



Innovation in the Wheat Industry

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AEIC Spring Meeting

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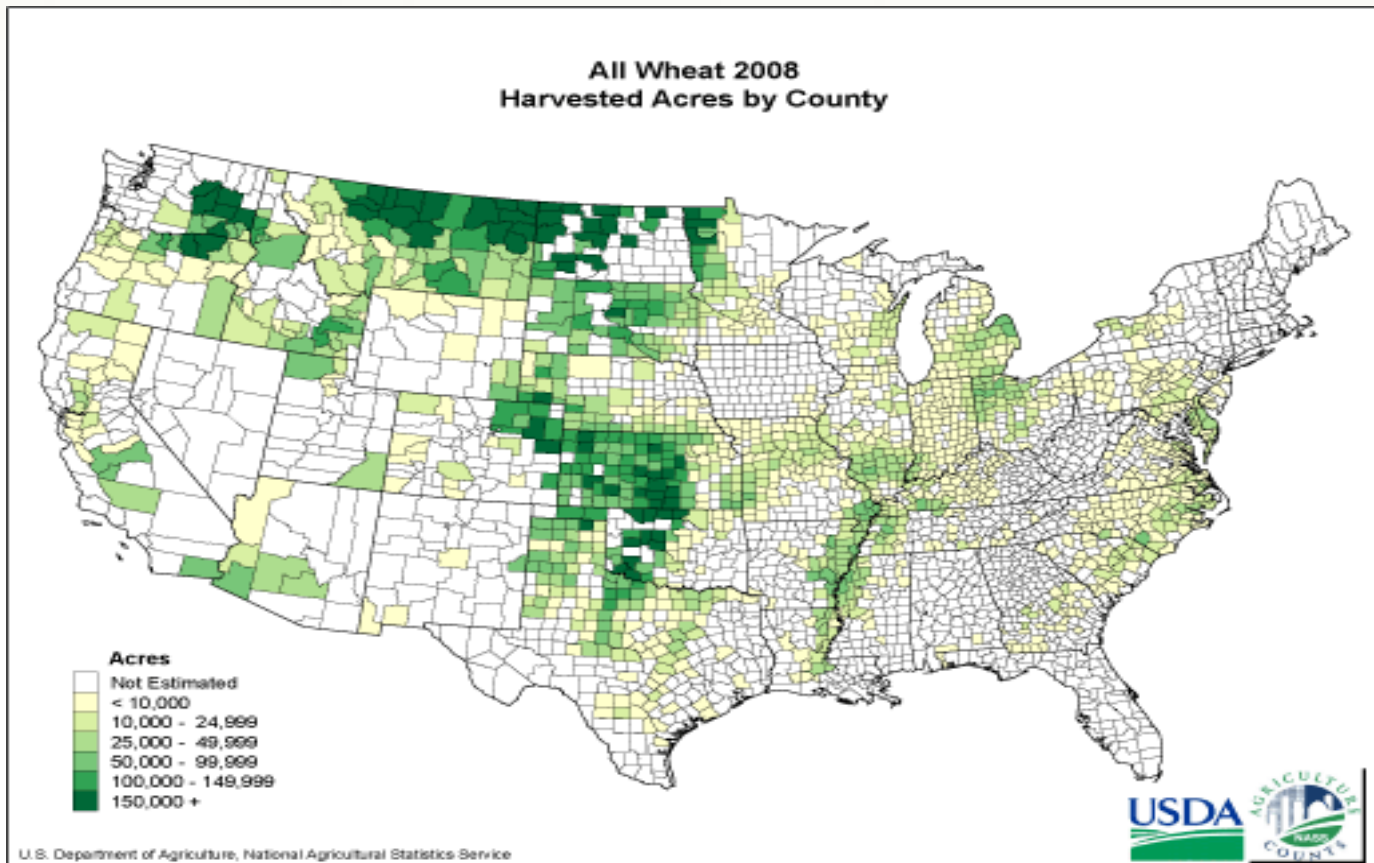
The World Needs Wheat

- Need to **double global food production** by 2050 to feed an estimated 9 billion people
- Wheat accounts for 20 percent of the world's caloric intake *(Source: FAO)*

