North Carolina Agriculture and Biotechnology Summit 2014

STEWARDS OF THE FUTURE

Stewards of the Future: The Future of Food

November 18-19, 2014 | McKimmon Center | Raleigh, North Carolina

The North Carolina Biotechnology Center's AgBiotech Initiative and North Carolina State University's College of Agriculture and Life Sciences combined their signature events for a two-day conference in November 2014. Designed to engage the agriculture and biotechnology communities, key topics explored and presented were research innovation, technology commercialization, regulation, policy, public acceptance, agricultural production, and agriculture (ag) biotech products.

Experts from around the state and beyond came together to explore the growing global food crisis, the associated challenges for how to feed the world into the future, and the significant research taking place at NC State University's College of Agriculture and Life Sciences to address these challenges. While discussing challenges was certainly front and center for Stewards of the Future, opportunities for bringing products to market while ensuring a safe and abundant food supply for a growing world led the day.

The following narrative report was developed from participatory session of the conference, ***The Time is Now: Action Planning to Shape the Future of Food***. In this facilitated session, participants discussed in small groups' ways to seize new opportunities and meet the challenges presented throughout the conference. In all, six questions were presented to the small discussion groups resulting in a comprehensive list of ideas. The audience offered up collaboration, education, and methods for

enhancing the economy related to agriculture and agribusiness as the three primary areas to focus in being responsive to growing food crisis.

For additional information regarding the 2014 Summit, please visit the NC State University's College of Agriculture and Life Science Steward of the Future: ***The Future of Food.***

In 2015, NC State University's College of Agriculture and Life Sciences Steward of the Future will examine ***Water for a Growing World*.**

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Dialogue About the Future of Food

During the participatory session of the conference, *The Time is Now: Action Planning to Shape the Future of Food, participants responded to six questions:*

1. What did you *Discover or Learn* as a result of your participation during the 2 days of the Summit?
2. Are there any *Major Themes* that can be heard that characterize the major discoveries from the summit?
3. What *One Major Opportunity* can better position NC and its partners to shape the future of food security at the local, state, national and/or global levels?
4. What *One Major Action Item* would you recommend for shaping the future of food security at the local, state, national or global level?
5. What *One Major Opportunity* can better position NC and its partners in shaping economic growth at the intersection of food security in NC and beyond?
6. What One Major Action Item would you recommend for shaping economic growth at the intersection of food security in NC and beyond?

Discoveries and Learnings Resulting from Participating in the Food for the Future Conference

When reflecting back on the two-day Agriculture and Biotechnology Summit, attendees came away with significant learning related to genetically modified food, conventional and organic food labeling, food security and distribution, current regulations, agricultural biotechnology, new technologies, an increased interest in soil science, and closing the gap between research and practice.

Meet People Where They Are. Audience feedback suggested connecting information surrounding these practices within public spaces. *"Ag advocacy needs to meet people where they are and it is essential to successfully educate the general public regarding the benefits of biotech and its role in feeding a growing population."* Communication is key in spreading the healthful messages related to ag biotech. Citizens must have access to clear messages surrounding food security, waste, distribution, processing, and soil.

Dialogue is Needed. Dialogue is needed amongst different types of agricultural producers – conventional, organic, confined livestock production and free-range production – to find common ground around support for agriculture. For example, USDA recently held a two-day workshop at NC State University on coexistence among

producers of conventional, organic, identity preserved (IP), and genetically engineered (GE) crops. We must give voice to the diversity of champions within agriculture, addressing misconceptions, challenging misinformation through science-based advocacy, and messaging.

What are biotech crops? How are they useful? The messages available to the mainstream public are dominated by a clear anti-GMO message distributed by companies that benefit from an anti-GMO message. University scholars and faculty must be willing to share their research and perspectives surrounding ag biotechnology. Farmers are often more likely to consider new technology, but the average consumer is often only exposed to the cautionary messages shared about GMOs.

