

Outreach Delivery as Part of Bioenergy Education

- Bobby Grisso
 - Virginia Tech
- Seminar - May 10, 2012

Outreach Delivery As Part Of Bioenergy Education

- Bobby Grisso
- Professor and Extension Engineer
 - BS & MS - VPI&SU
 - PhD - Auburn University
 - University of Nebraska
 - Virginia Tech







AIR RESOURCES

NPS » Explore Nature » Air Resources

Air Quality in Parks

Basics

Laws & Policy

Monitoring & Data

Natural Lightscapes

Permit Applications

Photos & Multimedia

Planning

Publications

Studies

Students & Teachers

Web Cameras

Great Smoky Mountains
National Park

Look Rock Camera

Purchase Knob Camera

More NPS Air Web Cams

Who We Are

Explore Nature Home

About Natural Resources

Contact Natural Resources

Search

RSS

Great Smoky Mountains National Park

View from Look Rock
Looking East

Air Data
& Weather

NPS Air
Webcams

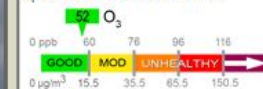
Visual Range is about 28 miles • updated 04/25/2012 08:45 AM EDT



webcam clear/hazy landmark map it archives view larger

Current Air Quality »

Ozone - O₃
updated 04/25/2012 08:00 AM EDT



Particulate Matter - PM_{2.5}
updated 04/25/2012 08:00 AM EDT

See more air data »

Current Weather »

updated 04/25/2012 08:00 AM EDT

Temperature 53 F
Humidity 68 %
Wind W-4 mph
Precipitation - 1 hr 0 in.

See more weather data »

About Air Pollution »

In Depth »

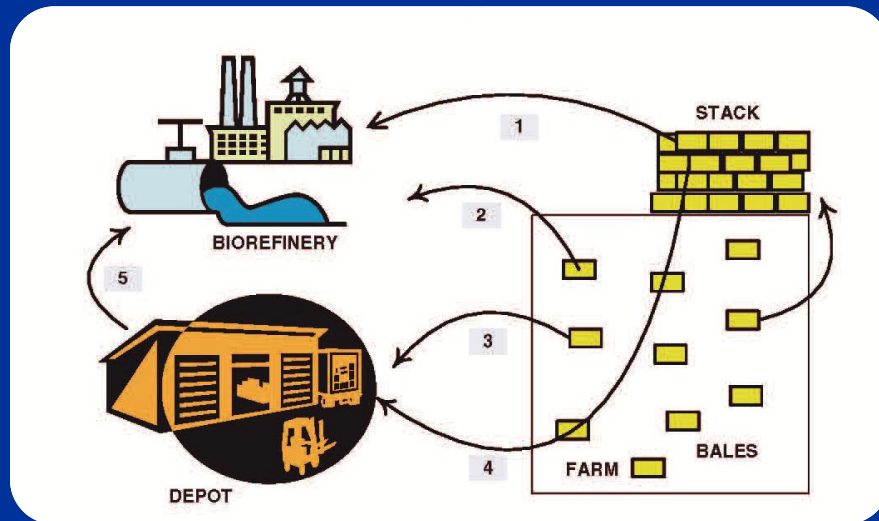
Feature »



Last Updated: April 25, 2012

BSE - Grisso

- Sabbatical Spring 2012
 - Biomass Logistics
 - Machinery systems (equipment parameters)
 - Logistics patterns



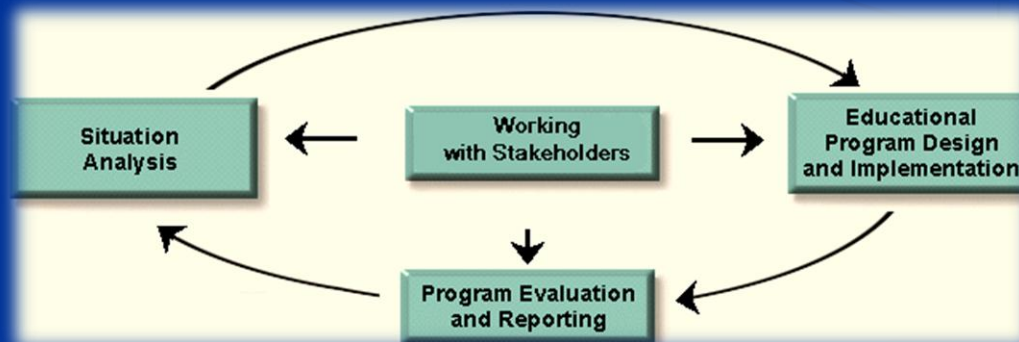


Three Fold Mission

- Research - Teaching - Extension
 - Discovery - Engagement - Outreach
- Extension / Outreach
 - Unbiased research to help make decisions
 - Relevant insights of alternatives & solutions
 - Informal adult education
 - Impact of the educated (difference?)

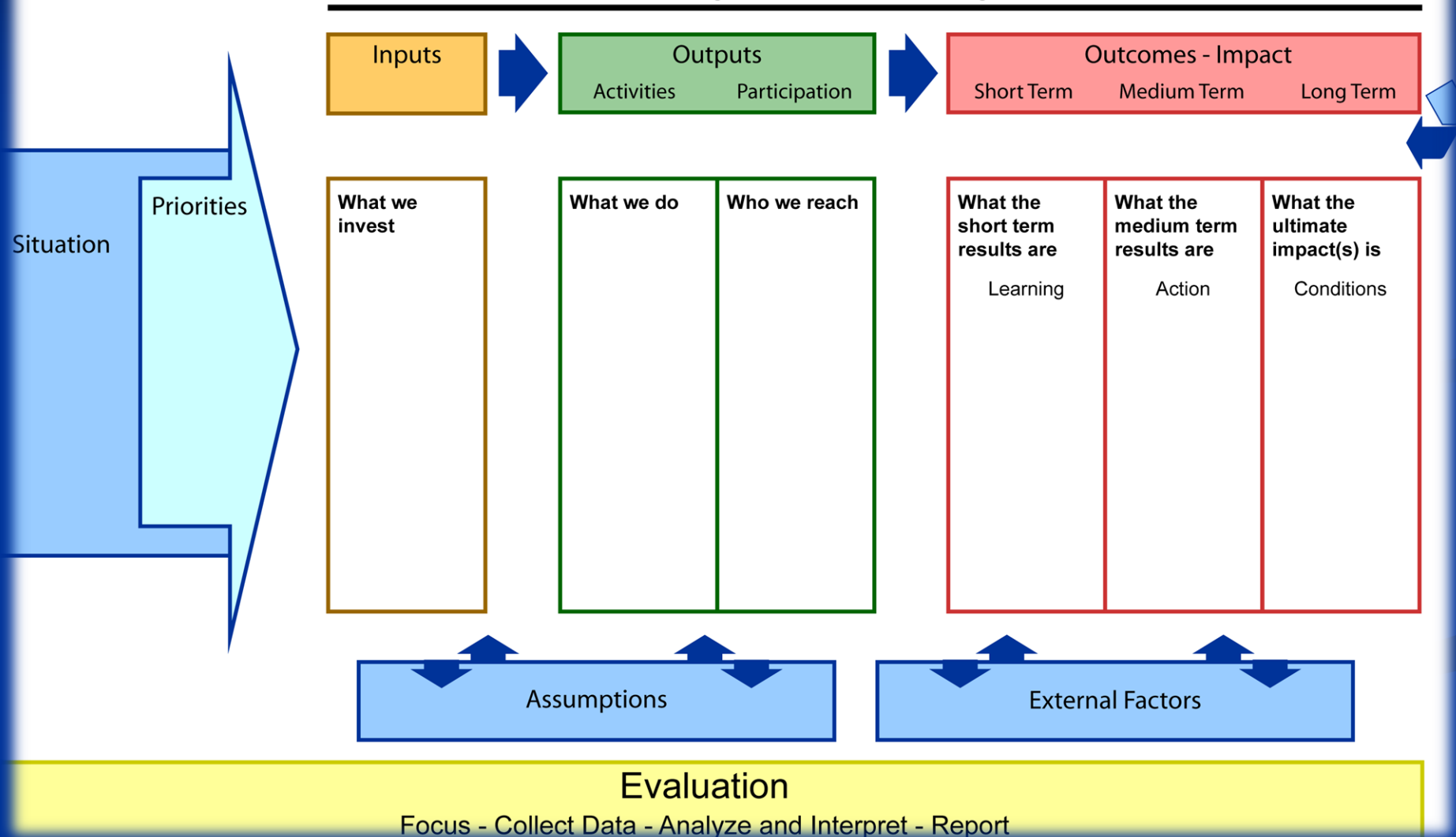
Engaging Scholarship w/in Outreach Programs

- Awareness - Land Grant University
- Program Logic Model
 - ftp://bseerv214.bse.vt.edu/grisso/Program_Logic/
- Importance of Deliverables / Impacts
- Example programs



Program Logic Model

Program Action - Logic Model

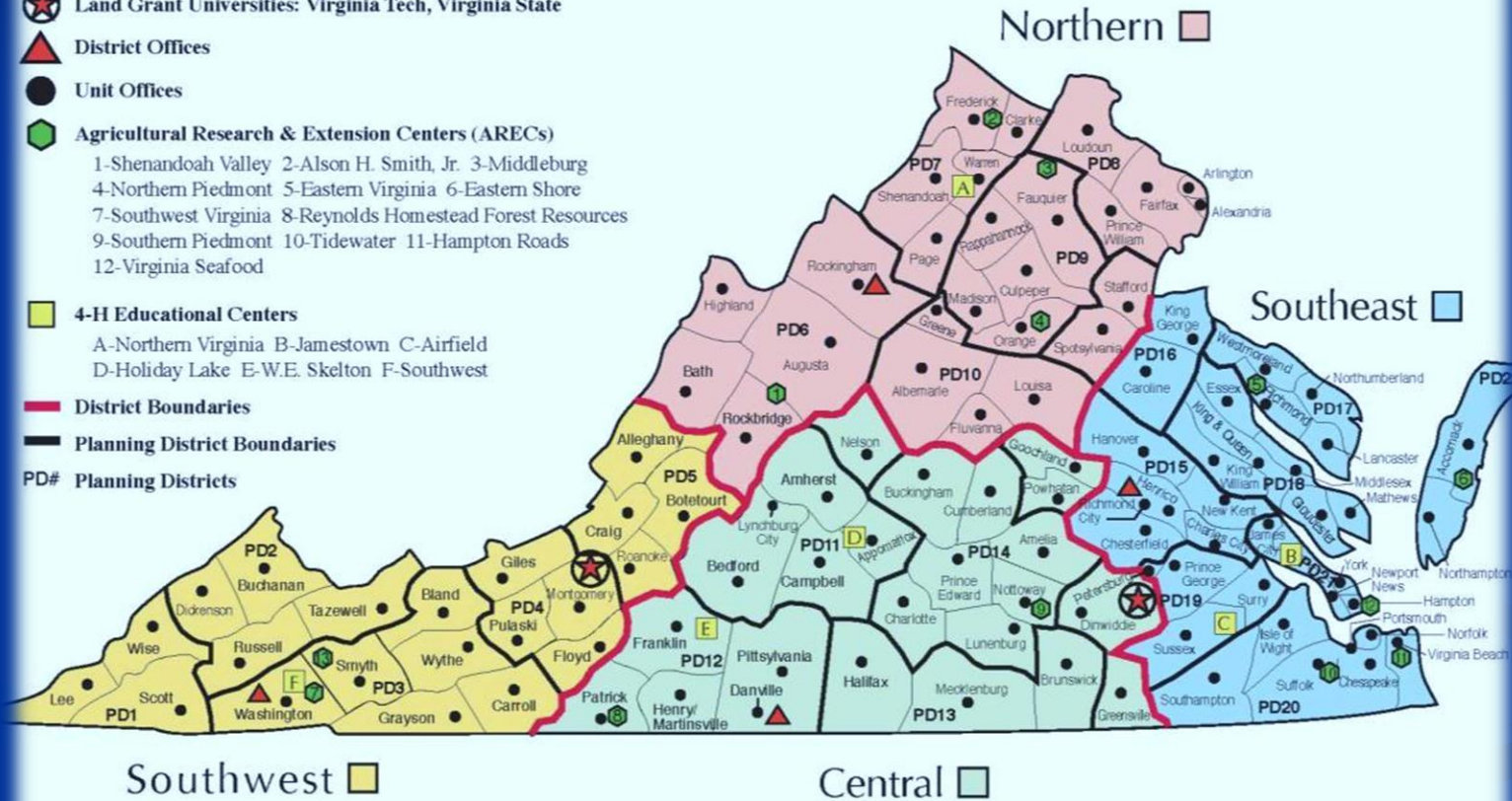


VCE - Extension

Virginia Cooperative Extension

Publication 490-100
Revised December 2009

-  Land Grant Universities: Virginia Tech, Virginia State
-  District Offices
-  Unit Offices
-  Agricultural Research & Extension Centers (ARECs)
 - 1-Shenandoah Valley 2-Alson H. Smith, Jr. 3-Middleburg
 - 4-Northern Piedmont 5-Eastern Virginia 6-Eastern Shore
 - 7-Southwest Virginia 8-Reynolds Homestead Forest Resources
 - 9-Southern Piedmont 10-Tidewater 11-Hampton Roads
 - 12-Virginia Seafood
-  4-H Educational Centers
 - A-Northern Virginia B-Jamestown C-Airfield
 - D-Holiday Lake E-W.E. Skelton F-Southwest
-  District Boundaries
-  Planning District Boundaries
- PD# Planning Districts



