Outline

• Introduction and overview of Field to Market and the Supply Chain Sustainability Program
• Specific activities related to water quality
• Research challenges and opportunities
• Engagement challenges and opportunities
Field to Market: The Alliance for Sustainable Agriculture focuses on defining, measuring and advancing the sustainability of food, fiber and fuel production.
Guiding Principles

- Engage the full supply chain
- Drive continuous improvement
- Focus on commodity crops
- Provide collaborative leadership
- Transparent
- Grounded in science
- Remain technology neutral
- Focused on outcomes
- Offer useful measurement tools & resources
- Coordinated and comprehensive approach

Supply Chain Sustainability Program

Delivering Sustainable Outcomes

Benchmarking Sustainability Performance
Catalyzing Continuous Improvement
Enabling Sustainability Claims
Fieldprint® Platform

Provides corn, cotton, potato, rice, soybean and wheat growers with a free and confidential tool to explore relationships between management practices and sustainability outcomes

- Helps growers evaluate their farming decisions in the areas of:
  - Biodiversity (Piloting)
  - Energy use
  - Greenhouse gas emissions
  - Irrigated water use
  - Land use
  - Soil carbon
  - Soil conservation
  - Water quality
- Farmers can save their information and compare the environmental impact of different management decisions on their operation

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Catalyzing Continuous Improvement

45 Fieldprint® Project Collaborations

Growers and members of the food, fiber and fuel value chain are partnering to demonstrate the value that outcomes-based sustainability metrics and the Fieldprint Platform bring to promoting continuous improvement in sustainability outcomes and helping advance more sustainable production.

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Collaboration and transparency within the supply chain is key to answering consumer questions on where and how their food, fiber and fuel are produced.

Field to Market supports the food and agriculture in answering these questions by aggregating field-level data in a standardized and anonymized fashion to make three types of sustainability claims:

- **Participation Claims**
- **Measurement Claims**
- **Impact Claims**

To me, the real definition of ‘sustainability’ is ensuring that my kids are going to have somewhere to farm,” said Rita Herford, participating wheat farmer, Minden City, Michigan. “It's doing things right, it's doing things environmentally friendly, keeping the soil healthy, replenishing nutrients into the soil, because if we don't have land to farm on, if we don't keep that quality up, we don't have a farm.”
Field to Market efforts on water quality

- One of the eight sustainability outcomes we calculate is Water Quality
  - Using the NRCS Water Quality Index as a qualitative indicator of the risk of loss of nutrients, sediment and pesticides
  - Also include a quantitative measure of soil erosion (RUSLE2 and WEPS)

- Membership interest in a more informative, robust metric for driving continuous improvement and enabling supply chain reporting
  - Can we provide farmers with individual field performance – nutrient losses – that are quantitative, accurate and actionable?

- Embarked on efforts to develop and test ideas for quantitative metrics based on scientific models
  - Initial proof of concept (2016)
  - Review of available tools and data (2017)
  - Field level pilot project (2018)

The Unique Challenge of Water Quality

- **Scale: How to provide an accurate estimate?**
  - Spatial scale of data collection and modeling tools focuses on watersheds and in-stream dynamics
  - For non-point sources of nutrients – farm fields – losses are determined by thousands of individual decisions balancing many needs

- **Visibility: How to communicate impact?**
  - While sediment loss is visible, nutrient loss is not visible and is difficult to measure or monitor at a field scale

- **Cost: How to incentivize change?**
  - The cost of nutrient loss is borne by both the land manager (adding more than is used by the crop) and society; the benefits of adding nutrients similarly accrue to both the land manager (yields) and society (sufficient, affordable food supply)

- All require partnerships, collaboration and transparency to make progress
Barriers to an Improved Water Quality Metric

- **Water quality research** – data collection, monitoring and modeling – historically has focused primarily on watershed outlets and in-stream water quality
  - It remains difficult to measure and to model individual farm fields or farm operations with a known degree of confidence
- **Data collection** – edge-of-field instrumentation, data gathering, analysis, publication – takes time
  - Model development lags data collection
- **What we are focused on:**
  - Determining the cost and benefit of a quantitative metric and scoping the required data, level of effort and potential improvements
  - Determining if there are other approaches than field scale metrics and in-field conservation practices that we could incentivize

### Water Quality Models

**Index Based Models**

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<th>STEP</th>
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**MODEL USABILITY**

- Ease and Efficiency of Use
- Crops modeled
- Time Step
- Transparency
- Applicability across the US
- Horizontal Segmentation
- Vertical representation

**MODEL PROCESSES**

- Edge-of-Field BMPs
- In-Field BMPs
- Hydrology
- Irrigation
- In-Field Management Options
- Nitrogen, Phosphorus
- Pesticides
- Plant Growth
- Sediment
- Tillage Options
Research and Model Development

- Field scale, accurate, easy to use models are needed to enable farmers to better understand their individual contribution and opportunity to mitigate excess nutrient loss.
- Current research models require substantial expertise to operate and interpret
- USDA is actively working on this issue, however models can only be as accurate as our scientific understanding and there are clear limitations.

- How do conservation practices, and combinations of practices, influence water quality at a field scale in different regions?
- Collaboration among scientists with edge-of-field research projects
  - Central data repository to share learnings?
  - Collaboration between field research and modeling teams?
  - Collaboration and inter-comparisons of models?

Water Quality Challenges: Opportunities

1) Reduce inputs - nutrient management/reduction
   Requires: Education, clear guidelines, training, and some luck with the weather
   Risks/Challenges: Regulatory “stick” is light and not enough “carrot”; overall, this alone on all crop land is not sufficient to reduce nutrient loads in watersheds to the HTF goal levels.

2) Increase removal through rotation management and cover crops
   Requires: Education, experimentation by growers, commitment to transition to a new way of farming (investment in new equipment; cc can be trial and error; need to find new markets for other crops in rotation)
   Risks/Challenges: Initial years of adoption of changes of this kind can reduce yields; it can require a radical change and if farmers aren’t prepared and supported they may reject after a first year.

3) Increase removal through edge of field structures
   Requires: moving some land out of production; initial investment in building the structures
   Risks/Challenges: No individual business or other incentive for a farmer; initial cost needs to be shared or funding provided. Where the structures are placed matters greatly; expert guidance is important.

Water Quality Challenges: What practices will make a difference?
Taking Action Now

• Research and models are needed and will help over the long term
• Near term, we have enough information to take action

• Educate farmer advisors with consistent messages and resources
  • Including private sector advisors (e.g. ag retailer field staff)

• Supply chain signal that improvement is an important goal of customers to provide added incentive

• Developing a business case and financial tools for implementation of practices that we know work

Thank You
For More Information
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