Field to Market: What is Sustainable Agriculture?
Illinois Soybean Association July 2012

Catherine Campbell, Consultant, Field to Market, The Keystone Alliance for Sustainable Agriculture
Who is Field to Market?

• Collaborative Stakeholder Group
  – Bringing together the full supply chain
  – Includes producers

• Commodities Focused
  – Unique supply chains and traceability issues

• Develop science- and outcomes-based measures
  – Identify the key indicators for sustainability
  – Measure broad-scale trends and field-scale outcomes

• Scale and implement metrics for supply chain sustainability programs
How We Define Sustainable Agriculture

- Meeting the needs of the present while improving the ability of future generations to meet their own needs
  - Increasing productivity to meet future food and fiber demands
  - Improving the environment and human health
  - Improving the social and economic well-being of agricultural communities
Deliverables: What We Are Doing

- National indicators report: Documentation of overall trends
- Supply chain projects: Direct engagement in continuous improvement
- Grower Fieldprints: Individual opportunities for continuous improvement
- Public data and models
  Collaboratively developed
  Outcomes based
Criteria

- Outcomes based
- Practice/technology neutral
- Transparent and credible science
- On-farm production outcomes within a grower’s control

Data & Methods

- Crops: corn, cotton, potatoes, rice, soybeans, and wheat (2012)
- Indicators: land use, soil use, irrigation water, energy use, greenhouse gas emissions in socio-economic added in 2012
- Analyzed publicly available data, 1980-2011; U.S. national-scale indicators
- Peer reviewed
Soybean Results

**Improved:**
- All per bushel measures
- All soil erosion measures
- Yield and total production

**Increased:**
- Total land use
- Total irrigation water applied
- Total energy use
- Total GHG emissions

*Index of Per Bushel Resource Impacts to Produce Soybeans
(United States, Year 2000 = 1)*

<table>
<thead>
<tr>
<th>Year</th>
<th>2000*</th>
<th>Unit - per Bushel</th>
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<tbody>
<tr>
<td>Land Use</td>
<td>0.027</td>
<td>Planted Acres</td>
</tr>
<tr>
<td>Soil Erosion</td>
<td>0.131</td>
<td>Tons</td>
</tr>
<tr>
<td>Irrigation</td>
<td>0.766</td>
<td>Acre Inches</td>
</tr>
<tr>
<td>Water Applied</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy</td>
<td>70.669</td>
<td>Btus</td>
</tr>
<tr>
<td>Greenhouse</td>
<td>15.1</td>
<td>Pounds CO₂e</td>
</tr>
<tr>
<td>Gases</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Five-year average 1996 - 2000

**Note:** Data are presented in index form, where the year 2000 = 1 and a 0.1 point change is equal to a 10% difference. Index values allow for comparison of change across multiple dimensions with differing units of measure.
A Closer Look
Soybean Results: Soil Erosion

- **Total soil erosion** decreased over most of the study period, but has increased more recently (similar for corn)

- **Per acre soil erosion** decreased during first half of study period, then leveled off (similar for corn, cotton, and wheat)
A Closer Look
Soybean Results: Irrigation Water Applied

- **Per acre irrigation water applied** has been flat over most of the study period

- **Per bushel soil irrigation water applied** decreased 42% but has leveled off in recent years

<table>
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<tbody>
<tr>
<td><img src="image1.png" alt="Graph" /></td>
<td><img src="image2.png" alt="Graph" /></td>
<td><img src="image3.png" alt="Graph" /></td>
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<tr>
<td>(Million acre inches)</td>
<td>(Acre inches)</td>
<td>(Acre inches per bushel)</td>
</tr>
<tr>
<td>y = 1.3871x + 14.457</td>
<td>y = -0.0291x + 9.6677</td>
<td>y = -0.0135x + 1.0046</td>
</tr>
<tr>
<td>R² = 0.8419</td>
<td>R² = 0.3329</td>
<td>R² = 0.7617</td>
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</table>
U.S. Producers Have a Great Story to Tell...

