fact that the world consumption continued to grow from 2000-03 to 2004-07, though by only 3.3 percent, made matters worse as the effect of gains in production was whittled down. This growth was spearheaded by India whose rate of growth of consumption was 4.69 percent and thus helped to pull the average up because of the country's large population. In fact India saw a massive depletion in its rice stocks in the twenty first century – from 25mn tonnes to 8.5mn tonnes in 2004. There has been a very slight increase in stocks in recent years but not large enough for the fear of stocks running out to subside. In 2007 rice stocks attained their highest level after 2004 but even that was 13mn tonnes, much lower than that in 2000. Thus, India imposed a ban on non-basmati rice exports in 2007 and basmati rice exports in 2008.[3] Exports from India fell by 3mn tonnes in 2007 – quite a significant fall in a world market where the total amount traded on the international market varies between 27 and 30mn tonnes. Consequently prices rose.

Table 6: Rice Consumption and Production – Average Levels and Percentages

	Average Annual Production (million tonnes)	Average Annual Consumption (million tonnes))			
Period	**World**	**World**	**India**	**China**	**Vietnam**
2000-03	392.20	405.76	82.27	134.65	17.64
2004-07	424.38	419.26	86.12	128.21	18.52
Percentage change	8.21	3.3	4.69	-4.78	4.96

Note: Calculated from data provided in http://worldfood.apionet.or.jp/

The demand for soybean is derived from the demand for the two joint products obtained from processing this oilseed – soybean oil and soybean meal.[4] Soybean oil production increased at a rate from the first to the second period which was slightly higher than that for production. Similarly, in both periods the average level of consumption was slightly higher than that of production. But these small differences in averages meant that any cyclical downturns in production saw a depletion of stocks which led to an increase in prices. The percentage growth of consumption was extremely high at 20.92 percent (Table 7). Pulling it up were extremely high growth rates of consumption in India (32.52 percent) and China (56.42 percent). In India around 7 percentage points out of the total growth of 32.52 percent could be accounted for by population growth – the rest to economic development and a change in tastes. In China population growth only accounted for 2.5 percentage points. The rest could be attributed to economic development and changes in preferences.

[3] For a discussion on ban on rice exports look at Subramanian K. (June 14, 2008), "The Politics of Rice," *The Hindu Business Line*

[4] For a good exposition of related issues look at Bennet, David (February 5, 2003), "World soybean consumption quickens," http://southeastfarmpress.com/mag/farming_world_soybean_consumption/ (accessed on 25th June, 2008)

Given the low base level of Indian consumption, its increase from the first to the second period was less than 3 percent of the average world demand for the first period. The Chinese impact was much larger at 10 percent both on account of higher percentage change in own consumption levels and the higher base levels of such consumption.

In the United States there was a decrease in consumption for food and a more than compensating increase in industrial uses, i.e. biodiesel. Such industrial uses towards the end of the second period accounted for the use of 1mn tonnes of soybean oil.

Table 7: Soybean Oil: Consumption and Production – Average Levels and Percentages

	Average Annual Production (million tonnes)	Average Annual Consumption (million tonnes))			
Year	World	World	India	China	United States
2000-03	29.10	28.73	2.02	5.31	7.60
2004-07	35.46	34.73	2.68	8.30	8.20
Percentage change	21.85	20.92	32.52	56.42	7.85

Note: Calculated from data provided in http://worldfood.apionet.or.jp/

In the case of soybean meal, driving up the high rate of growth of world consumption was the phenomenal percentage growth of around 55 percent in Chinese soybean meal consumption (Table 8) which in turn could be attributed to the phenomenal growth of meat consumption in that country; the per capita meat consumption increased by more than 140 percent between 1990 and 2005.[5]

Table 8: Soybean Meal: Consumption and Production – Average Levels and Percentages

	Average Annual Production (million tonnes)	Average Annual Consumption (million tonnes))			
Year	World	World	US	EU	China
2000-03	125.14	124.73	28.88	32.55	17.48
2004-07	150.03	148.51	30.83	33.54	27.07
Percentage Change	19.89	19.07	6.73	3.06	54.91

Note: Calculated from data provided in http://worldfood.apionet.or.jp/

In the case of corn, the first period was marked by consumption levels which were significantly higher than production levels by a margin of more than 20mn tonnes. This implied that corn stocks went down by 80mn tonnes during this period. A higher growth of production implied that production did eventually overtake consumption but the damage had been done in the first period; the inadequacy of corn stocks continued into the second period with only small increases at best and in the presence of appreciably increasing consumption

[5] Von Braun, Joachim (December 2007), *The World Food Situation: New Driving Forces and Required Actions,* International Food Policy Research Institute (IFPRI), Washington DC

and one bad production year resulted in price increases. It can be argued that had corn consumption growth rates been lower, the recovery in corn would have been stronger; thus the insecurity resulting from low corn stocks would have been alleviated and prices would not have risen as much in the second period.

