

Projections of China's Food Security to 2030: Obligations as an Agricultural Superpower

James R. Simpson

Affiliate Professor, Washington State University

Professor Emeritus, University of Florida

Professor Emeritus, Ryukoku University, Japan

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The Problem

- **There has been worldwide concern about China's ability to feed itself, and the impact it will have on world food supplies**
- **That concern continues, particularly driven by China's growing imports of soybeans and projections by several sources that China will import 15 million tons of corn by 2015**
- **This presentation deals with the extent to which there is cause for concern, projections of long-term trade potential in soybeans and corn, hype and hope, and realistic reality**

Projection Method

- A computer model especially developed for long-term projections of animal inventories, feedstuffs requirements and feedstuffs availabilities is used.
- The method used is to calculate all requirements and availabilities on the basis of metabolizable energy (ME) and crude protein (CP).
- This method, rather than projecting individual commodities, or using a global econometrics approach is necessary because of the wide variety of feedstuffs fed.
- I developed this method 20 years ago and have been very pleased with the accuracy of long term projections.

“Back-of-the-Envelope” Prognostications

- For years many people have argued, and continue to argue, that China will significantly disrupt world food supplies.
- Their reasoning generally is simplistic, essentially calculations that can be done on the back of an envelope.
- To them, since China’s **population** is large and growing, per capita **income** is increasing rapidly, total meat, fish and seafood per capita **consumption** will increase so much that **vast** feedstuffs and food **imports** will be required. Period. End of analysis.
- **Is this simplistic thinking credible?**

Hype based on the Demand Side Only

- There have been numerous projections that China will suddenly change from being a major corn exporter to a huge importer.
- China's imports of a million tons or so for the past 2 years are morphing into 15 million tons by 2015!
- How can this happen in 5 Years? How about the supply side, and the continual great impact from technology development and adoption?

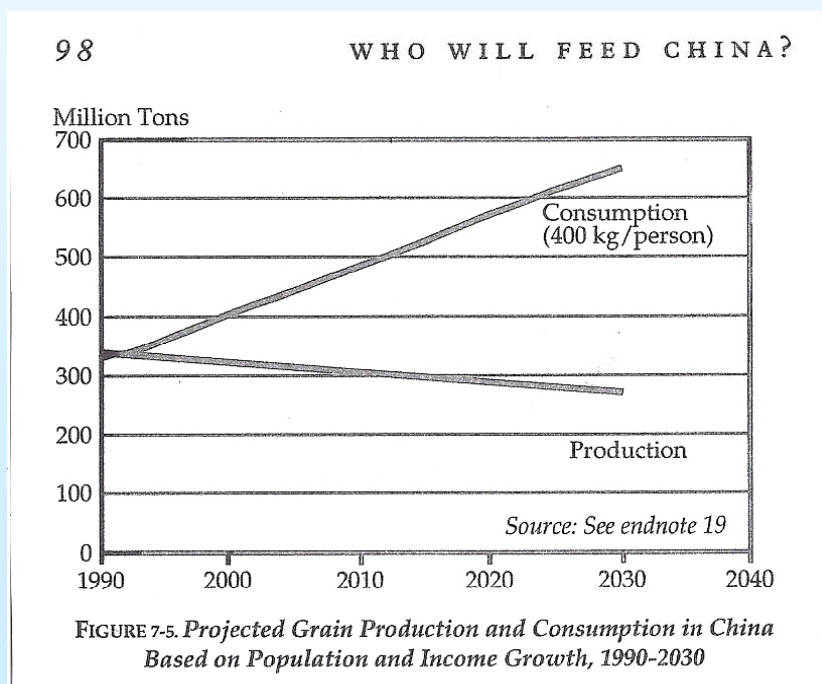
Mr. Lester Brown, President of Earth Policy Institute (and Formerly of World Watch) Stated on March 11, 2011:

”Beijing is losing a long battle to feed its growing population on its own....Just as China is America’s banker, America could become China’s farmer....The evidence of China’s plight is clear.”

Well, his evidence is not clear!

- And in fact, is as **silly** as that presented in his 1995 book *Who Will Feed China: Wakeup Call For a Small Planet*
- When he wrote that in 2030 China's grain import deficit (under his "back-of-the-envelope calculations) "would reach **369** million tons, nearly double current (world) grain exports."

Why? Because, as incredulous as it may seem, **grain production would actually decline** over that period!



Actually, it increased to 620 Million Tons in 2010 and is projected at 820 in 2030 !

