GROWING A HEALTHY FUTURE

FOOD • FUEL • WATER • LANDSCAPES • PEOPLE
Roadmap for Today’s Conversation

- 21st century landscape
- Why NU-IANR is leading the way globally to 2025
  - Growth trajectory
  - Focusing on strategic interdisciplinary investments
  - Public-private partnerships
  - Balancing the funding portfolio
  - Local to global
U.S. agricultural output, inputs, and total factor productivity, 1948-2011

Indices, 1948=1

Source: USDA, Economic Research Service, Agricultural Productivity in the U.S. data
Ag and Natural Resources at the Center

- Growing global population in a closed system
- Recognition of links between local and global food security, health, poverty and social/political stability
- Increased demand per capita for food, water, fiber and energy – tradeoffs loom large; need for disruptive technologies
Living in 2015, Thinking in 2050!
50 – +2B – 2X – 70 – +3B

Key Data

In **50 years**, the world population will require **100%** more food, and **70%** of this food must come from efficiency-improving technology.

**Source:** Food Economics and Consumer Choice (Simmons, 2013)
Global agricultural output will have to double in order to meet the expected demand for food, feed, fiber and fuel of 2050.

By 2050, the world's population will increase by one-third (33.7%) — from 7.18 billion to 9.6 billion people.

Economic growth is fueling a Protein Revolution in global agriculture.

Increased demand for livestock, poultry and fish is the largest driver in the world food economy and is expected to double by 2050, with 70% of the increase coming from developing countries. Grains and oilseeds are a major part of animal diets and, accordingly, demand for them will also grow substantially.

Doubling agricultural output to meet growing demand and alleviate hunger will increase pressure on already-stressed resources, requiring greater efficiency in agriculture and food systems.

Urbanization is accelerating. The share of the world's people living in urban areas will increase from 54% to 66% by 2050. More people — living in cities, making more money and shopping in supermarkets — will be able to afford increasingly diverse diets and will demand more expensive foods.

Economies are growing and incomes are increasing. By mid-century the world's middle class will grow from 50% to 70% of the population, with most change taking place in developing countries.

From 2013 to 2030 — poultry and egg demand will increase by 63%, milk by 55%, and ruminant meat by 44%, all of them outpacing population growth.

From 2013 to 2023, world per capita fish consumption will increase by 9% (1.7 kilograms per person) reaching 20.9 kg per person in 2023.

70% of extracted water worldwide is used for agriculture, and the amount will increase to an estimated 89% by 2050 — the amount will be even greater in the absence of any technological progress or policy interventions to stem the flow.

37% of land is used for crops and pasture.

1/3 of agricultural output is lost and wasted after harvest.
Competition for Limited Resources
Understanding and Assessing Climate Change: Implications for Nebraska

Speaker and Moderator DONALD WILHITE, Emeritus Director and Professor, National Drought Mitigation Center
With panelists ROBERT OGLESBY, DEBORAH BATHKE, and CLINTON ROWE, University of Nebraska–Lincoln Professors

SEPTEMBER 25, 2014 | 3:30 P.M.
NEBRASKA INNOVATION CAMPUS CONFERENCE CENTER, 2023 TRANSFORMATION DRIVE, LINCOLN, NE

LIVE STREAMING
OF ALL EVENTS
AT HEUERMANNLECTURES.UNL.EDU

University of Nebraska–Lincoln
Plant hardiness zones are shifting toward the poles as the climate changes.
We must continue to evolve . . .

http://www.naute.com/images/evolutionofman.jpg
Fifth Year of IANR to 2025
A Living Laboratory for the World
Nebraska = Ag and Natural Resources

- 49,969 farms and ranches + largest aquifer
- 45.5M acres of farmland, *largest irrigated state and watershed network*
- 1\(^{st}\) nationally in commercial red meat production
- 1\(^{st}\) nationally in cattle on feed
- 1\(^{st}\) in eggs for food processing
- 2\(^{nd}\) nationally in ethanol production capacity
- 3\(^{rd}\) in corn for grain production
- 5\(^{th}\) in soybean production
- 6\(^{th}\) in all hogs and pigs
- 7\(^{th}\) commercial hog slaughter
- 8\(^{th}\) in all hay production
To be the leading public university in the world in sustainably “feeding the future” . . . through advancing food, energy, natural resources and rural landscape security.
Integrated Teaching, Research and Extension
1,933
People Passionate about Making a Difference

