Thriving in a New Era in American Agriculture

Northeast Cooperative Council

Leaders’ Forum

February 29, 2016
I Started in Agriculture In This Era

My Grandfather

That’s me

Photo taken by my Mom in 1949.
Expertise of The Hale Group
Sample List of The Hale Group’s Clients

Monsanto
Heinz
Kellogg’s
Syngenta

Tyson
Pioneer
Dekalb

Cargill
Sunkist

Land O’Lakes

Papa Gino’s

Ocean Spray

PEPSICO

Bayer
Agriculture Will Thrive in the Future

Why?

- Food is essential to life.
- The global population is still growing.
- The global middle class is growing.

But there will be challenges ahead.

I’m talking about several challenges ahead.
When I started consulting in 1973 we did 10 year strategic plans.

Then we shortened it to 5 year plans.

Then clients asked for 3 year plans.

Then some clients did 2 year plans.

Now it’s next year’s budget.

I’m going to try to help you think farther out.
Major Categories of Change Drivers

- Technology
- Regulation
- Competition
- Consumers

Change
A. Three Major Forces Driving Ag Into a New Era

- **Technology:** The Emergence of Digital Agriculture
- **Regulation:** A Weakening of Political Support for Agriculture
- **Consumers:** Strange, Conflicting Consumer Expectations

B. Thriving in the New Era
I Have Two Audiences in Mind

Individual Farmers

Farmer Cooperatives
The Emergence of Digital Agriculture
Technological Eras in Agriculture

1920-40
- Expanded use of mechanized power

1921
- Commercial hybrid corn

1935
- Hybrid demand exceeds supply

1940-70
- 96% of corn acreage planted to hybrids
- Commercial fertilizer use doubled

1959
- Applied to 47% of croplands by 75% of farms

1960
- 96% of corn acreage planted to hybrids

1975
- Tractor numbers exceeded horses and mules

1994
- Satellite guidance begins

1996
- Herbicide-tolerant and insect-resistant crops

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2013
- 169 M acres, half of the US cropland, sown to GMO crops

Source: Dr. J. B. Penn, Deere & Co., The Snyder Memorial Lecture at Purdue University
Some of the content was developed for an Iowa AgState project on “Big Data in Row Crop Production.”

New material has also been added subsequently.
Big Data in Agriculture: A very broad term that is used differently by different people.

I will use the term **Digital Agriculture** which is broader and more comprehensive than the term **Big Data**.
The Major Components of Digital Agriculture

**Precision Agriculture**

**Definition**
Use of **new tools** that give farmers better operational control.

**Examples**
- Auto-steer
- Yield monitors
- Variable rate machinery
- Weather stations

**Prescription Agriculture**

**Definition**
Detailed prescription of agronomic practices to maximize yield or profit per acre using computer algorithms.

**Examples**
- FieldScripts
- Encirca
- Answer Tech

**Enterprise Agriculture**

**Definition**
Integrated, computer platform including: planning; agronomy; labor; work orders; purchasing; risk; inventory; logistics; machinery; marketing; profit per acre.

**Examples**
- Granular, Conservis
Digital Transformation of Agriculture
Past-Present-Future

1. Product

2. Smart Product

3. Smart, Connected Product

4. Product System

5. System of Systems

Digital Transformation of Agriculture
Past-Present

1. Product

2. Smart Product

3. Smart, Connected Product

4. Product System

- Smart Tractors
- Planters
- Combine Harvester
- Farm Equipment System
- Cultivation

Digital Transformation of Agriculture
Present-Future

4. Product System

5. System of Systems

- Smart Tractors
- Planters
- Combine Harvester

Farm Equipment System

- Cultivation

Weather Maps

Weather Data System
- Rain, Humidity, Temperature Sensors
- Weather Forecasts

Weather Data Application

Farm Equipment System

Farm Management System

Seed Optimization System

Irrigation System

Field Sensors

Irrigation Nodes

The Vision: Enable Farmers to Make 40 Critical Decisions

Critical Decision Sets:

Planning Data
- Seed Selection
- Weed-Control Program
- Insect-Control Program

Pre-Planting Data
- Fertility Program
- Tillage Program

Planting Data
- Plant Population Dynamics
- Seed Depth

In-Season Data
- Post-Emergence Pest Control
- Crop Diagnostics

Harvest Data
- Equipment
- Crop Marketing

Goal: Maximize Net Return Per Acre

Productivity Tools:

Seed Factors
- Seed is lynchpin decision – key to establishing yield potential

Planting Factors
- Focus on best field configuration, preparation and planting elements