VCE - Extension

- Front door of the university...
- 4 districts / 12 AREC / 4-H Centers
- 93 Counties & 13 jurisdictions
- I live in the Southwest District



- In 2010, more than 1.8 million people reached with face-to-face programs

BSE Extension Programs

■ Bioresidues Management & Utilization

■ Animal Waste Management

■ Agricultural Air Quality

■ By-Product Utilization

■ Biomass inventory

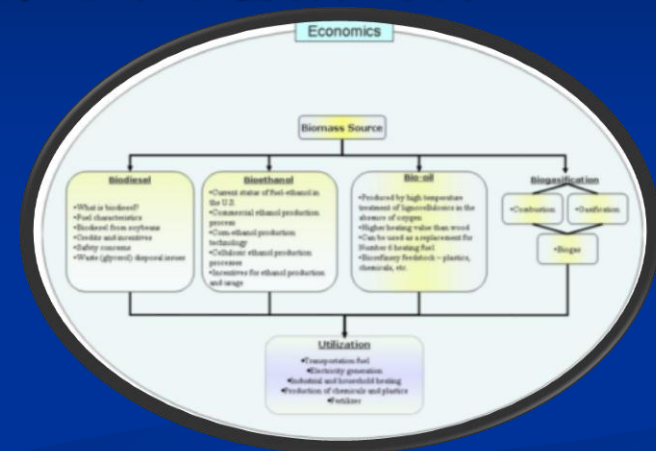
■ Bioenergy Engineering Education Program (BEEP)

■ Energy Conservation

■ Energy Series - Residential / Ag Production

■ Energy Audits

■ Plastic Recycling



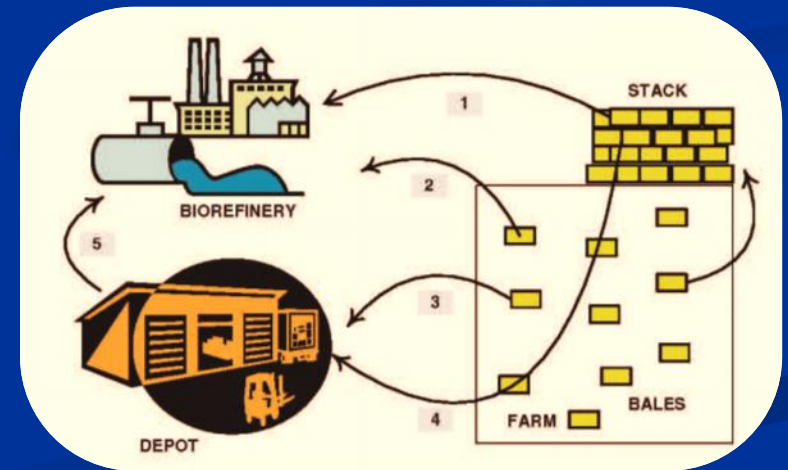
BSE Extension Programs

- Virginia Household Water Quality Program
- Watershed Studies
 - Watershed Management
 - Urban Stormwater Management
- Machine Safety & Management



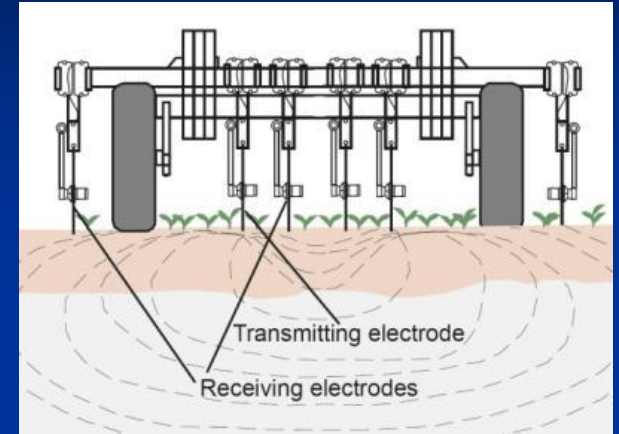
Specific Programs: Grisso

- Machinery Management
 - Precision Farming
 - Machinery Performance
 - Pesticide Application Cert
 - Conservation Tillage
- Biomass Logistics
 - Machinery systems
 - Logistics patterns



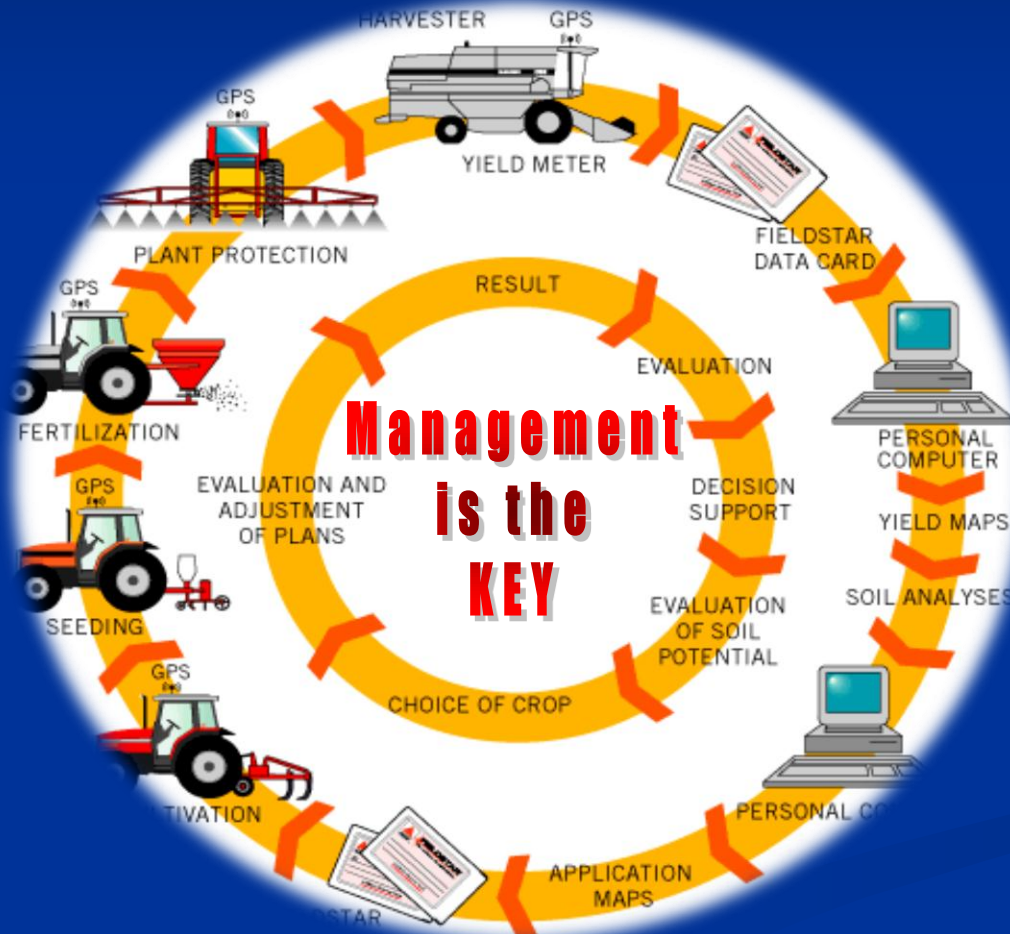
Precision Farming

- Awareness
 - Embedded technologies
 - Information driven
- Available technologies
- Potential return of investment
- Future developments & concerns

