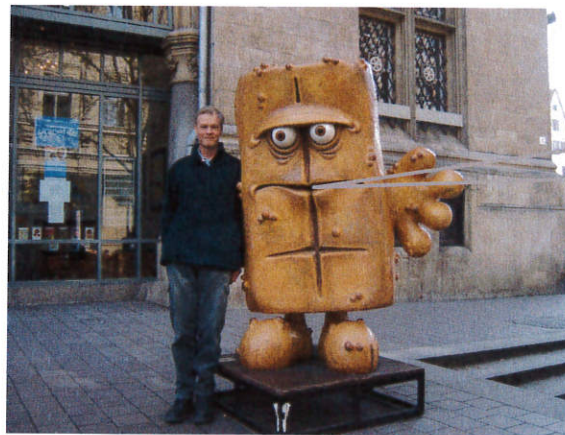


World Wide Wheat



Hello,
Everybody !

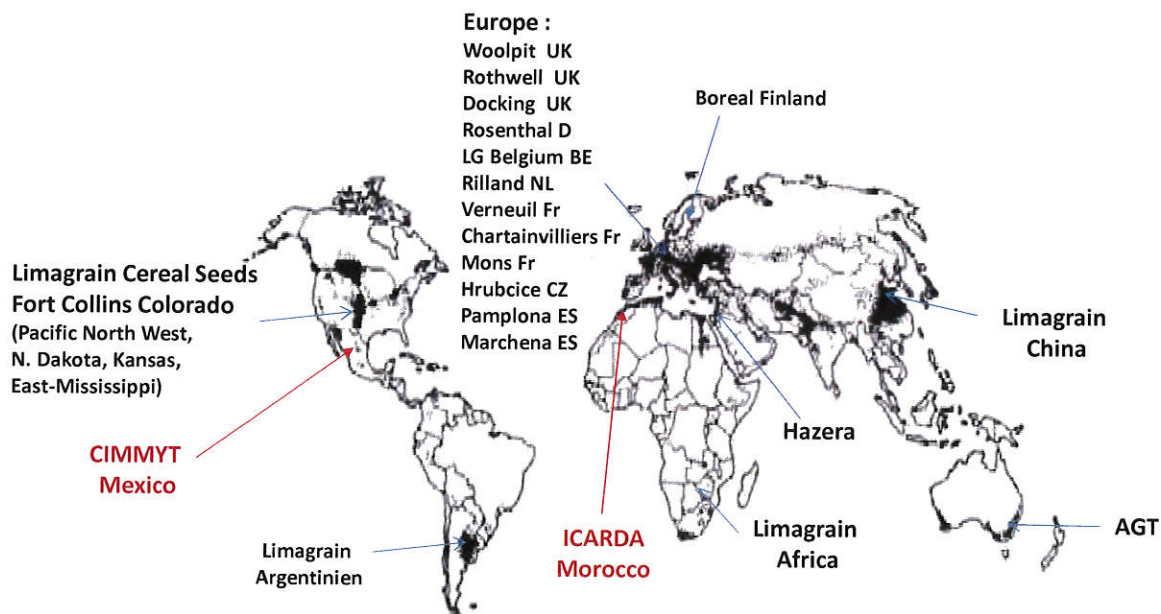
Mendel University, Brno
02.12.2014
Mike Taylor
Limagrain GmbH
Rosenthal Germany
(with a little help from „Bernd the Bread“)