Working Conclusions

- Technically, China can continue to essentially maintain 95 plus percent net food self-sufficiency for the next two decades.
- **Surpluses** of energy based feedstuffs supplies (such as corn) will continue to grow under current policies reaching 23 million tons of corn equivalents in 2030.... But,
- Protein **deficits** will continue to grow, from 32 million tons of soybean imports in 2007 to 60 million tons of soybean equivalent imports in 2015, 64 million tons in 2020 and 80 million tons in 2030....However,
- **The amount of soybean and corn imports can—and will—vary dramatically depending on government policies such as allocation of crop residue use—and climatic variations.**
- **Beware of medium term projections—such as the 5 years from 2010 to 2015. That simply is not enough time for a drastic increase in corn imports**



China Population and Per Capita Income

• Item	2009	2020	2030
• Population (billions)	1.35	1.43	1.47
Population (millions)	86=6%	31=2%	

Population will decrease 45 million in the 20 years from 2030 to 2050

(PPP US dollars)

• GDP Per Capita	6,838	16,850	30,176
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Growth rate 2009-2015 9 %

2015-2020 8.0 %

2020-2030 6%

• PPP GDP Per Capita **2009** was

United States \$46,436 Japan \$32,443

Per Capita Consumption of Livestock and Aqua Products

	<u>2007</u>	<u>2015</u>	<u>2020</u>	<u>2030</u>
Beef and veal (kg)	4	6	7	8
Pork (kg)	34	36	37	38
Poultry (kg)	12	13	16	20
Total meat (kg)	53	58	63	69
Aqua products (kg)	26	28	30	32
Total meat & Aqua (kg)	79	86	93	101

China's total meat & aqua in the year 2030 compared with 2007 in

Japan (kg) **107**

Germany (kg) **100**

United Kingdom (kg) **105**

United States (kg) **146**

• **Conclusion:** China already has a substantial meat and aqua diet

Now you have the actual population, income growth, and diet information. This is probably much different than the media hype. The point is beware of “back of the envelope analyses” which are usually wrong or misleading.....

- Basing analysis on what you want to happen usually leads to erroneous findings.
- Research is all about going beyond what seems to be the obvious, searching for details and....
- “thinking outside the box”

The Simplistic Thinking Does Not Take Technology Into Account! Example: Pigs and Pork Production

	2007	2015	2020	2030
Pork consumption per capita (kg)	34	36	37	38
Pig stocks (millions)	437	449	454	410
Production per Pig (kg)	106	113	122	137

- 12% change from 2020 to 2030 for Pork consumption per capita (kg)
 - 6% change from 2015 to 2020 for Pig stocks (millions)
 - 29% change from 2015 to 2020 for Production per Pig (kg)

Production per pig in inventory in 2007 in the United Kingdom was 150 Kg, and 158 kg in the United States

Example: **Backyard** Versus **Commercial** Pig and Poultry Production

	2007	2015	2020	2030
Pig meat production (%)				
Commercial (1)	45	56	71	86
Backyard	55	44	29	14
Chicken Production				
Laying hens				
Commercial	40	55	75	90
Backyard	60	45	25	10
Non-laying hens (broilers)				
Commercial	52	40	44	64
Backyard	48	60	56	36

(1) Generally considered over 50 fattening pigs at one time.

Impact of Productivity And Efficiencies On Animal Productivity

	2007	2015	2020	2030
Kg of meat per head of inventory				
Beef	60	66	79	96
Pork	106	113	122	137
Chicken	2.4	2.7	3.5	5.1
Tons milk/dairy cow	2.8	3.6	5.0	6.5
Kg eggs /hen	9.1	10.7	14.0	16.2