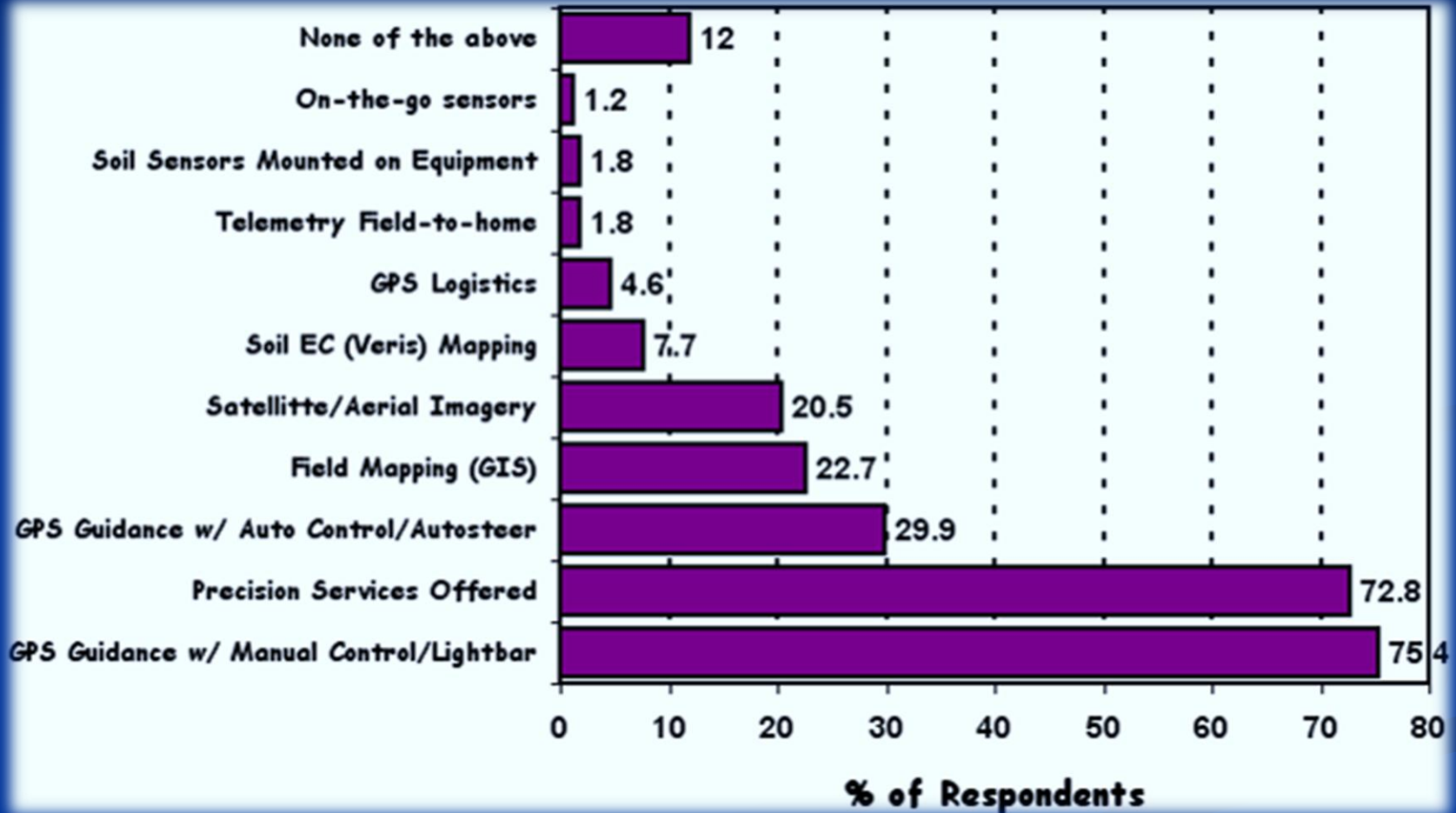


Precision Agriculture: Systems Approach

Right source
Right rate
Right time
Right place

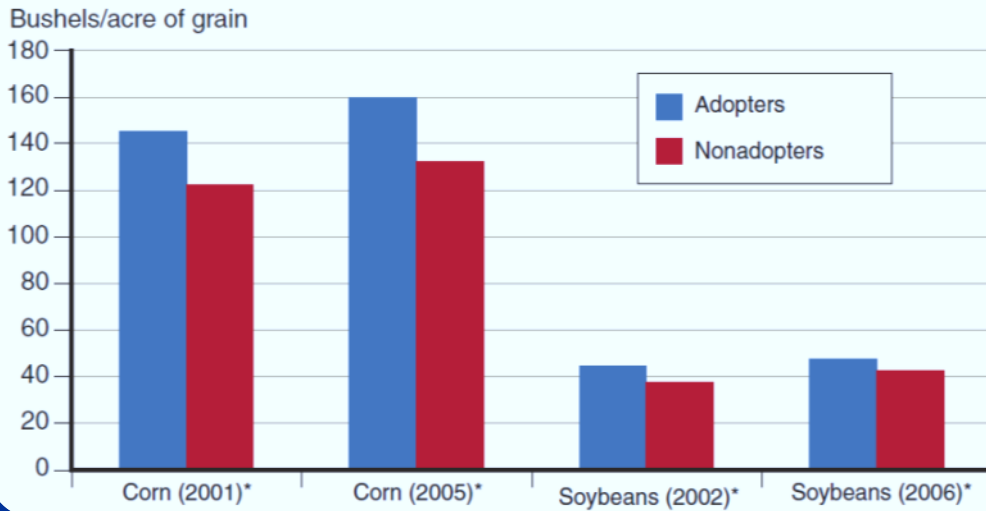


Precision Technology Use



Precision Farming Impacts

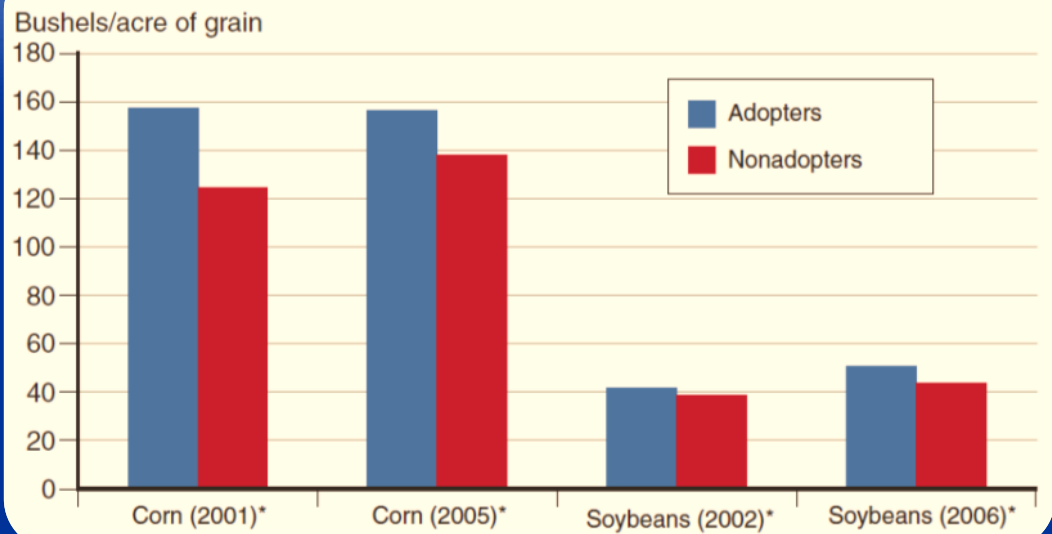
Comparison of yields among yield monitor adopters and nonadopters



Comparison of yields among VRT-fertilizer adopters and nonadopters



Comparison of yields among VRT-fertilizer adopters and nonadopters



Precision Farming Impacts

- Linked to emerging environmental and farm management questions.
- Has a positive impact on environmental quality through more efficient use of inputs.
- Farm management enhanced by more complete information on field conditions.



Scholarship

- Published & publicly disseminated
- Practical applied problems
- Publish findings both in
 - Research & Extension Forums
- Measure impacts and team activities
- Submit work for Blue Ribbon Awards

Scholarship

■ Examples - Precision Farming

- Adamchuk, V.I., R.D. Grisso, and M.F. Kocher. 2011. Spatial variability of field machinery use and efficiency. Chapter 8, 135-146. In: *GIS Applications in Agriculture*. Volume Two. Nutrient Management for Energy Efficiency, D.E. Clay and J.F. Shanahan, eds. Boca Raton, Florida: CRC Press.
- Grisso, R.D., M.F. Kocher, V.I. Adamchuk, P.J. Jasa, and M. Schroeder. 2004. Field efficiency determination using traffic patterns indices. *Applied Engineering in Agriculture* 20(5):563-572
- Grisso, R.D., P.J. Jasa, M.A. Schroeder, and J.C. Wilcox. 2002. Yield monitor accuracy: Successful Farming magazine case study. *Applied Engineering in Agriculture* 18(2):147-151

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Farm Energy Home

Farm Energy Community Page

Last Updated: February 10, 2011

Have a question?
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our Experts



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This resource area was created by the: [Farm Energy](#) community



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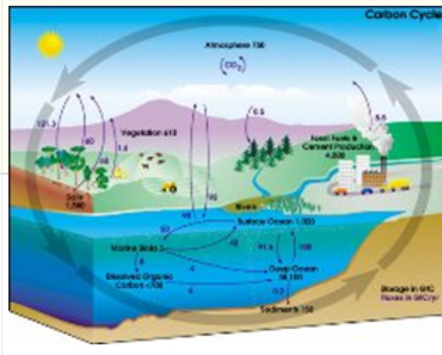
Topics

- [Introduction to Farm Energy](#)
- [Anaerobic Digestion and Biogas](#)
- [Biodiesel](#)
- [Biomass Combustion](#)
- [Efficiency and Conservation](#)
- [Feedstocks and Energy Crops](#)
- [Sustainability Dimensions of Farm Energy](#)
- [Solar Energy](#)
- [Wind Power](#)

[Ag Energy Webcast Series](#)

[Bioenergy Curriculum - NEW!](#)

Welcome to the eXtension Farm Energy web resource brought to you by University Extension specialists throughout the United States.



The eXtension Farm Energy website is designed to provide timely and practical energy information for agricultural producers and service providers that enhances profitability, conserves natural resources, and promotes the well-being of local communities.

Who Are Our Specialists?

The Farm Energy Community of Practice is a virtual, or on-line, community which includes over 170 members from land-grant universities and other agencies, including USDA, SARE, NREL, Sun Grant, ATTRA, NCAT, and state and county governments.

Community members have combined their expertise to provide this eXtension Farm Energy website. It is an information source for farmers and agricultural educators interested in all aspects

www.extension.org

Community members have combined their expertise to provide this eXtension Farm Energy website. It is an information source for farmers and agricultural educators interested in all aspects of farm energy--from conservation and efficiency to renewable energy production.

What Can Be Found?

The eXtension Farm Energy website provides fact sheets, research summaries, case studies, decision tools, worksheets, and many other resources to get started on a range of practices, including:

- [Conserving energy](#) through modified farming practices and equipment upgrades
- Growing and producing your own biofuels
- Evaluating [feedstocks](#) such as [switchgrass](#), [algae](#) and [sugar crops](#)
- Calculating [wind](#) and [solar power](#) potential on your farm
- Objective and practical information on the [Sustainable use and production of Farm Energy](#)



photo courtesy of James Wade

Browse related Articles by tag: [ag energy](#)

Have a specific question? [Try asking one of our Experts](#)

Unlike most other resources on the web, we have experts from Universities around the country ready to answer your questions.



BIOENERGY TRAINING

an on-line
educational
resource



The **Bioenergy Training Center** provides educational and training resources for Extension and other community-based educators. Resources include curriculum, links to instructor-led trainings (webinars, videos), information about face-to-face training programs, and assessment tools.

<http://fyi.uwex.edu/biotrainingcenter>



SUSTAINABLE BIOENERGY

Our introductory series contains four modules that present core topics and key concepts around bioenergy generation and environmental sustainability. The curriculum covers a wide range of issues, including sustainability concerns, technical aspects of bioenergy generation, bio-energy feedstock production, water quality, and community engagement processes to assist communities in understanding the implications of bio-based alternative energy.



BIOEN1: Introduction to Bioenergy: Background; Bioenergy products, feedstocks, co-products & by-products; Economic, social & ecological impacts of bioenergy at local, national, and global levels; Current and emerging challenges to bioenergy development

BIOEN2: Bioenergy Crop Production & Harvesting: Marketing and economics; Bioenergy crop production: A crop-by-crop analysis; Best management practices for protecting soil, water & wildlife



BIOEN3: Water Resources: Issues & Opportunities in Bioenergy Generation: Introduction; Watershed-level impacts: water use in bioenergy production; Policy options & implications

BIOEN4: Community Economic Development & Bioenergy Generation: Introduction to community issues in bioenergy development; Community participation in renewable energy development; Roles for Extension educators

Farm Energy Home

Bioenergy Curriculum

Last Updated: April 12, 2012

Have a question?
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our Experts



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This curriculum from the [Bioenergy Training Center](#) was created by over 40 [University Specialists](#) in the U.S. North Central region to provide unbiased, researched and peer-reviewed information for this emerging field.

Targeted for Extension and other community educators, these resources also provide valuable information for farmers, landowners, community leaders, industry and the inquisitive public.

Online courses are offered as modules, where learners can choose to study sequentially or with focus on specific topics. Each comprehensive module includes learning objectives, lessons, background and guiding questions, supporting resources, and self-quiz sections. The Sustainable Bioenergy Course features three [community assessment tools](#) to encourage participation in decision making about energy alternatives. (All materials are available in PDF download format.)



