

Is Agriculture Ready to Meet the 21st Century Challenge?

By Beth Bechdol, Pork Industry Day Guest Speaker



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Never in history has so much been required of agriculture. In addition to the ever-present mission to feed the world, agriculture is expected to help mitigate climate change, develop alternative energies, improve human health and create new sources of food and nutrition.

In just 50 years, the over nine billion people then living on this planet will require 100 percent more food than is needed today. Translation: agriculture will need to produce in that same time period twice the amount of grain, livestock and other products.

Because of environmental and practical limitations, there is simply insufficient high-quality land to just "grow" or "raise" more food. According to the World Bank, there is at most 12 percent more arable land available for food production that isn't presently forested or subject to erosion or desertification. There also will be significant limitations on water availability in the future. By 2050, it is estimated, four billion people, eight times as many as today, will be living in countries with chronic water shortages.

The United Nation's Food and Agriculture Organization reports that new farmland could meet 20 percent of this new food demand and increased cropping intensity may yield another 10 percent. The remainder – an overwhelming 70 percent of the additional world food needs – must come from technology and innovation.

Technology advancements and corresponding productivity gains in agriculture across the 20th century were remarkable and arguably prevented major famines or devastating food wars. Consider the following:

- Corn yields in 1910 were about 15 bushels to the acre. In 1960, they were 55 bushels per acre, and today, they are well over 160 bushels – a 300 percent increase in just the

- last 50 years. Wheat and soybean yields have seen 215 percent and 169 percent increases in that same 50-year period.
- The livestock sector, too, continues to provide more high-quality protein using fewer resources. The U.S. dairy industry produces nearly 60 percent more milk with 64 percent fewer cows than it did some 65 years ago. And, the same trend holds for pork. Compared to 1950, U.S. hog farmers produce 176 percent more pork per sow with 44 percent fewer sows.
- A century ago, each U.S. farmer's production fed only a dozen or so people. Today, the average U.S. farmer feeds 155 people.

Our next set of great challenges, though, will require even greater solutions and must come not only from the U.S. but from around the world. Investment and commitment to these three unique, yet inter-connected, areas are especially critical to our problem-solving.

1. Infrastructure. In the U.S., we continue to lament the crumbling road, bridge, rail and barge/shipping networks that are so critical to our agriculture industry's competitiveness and its ability to move products all over the globe. Massive (and long-term) investments are needed to modernize these massive networks and may have to come at the expense of other agricultural supports.

In the developing world, imagine the productivity gains that could come from improved roads, electricity, storage facilities, and irrigation. Without them, small farmers can't get fertilizer in or their produce out to market, they can't run water pumps and other equipment, and they lose too much of their crop after the harvest.

2. Agricultural research. To double production on existing land, more funding for agricultural research is needed from both the public and private sectors. Continued research for an expanding food system is essential in biotechnology and genomics, animal disease and human health, ecosystem services, food safety, chemical and biological engineering, information and satellite technology, among many other areas.

Groundbreaking research is occurring in the public sector and at the university level. Showing my Boilermaker pride, I would highlight that Purdue University is home to two of the past three World Food Prize recipients (the Nobel Prize equivalent). Dr. Phil Nelson received the 2007 prize for breakthrough developments in large-scale storage and transportation of fresh fruit and vegetables that make it possible to store foods for long periods of time without losing nutritional value or taste, and Dr. Gebisa Ejeta was honored in 2009 for developing drought-resistant sorghum hybrids which have enhanced the food supply for hundreds of millions of people in sub-Saharan Africa. These same innovations come from laboratories in Nebraska, Florida, Buenos Aires, Beijing and the world over.

Similar cutting-edge research and development occurs every day in private laboratories too. While it is unfortunate that total spending on public agricultural research has been on a steady decline, private companies are investing tens and hundreds of millions – even billions – each year in crop and animal genetic improvements, animal nutrition, food and nutrition enhancements, agricultural equipment and machinery, and input applications – all critical components to feeding the world.

3. Agricultural policy. Ill-conceived and outdated agricultural policies in both developing and developed countries could be the limiting factor to agriculture's success in meeting these new challenges. The Nobel winning development economist Amartya Sen has famously written, "No famine has ever taken place in the history of the world in a functioning democracy." Poorer nations would benefit from changing their policies on education, investment, trade, regulation, taxes and more, as well as the common practice of providing cheap food for city dwellers at the expense of production incentives for farmers.

Our own policies and those of the rest of the developed world also deserve some scrutiny. It is time that we move toward domestic policies that best serve the modern structure and diversity of U.S. agriculture. Just such an overhaul may be closer on the horizon than we think – but for reasons of fiscal impact for taxpayers rather than sound policy development for farmers.

All of these solutions will involve many different dis-

ciplines, the expenditure of significant amounts of money, continued changes in centuries-old agricultural practices, and difficult policy and political debates in countries all around the world.

Through the centuries, agriculture has single-handedly disproved the "doom and gloom" predictions of Thomas Malthus. Our collective challenge is to act so that history confirms the same about agriculture in the 21st century.

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