



Field to Market®

Sustainable Commodity Crop Sourcing: Supply Chain Action on Water Quality

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Sustainable Commodity Crop Sourcing

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

Field to Market® | Uniting the Supply Chain to Deliver Sustainable Outcomes for Agriculture



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

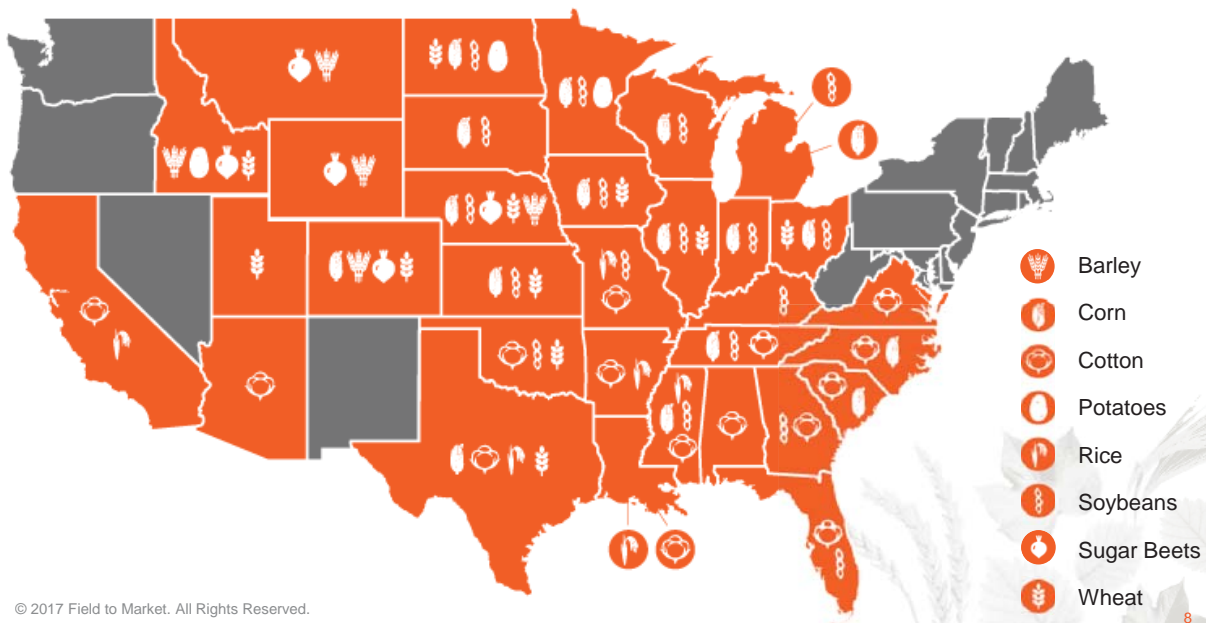


Catalyzing Continuous Improvement

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.



Independent Verification of Sustainability Claims



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

How it Works: Sourcing sustainable wheat in Michigan

Field to Market 2017 Collaboration of the Year: Kellogg's Origins Great Lakes Fieldprint Project

Kellogg's partnering with Syngenta and The Nature Conservancy

- Using the Field to Market Metrics to help farmers understand their sustainability outcomes
- Training Certified Crop Advisors through sponsorship of an RCPP in the watershed, ensuring technical assistance and cost-share programs are available to farmers to improve on their sustainability scores
- Annual grower workshop hosted by project partner organizations to share sustainability results and connect growers to additional resources
- Focusing on soil health (cover crops and reduced tillage) and nutrient management practices to improve water quality
- 7000 acres of soft winter wheat have been enrolled in the program
- Kellogg's can use the aggregate results in sustainability reporting and claims for their products

"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."

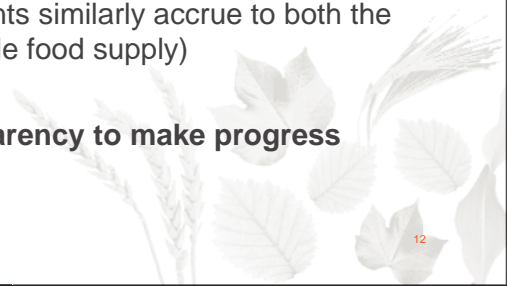
Field to Market efforts on water quality

- 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

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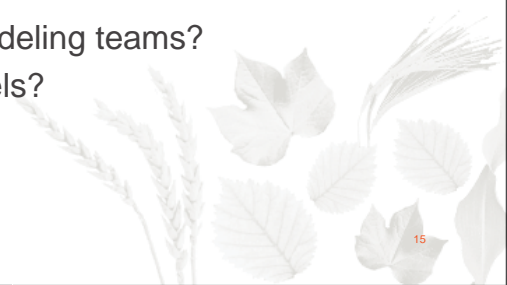
Water Quality Models	Index Based Models		Process Based Models												
	STEP	WQI	AnnAGNPS	APEX	CREAMS	DRAINMOD	EPIC	PHANTM	GLEAMS	HSPF	MIKE-SHE	RUSLE2	RZWQM2	SWAT	
MODEL USABILITY															
Ease and Efficiency of Use	H	H	M	L	L	L	M	UK	L	M	M	M	L	M	
Crops modeled	H	M	H	H	H	UK	H	UK	H	L	UK	H	M	H	
Time Step	L	L	H	H	H	H	H	UK	H	H	H	H	H	H	
Transparency	L	M	M	M	M	M	M	L	M	H	L	M	L	H	
Applicability across the US	H	H	M	H	H	H	H	L	H	H	H	H	UK	H	
Horizontal Segmentation	L	L	M	H	L	L	M	UK	M	M	M	L	L	M	
Vertical representation	L	L	M	H	M	H	H	H	H	M	M	H	H	H	
MODEL PROCESSES															
Edge-of-Field BMPs	UK	L	L	H	L	UK	UK	UK	M	M	UK	M	UK	H	
In-Field BMPs	L	L	M	H	M	UK	H	UK	M	L	UK	M	UK	H	
Hydrology	L	L	M	H	M	M	M	H	M	M	H	M	H	H	
Irrigation	L	L	H	H	NA	M	M	UK	M	H	H	M	M	H	
In-Field Management Options	L	L	H	H	M	M	H	UK	H	M	M	H	H	H	
Nitrogen, Phosphorus	M	L	H	H	M	L	H	L	H	H	M	NA	L	H	
Pesticides	L	L	H	M	H	UK	H	UK	H	H	M	NA	H	M	
Plant Growth	L	L	H	H	H	M	H	M	H	L	L	M	H	H	
Sediment	L	L	H	M	M	UK	M	UK	M	H	H	H	NA	M	
Tillage Options	M	L	H	H	H	M	H	UK	H	L	UK	H	H	H	

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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?



Conservation Practices for Water Quality Improvement

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

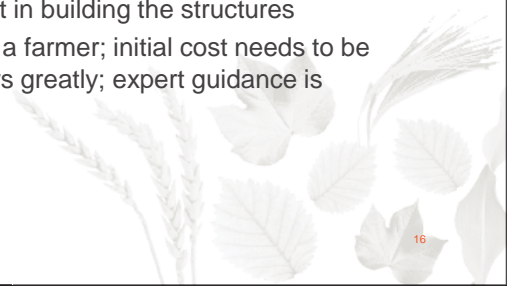
Requires: Education, experimentation by growers, commitment to transition to a new way of farming (investment in new equipment; cc can be trial and error; need to find new markets for other crops in rotation)

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.



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



Field to Market®

Thank You
For More Information
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