This resource area was created by the: [Farm Energy community](#)



Resource Area Feeds

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In This Resource Area

Topics

- Introduction to Farm Energy
- Anaerobic Digestion and Biogas
- Biodiesel
- Biomass Combustion
- Efficiency and Conservation
- Feedstocks and Energy Crops
- Sustainability Dimensions of Farm Energy
- Solar Energy
- Wind Power

Ag Energy Webcast Series
Bioenergy Curriculum - **NEW!**

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- COURSE 1: Bioenergy & Sustainability
- BIOEN1 – Intro to Bioenergy
 - Unit 1.1: Introduction to Bioenergy
 - Unit 1.2: Bioenergy Products, Feedstocks, Co-Products & By-Products
 - Unit 1.3: Economic, Social and Ecological Impacts of Bioenergy at Local, National and Global Levels
 - Unit 1.4: Current and Emerging Challenges to Bioenergy Development
- BIOEN2 – Bioenergy Crop Production & Harvesting
 - Unit 2.1: Bioenergy Crop Production: Marketing and Economics
 - Unit 2.2: Bioenergy Crop Production: A Crop-by-Crop Analysis
 - Unit 2.3: Bioenergy Crop Production: Best Management Practices for Protecting Soil, Water & Wildlife

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- COURSE 1: Bioenergy & Sustainability

- BIOEN3 – Water Resources: Issues & Opportunities
 - Unit 3.1: Introduction
 - Unit 3.2: Watershed Level Impacts
 - Unit 3.3: Water Use in Bioenergy Production
 - Unit 3.4: Policy Options & Implications

- BIOEN4 – Community Economic Development
 - Unit 4.1: Introduction to Community Issues in Bioenergy Development
 - Unit 4.2: Community Participation in Renewable Energy Development
 - Unit 4.3: Roles for Extension Educators

Developing...

■ COURSE 2: On-farm Energy Conservation & Efficiency

- ENCON1 - Introduction to Farm Energy Use
- ENCON2 - Farm Practices to Improve Energy Efficiency
- ENCON3 - Resources

■ COURSE 3: Anaerobic Digestion

- ANDIG1 - Introduction to Anaerobic Digestion
- ANDIG2 - Factors that Affect Manure Digestion
- ANDIG3 - Types of Anaerobic Digesters
- ANDIG4 - Anaerobic Digester Start-up, Operation & Control
- ANDIG5 - Economics of On-farm Anaerobic Digesters
- ANDIG6 - Cooperative Development of Digesters
- ANDIG7 - State and Federal Regulations

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Feedstocks for Biofuel Production

Last Updated: April 02, 2012

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Introduction



Switchgrass briquettes.
Photo: [Daniel Ciolkosz](#), Extension Associate, [Penn State](#)

Biomass feedstocks for energy production can result from plants grown directly for energy or from plant parts, residues, processing wastes, and materials from animal and human activities. The U.S. Department of Energy conducted an assessment of these feedstocks in 2005, ("[Biomass as Feedstocks for a Bioenergy and Bioproducts Industry: The Technical Feasibility of a Billion Ton Annual Supply](#)") and concluded that over 1 billion tons of agricultural and forestry-related biomass could sustainably be collected and delivered to biorefineries. Feedstocks can be classified by categories of plants or residues, by the energy products they produce, or in other ways. For discussion purposes, the following categorization of feedstocks will be used: sugars/starches, fibers/grasses, oil, crop residues, manures and organic wastes, and

wood and woody biomass.

Sugar and Starch Crops

Many of the sugar and starch crops that are candidates to produce biofuels are those currently being used for grains for feed and food or for sugars for sweeteners. Root and tuber starches are typically used as food staples throughout the world. These crops and their specific products can easily be converted, via traditional fermentation methods, to ethanol and similar alcohols for use in transportation and other fuels.

The specific challenges with most of these crops will be the competition for food and the need for genetic, production, and processing modifications to enhance energy production in a sustainable way.

- [Corn Grain](#)
- [Sweet Sorghum](#)

Cellulosic Biofuels Web Seminar Series 2010

Webinar Series Purpose

Cellulosic ethanol production is an emerging industry. Production practices, materials and business methods are expected to be different from those currently used in agriculture. This webinar series is intended to provide interested individuals with an overview of the ethanol industry and the anticipated needs, from production, agronomic, and contractual perspectives for supplying cellulosic materials to a biofuel plant. This webinar series was facilitated by [John Hay](#), [U. Nebraska Extension](#) and presented by National eXtension and the High Plains Extension Energy Team.

State of the Industry: Corn and Cellulosic Ethanol

March 26, 2010

- Presenter: Todd Sneller, Nebraska Ethanol Board
- [Program Announcement](#)
- [Video Recording of the Webcast](#)

Economics of Cellulosic Biofuels

April 30, 2010

- Presenter: Dr. Robert Wisner – Iowa State University (retired)
- [Video Recording of Webinar](#)

Cellulosic Biofuel Logistics

May 28, 2010

- Presenter: Dr. John Cundiff, Virginia Tech University; discussion of issues associated with biomass production and delivery
- [Program Announcement](#)
- [Video Recording of Webinar](#)

Agronomic Impacts of Cellulosic Material Harvest

Corn Stover Feedstock Logistics

June 25, 2010

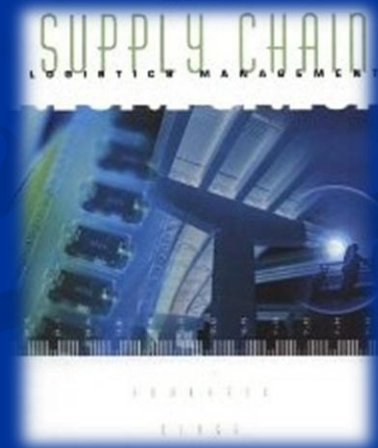
- Presenter: Dr. Greg Roth, Penn State University
- [Video Recording of Webinar](#)

Regional Feedstock Supply Opportunity

June 25, 2010

Supply Chain Logistics Management

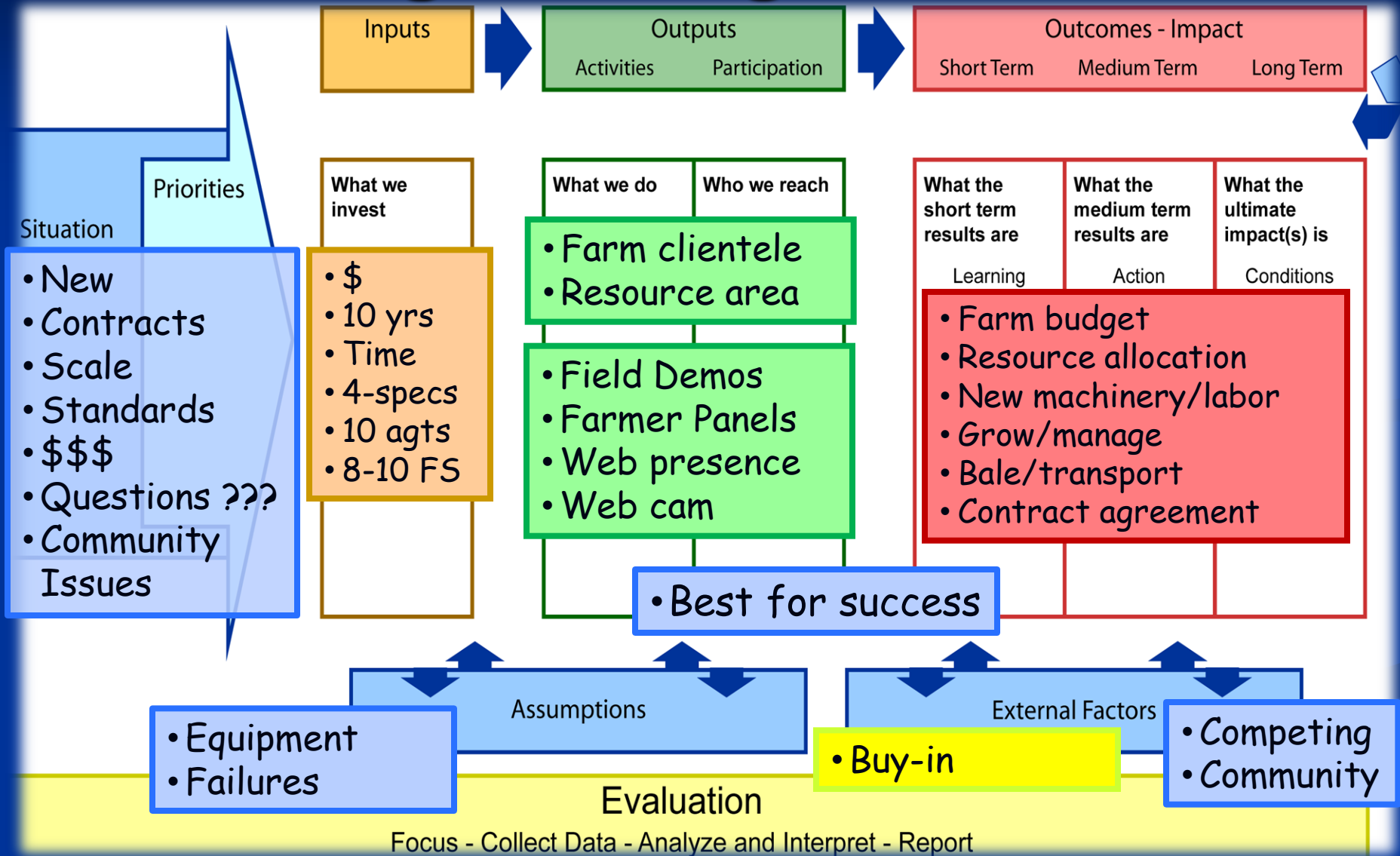
- **Supply chain management** - consists of firms collaborating to leverage strategic positioning and to improve operational efficiency
- **Logistics** - is the work required to move & position inventory through a supply chain... the process that creates value by timing & positioning inventory



Collaborating to leverage strategic positioning



Program Logic Model





Tennessee Experience

- Contracting with local farmers to produce 5,100 ac of switchgrass
 - 2,700 ac harvested in 2009
 - Added >2,400 acres in 2010
 - 1,000 ac improved varieties
 - Currently work with 61 farmers in a 9 county area in East Tennessee
 - 2010 Harvested 17,000 bales
- UT/Genera contract
 - ~\$450/ac/yr for 3 years
 - We provide seed, technical expertise
 - Separate storage contracts
 - Yield-based component in 2010
- Averaging about 8 tons/ac by 3rd year
 - Harvesting ~2 tons in year 1
 - ~5 tons in year 2
 - ~8 tons year 3 and beyond