www.LGseeds.de



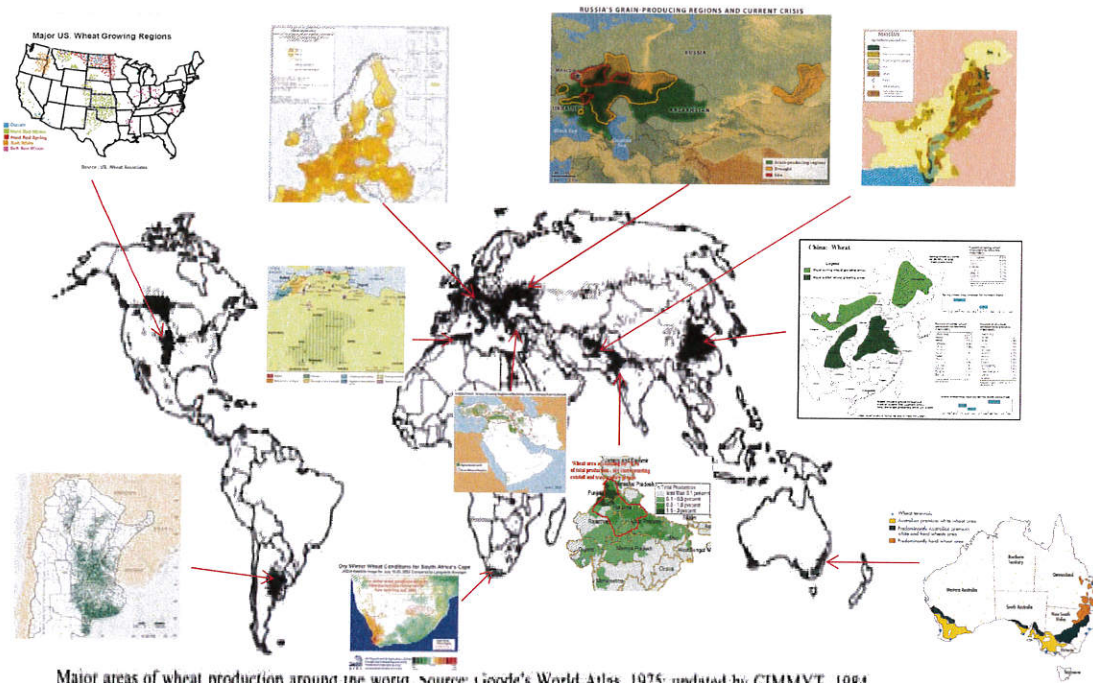
Unsere Züchtung. Ihr Profit.

Limagrain Wheat Breeding and Research Programmes



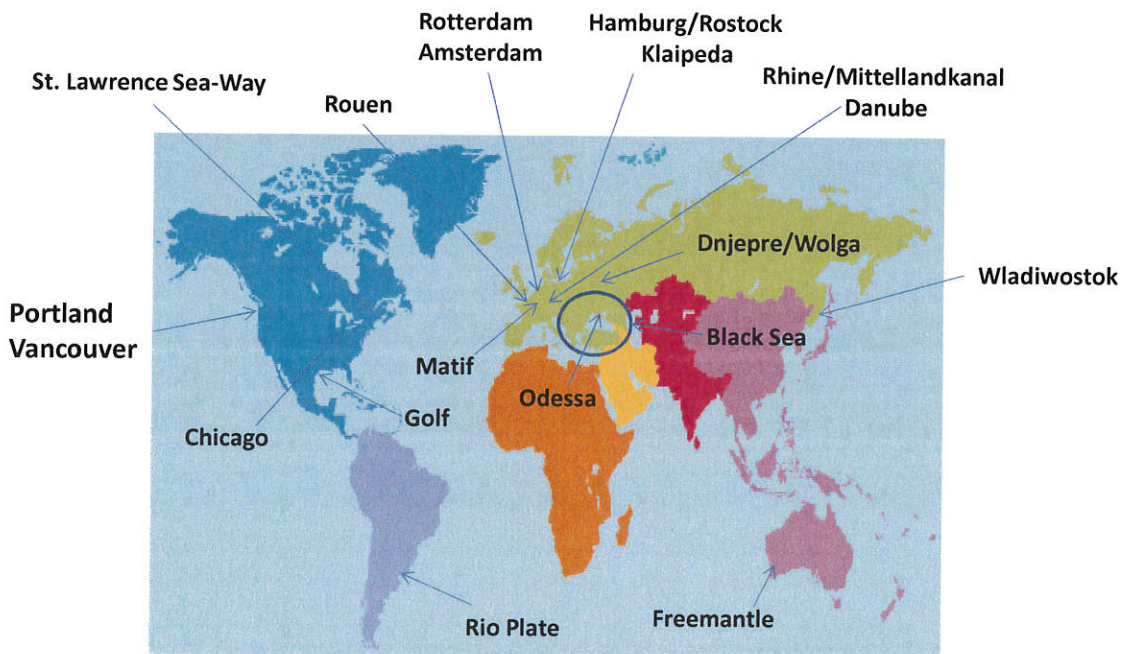
Major areas of wheat production around the world. Source: Goode's World Atlas, 1975; updated by CIMMYT, 1984.

Main Wheat Growing Areas of the World



Major areas of wheat production around the world. Source: Goode's World Atlas, 1975; updated by CIMMYT, 1984.

Global Wheat Trade



World Wheat Trade 2014
162 mio t.
