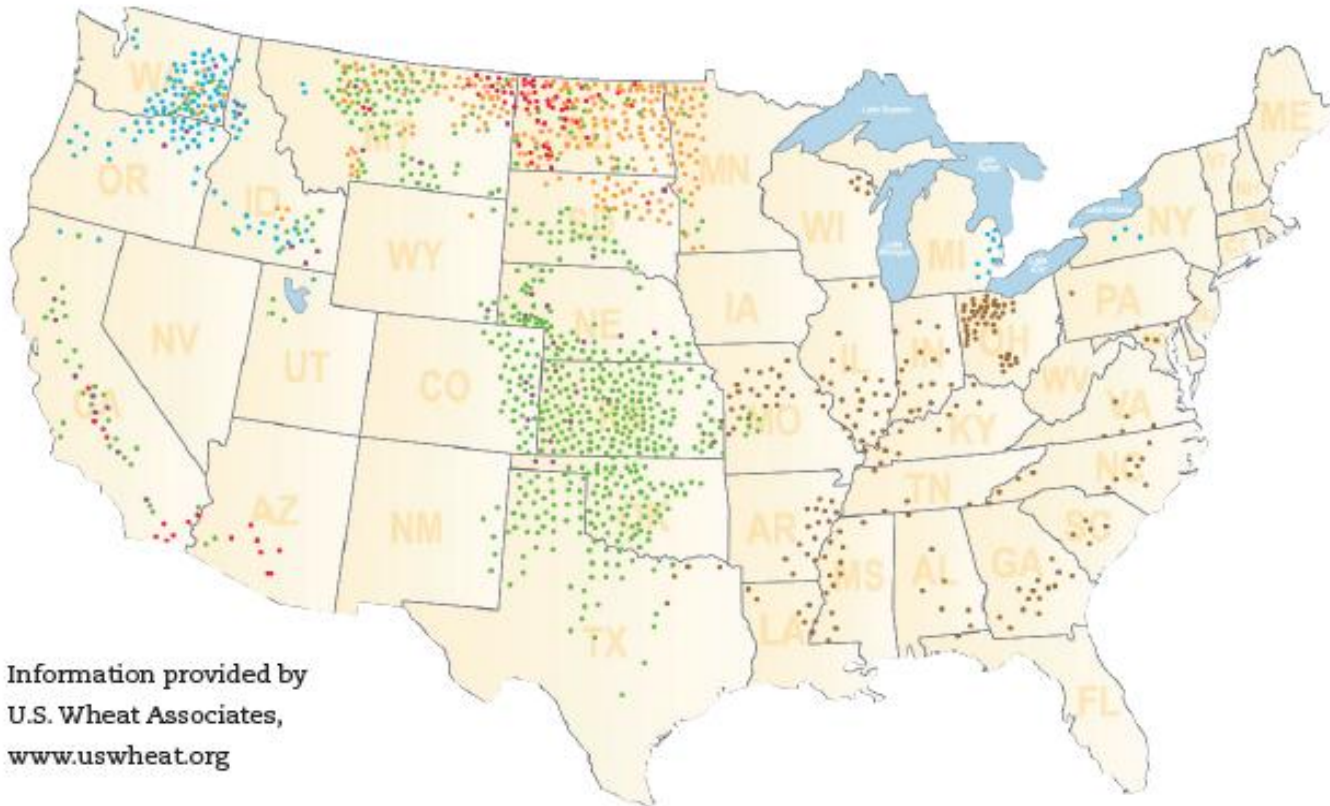
What the Future Needs

- Make wheat an attractive crop producers will choose to grow
- This requires
 - Public and private research
 - The entire wheat chain working together through dialogue and outreach