Pest-Control Factors
- Focus on insect and weed control regimes

In-Season Decisions
- Diseases, nutrient, etc. approaches based on in-field environment

Source: Monsanto Investor Presentation, October 2, 2013
Farmer Options for Data Collection

- Custom applicator machinery computers
- Ag retailer business records
- Lab results, e.g., soil testing
- Remote scanning, e.g., NDVI maps
- Farmer-owned machinery computers, e.g., tractors, planters, combines
- Farmer’s accountant
- Farmer’s manual records, e.g., hybrid number, planting date
- Field weather stations, e.g., rainfall, degree days
Farmer Options for Data Transmittal

- Computer transmittal from farmer computer
- Computer transmittal from vendors, e.g., soil test results, applicator records
- Written records
- Download of public data
- Computer flash drive
- Wireless network
Major Data Sets Used in Row Crop Agriculture

**Examples of Big Data**
- Weather data sets – historical, current and forecasts.
- Aggregated farm level data from millions of acres.
- Satellite imagery of large farming areas.

**Farm Level Data, Not Big Data**
- Soil samples on a grid basis.
- Farm financial, marketing, & risk management records.
- Yield maps for fields and management zones.

Agriculture will not totally convert to Big Data.

Some “Not Big Data” will always be important.
The Goal is to Link Data and Decisions

Making the link between

- **On-Farm Optimization**
  - Data-based decision-making for many more decisions
  - Early problem identification for management response
  - Custom solutions to minimize inputs and maximize yields

- **Input Product Innovation for Unique Conditions**
  - Biotech / seed research
  - Equipment R&D
  - Other input supplies

- **Market Linkage**
  - Improves transparency and predictability of markets
Current Problems with Big Data in Ag

(ATPs = agricultural technology providers)

Unequal Market Power

- Farmers do not have equal negotiating power with major ATPs
- Information asymmetry puts farmers at a major disadvantage
- There are few places a farmer can turn for detailed information

Complexity

- Farmers find the hardware, software, and business models hard to understand
- Hardware and software is not fully compatible across ATPs
- Many companies are marketing “tools” rather than “solutions”

Legal Obstacles

- Some user agreements limit farmers’ choices
- Some legal documents are hard to understand

Unclear Benefits

- There is a mixture of fact and hype in the marketplace
- The economic benefit of some products is not quantified
Four Strategic Questions

1. Will Digital Agriculture create a major “inflection point” similar to the introduction of hybrid corn many decades ago?

2. Will Digital Agriculture Technology cause the row crop sector to become integrated, i.e., coordinated through contracts with farm operators by:
   - A few large ATPs
   - A handful of large corn and soybean processors
   - Branded food manufacturers and foodservice chains

3. How rapidly will consolidation occur within the row crop sector?

4. Will the sophisticated agronomy models allow computers to provide agronomic advice with little local agronomic input?
Technology improvement and retirement of farmers are likely to create an inflection point in the 2021-2026 period.

No dramatic breakthrough until clear value has been demonstrated.
## The Case for Integration by Food Companies

<table>
<thead>
<tr>
<th>Likely</th>
<th>Not Likely</th>
</tr>
</thead>
<tbody>
<tr>
<td>Branded food companies need to protect their brand equity.</td>
<td>Not all farm practices are of interest to food companies.</td>
</tr>
<tr>
<td>Sustainability and traceability are becoming very important to a segment of consumers.</td>
<td>Consumer product food companies are unlikely to invest backward.</td>
</tr>
<tr>
<td>In some respects, corporate office suites have more power than legislatures.</td>
<td></td>
</tr>
</tbody>
</table>

“Standards compliance” by food companies protecting their brand will almost certainly use this technology to monitor adherence to their specs after the technology is perfected.
What Will Be the Rate of Farm Consolidation?

Key arguments for two alternative answers.

**Gradual Rate of Consolidation**
- If adoption of Digital Agriculture is slow due to complexity.
- If the ATPs can’t demonstrate value.
- If the data security issues become more severe.

**Accelerated Rate of Consolidation**
- Aging farmers retire and high tech, low cost producers capture land rentals.
- This technology is simplifying operations for large-scale farmers.
- Large farmers can hire people with specialty skills, e.g., IT and agronomy.
The Digitization of Agronomic Advice

How far will this trend go?

Obviously the actual trend is not a straight line – the graphic is directional only. It’s too early to tell how far this technology will go.
A. What’s your long-term plan for the farm?
   1. Retire within 5-7 years? Maybe you don’t need a plan.
   2. Continue operation within the family long-term.