World Cereal Production 2014

	mio t.	
	Produktion	Verbrauch
Maize	989	954
Wheat	715	704
Rice	476	480
Barley	145	141
Sorghum	61	60
Oats	24	24
Rye	16	15
Total	2426	2378

Quelle : USDA Foreign Ag. Service Nov 2014

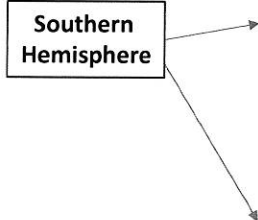
Livestock is the world's largest user of land resources, with pasture and land dedicated to the production of feed representing almost 80% of the total agricultural land. The sector uses 3.4 billion hectares for grazing and one-third of global arable land to grow **feed crops, accounting for more than 40% of world cereal production**. 26% of the Earth's ice-free terrestrial surface is used for grazing.

Main End Uses of Wheat

Bread in all forms					
Pasta Products					
Couscous					
Cookies					
Household Flours					
Knäckebröt and Crackers					
Animal Feed					
Bioethanol					
Starch					
Brewing					
Seed					

Main Wheat Producers 2013/14

	Area	t/ha	Production	Consumption	Export	Import
	mio. ha		mio.t	mio.t	mio.t	mio.t
EU28	25.8	5.6	143.1	115.8	31.9	4.0
China	24.1	5.1	121.9	121.5		
India	30.0	3.1	93.5	94.0	5.4	
USA	18.4	3.2	58.1	34.2	31.5	4.8
Russia	23.4	2.2	52.1	34.1	18.5	
Canada	10.4	3.6	37.5	10.0	22.1	
Australia	13.5	2.0	27.0	8.7	18.3	
Pakistan	8.6	2.8	24.0	24.1		
Ukraine	6.6	3.4	22.3	11.5	9.8	
Turkey	7.7	2.3	18.0	17.8	4.3	4.1
Iran	7.0	2.1	14.5	18.0		6.6
Kasachstan	13.0	1.1	13.9	5.9	8.0	
Argentina	3.5	3.0	10.5	8.9	1.6	
Egypt	1.4	6.1	8.3	18.5		10.2
Uzbekistan	1.4	4.9	6.8	8.4		2.2
Other States	18.7	2.5	47.2	149.5	9.4	50.2
Total	220.8	3.2	714.7	703.8	162.1	162.1

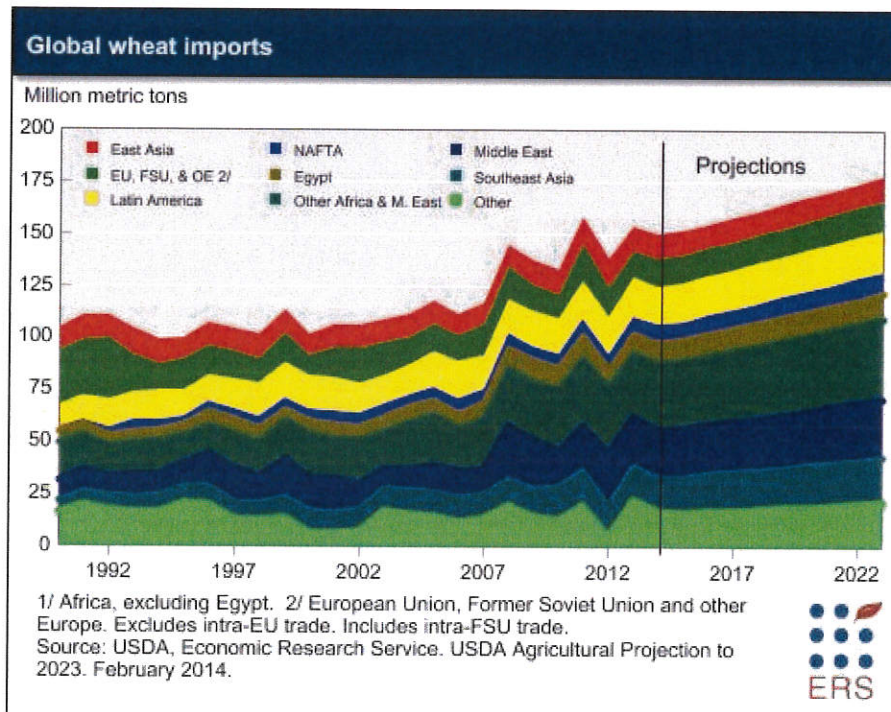
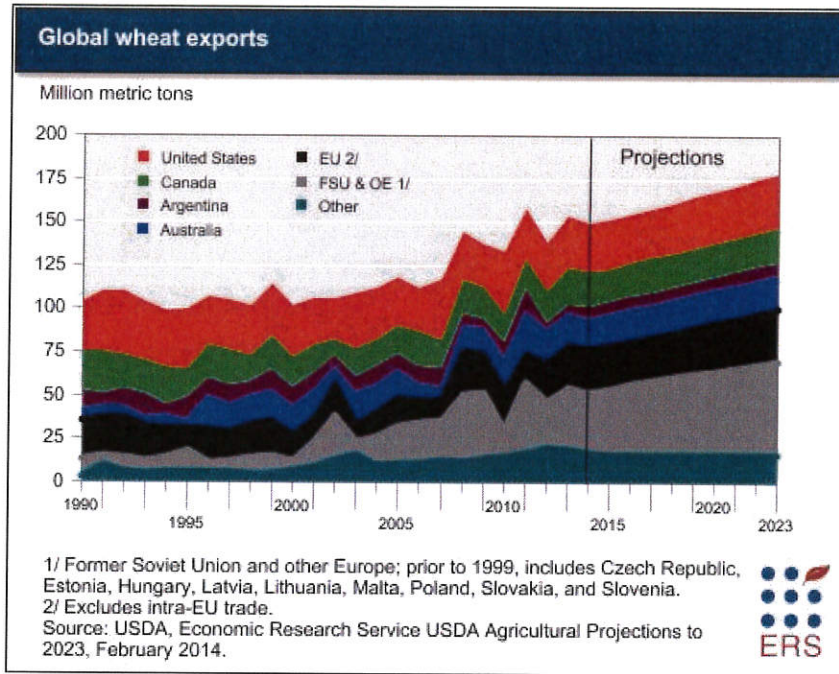