Where is Wheat Grown in the US



Wheat is Not Just Wheat

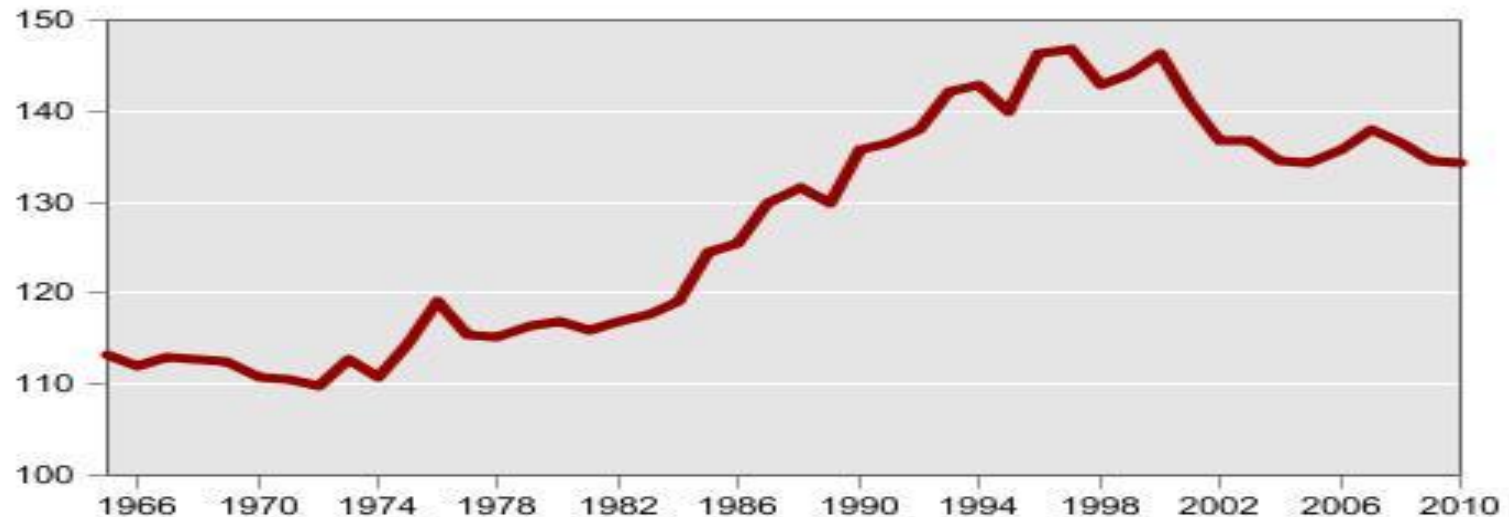


Information provided by
U.S. Wheat Associates,
www.uswheat.org

US Per Capita Wheat Flour Use

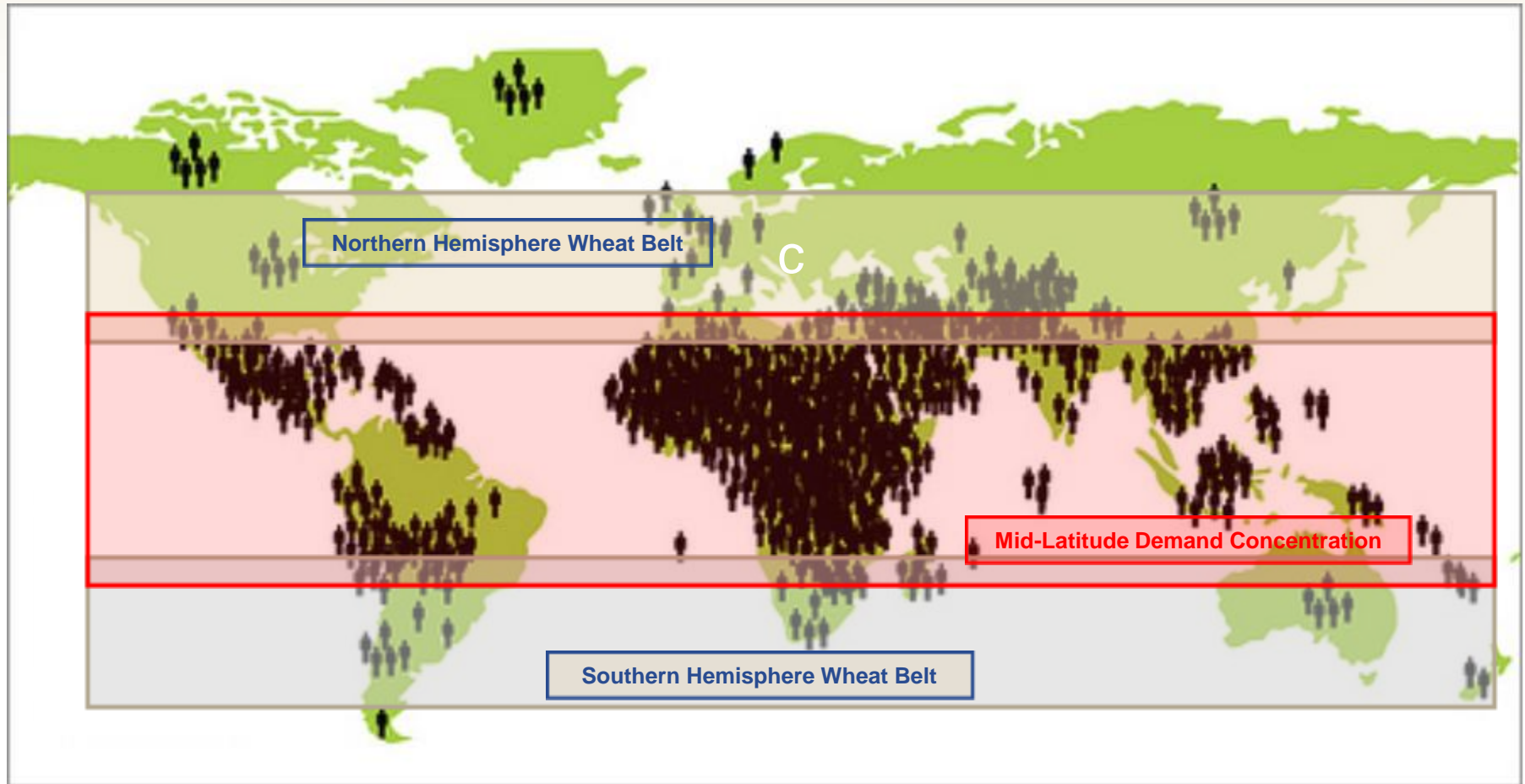
U.S. per capita wheat flour use, 1964-2010

Pounds/person



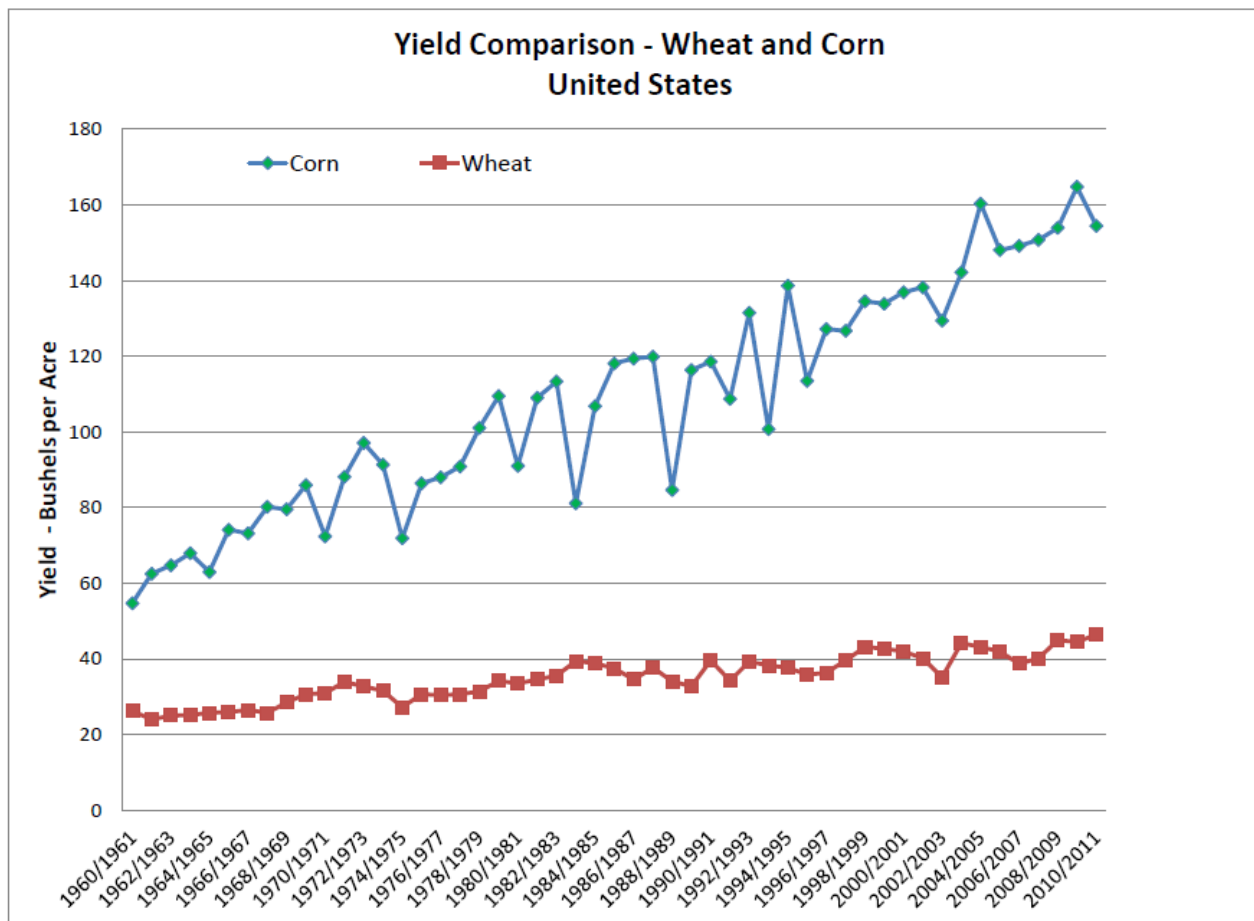
Source: USDA, Economic Research Service using data from ERS calculations using data from U.S. Department of Commerce, Bureau of Economic Analysis (population and trade) and Census Bureau, MQ311A.

