Agriculture 3.0: From Consolidation to Convergence

2014 FarmSmart Agricultural Conference
University of Guelph
January 18th, 2014

Dr. Jim Budzynski, Managing Partner
MacroGain Partners
www.macrogain.com
Caveat Emptor

My goal is to **stimulate thought** about the future, not accurately predict it!
My Five Topics Today

1. Ag 3.0 Paradigm
2. Macro Ag Economy
3. Technology Evolution and Industry Structure
4. Changing Production Economics
5. Investing in Ag
Agriculture 3.0: A Paradigm Shift

Considering Agriculture 3.0

The ag industry has reached another evolutionary tipping point. Consultant Jim Bridenbill believes that Agriculture 3.0 will be driven by economic, environmental, and the incredible promise of synthetic biology and changing consumer demand, and retailers need to be ready for serious change.

BY: JIM BRIDENBILL, MACROGAIN PARTNERS

Macro:
- Government
- Consumers
- Globalization

Technology:
- Info Tech
- Patents/Generics
- Biotechnology

Structural:
- Input Suppliers
- Production
- Processing & Mktg
- Retailers
Ag 3.0: Productivity

US Average Corn Yields, 1863 to 2002
Ag 3.0: U.S. Farm Consolidation Timeline

AG 1.0: Subsistence Agriculture Was a Lifestyle, Not an Investment

AG 2.0: Consolidation
- Farms
- Chemical Companies
- Seed Companies
- Fertilizer Companies
- Equipment Companies
- Ag Retail Rollups

AG 3.0: Lean & Green Decelerating Returns to Scale, Focus on Sustainability and Value Creation

Number & Size of US Farms 1900-2007

<table>
<thead>
<tr>
<th>Year</th>
<th>No. of Farms</th>
<th>Avg. Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>1900</td>
<td>5,740,000</td>
<td>147</td>
</tr>
<tr>
<td>1910</td>
<td>5,436,000</td>
<td>138</td>
</tr>
<tr>
<td>1920</td>
<td>6,454,000</td>
<td>148</td>
</tr>
<tr>
<td>1930</td>
<td>6,295,000</td>
<td>157</td>
</tr>
<tr>
<td>1940</td>
<td>6,102,000</td>
<td>175</td>
</tr>
<tr>
<td>1950</td>
<td>5,388,000</td>
<td>216</td>
</tr>
<tr>
<td>1960</td>
<td>3,711,000</td>
<td>303</td>
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<tr>
<td>1970</td>
<td>2,780,000</td>
<td>390</td>
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<tr>
<td>1980</td>
<td>2,439,510</td>
<td>426</td>
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<tr>
<td>1990</td>
<td>2,143,150</td>
<td>461</td>
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<tr>
<td>2000</td>
<td>2,172,280</td>
<td>434</td>
</tr>
<tr>
<td>2007</td>
<td>2,204,792</td>
<td>418</td>
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</table>
U.S. Farm Bifurcation

- Farm to Market
- Local Sales
- Non-GMO
- Niche Crops
- Niche Retail

1.8 mm Farms
9% of Production

200 K Farms
83% of Production

- High Volume Producer
- Niche Contractors
  - Seeds
  - Organic
  - Foreign Customers
  - Industrial
- Forward Integration
- Further Processing

