

4

Grand Challenge 4

We must play a global leadership role to ensure a safe, secure, and abundant food supply for the United States and the world.

Acknowledgments

■ Science Leaders

Glen C. Shinn (Texas A & M University), Team Leader
Jacque Fletcher (Oklahoma State University)
Francisco Diez-Gonzalez (University of Minnesota)
Susan F. Barefoot (Clemson University)
James G. Leising (University of Minnesota)

■ Executive Director

Carolyn Brooks (Association of 1890 Research Directors [ARD])

■ ESCOP Science and Technology Committee Members

John Liu (Auburn University)
Frank Zalom (University of California, Davis)

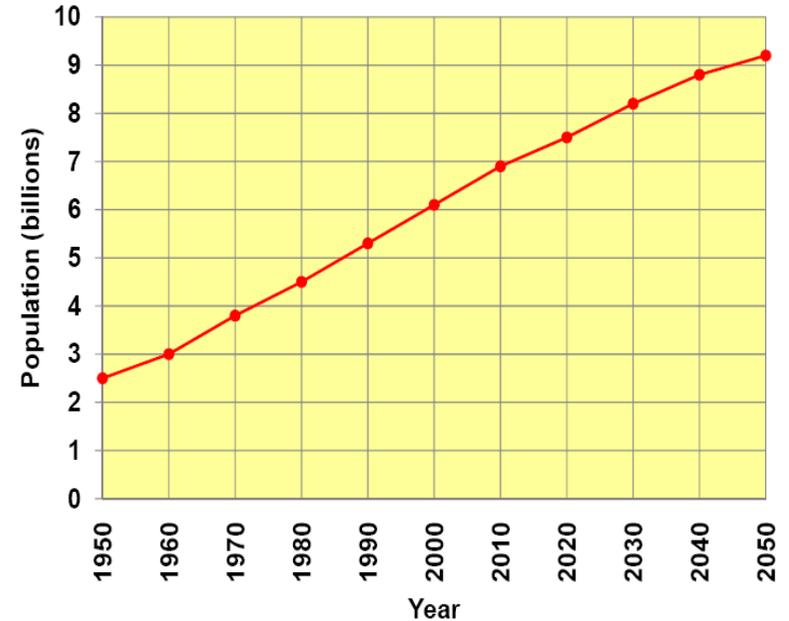
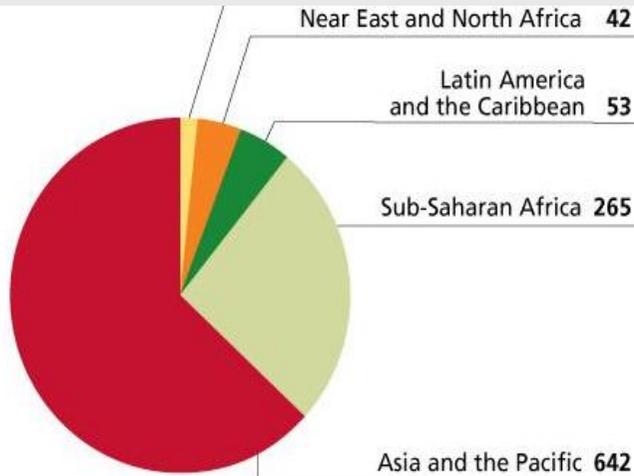
■ Peer Reviewers

George R. Askew (Clemson University)
Vern Cardwell (University of Minnesota)
Mary Palm (USDA-Animal and Plant Health Inspection Service [APHIS])
Mary E. Palm-Hernandez (USDA-APHIS)
Travis Park (Cornell University)
Frank Busta (National Center for Food Protection and Defense)

Food Security

Grand Challenges of Agriculture

1 in 6 people hungry
= 1.02 billion



“In the next 50 years we are going to have to produce more food than we have in the last 10,000 years, and that is a daunting task.”