Projected World Population Growth

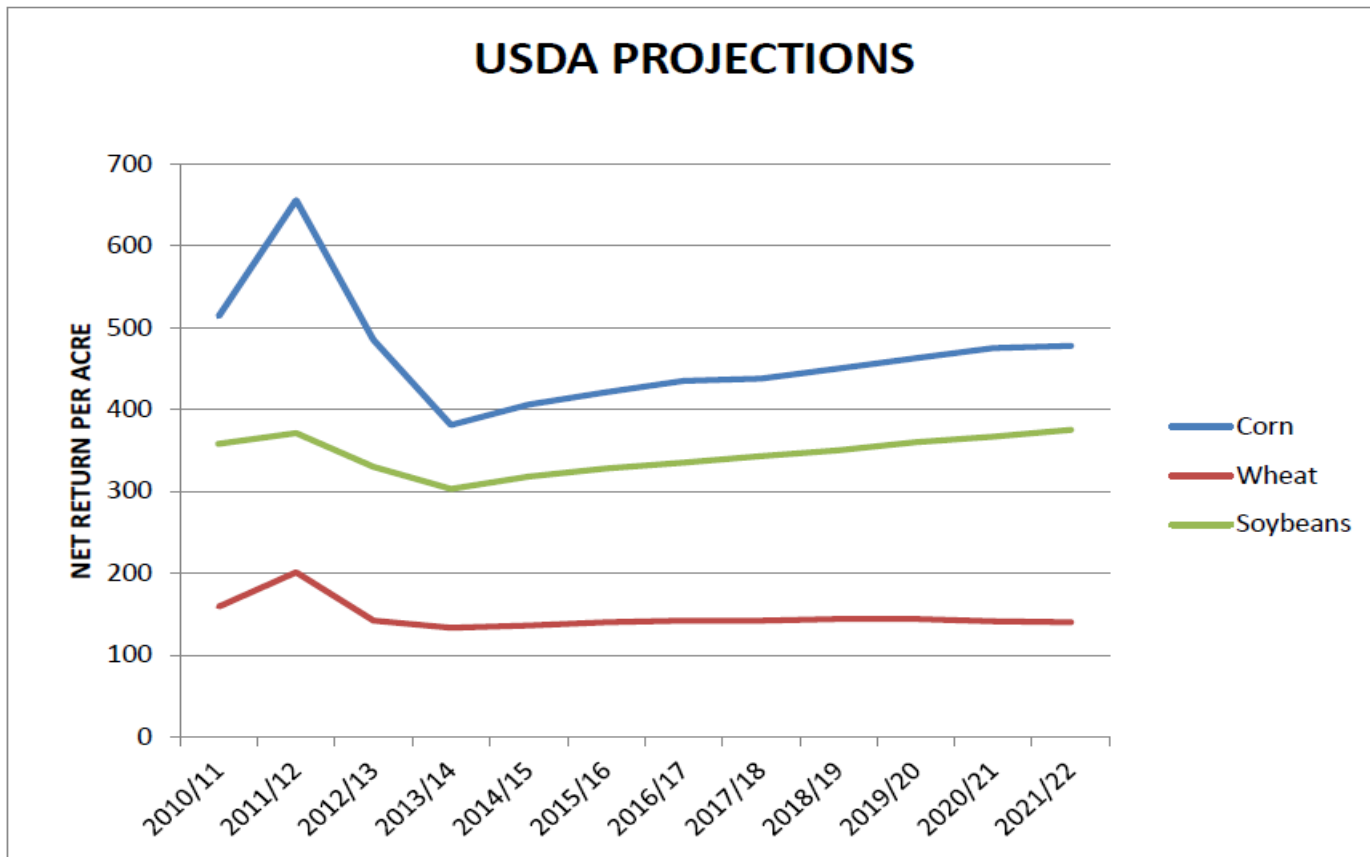


World wheat production occurs between about the 25th and 55th degrees, N & S latitudes