Source: USDA Foreign Agriculture Service
(Fas) November 2014

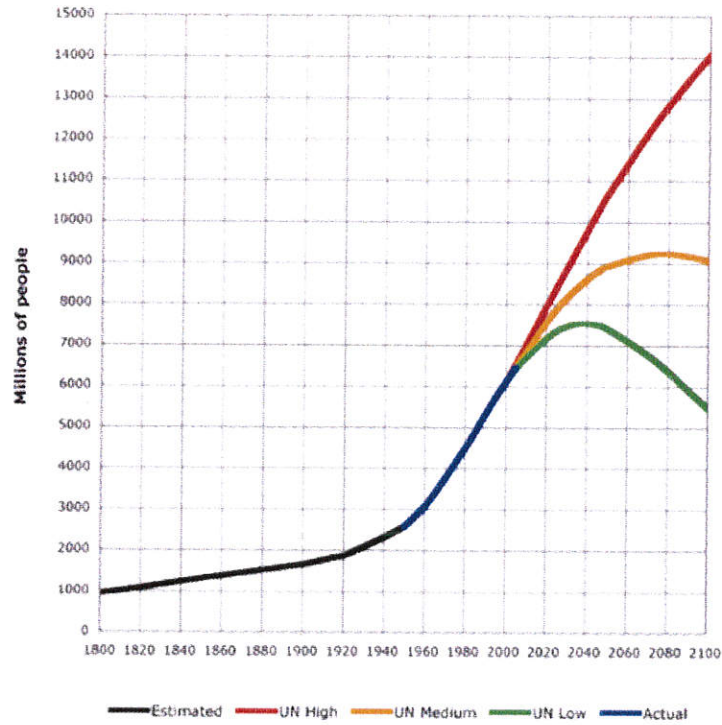
Main Wheat Import Countries 2010-2014

	Import mio.t.	
	2010	2014
Egypt	9.8	10.2
Algeria	5.3	7.5
Indonesia	5.5	7.4
Brazil	6.5	7.1
Japan	5.2	6.1
USA	2.9	4.8
Nigeria	4.0	4.6
Mexico	3.3	4.6
S. Korea	3.6	4.3
Turkey	2.5	4.1
EU27/28	5.5	4.0
Morocco	3.6	3.9
Philippines	2.8	3.5
Yemen	2.3	3.4
Saudi Arabia	2.0	3.4
Bangladesh	2.5	3.3
Iraq	3.6	3.2
Sudan	1.6	2.7
Afghanistan	2.3	2.1
Libya	1.9	2.0
Syria	1.5	1.6
Russia	2.0	
Tunisia	1.8	
Peru	1.6	
Israel	1.5	
South Africa	1.5	
Others	37.4	50.2
Total	126.7	162.1