• Efficiency gains over time, along with increased production
• Improvements on a number of economic and social indicators

As well as opportunities for continued improvement

• Pace of improvement has slowed over the study period
• Conservation Reserve Program contracts are expiring and prices are making production on those acres more economically viable
The Fieldprint Calculator:

Measuring Field Level Outcomes and Identifying Opportunities for Improvement
What is the Fieldprint Calculator?

• Free online education tool for row crop farmers that indexes their agronomics and practices to a Fieldprint
• Helps growers evaluate their farming decisions and compare their sustainability performance

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In the areas of:

• Land use
• Soil conservation
• Soil carbon
• Water use
• Energy use
• Greenhouse gas emissions
• Water Quality and Biodiversity in development

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Against:

• Their own fields
• Their own performance over time
• County, state and national averages
Field to Market Calculator Pilot Projects

- Demonstrate use of calculator on the ground to test utility at the grower level and through the supply chain
- Currently 6 member-led pilots engaging farmers across geographies, crops, and supply chains
- Over approximately 300 farmers engaged
Pilot Program Goals and Outcomes

- Establish baselines
- Continuous monitoring
- Implementation and documentation of change of practices
- Life Cycle Analysis
- Program education
- Relationship-building
Nebraska Corn Pilot:
BÜNGE - Kellogg’s Collaboration

Objective:
• Using FTM tools and resources to complete the carbon and water footprints for Kellogg’s Frosted Flakes supply chain by capturing the grower link and to collect the necessary data to raise the Fieldprint Calculator to a higher level of functionality

Process:
• Establish a representative grower database
  • 22 growers representing 35-40% of Crete corn grind (40,000 acres)
• Additional participation and support of:
  • National Resource and Conservation Service (NRCS)
  • National Corn Growers Association (NCGA)
  • Nebraska Corn Board
  • University of Nebraska Extension Service
• Collect data from farm production of corn.
Nebraska Food Chain Pilot:
Greenhouse Gas Emissions & Water Usage

Total 2009 Greenhouse Gas Emissions = 62,533 Short Tons
Total 2009 Water Usage = 695,913,852 Gal
Energy Use Efficiency

Irrigated Corn Crete Nebraska 2009, per Unit Energy versus Yield

(Btu per acre)

(Bushell per acre)

5 20 13 9 15 19 7 3 22 2 14 10 11 1 4 12 8 16 6 18

- Grain Drying
- Crop Protection
- Tillage and Transport
- Irrigation
- Seed
- Fertilizer

Yield to Market
Irrigation Water Use Efficiency

Irrigated Corn Crete Nebraska, 2009
(Inches of irrigation water)
Irrigated Corn 2009, Crete Nebraska – Average Field Print and Grower ID No. 1

<table>
<thead>
<tr>
<th>Grower ID - 1</th>
<th>Score</th>
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<tbody>
<tr>
<td>Land Use</td>
<td>89</td>
</tr>
<tr>
<td>Soil Conservation</td>
<td>154</td>
</tr>
<tr>
<td>Irrigation Water</td>
<td>71</td>
</tr>
<tr>
<td>Energy</td>
<td>101</td>
</tr>
<tr>
<td>Greenhouse Gases</td>
<td>103</td>
</tr>
<tr>
<td>Soil Carbon</td>
<td>200</td>
</tr>
</tbody>
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Field to Market
Pilot Feedback

“I’ll tell you, I wish I had this tool when I first started my position here at the District. It’s a great way to get to know growers and local operations and to get a conversation started. I’m making more in-roads with the Fieldprinting project, than I have with much of the previous outreach I’ve done. If it’s used as nothing more than an outreach tool, it’s a winner.”

– Jared Foster, Van Buren Conservation District/Paw-Paw pilot
Path Forward

- Acknowledge preferences
- Respect differences
- Listen
- Learn
- Exert leadership
- Move ahead together
For More Information

• [www.fieldtomarket.org](http://www.fieldtomarket.org)
  – Report, Calculator, and more!

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Questions?