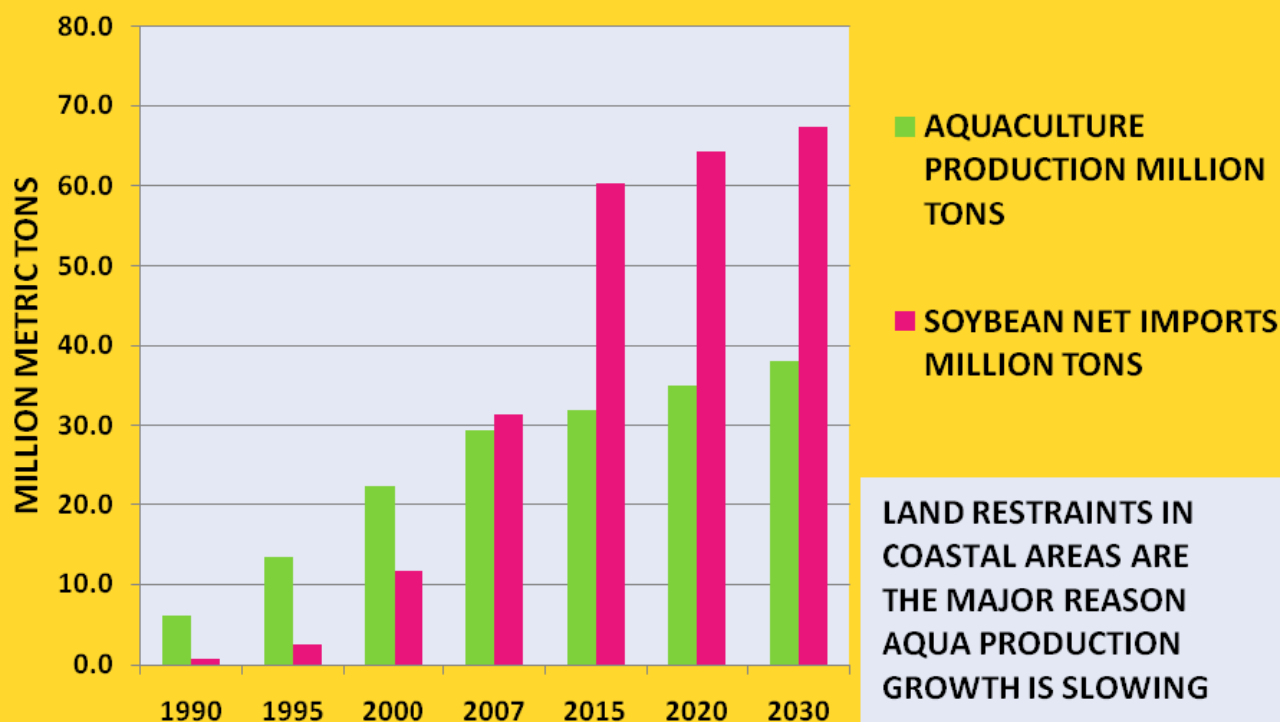
Those efficiencies and productivity

result in livestock inventories of **many** species growing moderately until 2015

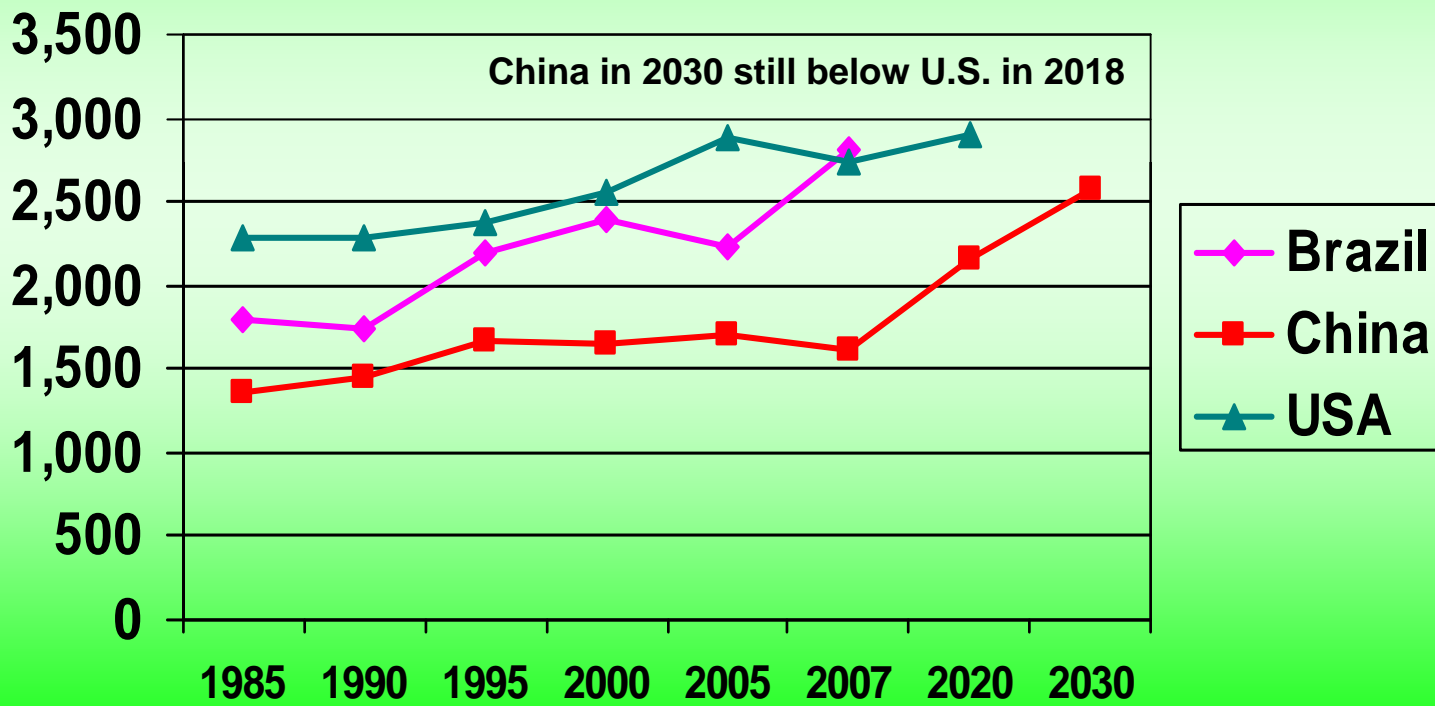
- **Then remaining about the same to 2020**
- **And then declining slightly until 2030**
- **This is due to population growth moderating from 2015 to 2020, and the very rapid decline to 2030.**
- **Add to that adoption of technology and structural change resulting in production per head of inventory increasing and the result is:**