• **1,164** IANR employees work on campus
• **769** IANR employees are located in Nebraska communities statewide
• **757** total faculty (34 in recruitment)
Goals

- Increase enrollment to 30,000
- Increase faculty by ~170
- Increase 6-year graduation rate to 70%
- Increase research expenditures to $300 M
- Increase national/international recognition of faculty
- Successfully launch Phase I of Nebraska Innovation Campus
Leading UNL Goals

1) 10th consecutive year of enrollment growth in Ag & Nat Res (~3,500 students, 6.6% increase) (NCTA up 28%, 384 students)
2) FY 2014 exceeded record in 2012 in research expenditures ($80M)
3) 6-year graduation rate of ~78%
4) Increasing tenure-track faculty by ~20% (65 FTE)
5) Leading the population and development of Phase I of Nebraska Innovation Campus
6) Grow IANR budget from $180 to $300M pa (currently $220M)
We must Build Innovators . . .
Paul F. Engler Agribusiness Entrepreneurship Program

This gift is in support of students who have the entrepreneur’s “fire in the belly.”
JOIN OUR TEAM

40 new faculty
joined IANR since the summer of 2013

34 new positions
projected to be posted in 2015

6 focus areas
for Phase 2 positions
Since 2012:

Total of 67 TT Faculty Hires (46)
2015 Phase II = 39 (19)
GRAND TOTAL by 2016 = 106

+65 FTE (~20%)
Join Our Growing Team at IANR

A LITTLE BACKGROUND ON IANR'S RECENT HIRING INITIATIVES:

The Institute of Agriculture and Natural Resources (IANR) at the University of Nebraska-Lincoln (UNL) is committed to world-class excellence in applications of agricultural and life sciences towards a sustained high quality of life for the citizens of Nebraska, and for a quickly growing global population.

Early in 2013, reflecting this commitment, IANR launched an initiative to hire new tenure-track faculty members in strategic impact areas of: Science Literacy; Stress Biology of Plants, Animals, and Agroecosystems; Healthy Humans; Healthy Systems for Agricultural Production and Natural Resources; and Computational Sciences. This Phase 1 effort was very successful, resulting in the recruitment and hiring of 35 highly skilled tenure-line faculty members (with two searches still active).

IANR is now moving foward with Phase 2 of this hiring initiative. Check back on this page for continued updates on new positions available and also dates and times for candidate seminars.

Recent Faculty Hires

Karsten Koehler, Nutrition and Health Sciences, Start Date 6/17/2015
The Interfaces are as Important as the Historically Primary Domains

The challenges we face do not fit neatly into academic departments.

They are complex problems that require multiple areas of expertise and diverse skill sets.
Innovation Campus
Phase 1 Building – 350,000 sq. feet

UNL Dept. of Food Science and Technology!
Follow the action through the web cam
www.truelook.com/clients/tetrad-webcam/
NEBRASKA ALLIANCE FOR ADVANCED FOOD SANITATION

Opportunities

- More effective and efficient sanitation approaches:
  \- Create innovative and environmentally friendly methods, reduce time and cost, improve food safety and food security.

Cooperative Technology Development:
- Extend technical resources of members, explore new technologies and get first look at new discoveries.

Education:
- Dissemination of science critical to industry partners and regulators.

Consulting:
- Problem solving and advancement of emerging technologies.

INNOVATION AND ADVANCEMENT IN PRODUCTION SANITATION

A unique opportunity exists for the creation of the Nebraska Alliance for Advanced Food Sanitation. The University of Nebraska-Lincoln and industry partners in the alliance will conceptualize, create, and disseminate improved sanitation approaches and practices. More efficient and effective sanitation will result in a reduction in the quantities of chemicals used in sanitation, savings in time and operational costs resulting in more affordable foods at the consumer level, and consistently safer food products.