Interestingly, it was the US which pulled up the growth rate of consumption of corn – its percentage consumption growth from the first to the second period was much higher than that for the world at 17.63 percent (Table 9); the fact that it accounted for around 30 percent of the world's consumption in combination with the previous factor had serious implications in terms of shoring up the growth rate of world consumption. Given that percentage growth from one period to the other of livestock consumption of corn in the US was just 4.2 percent it can be concluded that much of the increase in consumption was due to the use of corn for production of bio fuel, population growth being just about 3.5 percent and the chances of per capita food consumption rising significantly in a developed country being very low for a staple food. In fact average annual per capita consumption of corn in the US (food plus non-food) increased by as much as 90 kilos between the two periods.

Table 9: Corn: Consumption and Production – Average Levels and Percentages

	Average Annual Production (million tonnes)	**Average Annual Consumption (million tonnes))**				
	World	**World**	**US**	**South America**	**China**	**EU**
2000-03	605.58	626.14	202.86	51.04	124.41	56.68
2004-07	729.43	723.30	238.62	61.24	140.50	62.20
Percentage Change	20.45	15.52	17.63	19.97	12.93	9.73

Note: Calculated from data provided in http://worldfood.apionet.or.jp/

Conclusions

Though all four crops studied here – wheat, rice, soybean and corn – were characterised by a sharp rise in real prices (nominal prices deflated by the general price level) the reasons for the price rise varied from crop to crop. In the case of wheat one of the main reasons was that consumption had gone ahead of production by the beginning of the twenty first century. Stagnation in yields is one important reason for this state. Consequently, stocks were down and led to a rise in prices. The price rise was exacerbated by the crop failures in the US in 2006, Australia in 2006 and 2007 and another noticeable fall in production in Canada in 2007. Much of the increase in consumption was attributable to rapid population growth in Africa accompanied by an increase in per capita consumption led by economic development and a change in tastes.

In the case of rice a crop failure in India in 2002 caused a major jolt to the international market as it reduced production in India by 22mn tonnes and thus brought down its food stocks; the effect of this was felt much later as India's food stocks failed to recover and the country had to force its exports down by banning exports of non-basmati rice and later even *basmati* rice. The lack of recovery of food stocks in India can also be attributed to population growth and the resulting increases in rice demand even though Indian per capita consumption of rice fell over the period 2000-07.

In the case of corn there were no major crop failures but a rise in consumption at a very rapid rate prevented healthy increases in production from overwhelming the stock effects of consumption being in excess of production at the beginning of the twenty first century. This rapid increase in consumption was caused by a massive increase in per capita consumption levels in the United States attributable neither to an increase in livestock consumption nor consumption as staple food, especially as the US is a developed country where consumption of staples per capita is not expected to rise significantly as per Engel's law. Thus, it seems that the major reason for the increase in corn consumption was industrial production i.e. biofuel generation.

In the case of soybean it was a combination of occasional production reverses and a very sharp increase in consumption throughout which resulted in stocks reaching low levels in the last few years resulting in price increases. The increase in consumption demand arose from the sharp rise in demand for the two products derived from soybeans – soybean oil and soybean meal. Most of the increase in demand for both soybean meal and soybean oil came from China; in the case of soybean oil the factors which contributed to a rapid increase in Chinese demand were economic development and a change in tastes. In the case of soybean meal the Chinese demand increased due to an increase in the demand for meat consumption that accompanied its rapid economic development.