---Norman Borlaug

Food Safety

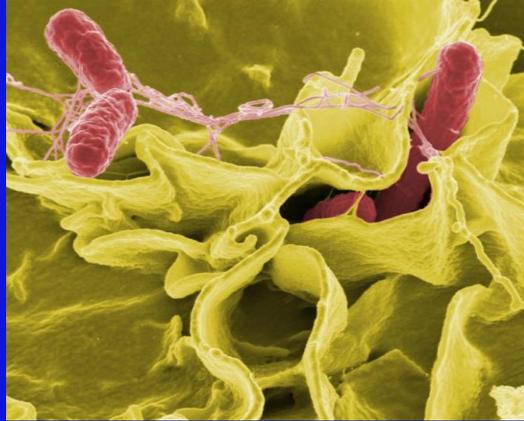
Salmonella

E. coli O157:H7

Fungal toxins

Bird flu

Bioterrorism



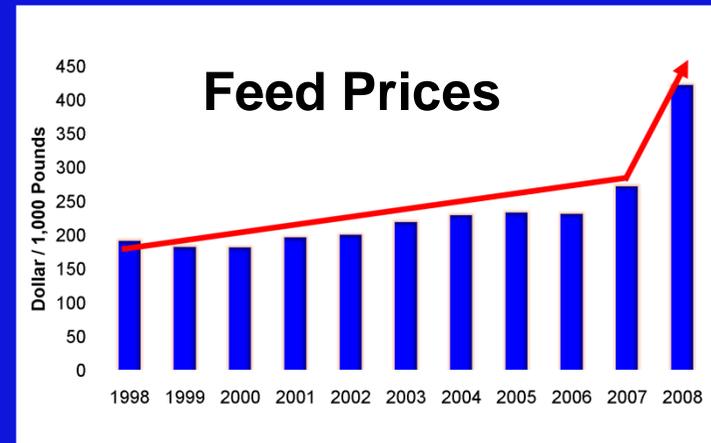
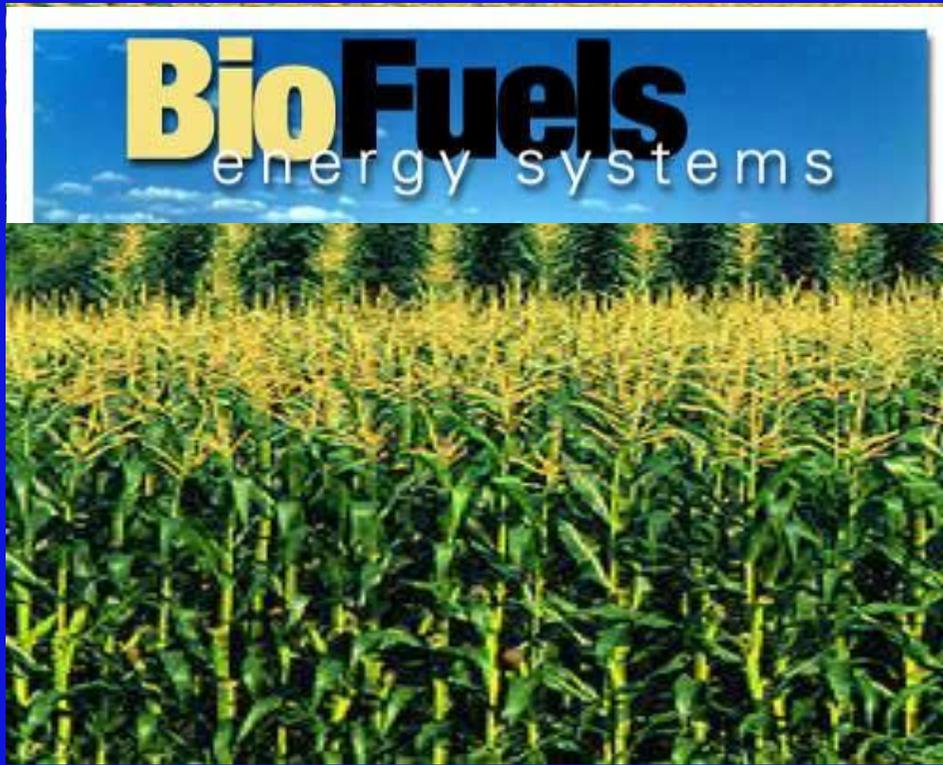
- 76 million annual illness in the US
- 5000 annual deaths in the US
- \$152 billion annual economic loss in the US
- > 2 million people worldwide die from foodborne or waterborne diarrheal diseases annually