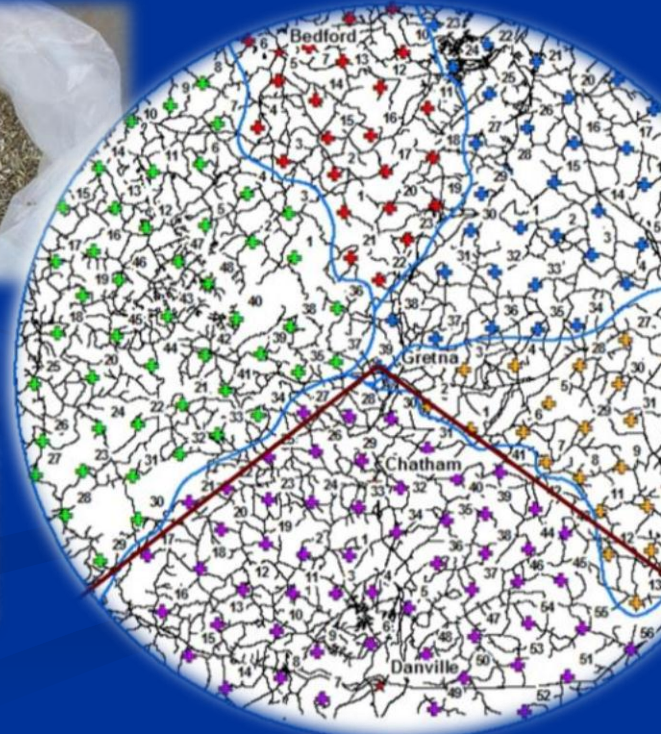








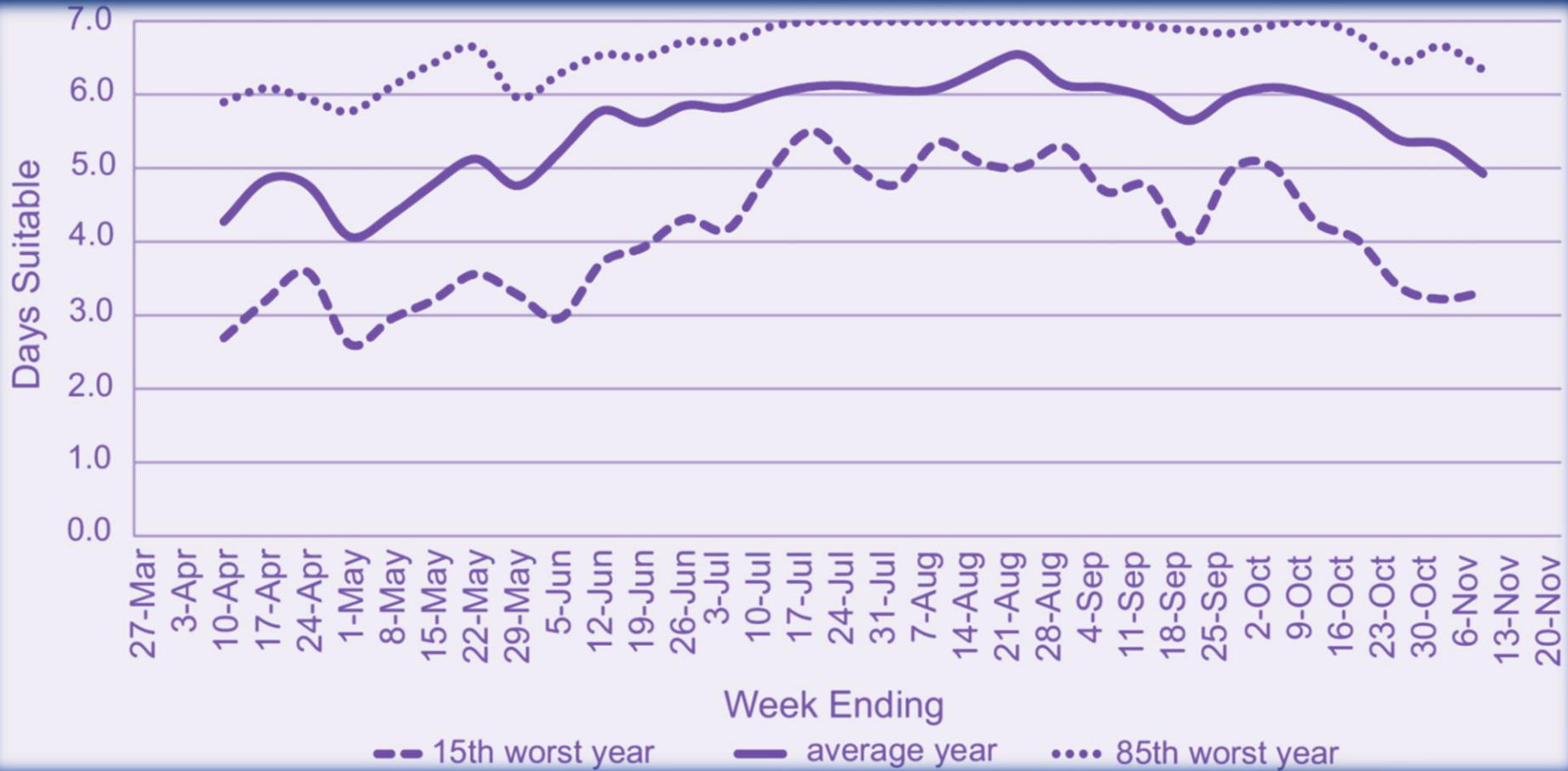
Weak Links



Expected days suitable for fieldwork

Data source: National Agricultural Statistics Service, Arkansas Field Office: 1975-2009.

Source: Griffin, T. and Kelly, J. 2010. Days Suitable for Fieldwork in Arkansas, FSA33

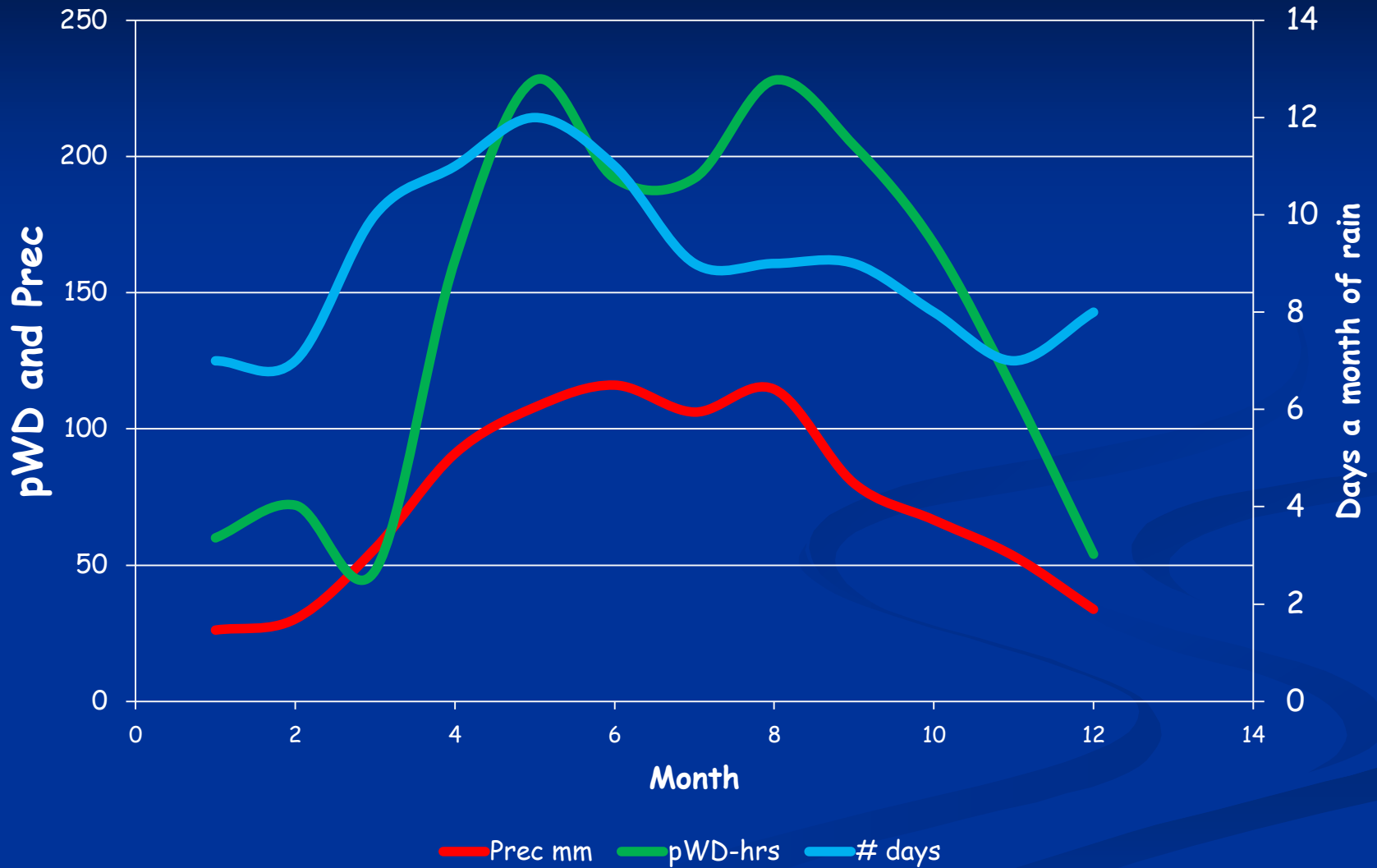


Available Working Days

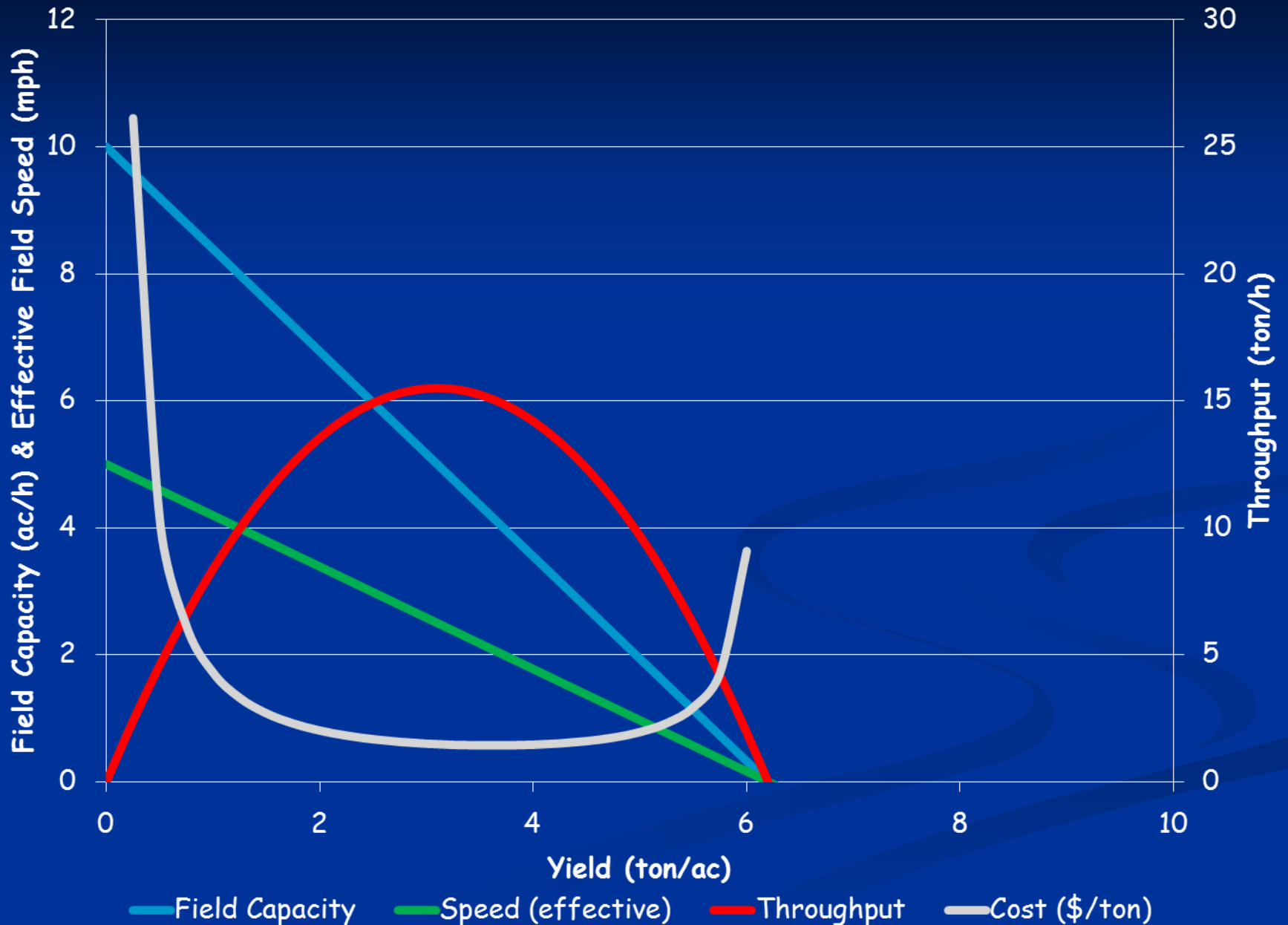
$$\begin{cases} WP \times (a_1 \times \%TotalSolar + a_2Temp + a_3PrecTemp + a_4ET) \\ WN \times (b_1Prec + b_2Prec_{lag} + b_3PrecAmt + b_4Rain?) \end{cases}$$

- If "Rain?" = YES (1) then "no go"
 - else if "Prec_{lag}" > 3 (AE2) then "no go"
 - else If "Sum of factors (pWD)" < -25 (AB2) then "no go"
 - else If "Sum of factors (pWD)" > 0 (AF2) then "Full Day" (AG2)
 - else "Half Day" (AG2/2)