Thus to summarise, the reasons for price rise varied from crop to crop – for wheat these were the crop failures in United States, Australia and Canada in various years and the slow growth in productivity, which led to production falling behind consumption at the beginning of the twenty first century, abetted by the rapid population growth and increase in per capita consumption in the African continent; for rice population growth in India was an abetting factor but it was the dramatic rice crop failure in the same country in 2002 which drove stocks to new lows that was the precipitating factor; for corn the gap between consumption and production at the beginning of this century and massive increases in per capita overall consumption of corn in the United States attributable to biofuel production were the main

reasons; in the case of soybean the reasons were the massive increase in Chinese demand for soybean oil and soybean meal (the latter resulting from a rapid increase in demand for meat consumption) attributable to that country's rapid economic development and changing tastes.

How can the world rid itself of this price surge? The simple answer is to reduce demand and increase supply. One major component of a demand reduction strategy consists of disabling the trade-off between food and biofuel supply. The development of second generation biofuels may act as a facilitator in this regard as these would not only economise on the use of material inputs but would also utilise waste matter not used for human consumption. One contentious way of increasing supply would be the doing away of land retirement subsidies by the Western world or the drawing down of strategic food stocks maintained by developed countries. Given that the likelihood of such solutions appears bleak, developing countries might have to seek yield increases through tried and trusted means – crop research, better farm extension services, more extensive irrigation coverage and facilitation of greater access to modern inputs.