Source: USDA Foreign Agricultural Service (Fas) November 2010/2014



World Population 1800-2100

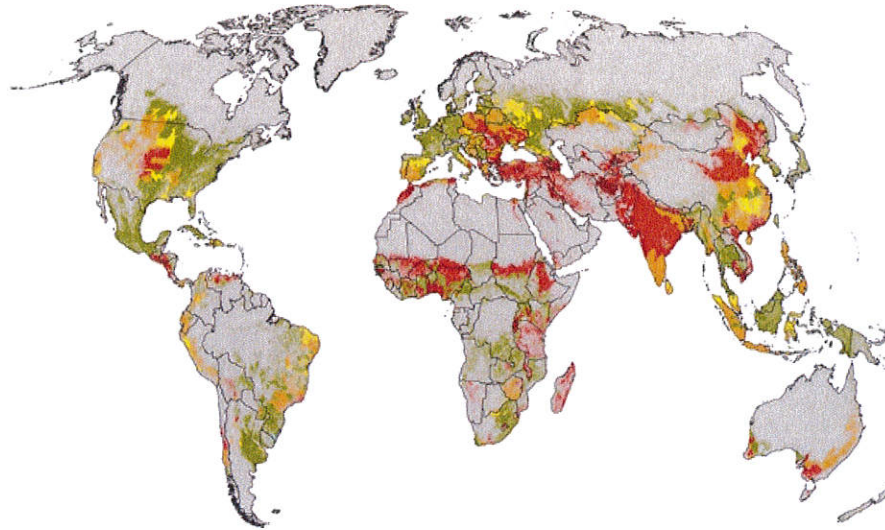


Is it possible to feed a world population of 9,0 mrd. people in 2050 ?

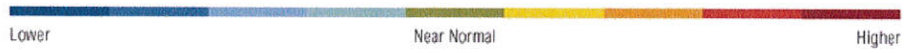
World Crop Area Projections (Million Hectares)

	2010	2015	2020	Change 2010-2020
Coarse Grains	313.9	317.7	323.0	9.1
Wheat	219.7	222.7	223.6	4.0
Rice	156.2	157.7	159.7	3.4
Oilseeds	202.8	209.5	215.2	12.4
Cotton	29.2	31.5	31.7	2.5
Fruit & Vegetable	114.3	117.1	120.1	5.8

Water stress will increase in many agricultural areas by 2025 due to growing water use and higher temperatures (based on IPCC scenario A1B)