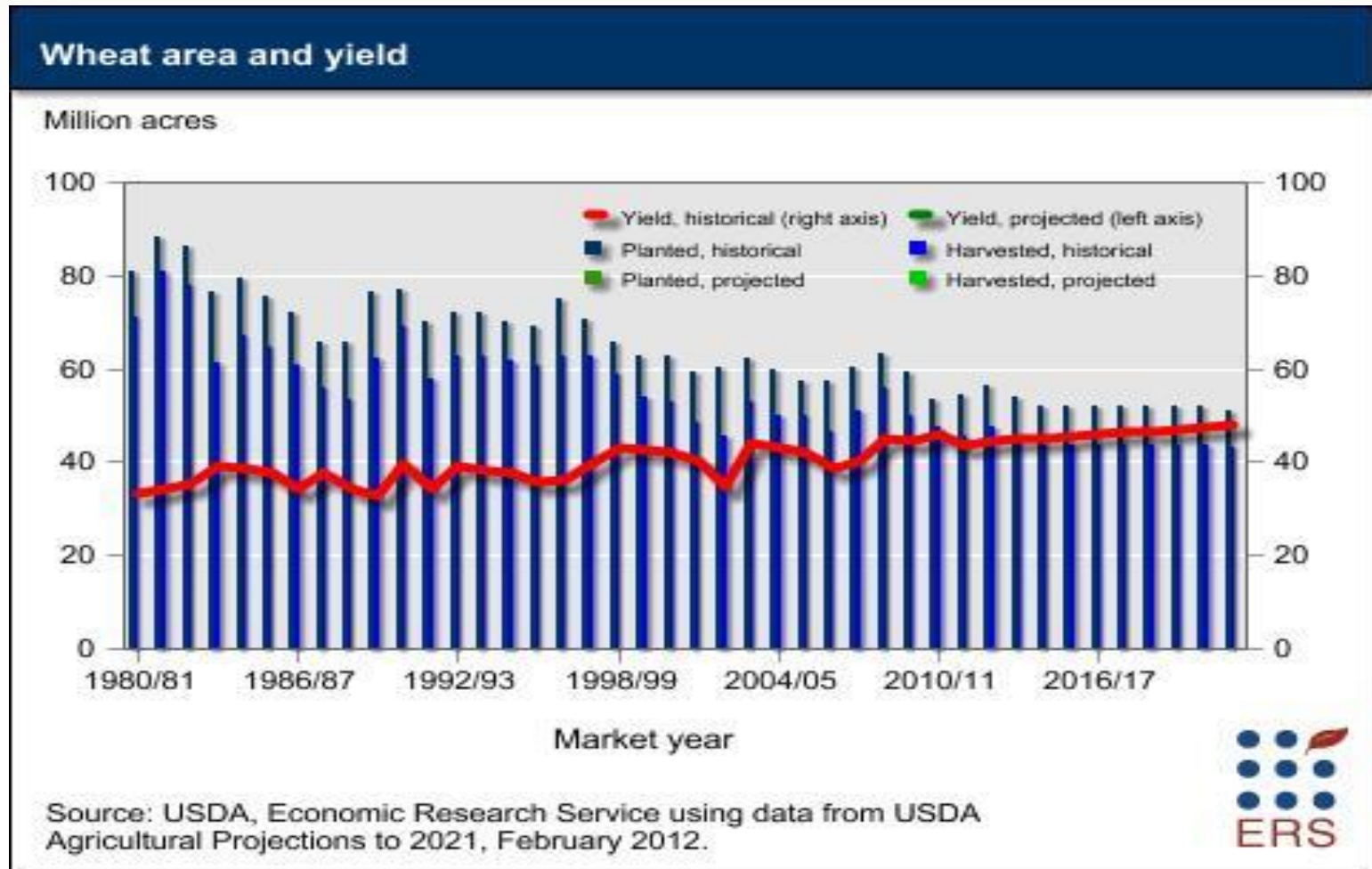
Corn vs. Wheat



Net Returns Per Acre



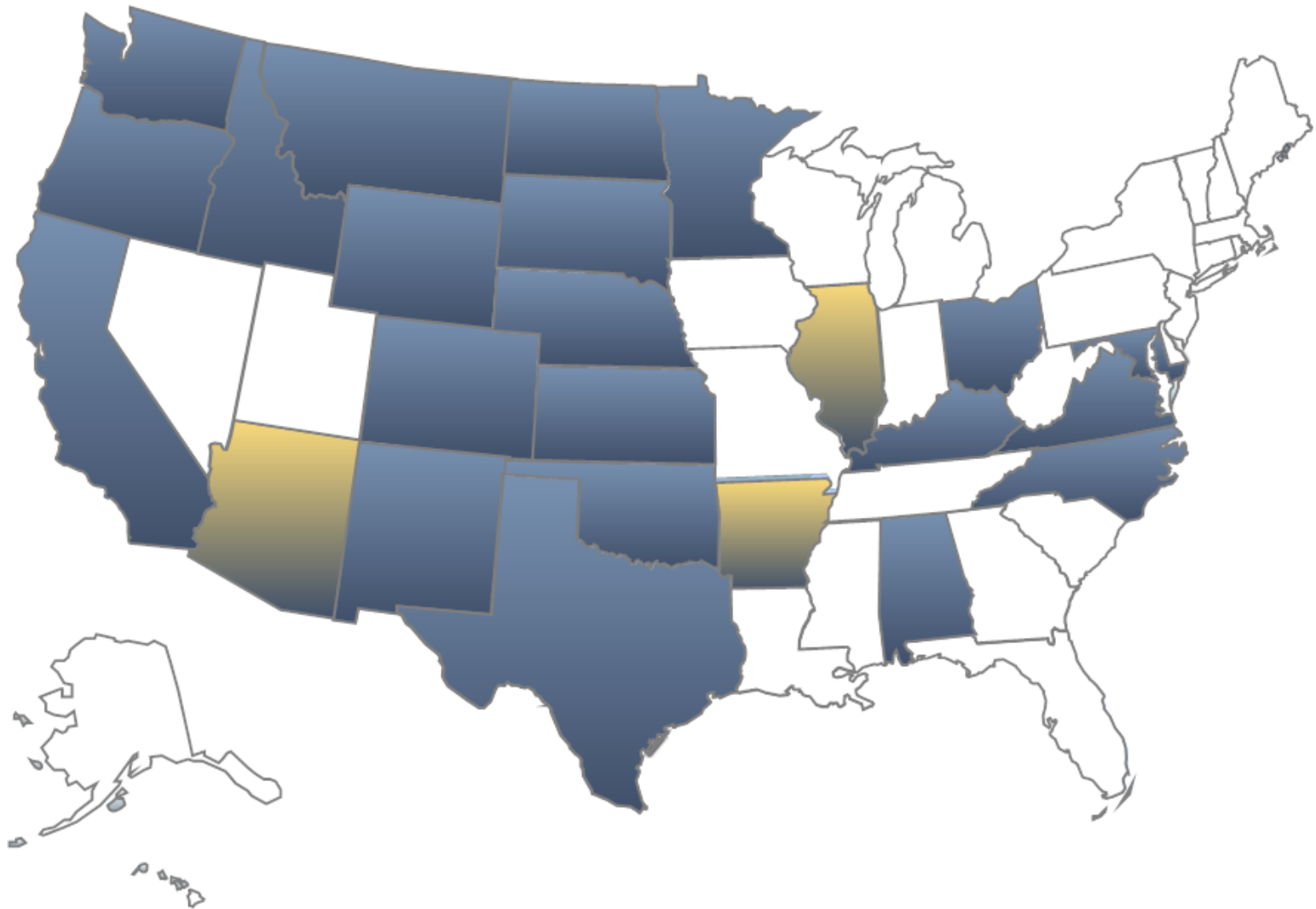
Wheat Acres Declining



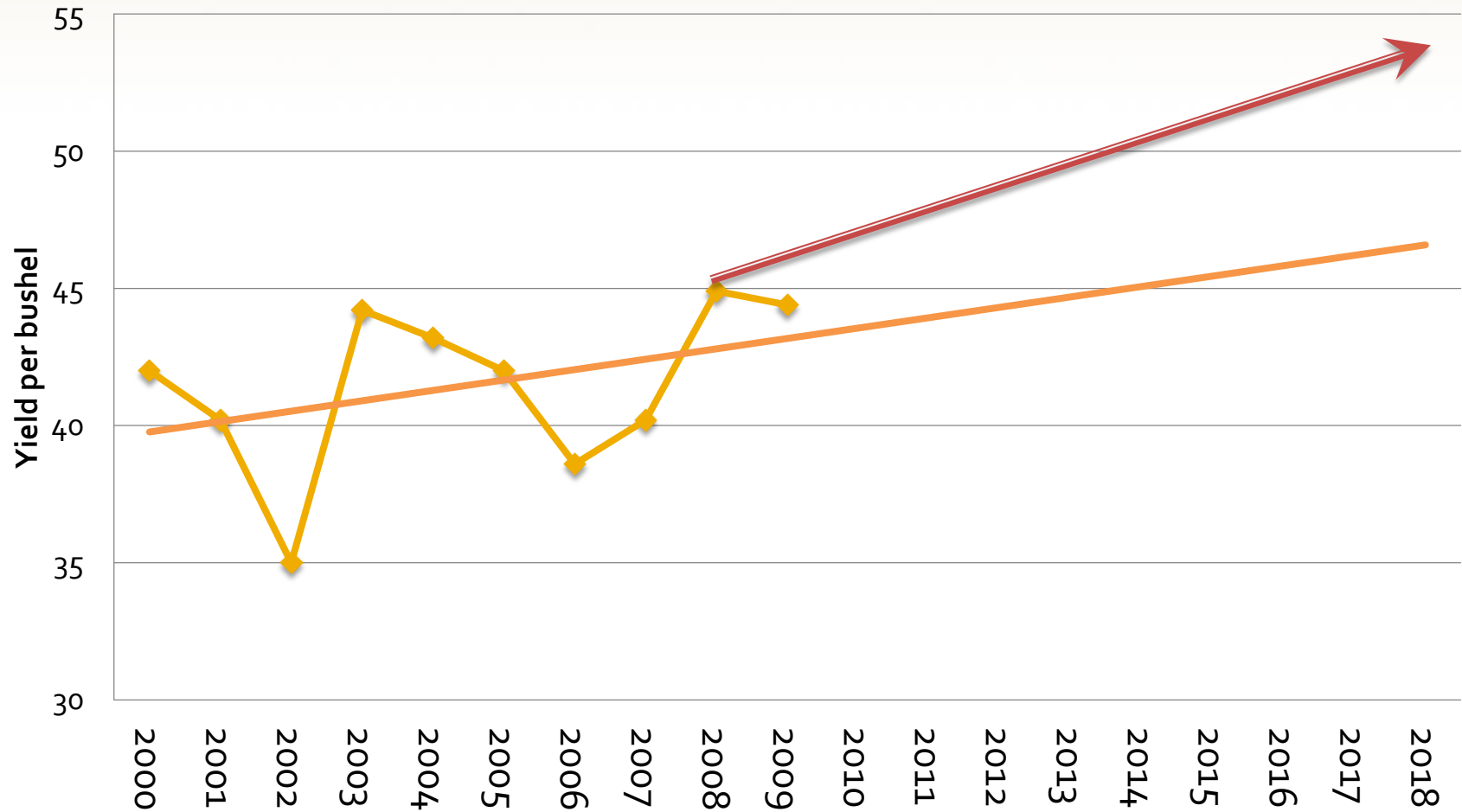
Wheat Diseases and Challenges

- **grain quality**
- wheat stem sawfly, Hessian fly, other insects
- stem, leaf and stripe rust diseases
- **Fusarium head blight**
- foliar diseases, root diseases
- powdery mildew, septoria diseases
- crown rot, root diseases
- Nematodes, aphid management/control
- post-harvest sprout tolerance
- **drought and heat stress, cold stress,**
- spring freeze damage
- weed management
- dual-use

NAWG Member States



Achieve a 20% yield increase by 2018





Paving the Way for New Technology The Case for Biotech Wheat” (Sept. 2009)

- Wheat acres are on a downward trend
- Net returns per acre to farmers favor other crops
- The wheat industry must change the equation
- Biotechnology can make a significant contribution
- Choice in the marketplace is fundamental.**

Wheat Biotechnology Commercialization

Statement of Canadian, American and Australian Wheat Organizations
May 14, 2009 (name of Grains Producers Australia updated Dec. 6, 2010)

In the interest of expressing support for more efficient, sustainable and profitable production of wheat around the world, the undersigned organizations have approved the following joint statement concerning commercialization of biotechnology in wheat:

1. Wheat is a vital food to all peoples of the world and we believe that by developing higher yielding better quality wheat varieties we can better supply the world with wheat food products.