Old “Center of Universe”:
200-600 Ac Farms Producing #2YC
Canada’s Ag 3.0 Shift

Avg 800 Acres
70% Decline in # Farms

Big Farms:
Top 12% Are 68% of Production

Small Farms:
Bottom 62% of Farms are 7% of Production

5% Less Farmland
and 5% Larger Farms in 5 Years!
<table>
<thead>
<tr>
<th></th>
<th>Agriculture 2.0</th>
<th>Agriculture 3.0</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Business Structure</strong></td>
<td>Individual Ownership</td>
<td>Institutional Ownership</td>
</tr>
<tr>
<td></td>
<td>Lifestyle Focus</td>
<td>Business Focus</td>
</tr>
<tr>
<td><strong>Risk Management</strong></td>
<td>Government Price Supports</td>
<td>Volatile Capital Markets</td>
</tr>
<tr>
<td></td>
<td>Traditional Hedging for Price Risk</td>
<td>Hedging &amp; Counterparty Risk</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Self-Managed Risk</td>
</tr>
<tr>
<td><strong>Differentiation</strong></td>
<td>Less Differentiated</td>
<td>More Differentiated</td>
</tr>
<tr>
<td></td>
<td>Economies of Scale</td>
<td>Marketing &amp; Brand Economics</td>
</tr>
<tr>
<td><strong>Biotechnology &amp; Traits</strong></td>
<td>Limited (Mostly Empirical) Understanding of MOAs</td>
<td>Rational Product Design Driven by Understanding MOAs</td>
</tr>
<tr>
<td></td>
<td>Input Trait Focus</td>
<td>Output Trait Focus</td>
</tr>
<tr>
<td><strong>Disease and Weed</strong></td>
<td>Reactive/Curative</td>
<td>Proactive/Preventative</td>
</tr>
<tr>
<td><strong>Management</strong></td>
<td>Widespread Use of Synthetic Chemicals</td>
<td>Biopesticides Ascendant</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Synthetic and Natural Solutions Coexist (True IPM)</td>
</tr>
<tr>
<td><strong>Nutrient Inputs</strong></td>
<td>Quantity, Not Quality</td>
<td>Quality, Not Quantity</td>
</tr>
<tr>
<td></td>
<td>Cheap Nutrients, Often Used in Excess</td>
<td>o Expensive Nutrients Used</td>
</tr>
<tr>
<td></td>
<td></td>
<td>o Strategically As Needed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>o 100% Utilization Target</td>
</tr>
<tr>
<td></td>
<td>Macro Nutrient Focus</td>
<td>Micronutrients More Relevant</td>
</tr>
<tr>
<td></td>
<td>Bulk, Broadcast</td>
<td>Niche Targeted Applications</td>
</tr>
<tr>
<td><strong>Environmental Sensitivity</strong></td>
<td>Medium to Low</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>Miniscule “Natural” Sector</td>
<td>Significant “Natural” Sector</td>
</tr>
<tr>
<td><strong>Tillage &amp; Equipment</strong></td>
<td>Scale Efficiency Focus</td>
<td>Right-sized for Farm Needs</td>
</tr>
<tr>
<td></td>
<td>Assume Low Energy Costs</td>
<td>Energy Efficiency Focus</td>
</tr>
<tr>
<td><strong>Precision Agriculture</strong></td>
<td>Focus on Data Collection</td>
<td>Interpretation of Data</td>
</tr>
<tr>
<td></td>
<td>Production Efficiency Focus</td>
<td>Focus on Decision Support</td>
</tr>
</tbody>
</table>
Ag 3.0: Lean & Green
"No Molecule Wasted"

**Seeds**
- Best Seed
- Right Time
- Right Population
- Right Placement

**Crop Nutrition**
- Optimize Rates
- Broadcast to Targeted
- Reduce Runoff, Volatilization
- 4R Practices

**Crop Protection**
- Preventative to As Needed
- Broadcast to Targeted
- Synthetics to Biopesticides

**Ag 3.0**
- More Efficient Processes
- Supply Chain Management
- Enhanced Food Safety
- Reduced Waste
- Manure Management
- Natural Production
- No GPAs, Hormones
- Reduced Feed Waste
- Holistic Management
- Metadata Management
- Efficient Decisions

**Food Processing & Retailing**
- More Efficient Processes
- Cheaper Feedstocks
- More Valuable Outputs
- Optimized Plant Size
- Reduced Waste

**Bioenergy**
- More Efficient Processes
- Reduced Waste

**Precision Decisions**
A Vision for Ag Productivity

1.0

Hard Manual Labor
Big Farm Families

2.0

Hybridization
Bulk Fertilizer
Crop Chemicals
Crude GMOs

3.0

Green & Lean

Recycling Systems
Control Systems
Info Mining
Refined GMOs
Biologics
“Hybrids”
Macro Ag Economy: Core Driver of Global Ag Demand