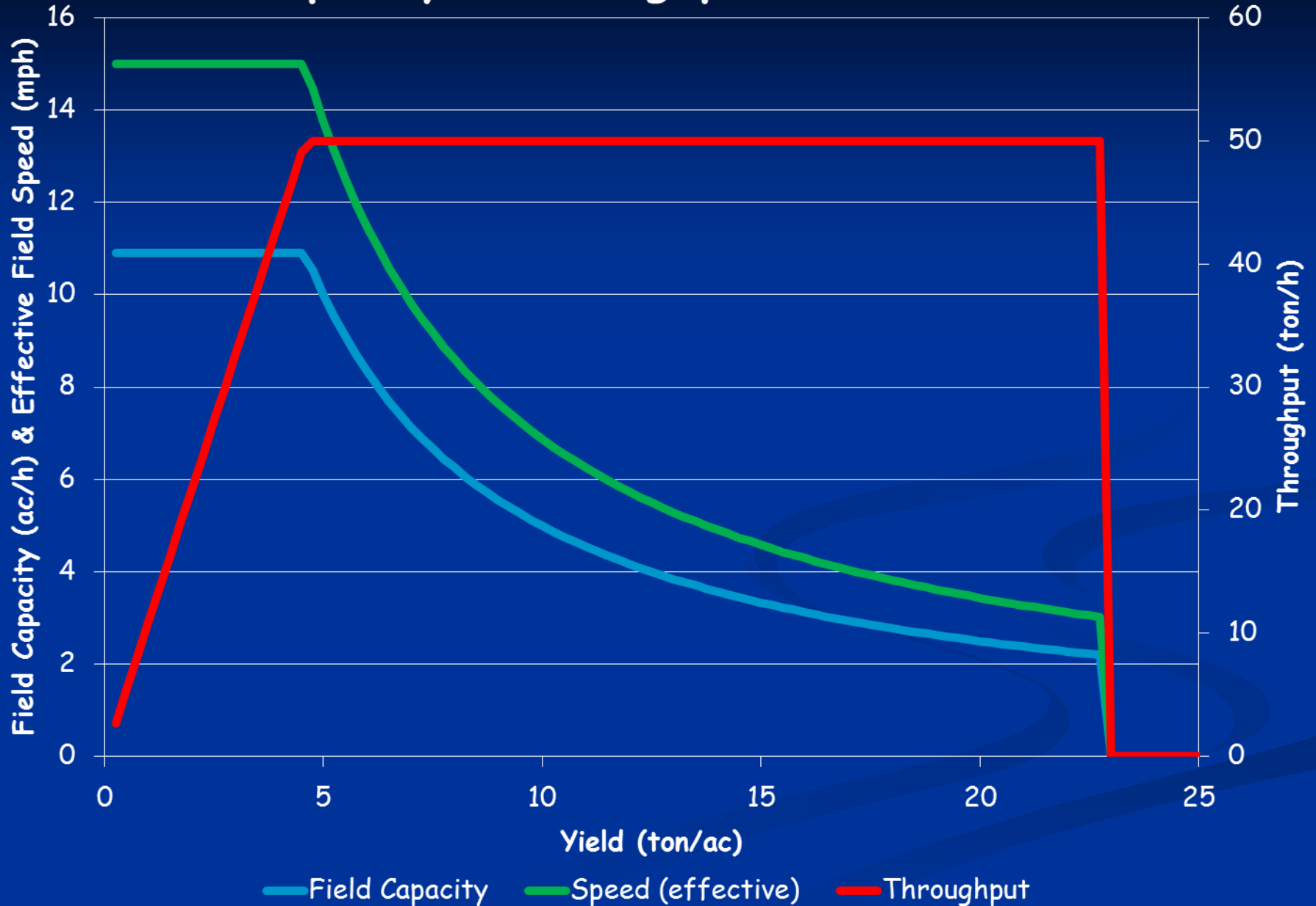
Available Working Days



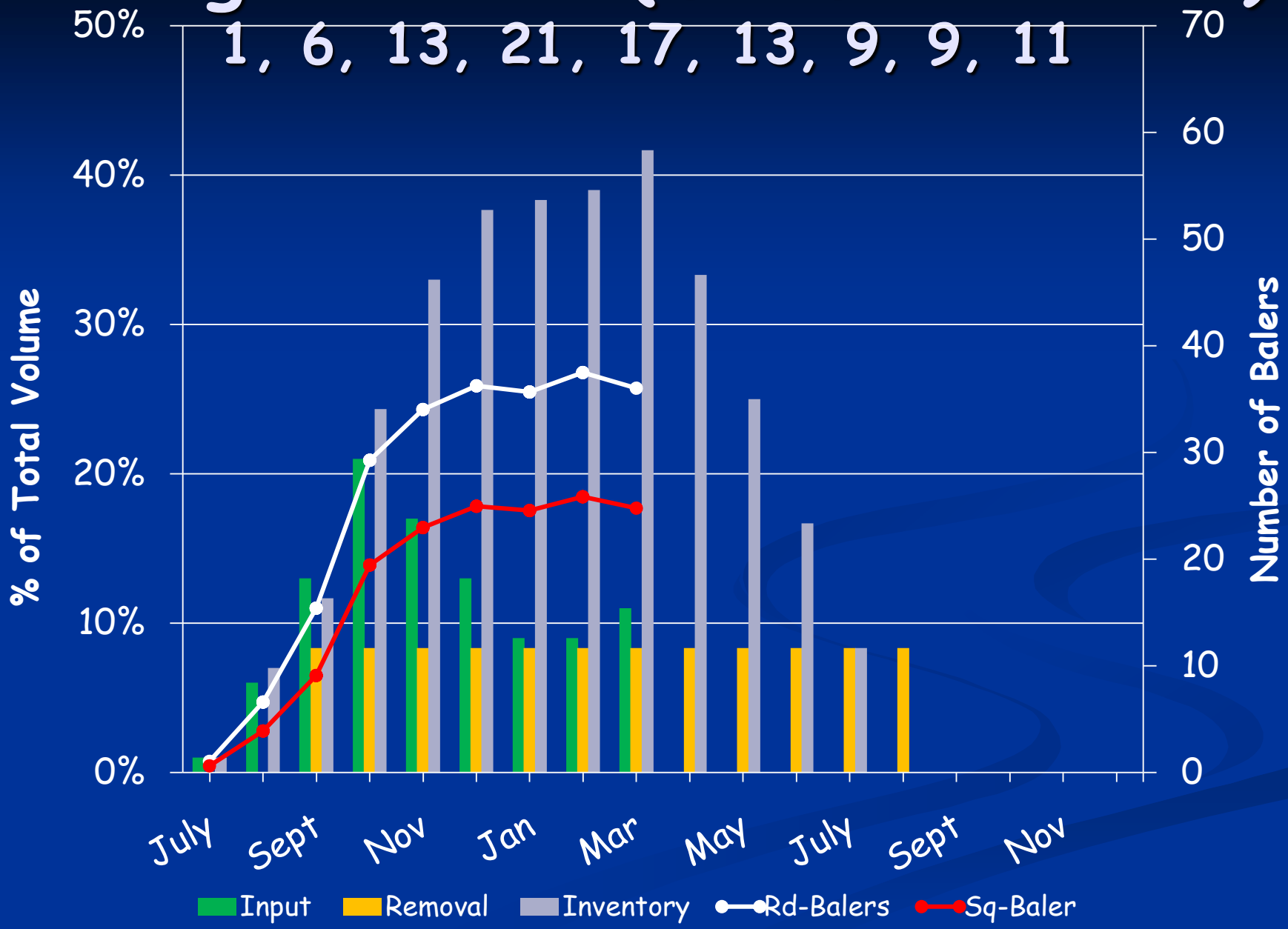
Bale Capacity & Throughput Related to Yield



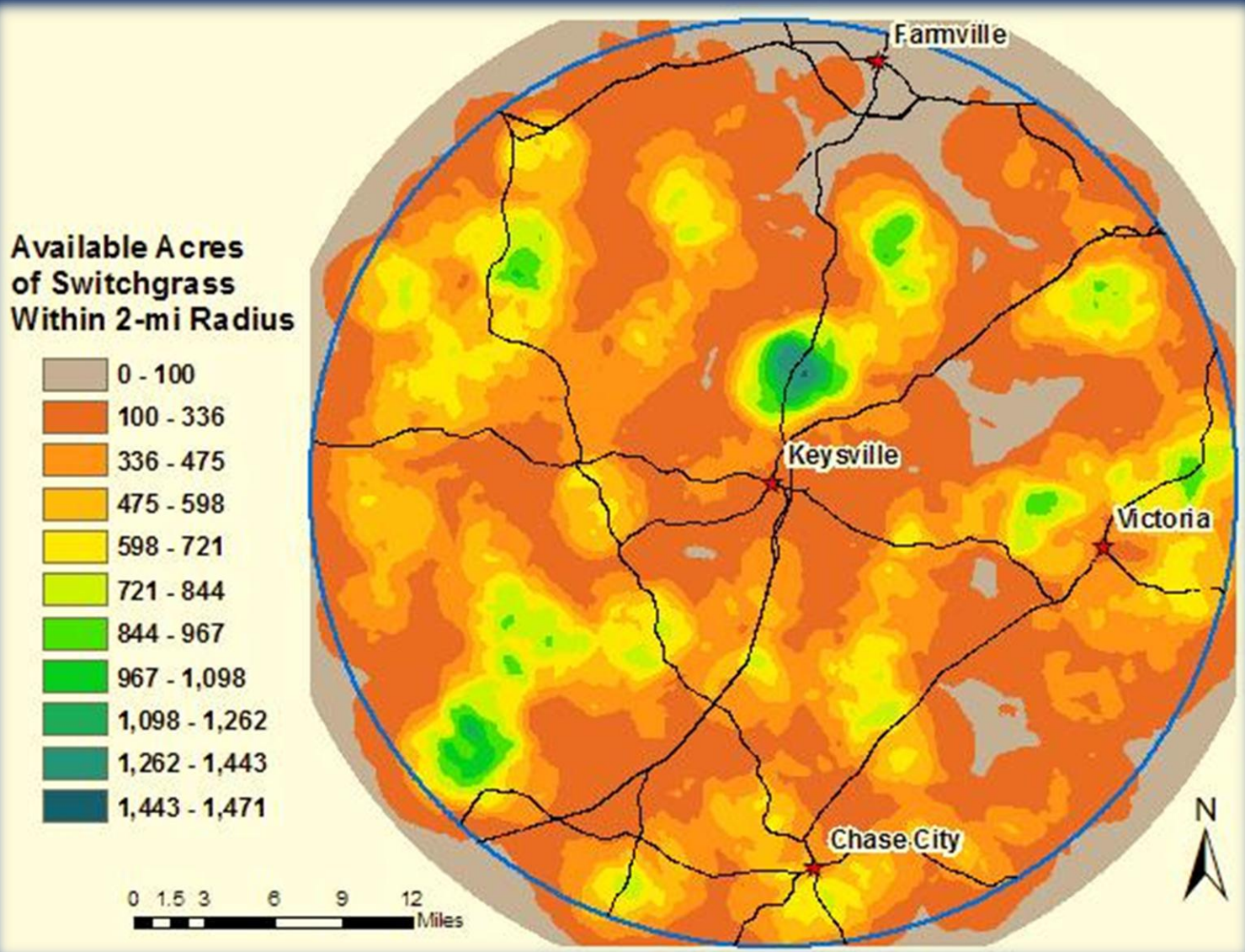
Bale Capacity & Throughput Related to Yield



Baling Rate %: (minimize balers)



Field Density Maps



<http://atlas.agr.gc.ca/bimat>

BIMAT

Biomass Inventory Mapping and Analysis Tool

Why did Canada build it?

