Beef Sustainability Project

National Cattlemen’s Beef Association

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● **Overview of U.S. Beef Industry**
  - Largest food and fiber sector
  - Own/manage 670 million acres of land in US
  - $73 billion in U.S. consumer spending on beef annually
  - 742,000 beef herds (90% < 100 head); 67,000 dairy herds
  - 30.9M beef cows; 9.3M dairy cows; 26.7M feeder calves
  - 2,140 feedyards with at least 1000 head capacity

● **With large impact, great responsibility**
  - Industry acceptance through history
    - Enhance environmental stewardship/food safety
    - Improve efficiencies throughout
    - Rely on fewer inputs to produce more beef
    - Increase economic contributions to Rural America
    - Preserve open spaces
    - Contribute time, talent, treasure to communities

● **Cattle/beef industry segments largely independent of each other**
  - Equity, management, financial
Environmental Footprint of U.S. Beef Production (1977 vs. 2007)

- Productivity has increased
  - Beef carcass yield increased 22%
  - Time to slaughter reduced 21% (609 d vs 485 d)
  - Total beef prod. increased 11%
  - Slaughter population decreased 5 million head

- Why?
  - Management
  - Genetic selection
  - Ration formulation
  - Growth enhancing technologies

In 1977, it took **five** animals (3,030 animal days) to produce the same amount of beef as **four** animals (1,928 animal days) in 2007

**Why does this matter?**
- We are producing more using fewer resources
- Smaller environmental footprint
  - 30% fewer animals
  - 19% less feed
  - 12% less water
  - 33% less land
  - 18% less manure
  - 16% lower carbon footprint
    - 18% less methane
    - 12% less nitrous oxide

Current Challenge:

9 billion people by 2050

70-100% more food

Solution: Produce More with Less
U.S. Beef Industry is Part of Solution

Increased Beef Demand Will be Met Sustainably

How?

Assess and Address Three Pillars of Sustainability
  - Reduce environmental Impact
    • Water, soil, air, land use, biodiversity
  - Maintain or Improve Industry Economics
    • Production costs, price, trade
  - Produce in a Socially Diligent Way
    • Working conditions, animal welfare, food safety

Sustainability is a journey, not a destination
  - Continuous improvement over time
● **US Beef Check-off funded project**
  – Contracted with National Cattlemen’s Beef Association to conduct study

● **Collaborators**
  – BASF Corporation
    – Eco-Efficiency Model
      » Certified by National Standards Foundation (NSF)
  – U.S. Department of Agriculture-Agricultural Research Service
    – Meat Animal Research Center
      » Clay Center, Nebraska
  – Combined over 600 LCA Projects
Project Objective

- Conduct a comprehensive sustainability assessment of entire U.S. beef industry
  - Cradle to grave assessment
  - LCA equally compares environmental impact and production costs (i.e. economics) to optimize sustainability
  - Social component (first ever to be completed)
  - Largest, most comprehensive study of its kind

- Discover new opportunities for improvement
Project Boundaries

Feed Production → Cow/Calf Stocker → Feedyard → Harvest and Further Processing

Consumer → Retail → Waste Disposal
Project Scope

1. “Hot Spot” analysis (stakeholder survey, literature review)
   - Qualitative tool
2. Life Cycle Assessment (environmental, economic, and social parameters)
3. On-line tool for individual producer use
Life Cycle Assessment

- Cradle to Grave
  - Cradle to Farm Gate
    - Integrated Farm System Model (USDA-ARS)
      » Process-based model – mathematical representation of processes in nature
    - Assess biological processes, animal performance, economics
    - Published extensively, Transparent
    - Validation: USDA ARS Meat Animal Research Center – 6,600 head cow/calf, 5,000 head feedlot, feed production, feed processing
      - Extensive data available
    - Inputs to BASF’s Eco-Efficiency Analysis
  - Harvest to Waste Disposal
    - BASF’s Eco-Efficiency Analysis
    - ISO 14040 & 14044 Compliant
Sample Product Sustainability Improvement Environmental Assessment

Effect Category
- Resource Consumption
- Energy Consumption
- Emissions
- Tox-Potential
- Risk Potential
- Land Use

Ecological Fingerprint
- Energy
- Land Use
- Emissions
- Resources
- Risk potential
- Toxicity potential

Calculation of relative product position

Environmental Burden

Aggregation and weighting of impact categories

Calculation ➔ Normalization ➔ Weighting ➔ Aggregation
Eco-Efficiency Portfolio

- Distance from diagonal line is a direct measurement for eco-efficiency

Alternative “blue“:
- High costs. Low environmental impact

Alternative “red“:
- Low costs. High environmental impact

- Both alternatives have the same eco-efficiency

Portfolio is balanced at all times!
More Sustainable Products in Time
Example of Product Improvement
Eco-Efficiency Analysis

Customer benefit
product improvement
over time

[Graph showing environmental impact and costs over time, with data points for 2003, 2007, and 2010.]
Sustainability Assessment Methods and Eco-Efficiency Analysis

- **Life Cycle Inventory**: quantification of inputs and outputs
- **Life Cycle Assessment**: evaluation of environmental impacts
- **Eco-Efficiency Analysis**: comparison of products or processes, including all life cycle costs, ecological and economic aspects have equal weight in the assessment, standard tool in the BASF Group; more than 400 analyses carried out, method certified by TÜV and National Sanitation Foundation

**SEEBALANCE**
- including social aspects

Matryoshka principle: each step "nests" the previous one
Status of Sustainability Assessment

- All data collection and analysis is complete for the eco-efficiency portion of the project
- Submit to National Standards Foundation (NSF) for certification soon
- Social component and producer tool will be complete by April 2013
- Next steps
  - Regional variation
  - Restaurant inclusion
Questions?