Water Stress Condition

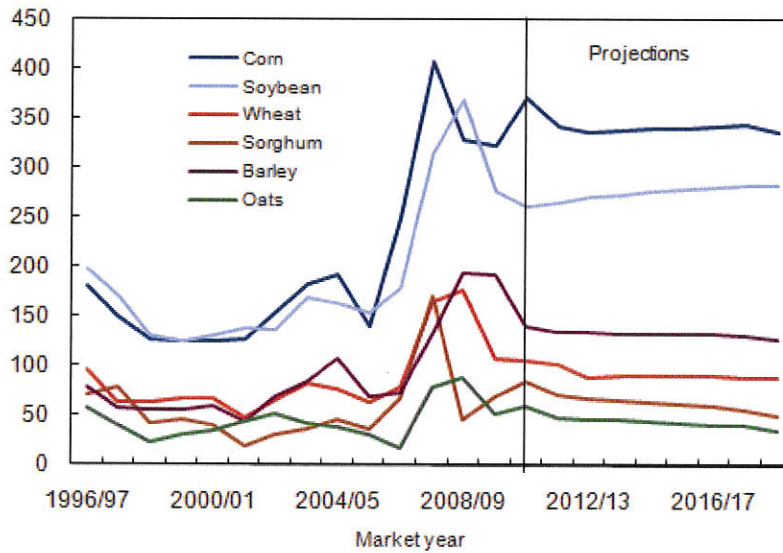


 WORLD RESOURCES INSTITUTE

Sources: <http://ow.ly/rp1MH>

Net returns for various crops

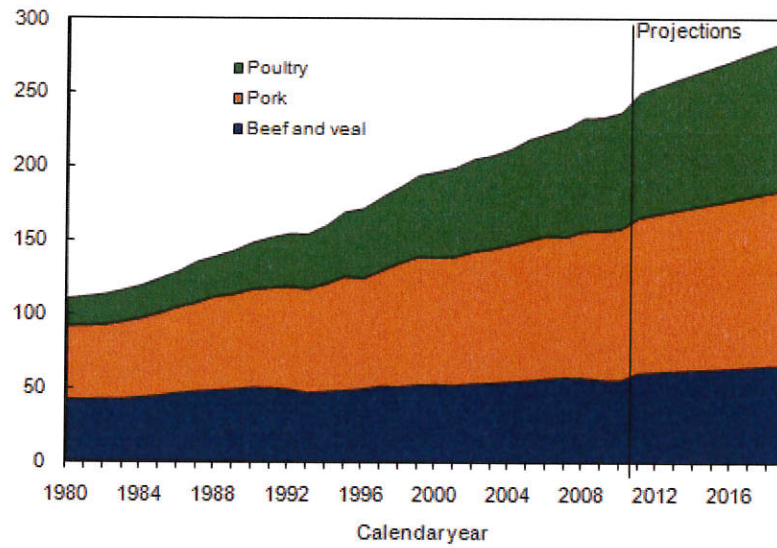
Dollars per acre



Source: *USDA Agricultural Projections to 2019*, February 2010. Economic Research Service, USDA.