Table A1: Wheat Country Specific Production, Trade and Production Profiles

Year	Area Harvested (1000ha)	Yield (ton/ha)	Production (1000ton)	TOTAL Export (1000ton)	TOTAL Import (1000ton)	TOTAL Consumption (1000ton)	Consumption for food and others (1000ton)	Feed Consumption (1000ton)	Ending Stocks (1000ton)	Population (million)	Per capita total consumption (kg/capita)
USA											
2000	21474	2.82	60641	28904	2445	36184	28008	8176	23846	282.3	128.2
2001	19616	2.7	53001	26190	2927	32434	27481	4953	21150	285	113.8
2002	18544	2.36	43705	23139	2106	30448	27298	3150	13374	287.7	105.8
2003	21474	2.97	63814	31524	1715	32507	26986	5521	14872	290.3	112
2004	20234	2.9	58738	29009	1921	31823	26868	4955	14699	293	108.6
2005	20283	2.82	57280	27291	2214	31357	27010	4347	15545	295.7	106
2006	18943	2.6	49316	24729	3317	31035	27742	3293	12414	298.4	104
2007	20644	2.72	56247	34428	2585	29892	28259	1633	6926	301.1	99.3
2008	22768	2.91	66184	27216	2722	35353	28413	6940	13263	303.8	116.4
EU											
2000	26471	4.98	131697	15675	3536	118354	62027	56327	17483	377.7	313.3
2001	25929	4.76	123353	12751	8720	118456	61950	56506	18349	378.8	312.7
2002	26419	5.02	132579	18132	10686	124991	64990	60001	18491	379.8	329.1
2003	24318	4.55	110578	9834	7374	115095	62650	52445	11514	380.7	302.3
2004	25996	5.65	146886	14745	7061	123220	64000	59220	27496	381.6	322.9
2005	25833	5.12	132356	15694	6758	127525	64550	62975	23391	382.4	333.5
2006	24440	5.11	124783	13873	5137	125500	65300	60200	13938	383.1	327.6
2007	24673	4.84	119481	9500	6500	118965	65300	53665	11454	383.7	310
2008	26591	5.26	140000	15000	5000	129000	66000	63000	12454	384.3	335.6
Australia											
2000	12141	1.82	22108	15930	74	5328	2728	2600	5509	19.2	278
2001	11592	2.1	24299	16409	76	5427	2727	2700	8048	19.4	280.4
2002	11070	0.92	10132	9146	286	6125	2725	3400	3195	19.5	313.4
2003	13067	2	26132	18031	73	5925	2725	3200	5444	19.7	300.3
2004	13399	1.63	21905	14742	75	5900	2700	3200	6782	19.9	296.3
2005	12456	2.02	25173	16012	75	6400	2700	3700	9618	20.1	318.6
2006	11624	0.92	10641	8728	93	7400	2700	4700	4224	20.3	365.2
2007	12300	1.07	13100	7000	75	6200	2700	3500	4199	20.4	303.4
2008	13500	1.78	24000	15000	75	6200	2700	3500	7074	20.6	301
Canada											
2000	10963	2.42	26519	17316	199	7043	4065	2978	9658	31.3	225.2
2001	10585	1.94	20568	16272	341	7746	4171	3575	6549	31.6	245.2
2002	8836	1.83	16198	9403	382	8001	4223	3778	5725	31.9	250.8
2003	10215	2.26	23049	15836	233	7186	4048	3138	5985	32.2	223.1
2004	9389	2.64	24796	14880	253	8232	4168	4064	7922	32.5	253.2
2005	9404	2.74	25748	16003	290	8319	4135	4184	9638	32.8	253.6
2006	9682	2.61	25265	19638	322	8738	4410	4328	6849	33.1	264
2007	8640	2.32	20050	15000	300	8000	5000	3000	4199	33.4	239.6
2008	10000	2.45	24500	16500	300	7700	5200	2500	4799	33.7	228.6
Argentina											
2000	6408	2.53	16230	11272	7	4991	4909	82	589	37.5	133.1
2001	6825	2.27	15500	10075	12	4887	4802	85	1139	37.9	128.9
2002	5900	2.08	12300	6759	7	5157	5077	80	1530	38.3	134.5
2003	5700	2.54	14500	9407	4	5232	5152	80	1395	38.7	135.1
2004	6100	2.62	16000	11834	2	5010	4930	80	553	39.1	128
2005	5000	2.9	14500	9563	10	5000	4920	80	500	39.5	126.5
2006	5285	2.88	15200	10500	5	4900	4820	80	305	39.9	122.7
2007	5600	2.86	16000	10000	5	5430	5350	80	880	40.3	134.7
2008	5100	2.84	14500	9500	5	5480	5400	80	405	40.7	134.7
China											
2000	26650	3.74	99640	623	195	110278	100278	10000	91877	1268.9	86.9
2001	24640	3.81	93873	1512	1092	108742	99742	9000	76588	1276.9	85.2
2002	23910	3.78	90290	1718	418	105200	98700	6500	60378	1284.3	81.9
2003	22000	3.93	86490	2824	3749	104500	98500	6000	43293	1291.5	80.9
2004	21626	4.25	91950	1171	6747	102000	98000	4000	38819	1298.8	78.5
2005	22792	4.28	97450	1397	1018	101500	98000	3500	34390	1306.3	77.7
2006	22960	4.72	108470	2783	380	102000	98000	4000	38457	1314	77.6
2007	23100	4.76	109860	2700	200	104000	98000	6000	41817	1321.9	78.7
2008	23400	4.87	114000	2000	30	107000	98000	9000	46847	1330	80
India											
2000	27486	2.78	76369	1569	441	66821	66321	500	21500	1004.1	66.5
2001	25700	2.71	69680	3087	32	65125	64625	500	23000	1022	63.7
2002	25900	2.77	71810	4850	34	74294	73694	600	15700	1039.7	71.5
2003	24860	2.62	65100	5650	8	68258	67658	600	6900	1057.5	64.5
2004	26620	2.71	72150	2120	8	72838	72338	500	4100	1075.5	67.7
2005	26500	2.59	68640	801	32	69971	69671	300	2000	1093.6	64
2006	26400	2.63	69350	200	6708	73358	73058	300	4500	1111.7	66
2007	28200	2.69	75810	50	2000	75850	75650	200	6410	1129.9	67.1