Link K-12 Educators with Ag Information. Link educators to information on ag biotech, commercial and organic farming, and share that information with their students and the families of those students. "We need to do more to involve teachers in this conversation – this will allow us to better prepare students to lead this industry in the future." Additionally, "everything comes back to education – teachers are the link to students learning about GMOs, new farmers, and leading strong students into agriculture and science." This will meet the demand by supplying companies, farms, and businesses with more skilled and technically trained workers/scientists/employees.

Challenges of Regulations and Modern Logistical Demands. Including the labeling process, logistics and regulations can be considered challenges to new technologies and new participants. "GMO labeling is a problem, in part, caused by the inability of ag biotech to effectively communicate a difficult subject matter." As science continues to change – regulation must not only match its rate of change but also allow developments of new technologies.

Through thoughtful communication, including social media use, and by linking science to people with every-day-life human-interest stories, the ag biotech industry will clarify the currently ambiguous messages surrounding ag biotech crops.

Five Major Themes of the Food for the Future Summit

The Questions Help Tell the Story. The world's population continues to grow and with it, the need for increased yields and protections of food sources. There is a need for all segments of agriculture to work together and share in the story to consumers; this is a multilateral effort. Governments remain reactive to global and national issues as opposed to proactive. *How can we assist with the management of the future food supply? Moreover, its waste by-products? Should there be more of a focus on waste consumptions in food production/supply chain? How will the future food supply be secured given emerging diseases and infestations? What role does economic disparity*

play in the global food crisis? Regulatory policy- where does it aid or hinder food security? Use positive examples to humanize the issues; share the stories.

Build an Educational Science Network. There is value and a need for education across the ag-bio tech spectrum in terms of science education that informs individuals, particularly younger generations not traditionally considered part of the scientific community. Science education is both about the methods and how those methods help describe relationships on examination. Applied learning can be constructed through farm internships or at home during onsite learning and training, or other informal approaches to public education. There is a need for education that can meet the public where they are with their understanding about ag-bio technology and its role in responding to the global food crisis.

*Note, North Carolina is in a good place with the right people working together**.*** Build that network around North Carolina, through the diversity of its agriculture products and the number of ways North Carolina products are produced and grown. Learn what we do not know to yield different approaches for managing the future of food security. Then continue to build an educational network that is responsive to the global food crisis.

Identify Knowledge Gaps on Both Sides of the Aisle. Knowledge gaps abound on both sides of the aisle whether that is in organics or biotechnology. Identify them. *How can we develop a better long-term focus? How can WE tell a better story about solving the impending food crisis? How can we close the knowledge gaps between various industries?* Instilling transparency is a public demand. Scientists are wary of mandates that advocate "pushing the science" in one direction or another. Scientists want to support "respectable science" that lends itself to critical methods and thinking. Citizens want corporate transparency, subscribing to "no one's" public relations news.

Identify Prevalent Communication Gaps. One example is ensuring consistency and education behind the labels. We need to recognize that deceptive labels are a problem. We need to communicate the value of biotechnology, personally as well as professionally. We need to close the communication gaps between various industries, including the media.

Identify Emerging Issues. Emerging issues that consider both the security of the food and our water supply; the timeline is urgent for both topics. There is great science potential to learn about the opportunities that will support the future security of both. There is potential for increase in consumer friendly GE products in addition to those that are just farmer friendly.

Major Opportunities to Shape the Future of Food Security in North Carolina and Beyond

Expand on NC's Position as Ag Biotech Leader. North Carolina is a recognized world leader in the field of agricultural biotechnology, with a number of leading biotech companies based here. Collaboration and partnerships that exist between research universities, industry and government have created a rich environment for innovation.

As we face the need to feed a growing world food population, NC is well positioned to expand on these partnerships to create a culture of entrepreneurship to address these issues. The industry needs to do more to inform the public of the value of ag biotech. Farmers value crops developed with traits that ease production. *How can GM traits with environmental benefits enhance consumer confidence in the products? Does pest and disease resistance result in lower chemical use on food crops and in the environment? Could drought-tolerant crops reduce critical water use in production? How can food waste reduction help address the food needs of our growing world?*

***Educate Next Generation of Farmers and Scientists*.** Beginning as early as K-12, we must educate the next generation of research scientists and farmers. Our major universities can support this effort by creating curricula to help K-12 educators teach basic ag biotech concepts in the classroom. This type of learning should stress the importance of ag biotech in expanding food production in NC and around the globe. In universities, we must continue to educate our future farmers by connecting students with relevant internships. Faculty cluster hires, which unite multi-disciplinary faculty working toward a common goal, could be targeted at feeding a hungry world.