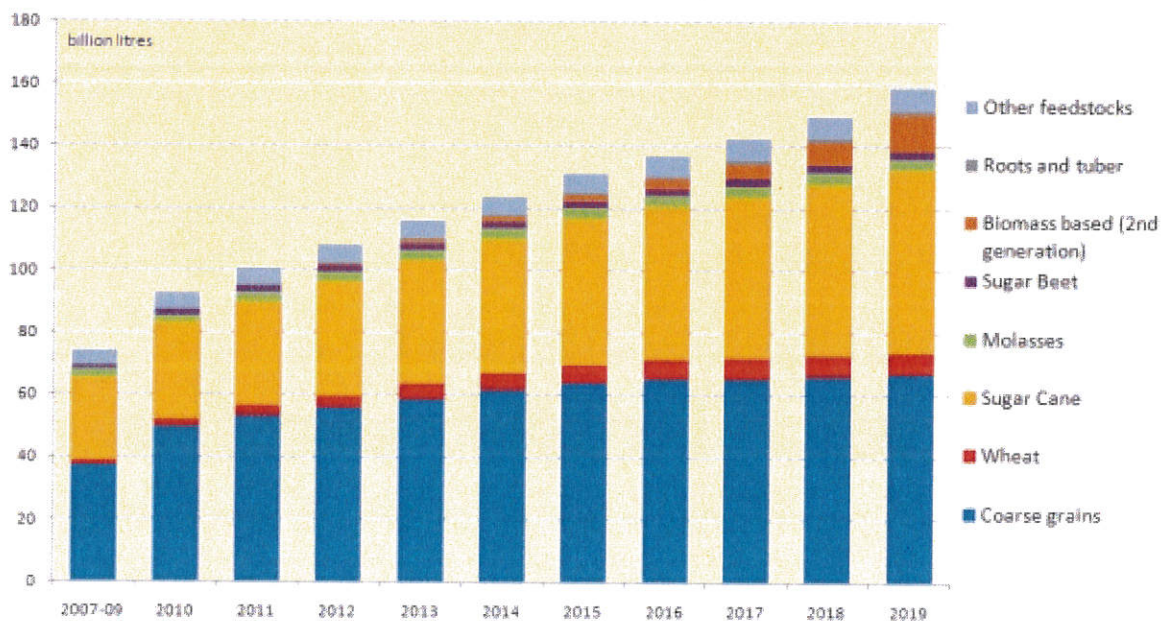
Estimated global meat production

Million metric tons

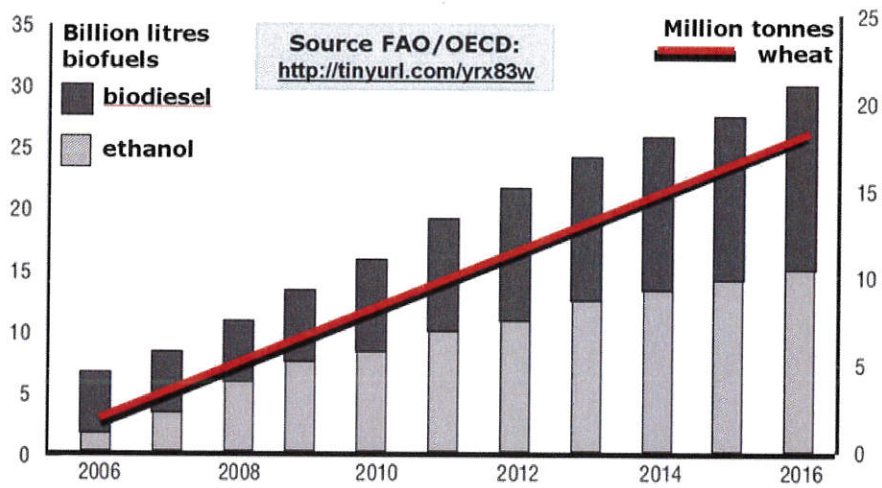


Source: *USDA Agricultural Projections to 2019*, February 2010.
Economic Research Service, USDA.

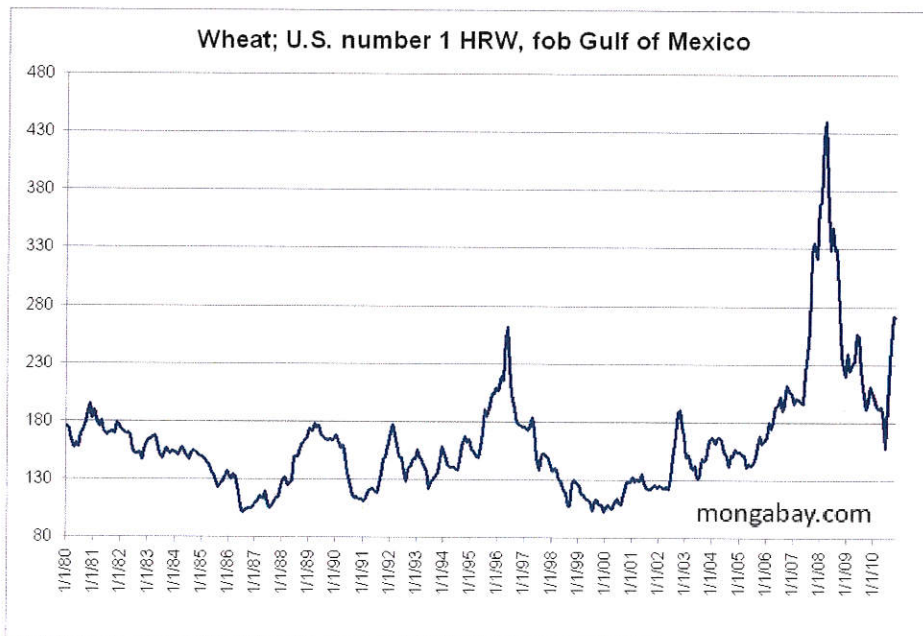
Global ethanol production by feedstock



EU Bio-Fuel Development



Wheat Price Development



- OECD FAO estimate a price rise of 20 % between 2010-2020
- Price depends on yield (catastrophes) and on stock-use ratio



HARD RED WINTER



The dominant class in U.S. exports and the largest class produced each year. Produced in the Great Plains states, a large interior area extending from the Mississippi River west to the Rocky Mountains and from Canada to Mexico. Wide range of protein content, good milling and baking characteristics. Used to produce bread, rolls and, to a lesser extent, sweet goods and all-purpose flour. Major foreign buyers include Russia, China, Japan, Morocco and Poland



HARD RED SPRING



Contains the **highest percentage of protein**, making it an **excellent bread wheat** with superior milling and baking characteristics. Majority of crop is grown in Montana, North Dakota, South Dakota and Minnesota. Exported largely to **Central America, Japan, the Philippines and Russia**



SOFT RED WINTER



Grown primarily east of the Mississippi River. High yielding, but relatively low protein. Used for **flat breads, cakes, pastries, and crackers**. Largest customers are **China, Egypt and Morocco**.



DURUM



The hardest of all U.S. wheat and consistently the class with the lowest export volume, accounting for less than 5 percent of all U.S. wheat exports. Grown in the same northern states as Hard Red Spring, although 70 to 80 percent of the U.S. annual production comes from North Dakota. Used to make **semolina flour for pasta** production. The largest importer is **Algeria**.