	2007	2015	2020	2030
Poultry stocks (billion birds)	5.6	7.9	8.1	7.5
Milk cows (millions)	12.4	9.7	8.6	9.0
Non-bovine work animals (millions)	18.1	11.7	8.0	5.0
Beef/draft cattle (millions)	95.2	117.1	118.2	114.8

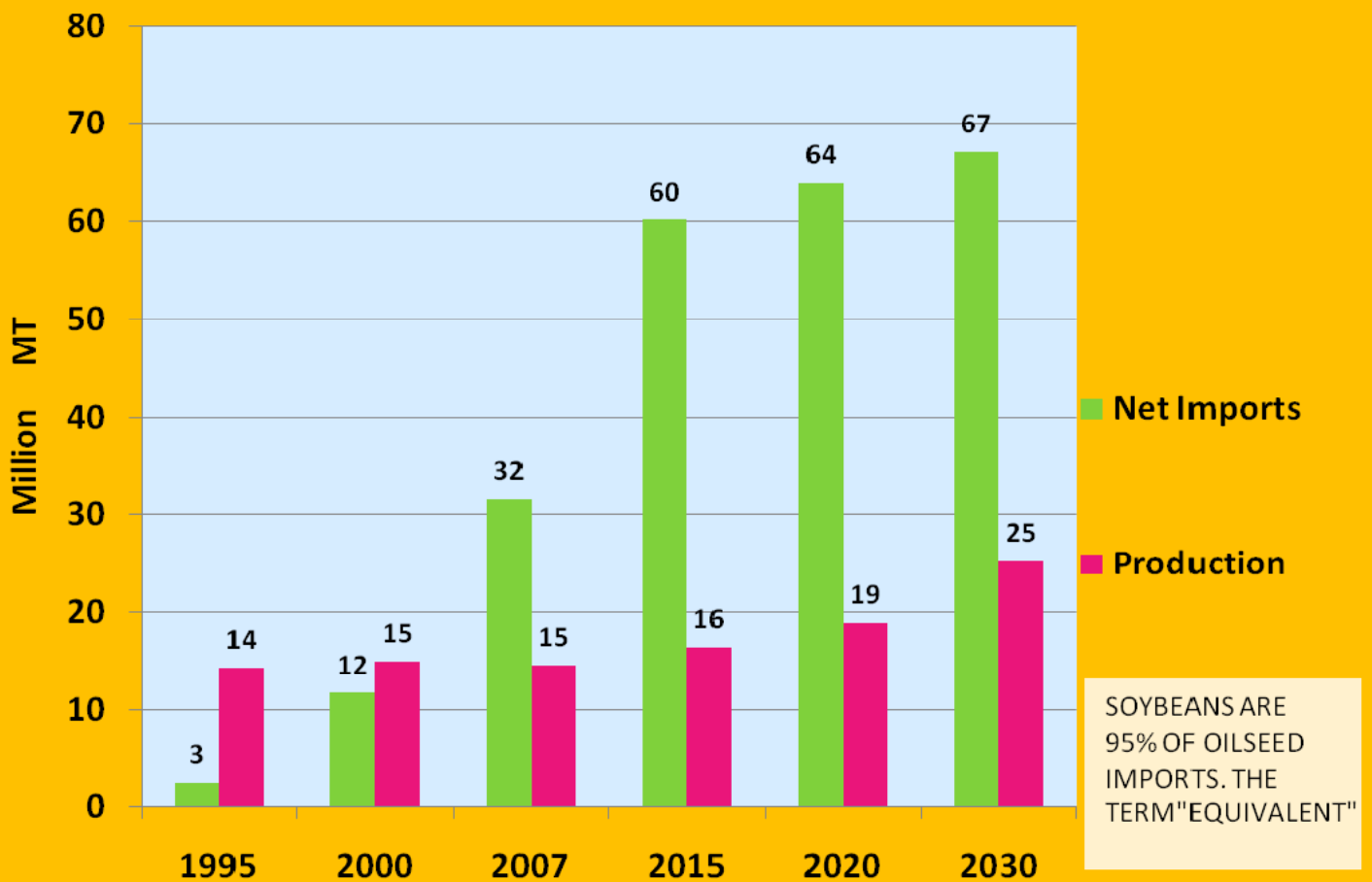
CHINA'S RAPID GROWTH IN AQUACULTURE PRODUCTION IS A MAIN REASON SOYBEAN IMPORTS HAVE INCREASED DRAMATICALLY