Educate the Public. Public education is also needed to increase consumers' understanding of the value of ag biotech. NC's biotech centers and research universities are uniquely positioned to share the promise the genetic engineering holds beyond the basics of crop production. *Can GE crops be developed to deliver nutrients (e.g., Vitamin A through Golden Rice)? Can GE crops support other human health benefits (e.g., reducing aflatoxins – carcinogens -- in food crops, to reduce cancers in developing countries).*

Create a Vision for Collaboration and Regulatory Reform. NC can invite global regulators and other opinion leaders here to see benefits of biotech in action. NC's approach to regulation that involves farmers, industry and government working together could serve as a model for other states. This type of collaboration leads to positive regulatory and policy change that encourages innovation. Gatherings like the Ag & Biotech Summit also can provide a forum for future action through working groups, educational programs, and outreach. Let the world know that NC is open to AgBiotech to create jobs and boost our economy.

Major Action Items to Shape the Future of Food Security in North Carolina and Beyond

Recommendations for major action items to shape the future of food security at the local, state, national or global level fell into three general categories:

Collaboration. Collaboration. Collaboration. Partnerships. Partnerships. Partnerships. This theme resonated throughout the responses. The overwhelming directive was to create more partnerships between academia and industry for everything from pushing biotech ideas through the regulatory process to sponsoring education programs that focus on eliminating food waste. North Carolina policymakers, researchers and industry leaders can form relationships across borders nationally and internationally to design laws and policies that will establish self-sufficiency and protections. To that end, one memorable respondent suggested that NC State "follow Nelson Mandela's lead and build land grant style research universities in Africa." There also was a strong call to create collaborative outreach organizations/consortia to do everything from attracting investor funding to shaping policy.

NC State Plant Sciences Initiative *and* ***Food Manufacturing Initiative.*** A number of respondents expressed excitement about and hope for the potential of the NC State Plant Sciences Initiative and Food Manufacturing Initiative. These initiatives will create new and exciting opportunities for interdisciplinary research, bringing together industry and academia and stimulating the state's economy (as one participant aptly said, "*connect ideas with investment").* These efforts also will generate important advances in science and technology that address the grand problem of feeding the world, provide ag entrepreneurship opportunities and raise the overall profile of ag biotech in North Carolina while ensuring there is ample protection for food production and distribution.

Policy Development. Participants voiced a strong need for increased involvement across stakeholder groups (industry, academia, etc.) in the development of policy as it pertains to science, biotechnology and agriculture and food security. On more than one occasion, respondents suggested developing a think tank – independent, task-oriented and objective-driven – that would focus on agriculture policy, regulatory affairs, trend analyses, etc. There also were many suggestions for improved guidance through regulations, especially for farmers who might be struggling with guidelines and scientists trying to bring products to market, and the creation of new public policies that enable the North Carolina "ag biosphere" to flourish. In addition, require all state and federal politicians to attend a seminar on current agriculture topics to impress on them the importance of the industry and its partners, and the issues of food security.

Education/awareness. This category dominated all participant feedback, with a resounding call to improve public education, engagement and advocacy in an effort to eliminate misconceptions and increase awareness of agriculture and biotechnology (especially GMOs) among the general public, legislators, other decision-makers, and the K-12 population.

Action items to shape the future of food security in North Carolina and beyond:

- develop white papers and proposals of projects that address food security
- increase funding in education around all aspects of food science and supply chain
- develop a North-Carolina focused ad campaign on biotech and agriculture

- employ social media to communicate all sides of the issues
- create more campaigns like “Eat Less, Move More”
- establish education initiatives that focus on resource conservation
- create forums to stimulate diversity partnerships (such as the Farm Bureau in non-agricultural schools)
- hold public forums for anyone to raise questions (to be answered by the biotech companies and universities)
- establish community gardens and programs that teach the general public how to make use of local resources
- produce an “emotional piece, such as a documentary that communicates farming as a highly technical business”
- invest more in K-12 agricultural education and hire more ag education teachers
- create a means to connect students at all levels with farmers and researchers
- match educators with the ag and biotech industries

Concisely: “Increase the scientific literacy of every citizen, especially K-12 students. Teach them where food comes from, what it really is and how it becomes a meal. Arm our youth with the correct information and the confidence to deliver it.”