Environmental Degradation & Climate Change Threaten Food Security

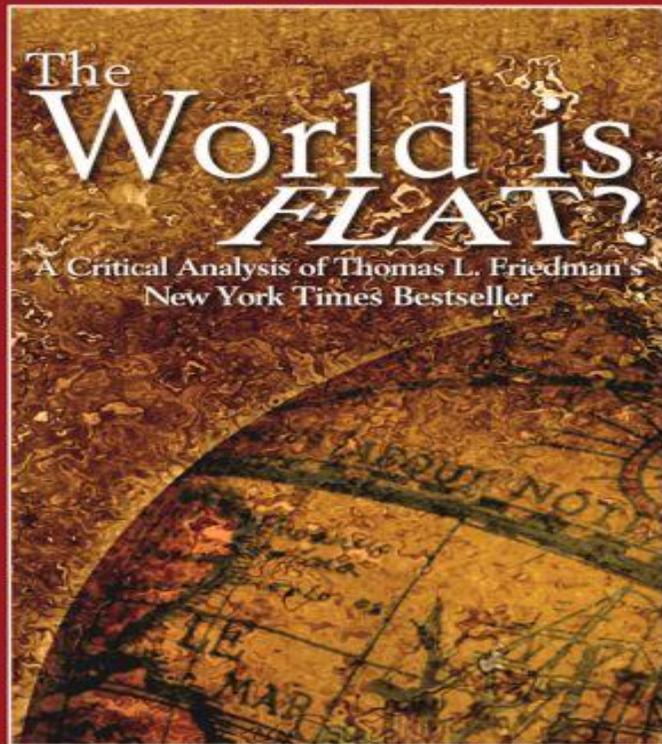


- **Extreme weather**
- **Climate change**
- **Water resources**
- **Reduced farm lands**

Competitive use of farm land, and increased cost of farming



Globalization requires a global approach



Ronald Aronica • Mtetwa Ramdoo

- **Global demands on food**
- **Global climate change**
- **Global food safety**
- **Global terrorism**
- **Global competition**
- **Global cooperative initiatives**