Soybean yields in China, Brazil and USA 1985-2030



China Soybean Production and Equivalent Soybean Imports, 1995-2030



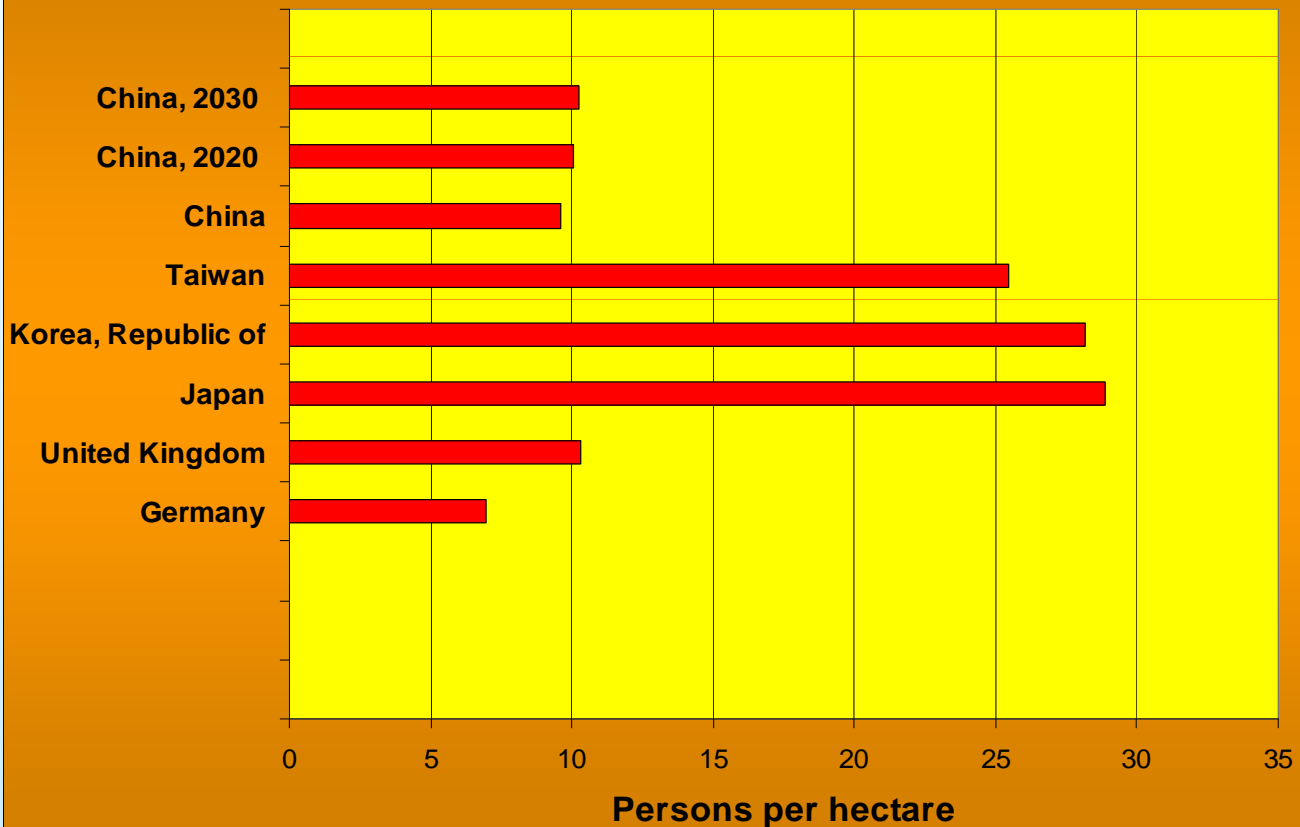
Bottom Line on Soybeans

- **Strong demand continuing**
- Slowing of growth rate due to increased efficiencies and productivity of livestock and lower growth of aquaculture
- Projections of 60 million tons of imports in 2015 reasonable,
64 million tons in 2020 quite probable
Around 80 million tons in 2030 quite likely
- **Much less variation in soybean projections than corn because imports have accounted for two thirds of use and will account for 73-79 percent in the next 2 decades**

Myths, Misconceptions And Mistakes About China and the Crop side

- Beware of “back-of-the-envelope” simplistic reasoning.
- Much of the mindset that China will be a significant corn importer is based on hope.
- Myth. China is densely populated and there is not enough arable land per person. Wrong. It is about the same as the United Kingdom.
- Misconception. Farm sizes are extremely small, severely limiting productivity. That is social data. Field sizes are quite large—accommodating mechanized production practices.

Persons per hectare of arable land in selected countries and regions, 2007 and China in 2020 and 2030



Most grain and oilseed crops are grown on quite large fields without discernable boundaries and worked communally.