Year	Area Harvested (1000ha)	Yield (ton/ha)	Production (1000ton)	TOTAL Export (1000ton)	TOTAL Import (1000ton)	TOTAL Consumption (1000ton)	Consumption for food and others (1000ton)	Feed Consumption (1000ton)	Ending Stocks (1000ton)	Population (million)	Per capita total consumption (kg/capita)
2008	27700	2.77	76780	50	100	78100	77900	200	5140	1148	68
Kazakhstan											
2000	10500	0.87	9100	3972	14	4696	3596	1100	1146	23.6	198.6
2001	10700	1.19	12700	3977	15	5800	3700	2100	4084	23.9	242.7
2002	11500	1.1	12600	6238	27	6800	4100	2700	3673	24	283.4
2003	11300	0.97	11000	4217	10	6800	4100	2700	3666	25.3	269.1
2004	11800	0.84	9950	3039	17	7400	4700	2700	3194	27.1	273.5
2005	11800	0.93	11000	3817	36	7400	4700	2700	3013	28.5	259.5
2006	12400	1.09	13500	8000	29	7500	4800	2700	1042	29.9	250.6
2007	12750	1.3	16600	8500	30	7500	4800	2700	1672	31.1	241.5
2008	13000	1.08	14000	6000	30	7500	4800	2700	2202	31.9	235.2
Russia											
2000	23200	1.48	34450	696	1604	35158	23658	11500	1400	146.7	239.6
2001	23800	1.97	46900	4372	629	38078	24078	14000	6479	146	260.8
2002	25700	1.97	50550	12621	1045	39320	23320	16000	6133	145.2	270.9
2003	22150	1.54	34100	3114	1026	35500	23000	12500	2645	144.3	246
2004	24200	1.88	45400	7951	1197	37400	23800	13600	3891	143.5	260.6
2005	25400	1.88	47700	10664	1282	38400	23500	14900	3809	142.8	268.9
2006	23700	1.89	44900	10790	861	36400	22300	14100	2380	142.1	256.2
2007	24500	2.02	49400	12000	1000	38200	22800	15400	2580	141.4	270.2
2008	25500	2.12	54000	12500	1000	39000	23000	16000	6080	140.7	277.2

Table A2: Rice – Country Specific Production, Consumption and Trade Profiles

Year	Area Harvested (1000ha)	Yield (ton/ha)	Production (1000ton)	TOTAL Export (1000ton)	TOTAL Import (1000ton)	TOTAL Consumption (1000ton)	Ending Stocks (1000ton)	Population (million)	Per capita total consumption (kg/capita)
India									
2000	44361	1.92	84980	1685	0	75960	25051	1004.1	75.7
2001	44600	2.09	93340	6300	0	87611	24480	1022	85.7
2002	40400	1.78	71820	5440	0	79860	11000	1039.7	76.8
2003	42400	2.09	88530	3100	0	85630	10800	1057.5	81
2004	42300	1.97	83130	4569	0	80861	8500	1075.5	75.2
2005	43400	2.11	91790	4688	6	85088	10520	1093.6	77.8
2006	44000	2.12	93350	5500	0	86940	11430	1111.7	78.2
2007	44000	2.17	95680	2500	0	91610	13000	1129.9	81.1
2008	44500	2.16	96000	2000	0	93000	14000	1148	81
China									
2000	29962	4.39	131536	1847	270	134300	93009	1268.9	105.8
2001	28812	4.31	124306	1963	304	136500	79156	1276.9	106.9
2002	28200	4.33	122180	2583	258	135700	63311	1284.3	105.7
2003	26508	4.24	112462	880	1122	132100	43915	1291.5	102.3
2004	28379	4.42	125363	656	609	130300	38931	1298.8	100.3
2005	28847	4.38	126414	1216	654	128000	36783	1306.3	98
2006	29295	4.34	127200	1340	472	127200	35915	1314	96.8
2007	29600	4.39	129840	1000	300	127340	37715	1321.9	96.3
2008	29750	4.39	130550	1100	330	127650	39845	1268.9	96
US									
2000	1230	4.83	5941	2590	345	3676	887	282.3	13
2001	1341	5.01	6714	2954	419	3850	1216	285	13.5
2002	1298	5.04	6536	3860	471	3534	829	287.7	12.3
2003	1213	5.29	6420	3310	478	3656	761	290.3	12.6
2004	1346	5.54	7462	3496	419	3935	1211	293	13.4
2005	1361	5.23	7113	3660	544	3838	1370	295.7	13
2006	1142	5.46	6239	2943	654	4054	1266	298.4	13.6
2007	1112	5.68	6314	3582	699	3990	707	301.1	13.2
2008	1116	5.65	6300	3166	730	4024	547	303.8	13.2
Japan									
2000	1770	4.88	8636	481	679	8297	2621	126.7	65.5
2001	1706	4.83	8242	45	655	8779	2694	126.9	69.2
2002	1688	4.79	8089	200	625	8742	2466	127.1	68.8
2003	1665	4.26	7091	200	700	8357	1700	127.2	65.7
2004	1701	4.67	7944	200	775	8300	1919	127.3	65.2
2005	1706	4.84	8257	200	669	8250	2395	127.4	64.8
2006	1688	4.61	7786	200	675	8250	2406	127.5	64.7
2007	1673	4.74	7930	200	700	8150	2686	127.5	63.9
2008	1650	4.79	7900	200	700	8130	2956	127.4	63.8
Vietnam									
2000	7493	2.73	20473	3528	40	16932	978	79.1	214.2
2001	7471	2.82	21036	3245	40	17966	843	80	224.6
2002	7463	2.88	21527	3795	40	17447	1168	80.9	215.6
2003	7468	2.96	22082	4295	300	18230	1025	81.8	222.9
2004	7450	3.05	22716	5174	320	17595	1292	82.7	212.8
2005	7314	3.11	22772	4705	350	18392	1317	83.5	220.2
2006	7203	3.18	22922	4522	450	18775	1392	84.4	222.4
2007	7342	3.21	23543	4500	150	19317	1268	85.3	226.6
2008	7315	3.22	23560	4500	450	19380	1398	86.1	225
Thailand									
2000	9891	1.72	17057	7521	0	9250	2247	61.9	149.5
2001	10125	1.73	17499	7245	15	9400	3116	62.3	150.8
2002	10158	1.69	17198	7552	0	9460	3302	62.8	150.6
2003	10315	1.75	18011	10137	0	9470	1706	63.3	149.7
2004	9995	1.74	17360	7274	0	9480	2312	63.7	148.8
2005	10220	1.78	18200	7376	2	9544	3594	64.2	148.7
2006	10270	1.78	18250	9500	5	9870	2479	64.6	152.7
2007	10430	1.77	18500	10000	7	9467	1519	65.1	145.5
2008	10500	1.79	18800	9000	8	9450	1877	65.5	144.3