B. What’s your current portfolio of Digital Agriculture tools?
   1. Farm machinery
   2. Computers/software
   3. Human skills

C. Decision Improvement Analysis
   1. Which decisions, if improved, would increase profitability the most?
   2. Which one should you work on first?
      • Financial analysis
      • Hybrid selection
      • Marketing
      • Nutrient management
      • Machinery logistics
      • Other
D. What options are there to improve your decision making?
   1. Equipment
   2. Computers / software
   3. Human skills

E. What is an appropriate plan from getting from where you are to where you want to be?
   1. Equipment
   2. Computers / software
   3. Human skills
   4. Business relationships
   5. Time line
   6. Estimated investment requirement
   7. Implications of plan for operation
      a. New employees
      b. Expanded operation to justify investment
F. Read everything you can on Digital Agriculture.

G. Demand answers when selecting service providers:
1. * Exactly what does your service provide my operation?*
2. *What is the economic value of that benefit? Can it be documented?*
3. *What is the cost of this service?*
4. *How easy is it to use?*
5. *Is it compatible with the rest of my computers and equipment?*

H. Evaluate vendors of equipment and data services with a strong focus on support for training and customer service.
Role for Farmer Cooperatives

- This is a topic for a good consulting project.
- This is bigger than any one medium-size farmer.
- Farmer cooperatives must play a major role.
  - Education, education, education.
  - New service opportunities that farmer-members need.
  - Greater IT link between production and processing.
- You cannot ignore it; you must embrace it.

This is the next technological era in global agriculture.
A Weakening of Political Support for Agriculture
Competing Visions for the Future
We know very little about the ag policies of these candidates.
Direct Government Payments to Farmers in Billion Dollars

Billions

$25.00

$20.00

$15.00

$10.00

$5.00

$0.00

Direct Government Payments as a Percent of Net Farm Income

The average over the last 32 years was 19.8%

Some sectors of ag receive much more than 20%.

How long will this continue?

- The Federal budget is severely squeezed.
- The size of the Federal government is one of the big debates.
- Farmers still have a positive image with citizens.
- But your production practices are under intense scrutiny:
  - GMOs, fertilizer usage, pesticides, antibiotics, animal confinement
- Stalwart farm legislators are approaching retirement age
- Ethanol policy is under attack.
- Some ag sectors want free trade and others don’t.
- Agriculture is not a “hot topic” in the Presidential campaign.

It’s getting harder to explain agriculture’s political interests to the “average” American.
Iowa Governor Terry Branstad is the longest serving governor of any state in the history of the U.S. – 21 years.

Branstad’s announcement days before the caucus:

- [Cruz] “is the biggest opponent of renewable fuels. He’s heavily financed by Big Oil. So we think once Iowans realize that fact, they might find other things attractive but he could be very damaging to our state.”
- Cruz is “diametrically opposed to what we really care about.”

Ted Cruz opposes the Renewable Fuel Standard that requires refineries to blend an increasing amount of biofuels each year.
Results of the Iowa Republican Caucus

- Ted Cruz 27.6%
- Donald Trump 24.3%
- Marco Rubio 23.1%
- All others 25.0%

Why did Iowa voters disregard Branstad’s warning the negative aspects of Cruz’s ethanol policy?
<table>
<thead>
<tr>
<th>U.S. Senate Ag Committee</th>
<th>U.S. House Ag Committee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chuck Grassley, (R) IA, age 82</td>
<td>Rich Nolan, (D) MN, age 72</td>
</tr>
<tr>
<td>Thad Cochran, (R) MS, age 78</td>
<td>Collin Peterson, (D) MN, age 71</td>
</tr>
<tr>
<td>Patrick Leahy, (D) VT, age 75</td>
<td></td>
</tr>
<tr>
<td>Mitch McConnell, (R) KY, age 74</td>
<td></td>
</tr>
<tr>
<td>Pat Roberts, (R) KS, age 70</td>
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Their replacements will not have the same political clout with their colleagues.
How Long Will Farm Subsidies Continue? At What Level?

- Only God knows.
- A lot will depend on the outcome of the November election.
  - President
  - House of Representatives
  - Senate

The prudent assumption:

The era of support for agriculture is over.

Agriculture is no different than any other industry.
Strange, Conflicting Consumer Expectations
Consumers are Driving Change as Never Before

Driving Forces

- Health & Wellness
- Transparency
- Production Practices
- Convenience
- Local
- Sustainability

Shifts in Spending & Eating Patterns
What is Health and Wellness?

Health and Wellness can mean:

- Low in fat
- Natural
- No GMOs
- Organic
- Vegan
- No artificial ingredients
- No empty calories
- No HFCS
- Fresh
- Better for you
What is Local?