Major Opportunities to Shape Economic Growth at the Intersection of Food Security in North Carolina and Beyond

North Carolina’s biggest economic driver is agriculture and agribusiness, and with a growing world population needing more food and fiber, opportunities exist for the industry to grow. Emphasizing the value of collaboration and increasing public awareness of consumers’ and farmers’ need, Stewards of the Future participants recommended the following opportunities to shape economic growth in North Carolina and beyond.

Create. Create. Create. Create higher-yielding crops, higher-value agricultural products and new markets and enterprises. Participants pointed out that research into and development of new crops for North Carolina, higher crop and livestock yields, better post-harvest processes and higher-value agricultural products could enhance the economy. Additional economic advantages could be achieved if more locally grown crops and livestock were locally processed into food, fiber, fuel and other products in environmentally sustainable ways and if North Carolina farmers could produce fruits, vegetables and other foods for not only local markets but for export to the rest of the East Coast and beyond. Becoming fully self-sufficient in water, food and energy could also be advantageous, as would developing partnerships between farmers and local distribution areas to ensure that everyone – even those in food deserts – has access to fresh food and balanced nutritious. Choosing which avenues to pursue requires determining consumers’ and farmers’ interests and then using research and communication to help bring those interests together, participants said.

***Looking to New, Next Generation and Existing Farmers*.** In North Carolina, the average farmer is 58 years old. To feed a growing world population, we need to create opportunities that encourage young people to embrace farming while assisting existing farmers in expanding their operations. Public policy and legislation can encourage young people to go into farming by providing tax breaks, educational credits, student loan forgiveness, farm apprenticeships and loans for land and equipment. Government can also persuade new and existing farmers to pursue high-value crops, technologies or enterprises through attractive tax incentives and less cumbersome regulations. Co-ops also present farmers with economic opportunities, as would new buildings that house incubators or food-transfer spaces. Finally, participants said, experienced and inexperienced farmers need to be made aware of existing resources and expertise that they can take advantage of.

Value and Reduce Waste. The United Nations estimates that roughly one third of food produced in the world for human consumption is lost or wasted each year. Finding ways to cut food waste at each step between the field and the table and to create usable products from what would otherwise be wasted would not only help fill the need for more food for a growing world population, it could also boost the economy.

***Increasing investment in agriculture, agribusiness and related research*.** Participants encouraged the government to aggressively pursue new public and private funding sources, including venture capital and angel investors for agricultural technologies. They also called for using Golden LEAF funds for transformational agricultural biotechnology projects.

Boosting the knowledge base. Participants called for enhancing the collective knowledge base by expanding on-farm research, building graduate students' ability to address food-security issues, supporting basic research and finding ways to put the resulting research-based knowledge to use on farms and in other agricultural businesses. The goal would be to lower costs and increase productivity with new tools, technologies and practices that make farms of all sizes more sustainable, both financially and environmentally. They also encouraged growers, universities and companies to work together to collect and use big data collaboratively to bring about leaps in understanding that yield significant economic returns. In addition, they called for providing modern research facilities, such as that proposed in NC State's Plant Sciences Initiative, to bring together academia and industry for interdisciplinary plant research.

Major Action Items to Shape Economic Growth at the Intersection of Food Security in North Carolina and Beyond

The Stewards of the Future recommended the following ***action items*** to shape economic growth at the intersection of food security in North Carolina and beyond.

Create "Do Forums." Develop and create a forum to address actions and proposals in "Do Forums". Examples might include hosting multistate and /or multinational ag conferences or institutionalizing the summit as the NC State and NC Ag TED Summit Conference for Ag. But also consider more regional and local workshops that are smaller in scale and target geographic areas. Offer workshops to bring farm families together to help them understand and implement technology, data collections and distribution, and how to communicate the message to their non-farm friends. These workshops could serve as places for sharing peer knowledge or gathering specific input and feedback from stakeholders that can guide our advocacy and education.