Table A3: Soybean oil –Country Specific Production, Consumption and Trade Profiles

Year	Production (1000ton)	TOTAL Export (1000ton)	TOTAL Import (1000ton)	TOTAL Consumption (1000ton)	Industrial Consumption (1000ton)	Food Consumption (1000ton)	Feed Consumption (1000ton)	Ending Stocks (1000ton)	Population (million)	Per capita total consumption (kg/capita)
2000	26734	7048	6948	26366	635	25560	171	3134	6073.3	4.3
2001	28897	8341	7737	28311	795	27309	207	3116	6149.1	4.6
2002	30584	9032	8272	30167	717	29287	163	2773	6224.2	4.8
2003	30183	8827	8333	30059	695	29209	155	2403	6299.3	4.8
2004	32563	9119	8907	31694	962	30563	169	3060	6375	5
2005	34572	9816	9019	33574	2592	30819	163	3261	6451.4	5.2
2006	36393	10682	9698	35594	3793	31638	163	3076	6528.1	5.5
2007	38298	11223	10663	38075	4556	33355	164	2739	6605	
India										
2000	814	19	1400	2024	0	2024	0	171	1004.1	2
2001	833	4	1479	2300	0	2300	0	179	1022	2.2
2002	615	5	1197	1900	0	1900	0	86	1039.7	1.8
2003	996	5	906	1885	0	1885	0	98	1057.5	1.8
2004	900	11	2026	2627	0	2627	0	386	1075.5	2.4
2005	1050	13	1727	2918	0	2918	0	232	1093.6	2.7
2006	1180	10	1403	2598	0	2598	0	207	1111.7	2.3
2007	1415	10	1000	2525	0	2525	0	87	1129.9	2.2
China										
2000	3240	53	355	3542	0	3542	0	280	1268.9	2.8
2001	3575	59	551	4137	0	4137	0	210	1276.9	3.2
2002	4730	13	1712	6389	0	6389	0	250	1284.3	5
2003	4535	15	2728	7157	0	7157	0	341	1291.5	5.5
2004	5421	40	1728	7203	0	7203	0	247	1298.8	5.5
2005	6149	105	1516	7607	0	7607	0	200	1306.3	5.8
2006	6340	94	2404	8600	0	8600	0	250	1314	6.5
2007	6800	50	3000	9790	0	9790	0	210	1321.9	7.4
US										
2000	8355	636	33	7401	0	7401	0	1255	282.3	26.2
2001	8572	1143	21	7635	0	7635	0	1070	285	26.8
2002	8360	1027	21	7748	0	7748	0	676	287.7	26.9
2003	7748	425	139	7650	0	7650	0	488	290.3	26.4
2004	8782	600	12	7911	0	7911	0	771	293	27
2005	9248	523	16	8147	706	7441	0	1365	295.7	27.6
2006	9293	857	17	8419	1253	7166	0	1399	298.4	28.2
2007	9639	1406	23	8346	1270	7076	0	1309	301.1	27.7