The timing for this initiative is opportune to support the mandates for validated preventive controls for food safety hazards that will be promulgated by the U.S. Food and Drug Administration’s Food Safety Modernization Act (2011). Alliance activities are envisioned to focus on advanced food safety concerns including microbial pathogens, allergens, and toxic chemicals: food quality and shelf life; cost and risk benefit assessments; water conservation and reusability; and genetically engineered foods.

General Information:
- Ann Willet Pharm D, MBA, Director of Strategic Alliances: 402-472-5355 awillett2@unl.edu

Department of Food Science and Technology:
- Steve Taylor Ph.D., University of Nebraska-Lincoln: 402-472-2833 staylor2@uni.edu
- Joe Bosman Ph.D., University of Nebraska-Lincoln: 402-472-3070 jbosman2@unl.edu

The University of Nebraska-Lincoln is an equal opportunity educator and employer.
Platform Suspension System

Contributors:
- Mechanical and Materials Engineering, College of Engineering – Mechanical design and construction, controls design
- CALMIT – Wireless Instrument Pod

- 45° Optimum Angle
- Instrument Pod
- Laptop
- Wireless Connection
- XYZ Position motors & Cable assemblies A, B, C, D
- Winch Assembly for optimum angle adjustment
- Calibration Target
Total factor productivity index projections

- Historical actual
- Historical trend
- Scenario 1: R&D constant, nominal $
- Scenario 3: R&D increases 1% per year, real $
- Scenario 1*: R&D constant, nominal $, with one-time cut of 25% in 2014

Source: Economic Research Service.
GROWING A HEALTHY FUTURE

FOOD • FUEL • WATER • LANDSCAPES • PEOPLE

- PCAST (Ag Research, Antibiotics)
- AGree
- Chicago Council on Global Affairs
- STEM Ag and Food Council
- Council on Competitiveness
- Foundation for Food and Ag Research
- NAAAS (Animal Ag / Science)
- NNMI (Food Factory of the Future)
Feeding the World

By 2050 we’ll need to feed two billion more people. How can we do that without overwhelming the planet?

PHOTOGRAPHS BY GEORGE STEINMETZ

Building agricultural research

In many parts of the world, it is becoming increasingly difficult to feed a growing population, especially with the added stress of climate change. Agricultural research is crucial to developing new technologies and strategies to increase food production without damaging the environment.

One area of research that has shown promise is the use of genetically modified crops. These crops can be engineered to be more resistant to pests and diseases, which can help increase food production while reducing the need for chemical pesticides. However, there are concerns about the long-term effects of genetically modified crops on the environment and human health.

Another area of research is the use of precision agriculture, which involves using technology to monitor crop growth and predict the best times for planting and harvesting. This can help farmers make more efficient use of resources and reduce waste.

Despite these challenges, agricultural research continues to be a vital field, with researchers working to develop new technologies and strategies to help feed a growing population while protecting the environment.
Private Giving to the University

> $1.8 B

~ $140 M

$250 M

“25 by 2025”
Endowed Chair Campaign
“25 by 2025”
Endowed Chair Campaign

Nebraska Wheat Growers Presidential Chair (2011)
Nebraska Soybean Board Presidential Chair (2013)
Nebraska Corn Board Presidential Chair (2014)
Allen Food for Health Presidential Chair (2014)
Engler Agribusiness Entrepreneurship Chair (2011)
Robert B. Daugherty Water for Food Chair (2012)
Ron Hanson Nebraska Ag Bankers Chair (2014)
Heuermann Agronomy Chair (2011)
Ralph and Alice Raikes Chair (1999)
William F. Allington Distinguished Plant Pathology Chair (1995)
George Dempster Smith Chair (2009)
William F. Splinter Chair*
Yeutter International Trade & Finance Presidential Chair*