2. One important tool to help feed the world into the future is biotechnology. Basic agronomic improvements to wheat like strengthening disease and insect resistance, enhancing wheat's use of soil nutrients and water, increasing its tolerance to weather extremes like drought and frost, are all possible with biotechnology. Another critical area for biotechnology is to improve the nutritional aspects of wheat to facilitate healthier living for people all over the world. Biotechnology is not the only answer to these questions, but it will be a significant component in solutions.
3. In many of our production areas, wheat production is under pressure from competing crops which, through the application of biotechnology, have achieved higher productivity, reduced input use, and other benefits not available in wheat. As a result, the historic area of wheat production has declined in many areas and economics are driving producers away from wheat and into other crops if they have alternatives. If wheat continues on a non-biotech course, then farmers will continue to devote a greater share of their acreage to biotech crops, where profitability is relatively greater, resulting in lower world wheat production than would otherwise be the case.
4. In general, wheat yields are on a very slow growth trend in comparison with competing crops, and the longer it takes to increase the growth rate the bigger will be the hole from which the industry must climb.
5. Biotechnology is a proven technique to deploy traits of interest with a high degree of precision in agricultural crops. Crops derived through biotechnology are subjected to strict regulatory scrutiny before commercialization. Over 10 years of global experience with biotechnology has demonstrated a convincing record of safety and environmental benefits as well as quality and productivity gains.
6. Lack of private and public investment in wheat research has left wheat development behind the advances in competing commodity crops, and has also led to a shortage of scientific expertise in wheat research generally. By providing an opportunity for private companies, the level of activity in wheat research will expand and attract a new generation of scientists into the field.