- Provide access to accurate and reliable Canadian biomass and landscape information via the Internet.
- Facilitate analysis of biomass inventory and impact of exploitation of selected agricultural, forestry, and municipal woody biomass.

Biomass Inventory Mapping and Analysis Tool

Scale: 1:15,000,000 Calculate Biomass...

Search by geographic name

Search within current view

Map display

- Reference Features
 - Populated Places
 - Power Lines *
 - Pipelines *
 - Railroads *
 - National and Provincial Parks *
- Agriculture
- Forestry
- Land Suitability
 - Hybrid Poplar
 - Willow
- Land Cover
 - Landcover

Legend

Roads, Rivers, Lakes and Boundaries

- River
- Lake
- Trans-Canada Highway
- Major road
- Provincial boundary

Landcover

- Mixed forest
- Broadleaf forest
- Open water
- Transitional forest
- Coniferous forest
- Tundra
- Barren land
- Snow/ice
- Cropland
- Rangeland
- Build-up area

Biomass Inventory Calculation

Select Analysis Location: Place Point On Map...

Herbaceous Material

- Barley
- Wheat
- Flax
- Oat
- Corn

Crop Types: Cattle
Participation Rate: 25%
Tillage Type: Current State

Woody Material

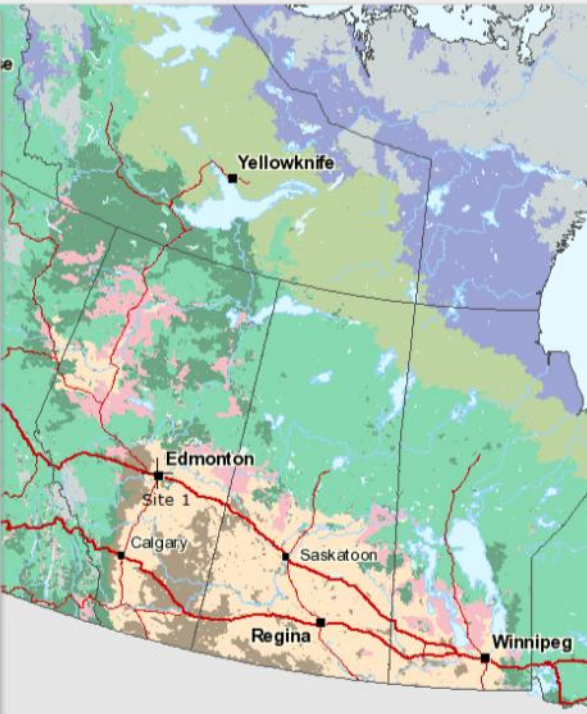
- Softwood Roadside Harvest Residue
- Hardwood Roadside Harvest Residue **Calculating biomass...**
- Softwood Mill Residue
- Hardwood Mill Residue
- Urban Wood Waste

Calculation Type

- Calculate the amount of biomass available within a specified distance
60 km Preview Area
- Calculate the area required to satisfy the specified demand for biomass

tonnes

Close Show Results Calculate



AgriMap

AgriMap puts land and water information and tools into the hands of producers and users. It provides a variety of information from soils to water features, land cover to high-resolution satellite and aerial imagery, as well as plots, roads, quarter sections and more. This interactive mapping application has built-in tools to customize maps for simplifying land-use decision making.

Drought Watch Interactive Mapping

The Drought Watch Interactive Mapping application (DWIM) presents a series of agroclimatic biometric maps depicting long-term "normals" or averages for precipitation, temperature, growing degree days, and more. These long-term trends are key to understanding the risk and potential impacts of drought in Canada.

Soils of Canada

These national scale thematic maps display the distribution and areal extent of soil attributes such as drainage, texture of parent material, kind of material, and classification of soils in terms of Soil Order and Great Groups. The soil and associated classes of the Canadian landscape are depicted on the local surface form thematic maps.

Canadian Census of Agriculture - 2006 Map Series

The Census of Agriculture, conducted every five years by Statistics Canada, provides a comprehensive picture of agricultural activity in Canada.

Plant Hardiness Zones of Canada

The Plant Hardiness Zones map outlines the different zones in Canada where various types of trees, shrubs and flowers will most likely survive. It is based on the average climatic conditions of each area. The 1987 plant hardiness map was created by Agriculture Canada scientists using Canadian plant survival data and a wide range of climatic variables. The 2006 plant hardiness map was created by Natural Resources Canada's Canadian Forest Service using the same variables as the 1987 map and includes more recent climate data (1981-90).

Biomass Inventory Mapping and Analysis Tool

The Biomass Inventory Mapping and Analysis Tool (BIMAT) provides Internet-based GIS functionality to query and visualize biomass inventory data. It was developed to broaden our knowledge about the availability of Canadian herbaceous and woody opportunities biomass, as well as the spatial variability of this resource across the country. Users of the application will be able to make well-informed decisions based on spatially-explicit information that presents a comprehensive view of biomass quantity and opportunity in Canada. Biomass usage and location information made available through a collection of thematic maps and interactive queries of the herbaceous and woody biomass databases.

Agro-Pedological Atlas of South Eastern Montreal Plain, Quebec

The Agro-Pedological Atlas is a set of interactive maps which allow the characterization, the fertility, the quality of the water regime, the vulnerability to degradation and the potential of the agricultural soils and land in the Montérégie region of the province of Quebec.

Agri-Environmental Indicators

The National Agri-Environmental Health Analysis and Reporting Program (NAHEAP) assesses and reports on the agriculture sector's environmental performance via a set of Agri-Environmental Indicators (AEI). These indicators are intended to provide reliable, science-based information on the current state and changes in the conditions of the environment in agriculture at a national or regional scale.

Canada Land Inventory (Agriculture) Data Download

The Canada Land Inventory (CLI) is a comprehensive multi-disciplinary land inventory of rural Canada, covering over 2.8 million square kilometers of land and water. In the late 1990's, CLI data was converted to the original CLI Agriculture database as a component-based file structure. This site provides access to these datasets.

Crop Condition Assessment Program

The Crop Condition Assessment Program (CCAP), developed and maintained by Statistics Canada in partnership with Agriculture and Agri-Food Canada, is an interactive application that uses low-resolution, digital satellite data during the growing season to monitor changing vegetation conditions in Western Canada and the United States.

National Ecological Framework for Canada

The National Ecological Framework for Canada is the result of the commitment and need to think, plan, and act in terms of ecosystems. This approach requires a consistent, national spatial context within which ecosystems at various levels of generalization can be described, monitored, and reported on. The use of such a framework of standard ecological units provides for common communication and reporting between different jurisdictions and disciplines.

<http://atlas.agr.gc.ca/bimat>

Biomass Inventory Mapping and Analysis Tool

Go to a location Scale 1:1,000,000 Calculate Biomass...

Go to a region

Search by geographic name

Search within current view

Map display ?

- Reference Features
 - Populated Places
 - Power Lines
 - Pipelines
 - Railroads
 - National and Provincial Parks
- Agriculture
 - Wheat
 - Straw Yield (Oven Dried Tonnes per H
 - Available Straw (Oven Dried Tonnes pr
 - Available Straw Less Cattle Usage (Ov
 - Barley
 - Straw Yield (Oven Dried Tonnes per H
 - Available Straw (Oven Dried Tonnes pr
 - Available Straw Less Cattle Usage (Ov
 - Oat
 - Flax
 - Corn
 - Stover Yield (Oven Dried Tonnes per H
 - Available Stover (Oven Dried Tonnes p
 - Other
- Forestry
- Land Suitability
 - Hybrid Poplar
 - Willow
- Land Cover
 - Landcover *
- Results
 - Site 1

Legend ?

Site 1

Biomass Inventory Calculation Results ?

Print Save to PDF

Site 1

General Calculation Parameters

Location Point (Lat, Lon) (53.63°, -113.57°)

Contributing Area 10 800 km²

Radius 60 km

Herbaceous Calculation Results

Participation Rate 25%

Competing Use Cattle

Tillage Type Current State

Crop Type	Amount (ODT)
Barley	2 837
Wheat	66 818
Flax	99
Oat	11 224
Corn	21
Herbaceous Biomass...	80 999

Woody Calculation Results

Sustainable Source	Amount (ODT)
Woody Biomass Total	0

Display on map and include in report

Biomass Inventory Calculation ?

Select Analysis Location:

Herbaceous Material

- Barley
- Wheat
- Flax
- Oat
- Corn

Crop Types:

Competing Use: Cattle

Participation Rate: 25%

Tillage Type:

Woody Material

- Softwood Roadside Harvest Residue
- Hardwood Roadside Harvest Residue
- Softwood Mill Residue
- Hardwood Mill Residue
- Urban Wood Waste

Calculation Type

Calculate the amount of biomass available within a specified distance

60 km

Calculate the area required to satisfy the specified demand for biomass

tonnes

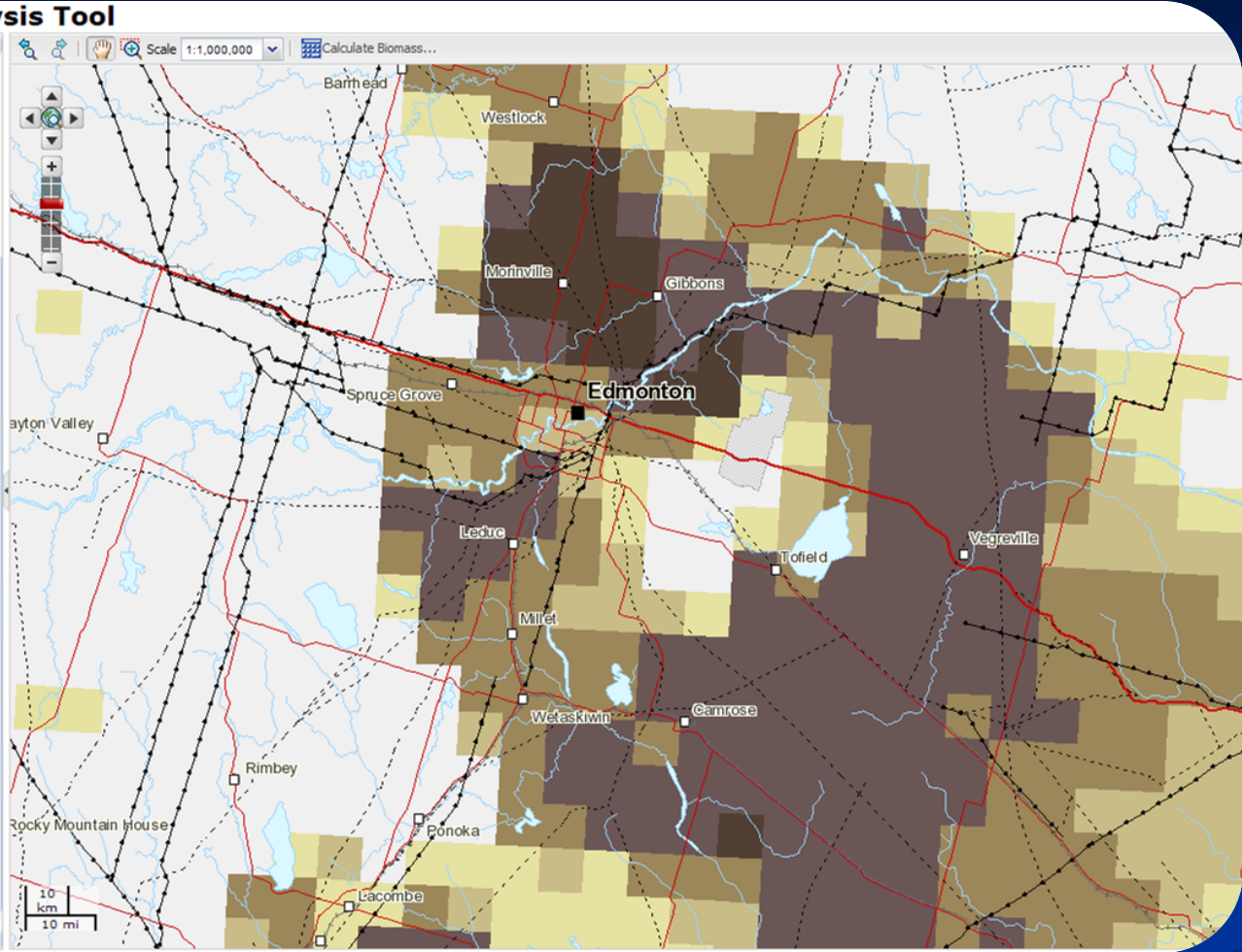
<http://atlas.agr.gc.ca/bimat>

Biomass Inventory Mapping and Analysis Tool

- Pipelines
 - Railroads
 - National and Provincial Parks
- Agriculture
- Wheat
 - Straw Yield (Oven Dried Tonnes per Hectare per Year)
 - Available Straw (Oven Dried Tonnes per Year)
 - Available Straw Less Cattle Usage (Oven Dried Tonnes per Year)
 - Barley
 - Oat
 - Flax
 - Corn
 - Other
- Forestry
- Land Suitability
 - Land Cover
 - Landcover *

Legend ?