Local can mean:
- The name of the farm is on the menu
- A farmer’s market where I can meet the farmer
- Produced within 150 miles
- Produced in my state
- Small business
- Food with a story
- Not processed
- Flavorful
- Fresh
- I know the origin
Sustainability can mean:

- Environmentally sensitive
- Profitable over the long term
- Profit is not the only business motive
- Efficiency
- Fair trading practices
- Integrity
- Traceable
- Safe
- Socially sustainable
- Responsible
Production Practices can mean:
- Humane treatment of animals
- No antibiotics
- No hormones
- No confinement
- No painful practices
- Minimal synthetic fertilizers
- No GMOs
- No factory farms
- No pesticides
- Small business
The Market for Food is Bifurcated

Segments: Lifestyle and Value

In constant dollars

Source: U.S. Department of Commerce
(1) In 1998 constant dollars
A Few Examples of Brand Positioning

Segments: Lifestyle and Value

Source: U.S. Department of Commerce
(1) In 1998 constant dollars
Consumers will get more demanding, not less.

So what can you do about it?
Three Generic Strategies by Michael Porter

![Diagram showing three generic strategies: Differentiation, Low-Cost Leadership, and Focus.](image)

Source: *Competitive Strategy* by Michael E. Porter
Page 52
Three Generic Strategies by Michael Porter

Uniqueness Perceived by the Customer

- Co-ops: Focus on specific consumer groups
- Co-ops: Do anything to meet those needs
- Farmers: Consider direct, local marketing

Low-Cost Position

Stuck in the Middle

Source: Competitive Strategy by Michael E. Porter and The Hale Group, Ltd.
Page 53
Three Generic Strategies by Michael Porter

Uniqueness Perceived by the Customer

Industry-Wide

Low-Cost Position

- Use the latest technology
- Expand scale as much as possible without losing control

Particular Segments Only

Stuck in the Middle

Source: Competitive Strategy by Michael E. Porter and The Hale Group, Ltd.
Three Generic Strategies by Michael Porter

**Uniqueness Perceived by the Customer**

- Focus on unique needs of specific segments
- Meet those needs better than any competitor

**Low-Cost Position**

- Stuck in the Middle

Source: Competitive Strategy by Michael E. Porter and The Hale Group, Ltd.
Three Generic Strategies by Michael Porter

Uniqueness Perceived by the Customer

Low-Cost Position

Industry-Wide

Particular Segments Only

Get out fast

Source: Competitive Strategy by Michael E. Porter and The Hale Group, Ltd.
Page 56
Can different profit centers pursue different strategies?

Yes, but… be careful.
It’s easy to get stuck in the middle.
Thriving in the New Era
Meet My Grandfather, Isaac Ludwig
The Story of Pappy Ludwig

- Pappy started farming in the 1st decade of the 20th century
- Obviously, he started farming with horses
- He switched to farming with a tractor in the early 1930s.
- In 1947 he decided to slow down.
- He and my grandmother moved in with our family.
- Pappy asked to farm our land since Dad worked off the farm.
- He loved us kids unconditionally.
- He took us everywhere he went.

Pappy was a wonderful grandfather.
Pappy decided to “farm the right way.”
He bought two Belgian work horses – Bill and Jack.

Bought horse drawn implements – plow, mower, wagon, planter, drill, etc.

Bill and Jack were almost family members

I grew up learning to farm with horses.

We sold milk, eggs, live hogs.

There was no refrigerated milk cooler.

Milk cans were set in cool water in a concrete trough.

I hate to think what our bacteria counts were.
He loved his cows.

He loved his pigs.

He loved his horses.

But he hated change.

He knew “the right way to farm.”

He wasn’t going to let anyone else tell him how to farm.

People should buy what he produced.

Pappy was a terrible business person.
Let’s Fast Forward 67 Years to 2016

The rate of change in agriculture is accelerating.
Facing Turbulent Times

How should you face turbulent times?

You can’t go back to farming “the right way.”

You must move forward.
Stay focused on the changing environment.

Stay ahead of the pack:

- *Either lower costs than most.*
- *Better reading on consumer desires.*

Some of you are superb business persons.

But I suspect a few of you have a smidgen of Pappy in you.

You want to do what you want to do because you like doing it.

The future will not be kind to those farmers.

Be a business person first, a farmer second.

You don’t have to like all of the changes. I certainly don’t.

Be prepared to change.
What is Under Your Control?

God, grant me the serenity to accept the things I cannot change,
The courage to change the things I can,
And the wisdom to know the difference.

– The Serenity Prayer
Thank you and Good Luck.