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Table A4: Soybean Meal – Country Specific Production, Consumption and Trade Profile

Year	Production (1000ton)	TOTAL Export (1000ton)	TOTAL Import (1000ton)	TOTAL Consumption (1000ton)	Industrial Consumption (1000ton)	Food Consumption (1000ton)	Feed Consumption (1000ton)	Ending Stocks (1000ton)	Population (million)	Per capita total consumption (kg/capita)
World										
2000	116145	36246	36083	116188	311	319	115558	5695	6073.3	19.1
2001	125070	41689	40508	123734	898	316	122520	5850	6149.1	20.1
2002	130654	42714	42542	130468	979	314	129175	5864	6224.2	21
2003	128672	45568	45011	128527	932	366	127229	5452	6299.3	20.4
2004	138819	46587	45948	137134	1060	420	135654	6498	6375	21.5
2005	145744	51441	50790	145727	1042	550	144135	5864	6451.4	22.6
2006	154167	54100	51696	151637	1079	558	150000	5990	6528.1	23.2
2007	161370	57966	56010	159554	1104	566	157884	5850	6605	24.2
US										
2000	35730	7335	46	28359	0	0	28359	348	282.3	100.4
2001	36552	7271	130	29541	0	0	29541	218	285	103.6
2002	34649	5728	157	29096	0	0	29096	200	287.7	101.1
2003	32953	4690	258	28530	0	0	28530	191	290.3	98.3
2004	36936	6659	134	30446	0	0	30446	156	293	103.9
2005	37416	7301	128	30114	0	0	30114	285	295.7	101.8
2006	39033	7971	142	31171	0	0	31171	318	298.4	104.4
2007	39720	8346	150	31570	0	0	31570	272	301.1	104.8
EU										
2000	13175	253	17712	30711	10	36	30665	809	377.7	81.3
2001	14042	332	19961	33406	10	31	33365	1074	378.8	88.2
2002	12950	344	20545	33335	10	34	33291	890	379.8	87.8
2003	11084	399	22012	32729	10	28	32691	858	380.7	86
2004	11300	529	21910	32680	10	32	32638	859	381.6	85.7
2005	10760	701	22823	32875	10	32	32833	866	382.4	86
2006	11550	547	22075	33092	10	32	33050	852	383.1	86.4
2007	11575	450	24400	35517	10	32	35475	860	383.7	92.5
Brazil										
2000	17725	10673	184	7063	0	0	7063	1253	175.6	40.2
2001	19407	11862	342	7580	0	0	7580	1560	177.8	42.6
2002	21449	13657	350	8055	0	0	8055	1647	179.9	44.8
2003	22360	14792	282	7696	0	0	7696	1801	182	42.3
2004	22658	14256	252	8878	0	0	8878	1577	184.1	48.2
2005	21892	12895	195	9300	0	0	9300	1469	186.1	50
2006	24100	12715	167	11108	0	0	11108	1913	188.1	59.1
2007	25175	13600	125	11670	0	0	11670	1943	190	61.4
China										
2000	15050	155	100	14995	0	0	14995	0	1268.9	11.8
2001	16300	1123	27	15204	570	0	14634	0	1276.9	11.9
2002	21000	843	0	20157	600	0	19557	0	1284.3	15.7
2003	20190	662	19	19547	580	0	18967	0	1291.5	15.1
2004	24026	658	69	23437	700	0	22737	0	1298.8	18
2005	27296	357	837	27776	700	0	27076	0	1306.3	21.3
2006	28090	867	32	27255	725	0	26530	0	1314	20.7
2007	30170	650	300	29820	750	0	29070	0	1321.9	22.6