Within the "Do Forums," be sure to include more young people such as those within 4H or high school students, and target individuals through the Grange or Cooperative Extension, or NC A&T University. Focus on the big picture, not simply the 10%; include farmers in the discussion & decision-making. Use the "Do Forums" as a way to engage stakeholder groups and interested publics who can help identify barriers to economic growth at the intersection of food security in North Carolina. Perhaps consider how to identify career opportunities and options for farming families; incentivize the family, not the person.

Focus some of the "Do Forums" efforts on how to build bridges in communication; not simply with those who understand and recognize the need and value of food security strategies but with those who do not even know it is an issue or who do not agree with the current strategies. Resist some labeling because of the fear of getting products banned. Rather provide more transparent labeling while working with the community, colleges & work force training initiatives. In addition, certainly one that tells the story about the value added of marketing and promoting in a uniform way. Perhaps provide a presentation on "green imperialism" – explore what this is and how some of us can afford to pay for our "food tickets" and enjoy the bounty of food available but others can only secure a handful of rice. Building understanding and demonstrating actions are critical to understanding the gaps in food security and the multi-level strategies for how to move forward in being responsive to those gaps.

Build a Culture of Ag Awareness & Sustainability for NC. Continue to build a culture of ag awareness in NC that intersects the importance of food security, not simply for North Carolina but beyond. There are several mechanisms to consider:

1. Continue to build appreciation for local ag within NC
2. Establish a committee that surveys to identify the common economic barriers that currently exists for industry, universities, farmers, etc., in obtaining a secure food system. For example – working conditions survey similar to the teacher working conditions survey can identify barriers to food production. Use the data to inform policy.
3. Include all local, state, and federal legislature into an awareness campaign – on the value of funding research and education regarding the importance of

4. creating a culture of ag awareness so that money becomes secondary and not the premise for building the initial relationships that create a secure food system into the future. Examples could include:
    a. Pass tax reform or incentives that lower the research and development cost for biotech companies and implementation of biotech in farming.
    b. Offer predictable tax/labor/legal system. Make laws easy to understand and access.
    c. Involve more famers, famer organizations and scientists in the formulation of laws and regulations.
    d. Support a system (financially educational opportunity, policies) for people to remain in and/or go back to the field; help incentivize farming families for future generations as a career.
    e. Provide better funding (grants) to farm-to-table initiatives such that access is increased for healthy foods in a variety of areas (including areas of food deserts).
    f. Give incentives for processing plants to move into NC and creating local distribution chains based off these
5. Develop legislation to encourage sustainable energy to mitigate climate change; other incentives.
6. Foster a cultural shift towards agriculture/biotech awareness to allow beneficial policies to happen – social media campaign, K-12 education, consortia body to disseminate research to public.

Connect Universities & Cross State Initiatives to Build North Carolina's Brand for the Future Security of Food. Build an ecosystem (safe space, think tank, community) where scientists, legislators, farmers and educators can work together towards a common mission and goals. Benchmark capabilities of NC against other states and their initiatives; find the sweet spot like *building North Carolina's brand to include the concept of consumer choice and encourage exports of North Carolina's products globally.* One mechanism to build and share initiatives is *establishing partnerships*. One way to do this is involve the NC Ag "biosphere" that is comprised of universities, RTP, biotech companies, and farmers. Promote the academic, industrial, and entrepreneurial partnerships to address specific targeted issues.

A second mechanism to build North Carolina's brand for the future security of food is through *research.* By working with professionals in other disciplines, more advance and novel research projects can be developed. Examples include:

- Invest in research of high value crops for NC and make "buy local" easier.
- Study what California and Chile do best to support diverse agriculture.

- Conduct an opportunity assessment for meeting NC needs – use partnerships across value-chain to develop and commercialize. Use also to communicate benefits of technology by various stakeholders in value-chain.
- Study to determine feasibility of processing; facility and research needs for processing and then provide research information to support greater food processing capability.
- Create a funding opportunity for translating basic science into crops.