Also a large portion of rural residents are part-time farmers who have jobs near

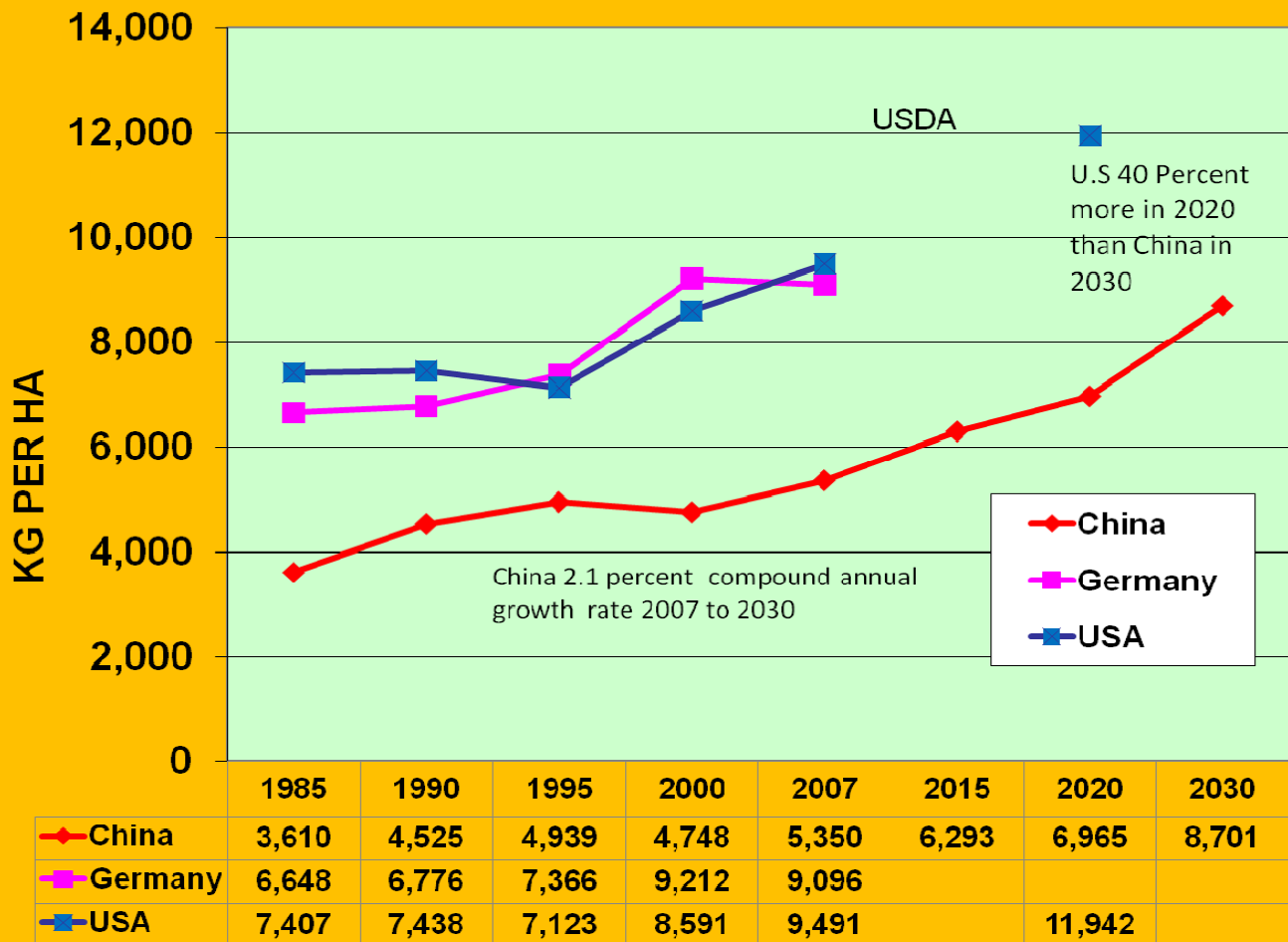
A very important factor is increasing investment due to great advances in granting Land tenure rights.



The large fields are leading to an increasing amount of contracting using large machinery for major tasks such as land preparation and harvesting leading to greater economic efficiencies

These production technologies are leading to synergisms from better management, and use of inputs which is increasingly making excess rural labor redundant.