42 Endowed Professorships Holders
IANR = 38,950 acres
NU = 43,734 acres
<table>
<thead>
<tr>
<th>Project</th>
<th>Completion Date</th>
<th>Cost</th>
<th>State Funding</th>
<th>Private Funding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biofibers Research Lab</td>
<td>Fall 2013</td>
<td>$376K</td>
<td>$376K</td>
<td>$450K</td>
</tr>
<tr>
<td>Havelock Farm Popcorn Building</td>
<td>Fall 2014</td>
<td>$450K</td>
<td>$450K</td>
<td>$450K</td>
</tr>
<tr>
<td>Entomology Bldg (WCREC)</td>
<td>Winter 2014</td>
<td>$337K</td>
<td>$337K</td>
<td>$337K</td>
</tr>
<tr>
<td>Snyder Addition (WCREC)</td>
<td>March 2014</td>
<td>$412K</td>
<td>$412K</td>
<td>$412K</td>
</tr>
<tr>
<td>Elliott Bldg Upgrade (PHREC)</td>
<td>Fall 2014</td>
<td>$3.9M</td>
<td>$3.9M</td>
<td>$3.9M</td>
</tr>
<tr>
<td>Animal Handling Facility (PHREC)</td>
<td>Fall 2013</td>
<td>$320K</td>
<td>$320K</td>
<td>$320K</td>
</tr>
<tr>
<td>High Plains Ag Lab (Sidney)</td>
<td>June 2014</td>
<td>$510K</td>
<td>$500K</td>
<td>$500K</td>
</tr>
<tr>
<td>Morrison Life Sciences Center Addn.</td>
<td>May 2014</td>
<td>$9M</td>
<td>$9M</td>
<td>$9M</td>
</tr>
<tr>
<td>Commodity Trading Room</td>
<td>Fall 2014</td>
<td>$763K</td>
<td>$763K</td>
<td>$763K</td>
</tr>
<tr>
<td>Stumpf International Wheat Center</td>
<td>December 2014</td>
<td>$1.02M</td>
<td>$20K</td>
<td>$1M</td>
</tr>
<tr>
<td>East Campus Rec</td>
<td>Summer 2015</td>
<td>$14.9M</td>
<td>$14.9M</td>
<td>$14.9M</td>
</tr>
<tr>
<td>Raising Nebraska – State Fair</td>
<td>Summer 2015</td>
<td>$5M</td>
<td>$5M</td>
<td>$5M</td>
</tr>
<tr>
<td>Quilt House Expansion</td>
<td>Summer 2015</td>
<td>$7M</td>
<td>$7M</td>
<td>$7M</td>
</tr>
<tr>
<td>Veterinary Diagnostic Center</td>
<td>Fall 2017</td>
<td>$45M</td>
<td>$41M</td>
<td>$4.2M</td>
</tr>
<tr>
<td>Nebraska Innovation Campus</td>
<td>2015/Ongoing</td>
<td>$85M</td>
<td>$30</td>
<td>$55</td>
</tr>
<tr>
<td>East Campus Residence Hall</td>
<td>Fall 2017</td>
<td>$37.5M</td>
<td>$37.5M</td>
<td>$37.5M</td>
</tr>
<tr>
<td>East Campus Learning Commons &amp; Legacy Plaza</td>
<td>Spring 2018?</td>
<td>$32.5M</td>
<td>$10M</td>
<td>$22.5M</td>
</tr>
</tbody>
</table>

**Total:** $245M
And We Need to Work Globally!
AFGHANISTAN (DOD ADT), BRAZIL (USP-ESALQ, CAPES, BSMP), ETHIOPIA, USAID (MENA, NASA Drought), TANZANIA (CIRCLES), UNESCO-IHE, CHINA (SAG, China Ag, Northwest A&F, IWHR), INDIA (IARI, MSSRF, JAIN, NIFTEM), VIETNAM (LMPPI-Harvard Kennedy School). INDONESIA (Bogor, USBI), TURKEY (Ataturk)
Point of Inflection!

The next six years are going to dwarf the last four . . .
GROWING A HEALTHY FUTURE

FOOD • FUEL • WATER • LANDSCAPES • PEOPLE