A third mechanism is the development of investments by the partnerships such as:

- Requesting NC legislature support for funding a plant science initiative across multi-disciplinary organizations like universities, industries, and other educational programs. Find funds now to support building a facility for the new plant science initiative and renovate other obsolete facilities at NC agricultural universities.
- Working with the NC Biotech Center to magnify efforts that can identify potential investors.
- Incentivizing food manufacturers to move to NC.
- Convincing NC's cohort of partners that investment into ag technologies will advance the state economy and result in a return on investment.
- Create some mechanism for funding from the state, industry, or both.

A fourth mechanism is to ensure better use of natural resources such as the land, water, and other generic resources (elite materials that have been developed by private and public sector).

Elevate Processing & Distribution Centers in NC. Two major action items that will help shape economic growth at the intersection of food security in NC are processing and distribution. Craft state initiatives to bring food systems like processing plants and distribution centers back home.

With respect to food processing in NC:

- Keep food processing in rural NC and build abattoirs or slaughterhouses
- Offer incentives for processing plants to move into NC; processing plants that will create local distribution chains as an extension of the former.

With respect to food distribution centers:

- Develop a roadmap for collective local food distribution greater than fifty miles.
- Develop roadmap of collective local food systems with distribution less than 50 miles.
- Ensure outreach to food processors and transportation links in order to integrate the food chain beyond the existing model.
- Step wise analysis of processes used in our industry at large to minimize waste and maximize efficiency.

Develop an Entrepreneurial Culture that Facilitates Economic Development. Encourage entrepreneurial atmosphere at the universities for spinout companies and products in ag biotechnology, at ag incubators, and as well at locally grown, locally processed, and locally consumed foods. Economic growth can be fostered and developed between public resources and incentives at local regional level. For example:

- Promote start-ups for food transportation services or kickstarters and emphasize greater jobs development as the market increases.
- Expand opportunities for aquaculture development.
- Promote entrepreneurship in the plant, animal, and food services
- Eliminate trade barriers while providing entrepreneurial tools and initiatives including trial and error situations.
- Advocate incentives for creating economic infrastructure and business to assist the local food value chain.

Facilitate expansion of public education and, entrepreneurial development opportunities. Facilitate educational and professional development opportunities that will shape economic growth at the intersection of food security in North Carolina and beyond.

For young learners, consider the following opportunities:

- Provide ag curriculum education in every middle and high school. Include curriculum that includes the spectrum of ag possibilities for the future, from ag-biotech to organic farming. Decide on and discuss hot topics and controversies across multiple courses and curricula. Make sure presenters represent both shared as well as different ideas, and that students feel like they are within a safe environment to explore a range of ideas.
- Incentivize and share agricultural opportunities with rural and urban students so that they value a future role in food production. Ensure access to education through scholarships, start-up packages, and enrollment in ag colleges and technology adoption. Invest in the “new” food security champions: students, teachers, extension services, and farmers. Provide internships and hands on opportunities for students/future employees/teachers.
- Leverage funding resources to collaborate (e.g. all about ag conference; agriculture students sharing across disciplines).Establish state and federal funds to encourage young educated ag graduates to get into farming.

For adults learners, consider the following opportunities:

- Support a system (of educational opportunities, policies, etc.) for people to go back to the field.
- Develop a short course geared for professionals who are interested in a career in agriculture (farming, aquaponics, etc.) as a side career or exit strategy from cube world.
- Develop young leaders and farmers. Train farmers in small crops, row crops, and greenhouse growers; develop the skill sets needed to feed NC first and spiral out from there.
- Support an intelligent immigration policy – “Ag for America” like “Teach for America”.
- Develop a program similar to the former NC Teaching Fellows to encourage young adults in the field of agriculture that includes industry and on farm internships – a commitment to the industry from the student.
- Expand teacher (STEM) externships through one coordinated effort v. several – consortium with universities, NC educators, and industry to gain synergies and increase impact.
- Cross-pollinate the learning between different professions such as the academic and practitioner; the researcher and the farmer.