In light of these resolutions, we will work toward the goal of synchronized commercialization of biotech traits in our wheat crops. While none of us hold a veto over the actions of others, we believe it is in all of our best interests to introduce biotech wheat varieties in a coordinated fashion to minimize market disruptions and shorten the period of adjustment. We are also committed to working with other stakeholders to address their needs and concerns as we travel the road to commercialization.



National Association of
Wheat Growers
U.S. Wheat Associates
North American Millers'
Association



Grain Growers of Canada
Western Canadian Wheat
Growers Association
Alberta Winter Wheat
Producers Commission



Grains Producers Australia
Grain Growers Association
Pastoralists and Graziers
Association of Western
Australia (Inc.)

1. Wheat is a vital, staple food
2. Biotechnology has been proven to reduce plant pests & diseases; increase productivity
3. Wheat, as a crop, is under pressure. Land area is in decline.
4. Wheat yield growth falls far behind competing crops.
5. Biotechnology is well regulated; has proven safety, performance and quality improvement record;
6. Investment in wheat research runs far behind competition



Principles for Commercialization

Originally adopted by NAWG and USW in 2004

1. Tech provider dialogue with USW/NAWG
2. Major market approvals
3. Low level presence thresholds
4. Accurate, fast and economical detection tests
5. Education and outreach supported by tech providers
6. Stewardship of technology
7. Value capture model = certified seed system

Traits of Interest

- **Drought tolerance**
 - **Improved yield**
 - **Disease tolerance, especially fusarium**
 - **Nitrogen use efficiency**
- Nutritional improvements
Protein quality & quantity