HARD WHITE WHEAT



The newest class of wheat to be grown in the United States. Closely related to red wheats (except for color genes), this wheat has a milder, sweeter flavor, equal fiber and similar milling and baking properties. Used mainly in **yeast breads, hard rolls, bulgur, tortillas and oriental noodles**. Used primarily **in domestic markets**, although it is exported in limited quantities



SOFT WHITE WHEAT



Used in much the same way as Soft Red Winter (for bakery products other than bread). Grown mainly in the **Pacific Northwest** and to a lesser extent in California, Michigan, Wisconsin and New York. **Low protein**, but high yielding. Produces **flour for baking cakes, crackers, cookies, pastries, quick breads, muffins and snack foods**. Exported to **Far East Asian** region.

**Quality laboratory
Portland Oregon
PNW**



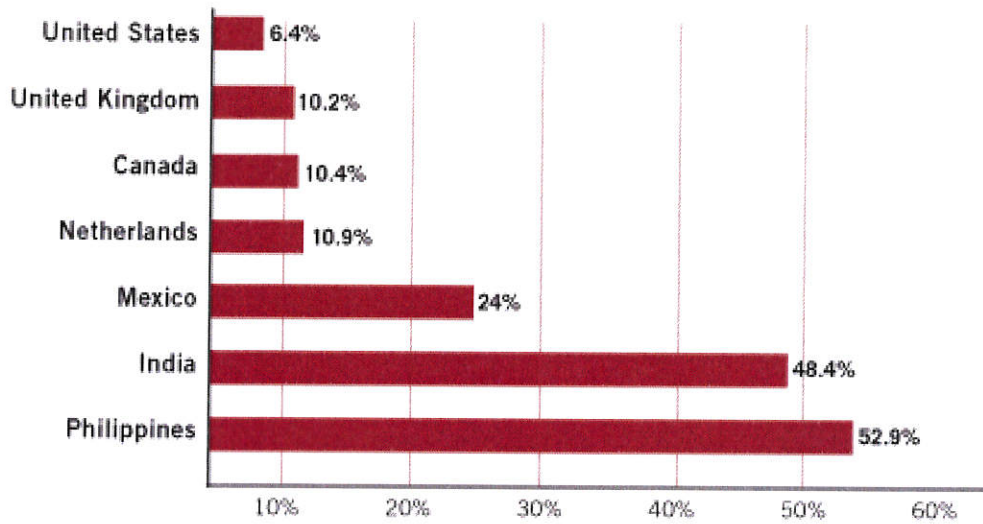
Problem Harvests

- 2002 Fusarium Head Blight in Europe
- 2003 Severe late frosts and Spring drought
- 2006 Severe Brown Rust epidemic
- 2010 Extreme pre-harvest sprouting in North West Europe
- 2012 Severe winter damage in Europe
- 2013 Late harvest due to very late Spring
- 2014 Severe Yellow Rust epidemic in Europe, extreme sprouting in France
- 2015 ? El Nino only mild in 2014,

**Wheat price spike caused riots
in Egypt in 2007 and gave rise to
the Arab Spring in 2012**



Percent of Disposable Income Spent on Food at Home



Wheat diseases and Pests

Fungal diseases

Fusarium graminearum
 Fusarium nodorum
 Fusarium spp.
 Magnaporthe grisea (Wheat Blast)
 Septoria nodorum

Septoria tritici
 Tan Spot (DTR)
 Mildew
 Brown Rust (Leaf Rust)
 Yellow Rust (Stripe Rust)
 Black Rust (Stem Rust) UG99
 Cephalosporium Stripe

Microdochium nivale (Snow Mould)
 Typhula
 Take-All
 Eyespot (Straw Breaker)
 Rhizoctonia (Sharp Eyespot)
 Fusarium pseudograminearum

Smut
 Stinking Bunt



UG 99



Viruses

BYDV
 WDV
 SBCMW
 WSSMV
 WSMV



Insect Pests

Root Nematodes
 Aphids
 Leaf Hoppers
 Thrips
 Ground Beetles
 Wire Worms (Agriotes)
 Cereal Leaf Beetles

Gall Midges
 Saddle Midge
 Hessian Fly
 Bulb Fly
 Frit Fly
 Stem Saw Wasp
 Locusts
 Anisoplia austriaca (Wheat Grain Beetle)
 Sunn Pest (Eurygaster)

Mayetiola destructor



Solution... Resistance breeding or Pesticides ?