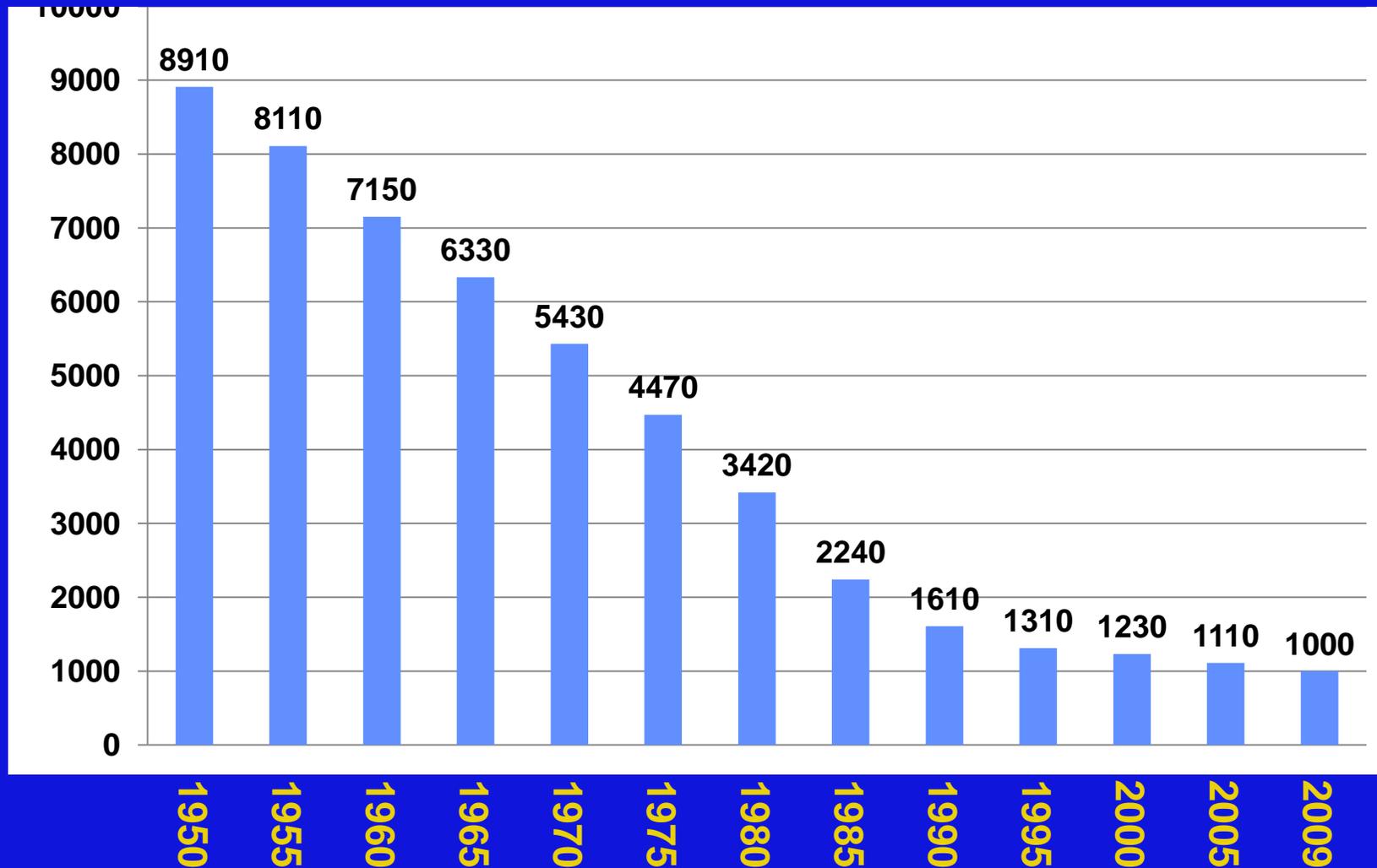
Current capacity: Landgrant system is best-positioned to take on the challenges

- **106 Land grant and 218 APLU institutions**
- **645,000 faculty members, 3.5 million undergraduates, and 1.1 million graduate students.**
- **Research-extension integrated systems**
- **State, regional, and multistate research network**

But must reenergize:

- **Setting priorities**
- **Strengthen collaborations**
- **Training next generation of Ag scientists and labor force**

Science Gaps: Ag Research Funding Has Declined in Real Value for Decades



Lawrence H. Officer and Samuel H. Williamson, "Purchasing Power of Money in the United States from 1774 to 2009," Measuring Worth, 2010. URL <http://www.measuringworth.com/ppowerus/>

US Must Invest Significant \$\$\$ in Agriculture to Maintain Leadership Role in the World

- **Purchasing powers of BRIC already 15% larger than US;**
- **China's economy alone will catch that of US in just short few decades;**
- **China and India train more engineers and Ph.D.'s than US;**
- **Significant Ag research investment by China, Brazil, and others.**

Research Needs and Priorities

1. Maximize the genomic potential of plants and animals
2. **Prevent, detect, monitor, control, and respond to food safety hazards**
3. Develop trace technology for microbial, chemical, and physical food contaminants
4. **Improve the nutritional values, diversity, and health benefits of food.**
5. Detect and eliminate bioterrorism agents, invasive species, pathogens
6. **Reduce dependence on chemicals such as pesticides, herbicides, and fungicides**
7. Identify plant compounds that prevent chronic human diseases (e.g., cancer)
8. **Plant and animal breeding**
9. Examine the impacts of changes in the food supply and food transportation systems relative to preservation practices, safety, and energy efficiency
10. **Develop food production regulatory policies**
11. Enhance translational research and technology transfer
12. **Develop cooperative international initiatives**

4

Expected Outcomes

a safe, secure, and abundant food supply for the United States and the world.