Table A5: Corn – Country Specific Production, Consumption and Trade Profiles

Year	Area Harvested (1000ha)	Yield (ton/ha)	Production (1000ton)	TOTAL Export (1000ton)	TOTAL Import (1000ton)	TOTAL Consumption (1000ton)	Consumption for food and others (1000ton)	Feed Consumption (1000ton)	Ending Stocks (1000ton)	Population (million)	Per capita total consumption (kg/capita)
World											
2000	137176	4.31	590831	76751	75025	608281	180376	427905	174544	6073.3	100.2
2001	137861	4.35	600339	74566	72520	621623	185344	436279	151214	6149.1	101.1
2002	137904	4.38	603555	76714	75127	626595	193410	433185	126587	6224.2	100.7
2003	142254	4.41	627594	77281	76398	648069	202880	445189	105229	6299.3	102.9
2004	145127	4.93	715770	77643	76676	687978	213395	474583	132054	6375	107.9
2005	145984	4.79	698997	80966	79453	704426	226992	477434	125112	6451.4	109.2
2006	149293	4.78	713131	93060	90650	725670	248331	477339	110163	6528.1	111.2
2007	158682	4.98	789812	98563	94816	775136	275567	499569	121092	6605	117.4
2008	158330	4.9	775258	91867	89851	791049	305435	485614	103285	6682.5	118.4
US											
2000	29316	8.59	251854	49313	173	198102	49706	148396	48240	282.3	701.6
2001	27830	8.67	241377	48383	258	200941	51983	148958	40551	285	705
2002	28057	8.12	227767	40334	367	200748	59445	141303	27603	287.7	697.8
2003	28710	8.93	256278	48258	358	211644	64447	147197	24337	290.3	729
2004	29798	10.06	299914	46181	275	224648	68220	156428	53697	293	766.6
2005	30399	9.29	282311	54201	224	232063	75726	156337	49968	295.7	784.7
2006	28590	9.36	267598	53970	304	230786	88595	142191	33114	298.4	773.3
2007	35022	9.48	332092	62233	381	266966	110749	156217	36388	301.1	886.5
2008	31889	9.35	298083	50802	381	266967	136151	130816	17083	303.8	878.7
South America											
2000	18338	3.47	63562	16636	5774	51347	9919	41428	4916	348.2	147.5
2001	16817	3.37	56683	13358	5163	49480	10205	39275	3924	352.9	140.2
2002	17917	3.73	66916	16758	5875	50891	10680	40211	9066	357.6	142.3
2003	17280	3.75	64759	15866	5626	52455	10740	41715	11130	362.2	144.8
2004	16952	3.75	63565	15835	6052	56033	11250	44783	8879	366.7	152.8
2005	17950	3.67	65826	16061	8571	59949	11525	48424	7266	371.1	161.5
2006	19777	4.21	83335	28578	9441	63372	11800	51572	8092	375.5	168.8
2007	20736	4.31	89346	27645	8775	65595	11950	53645	12973	379.8	172.7
2008	21110	4.29	90649	28835	8920	68795	12600	56195	14912	384.1	179.1
China											
2000	23056	4.6	106000	7276	89	120240	28240	92000	102372	1268.9	94.8
2001	24282	4.7	114088	8611	39	123100	29100	94000	84788	1276.9	96.4
2002	24634	4.92	121300	15244	29	125900	29900	96000	64973	1284.3	98
2003	24068	4.81	115830	7553	2	128400	31400	97000	44852	1291.5	99.4
2004	25446	5.12	130290	7589	2	131000	33000	98000	36555	1298.8	100.9
2005	26358	5.29	139365	3727	62	137000	36000	101000	35255	1306.3	104.9
2006	27900	5.43	151600	5269	16	145000	41000	104000	36602	1314	110.3
2007	28000	5.42	151830	500	100	149000	44000	105000	39032	1321.9	112.7
2008	27800	5.5	153000	500	100	157000	45000	112000	34632	1330	118
EU											
2000	8917	5.62	50089	585	3689	55108	12160	42948	2672	377.7	145.9
2001	9452	6.14	58022	1258	2201	58288	12780	45508	3349	378.8	153.9
2002	8995	6.41	57660	756	2824	57576	12517	45059	5501	379.8	151.6
2003	9138	5.24	47905	455	5859	55764	12250	43514	3046	380.7	146.5
2004	9677	6.87	66471	678	2469	63200	12650	50550	8108	381.6	165.6
2005	9227	6.63	61158	449	2634	61500	14500	47000	9951	382.4	160.8
2006	8569	6.39	54720	664	7056	62300	13600	48700	8763	383.1	162.6
2007	8472	5.71	48393	350	13000	61800	12800	49000	8006	383.7	161.1
2008	8660	6.48	56122	1000	7000	60200	14000	46200	9928	384.3	156.6