CORN YIELDS IN CHINA, GERMANY AND THE USA 1985-2030



RECENT NEWS RELEASES ON BIOTECHNOLOGY ADVANCES SHOW GREAT PROMISE TO DRAMATICALLY INCREASE CROP YIELDS

- PIONEER HI-BRED EXPECTS TO DOUBLE THE RATE OF GENETIC GAIN—TARGETING A 40 PERCENT YIELD INCREASE IN CORN AND SOYBEANS OVER THE NEXT 10 YEARS.
- MONSANTO PROJECTS DOUBLING OF YIELDS (FROM 2000 BASE) OF CORN, SOYBEANS AND COTTON BY 2030.
- MONSANTO IS TAKING STEPS TO LAUNCH THE WORLD'S FIRST DROUGHT-RESISTANT CORN—AND INCREASE YIELDS OF IT.
- AND CHINA IS A LEADER ON GENOMICS AND APPLIED BIOTECHNOLOGY IN AGRICULTURE

China's Corn Trade 1994-2010 (1,000 MT)

Year	Imports	Exports	Net Imports
1994	4,287	1,333	2,954
1995	1,476	157	1,319
1996	75	3,892	-3,817
1997	287	6,173	-5,886
1998	262	3,338	-3,076
1999	75	9,935	-9,860
2000	89	7,276	-7,187
2001	39	8,611	-8,572
2002	29	15,244	-15,215
2003	2	7,553	-7,551
2004	2	7,589	-7,587
2005	62	3,727	-3,665
2006	16	5,269	-5,253
2007	41	549	-508
2008	47	172	-125
2009	1,296	151	1,145
2010	1,000	200	800

Critical Question: Do the imports in 2009 and 2010 portend great long-term imports?

Critical information on corn

- The area harvested has increased continuously from 21 million HA in 1994 to 31 million now
- Total production has continuously increased from 99 million HA in 1994 to 158 million in 2009 and 168 million in 2010
- Total supply has continuously increased from 175 million MT in 2005 to 222 million in 2010
- Chinese are very opportunistic smart traders: Why not buy corn last summer when the price was low (at least relative to now)
- But **crop residues are** the most important aspect

Are You In A “Box” About China?

- There is a popular saying in the U.S. we hear incessantly. “How about thinking outside the box.” Essentially, that means throwing off mindsets, perceived myths, everyday hype, and focusing on “our” way of doing things.
- Lets keep the “box mentality” in mind as we explore energy feedstuff aspects—especially why China will import only marginal amounts of corn over the next few decades due to crop residues.

It is Important to know the source and kinds of Feedstuffs in China

Here they are by production source, 2006-2008

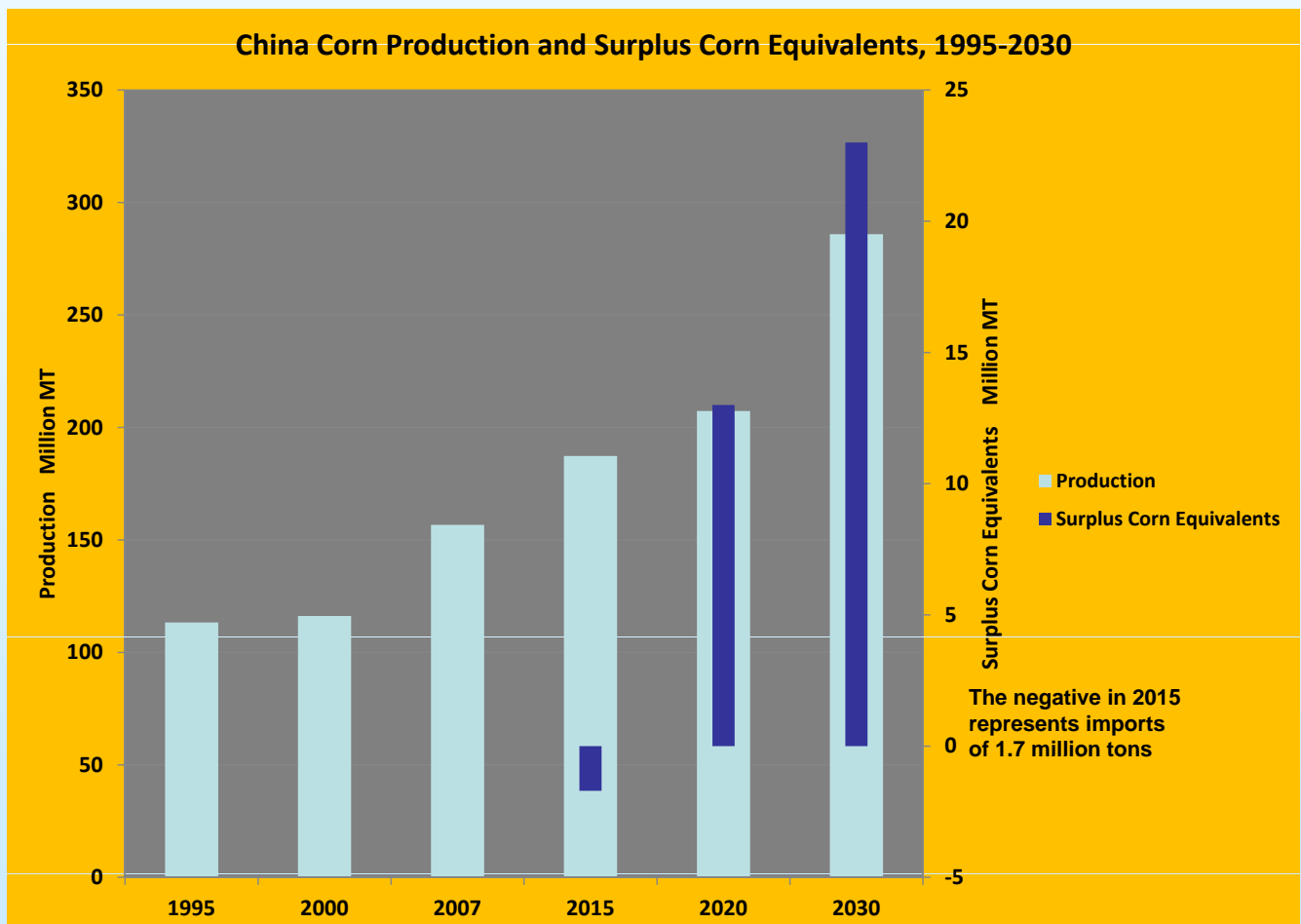
	Metabolizable energy (ME)	Crude protein (CP)
By-products	21	48
Crop residues and other NCFR	38	28
Grassland	12	9
Principal crop	29	14
Total	100	100