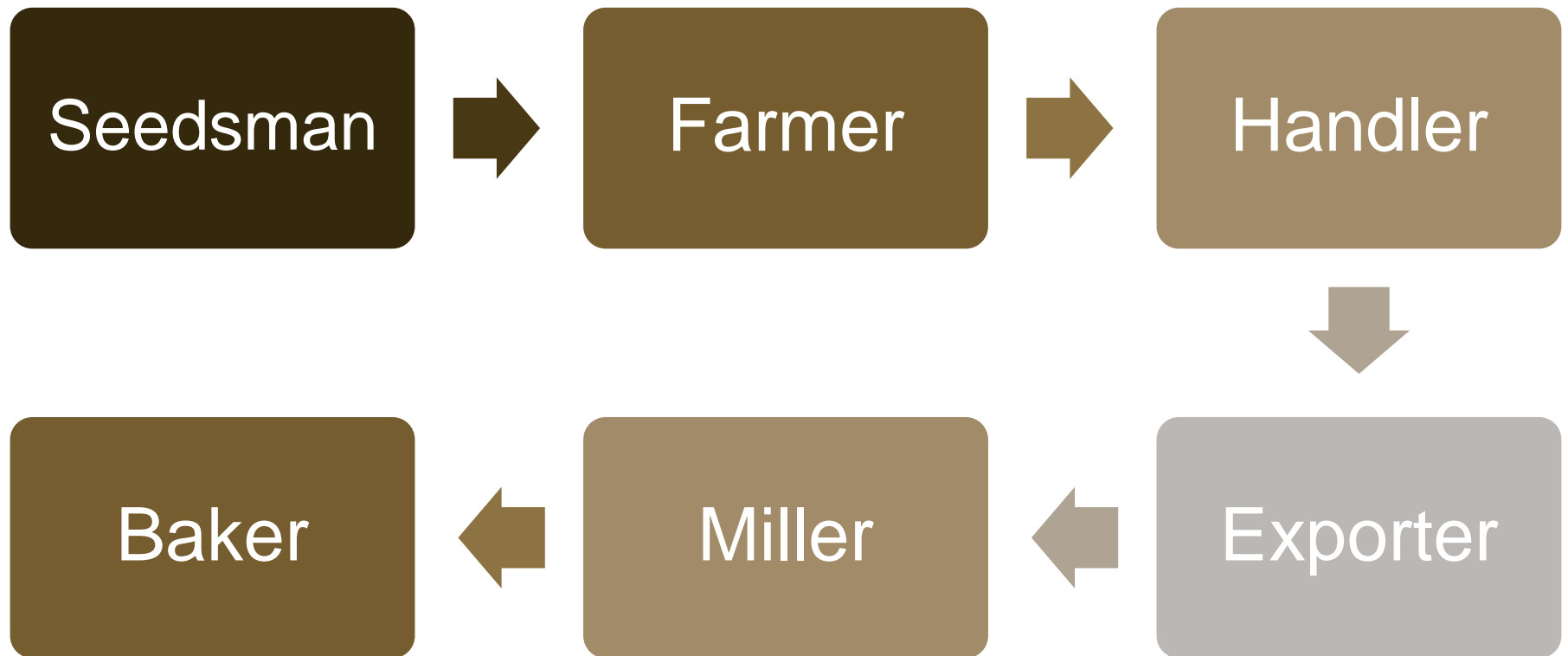
New Investments in Wheat

- **2008 to 2011**

- Bayer CropScience – Winter wheat, CSIRO, Athenix, Evogene, U of Nebraska, RAGT Semences, SDSU, Texas A&M
- Monsanto – WestBred, InterGrain, KSU, BASF, VA Tech
- Syngenta – Agri-Pro, Resource Seeds and Goldsmith Seeds, CIMMYT
- Limagrain – North American program, seed companies, Idaho State
- Dow AgroSciences – Northwest Plant Breeding HRZ Wheats
- Arcadia Biosciences – CSIRO & ACPFG, Limagrain
- KWS Cereals USA And more to come...

Industry Coordination

Timing is everything. When biotech wheat is ready, the entire industry needs to be ready.



Wheat Related Organizations

- NATIONAL ASSOCIATION OF WHEAT GROWERS – www.wheatworld.org/research and wheatworld.org
- US WHEAT ASSOCIATES – www.uswheat.org
- NATIONAL WHEAT IMPROVEMENT COMMITTEE -
- WHEAT FOODS COUNCIL - www.wheatfoods.org/
- GRAIN FOODS FOUNDATION – www.grainpower.org

Wheat Related Organizations Cont'd

- INTERNATIONAL GRAINS PROGRAM – www.ksu.edu/igp
- NORTHERN CROPS INSTITUTE – www.northern-crops.com
- WHEAT MARKETING CENTER – www.wmcinc.org
- AMERICAN INSTITUTE OF BAKING – www.aibonline.org
- AMERICAN ASSOCIATION OF CEREAL CHEMISTS – www.aaccnet.org
- WHEAT QUALITY COUNCIL - www.wheatqualitycouncil.org

Wheat Related Organizations Cont'd

- INTERNATIONAL WHEAT GENOME SEQUENCING CONSORTIUM – www.wheatgenome.org
- NORTH AMERICAN MILLERS' ASSOCIATION – www.namamillers.org
- AMERICAN BAKERS ASSOCIATION – www.americanbakers.org
- NORTH AMERICAN EXPORT GRAIN ASSOCIATION - www.naega.org

Innovation Now and for the Future

- **Innovation is needed** – wheat has fallen behind, the world needs food
- Wheat industry is **working together** toward responsible commercialization of biotechnology
- Public and private organizations have responded to calls from growers in the U.S., Canada and Australia for **more investment in wheat**