- Power Lines**
- Power line
- Pipelines**
- Pipeline
- Railroads**
- Railway
- Roads, Rivers, Lakes and Boundaries**
- River
 - Lake
 - Trans-Canada Highway
 - Major road
 - International boundary
 - Provincial boundary
- National and Provincial Parks**
- National park
 - Provincial park
- Wheat - Available Straw Less Cattle Usage (Oven Dried Tonnes per Year)**
- 1 - 1,000
 - 1,001 - 2,000
 - 2,001 - 3,000
 - 3,001 - 5,000
 - 5,000+



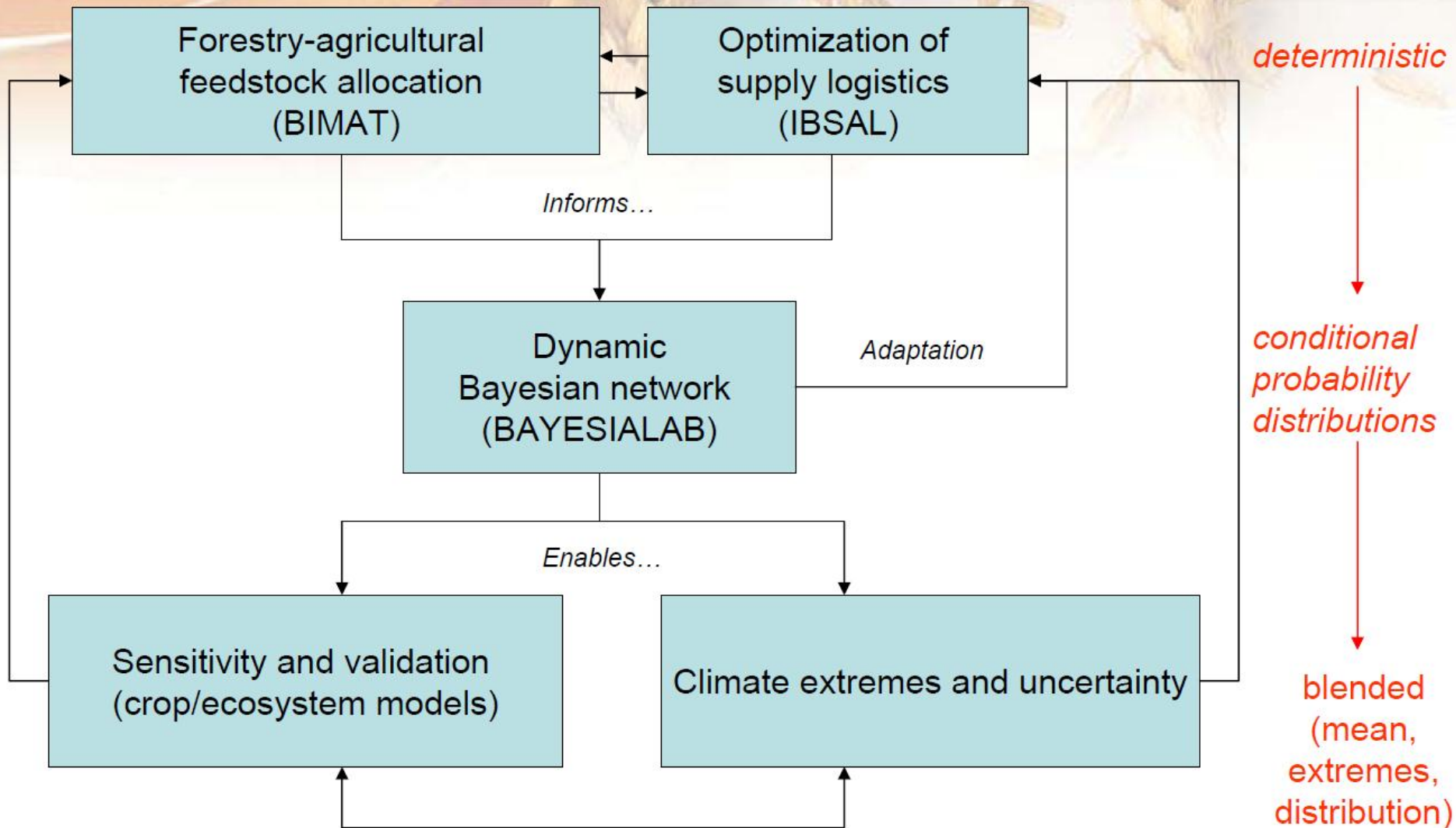
3'001 - 2'000
3'001 - 3'000
1'001 - 3'000
1 - 1'000
tonnes per year
Wheat - Available straw less cattle usage (oven dried
provincial park
national and provincial parks

BIMAT Project Plan

Develop New Online Analytical Functions

1. Alternative crop residue harvest system modeling (2009/10)
2. Logistics and carbon accounting information: full-cost accounting of biomass from ripe crop through to the plant gate. (2011/12)
3. Sustainability measurement framework for carbon accounting and sustainability assessment of multiple biofuel systems. Saskatchewan will be used as the case study jurisdiction. (2011/12)
4. Include information on the conversion systems for fuels and other biomaterials as a user selected choice based on technology information provided by the industry and science partners. (2011/12)

Modeling approaches for logistics and carbon



BIMAT Future Plan

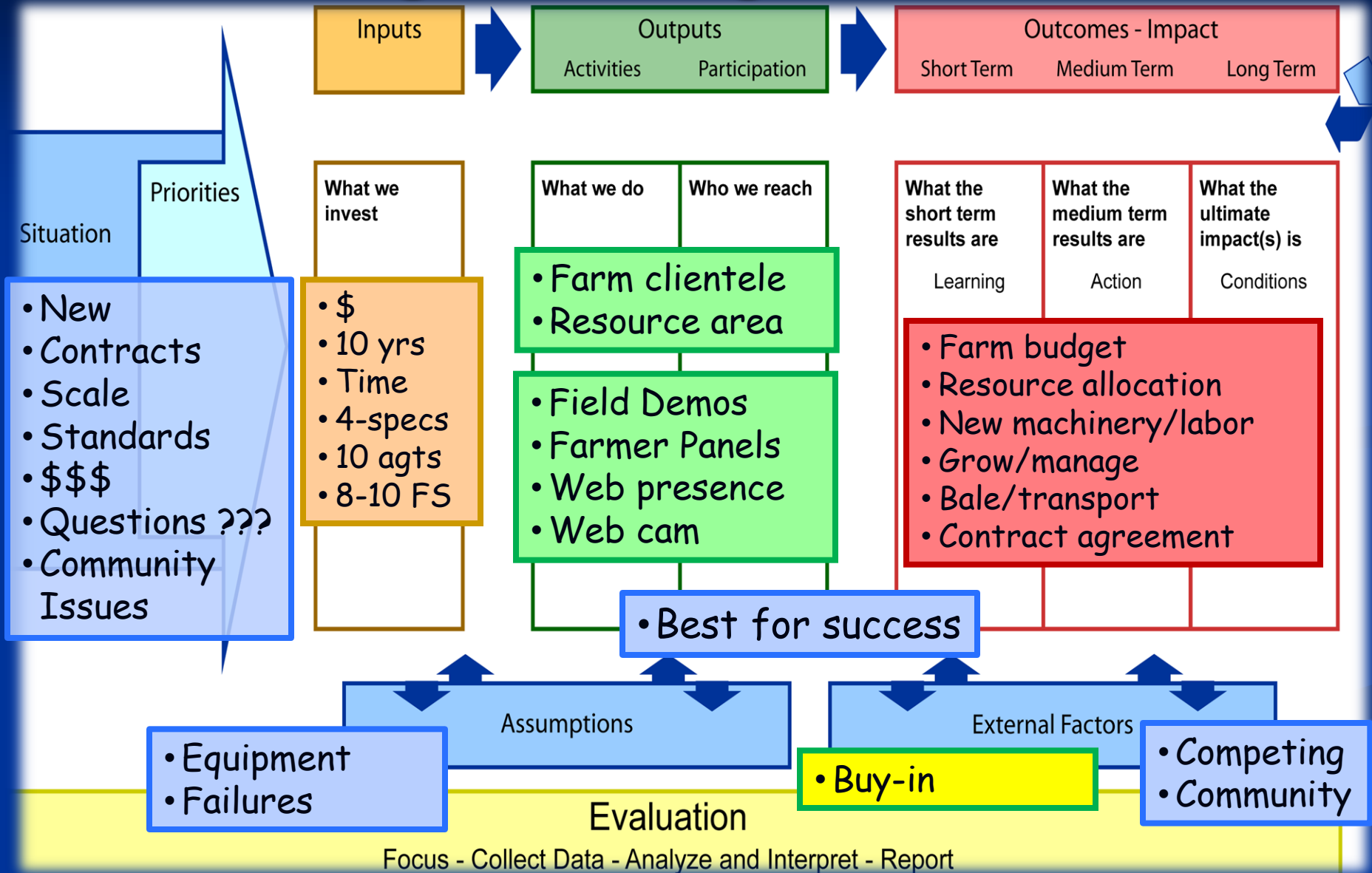
Improve and Expand Inventory

1. Estimates for grain production
2. Alternative crop residue harvest system modeling
3. Feedstock quality information for flax
4. Modeling of annual variability in biomass supply
5. Develop remote sensing tools and models to facilitate the within-year estimates of the biomass inventory
6. Land suitability information for the production of new forestry and forage crops for cellulosic feedstocks

Expand Biomass Reference Material

1. Add information about quality, conversion processes and life cycle evaluation

Program Logic Model





Scholarship

■ Examples - Biomass Logistics

- Grisso, R.D., D. McCullough, J.S. Cundiff and J. Judd. 2012. Using machinery management estimates for baling scheduling to fulfill inventory. ASABE Paper and Presentation No. 12XXX. St. Joseph, MI:ASABE
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- Judd, J., S.C. Sarin, J.S. Cundiff, and R.D. Grisso. 2010. An optimal storage and transportation system for a cellulosic ethanol bio-energy plant. ASABE Paper and Presentation No. 109413. St. Joseph, MI:ASABE
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- Raula, P.R., R.D. Grisso and J.S. Cundiff. 2008. Cotton logistics as a model for a biomass transportation system. *Biomass & Bioenergy* 32(4):314-325
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- Raula, P.R., R.D. Grisso, and J.S. Cundiff. 2008. Comparison between two policy strategies for scheduling trucks in a biomass logistic system. *Bioresource Technology* 99(13):5710-5721
- Ravula, P.P., J.S. Cundiff, and R.D. Grisso. 2005. Determination of optimal facility location for a biomass processing plant using GIS and Road Networks. AETC/ASAE Paper and Presentation. St. Joseph, MI:ASAE
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