Byproducts: DDGS, brewers grains, all meals such as soybean meal, Sugar beets, brans, corn and sorghum silage, and others.

Principal crop: Grains, oilseeds, fruits and vegetables, roots and tubers

Use of Corn Equivalents as a Measure of Corn Import Potential

- My model is essentially an accounting of all the protein (measured by crude protein or CP) and all the energy (metabolizable) (measured by calories and computed as megacalories or Mcal which are equivalent to 1,000 Kcal)
- All of the energy and protein in animal feedstuffs requirements, and availabilities from all sources are added up.
- The difference is either a deficit (potential imports) or a surplus (available for exports or other uses)
- Those deficits or surpluses are converted to soybean and corn equivalents
- **Crop residues are the key to determine if corn imports are required**



Example of FEEDING VALUES

RICE STRAW, WHILE USED EXTENSIVELY IN JAPAN, HAS LOW FEEDING VALUES

	CORN GRAIN	CORN STOVER	RICE STRAW
METABOLIZABLE ENERGY (Mcal			
UNTREATED PER KG)	3.4	1.9	1.4
TREATED	--	2.5	1.7
PERCENT GREATER	--	32	21
CRUDE PROTEIN (%)			
UNTREATED	8.6	5.4	2.9
TREATED	--	8.0	4.3
PERCENT GREATER	--	48	48

The big key point is that while crop residues are considered to have little value in the United States—they do serve as a close substitute for corn in China—and use of them is a main reason for the corn equivalent surplus

Some Conclusions

- Evaluation of China's balance sheet, and the technical and structural factors detailed in this presentation, strongly indicate only very minimal corn imports, if any, are likely in the next few years.... Projections are for possible imports of 1.7 million tons in 2015. Then, surplus corn equivalents of 13 million tons in 2020, and 23 million tons in 2030.
- Protein deficits will continue to grow, and soybean imports are projected to grow from 32 million tons 2006-2007 to 60 million tons in 2015, 64 million tons in 2020 and 80 million tons in 2030.
- However, change in dietary habits, beef in particular, and use of crop residues along with the vagaries of climate can cause changes in projections.
- **Technology development and adoption are the main reasons that....technically, China can continue to essentially maintain 95 plus percent net food self-sufficiency for the next quarter century.**

So Far, What Does All This Mean For **YOU**?

- Don't believe all you read or hear, especially in the media. Reporters, and the general public, just cite another media report.
- The 1995 Brown book is **STILL** regularly cited. Why, when it was so wrong and so silly?
- Answer: Lack of critical thinking. For example—does anyone read the book and really think about the chart I showed you?

More Myths, Misconceptions and Mistakes

- Myth. Believing that America has the lock on agricultural production systems.
- Misconception. China can never become powerful in agricultural knowledge and production.
- Make no mistake about it. China already is an agricultural superpower, and it will continue to become stronger.

Now, What Does this Mean For Japan?

- **China's position as an agricultural superpower, and its obligations to use it in the best interests of the world will grow as it morphs from its current middle level status of Newly Industrialized Country into an Economically Developed Country.**
- **Its approach to food security is based on inalienable "rights" to use its land and resources to achieve the food self-sufficiency rate that it itself sets.**

Now, With The Numbers Over, Its Time to Sit Back and Just Critically Think About:

- **The relation of China with the G-10 and other high cost agricultural nations, upcoming regional and bilateral trade negotiations, and in particular the situation of Japan a nation--**
- **that would essentially lose its agricultural sector and food processing sector if import tariffs were radically reduced.**
- **The critical question is: what are, and what should China's obligations be, regarding the other nations and Japan in particular?**