As the Developing World Becomes More Affluent, Food Demand Will Grow Dramatically

Germany 375.39 Euros or $500.07/week
Mongolia 41,985.85 togrogs or $40.02/week

*As the Developing World Becomes More Affluent, Food Demand Will Grow Dramatically*

Population – Urbanization – Income - Diets

*Three Billion People Consuming More Calories and More Protein!*

Confidential Draft for discussion purposes only
Commodity Prices Fit Into Two Broad Periods

1. BEB&FC: Before Ethanol Boom and Financial Crisis
2. AEB&FC: After Ethanol Boom and Financial Crisis

Prices Are Higher and Much More Volatile
Ethanol Boom Dynamics

Ethanol Boom Was Driven by Both Public and Private Support to Both Supply and Demand!
Most of the Ethanol Demand Has Been Met with New Production

USDA, Economic Research Service.
“On a daily basis, moves in commodities such as corn, soybeans, soybean oil, and wheat had correlations 60-70-80% with changes in the value of the dollar or the price of crude oil....for example, there is over a 90% correlation between the price of heating oil and soybean oil... “

William Lapp
Advanced Economic Solutions
Federal Reserve
Moral Hazard Run Amok

Fed Funds Rate in Greenspan/Bernanke Era

S&L Crisis
Dotcom Meltdown
Housing Bubble & Crash

Too Low Too Long

Each Successive Overstimulation (at Lower Rates) Creates a Bigger Bubble — Govt Manipulation of the Supply and Cost of Money Was a Major Cause of the Crisis!
Big Ben’s QE Forever
The Hubris Continues

U.S. Federal Reserve - Treasury and Mortgage-Backed Securities Held
Impacts of Ultra Low Interest Rates and Quantitative Easing

1. Asset Inflation
   – Stocks, Bonds
   – Housing

2. Speculative Bubbles
   – Pushing Out the Risk Curve at 40 BPS
   – Investment in PE, VC

3. Ponzi Finance
   – Dependence on Continual Asset Inflation to Sustain Investments
Asset Price Manipulation
Keeping Wall Street Happy

Our “Free” Markets are Largely Dependent on Government “Support” (Manipulation)
Global ZIRP and $5 Trillion

Near-zero policy rates globally

Estimated Global Currency in Circulation (Jan 1971 - Dec 2010)

James Bullard, Federal Reserve Bank of St. Louis, October 11, 2009

How does this have a happy ending?
The Ocean of Liquidity

What happens when we unwind this liquidity?
Potential Effects of Unwinding QE

1. Rise in Interest Rates
   - Insufficient Demand to Maintain High Bond Prices

2. Deflation
   - Inflated Assets Deflate as Interest Rates Increase

3. Commodity Inflation
   - 7 Year of Monetary Stimulus Put to Work

Deflationary Forces:
- Higher Interest Rates
- Weak Demand
- Asset Deflation

Inflationary Forces:
- Low Interest Rates
- Growing Demand
- Liquidity Unwind
What is the effect of high prices?

1. Induces New Technology into Agriculture
2. Induces New Land into Production
3. Rations Demand Among Existing Users
4. Increases Farm Income
5. Drives Input Sales – Seed, Chem, Equipment
6. Increases Ag Asset Prices
7. Stimulates Outside Investment in Agriculture

These Impacts Create Short Term Euphoria But Ultimately Distort Prices and Valuations
Technology and Structural Evolution

- New Paradigm:
  - Higher Value Crops
  - More Expensive Inputs
  - Higher Crop Yields

<table>
<thead>
<tr>
<th></th>
<th>Old</th>
<th>New</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technology Gain (bu)</td>
<td>4.5</td>
<td>4.5</td>
</tr>
<tr>
<td>Price Per Bushel</td>
<td>$2.00</td>
<td>$5.50</td>
</tr>
<tr>
<td>Value Created</td>
<td>$9.00</td>
<td>$24.75</td>
</tr>
<tr>
<td>Channel Margin (35%)</td>
<td>$3.15</td>
<td>$8.66</td>
</tr>
<tr>
<td>COGS/unit</td>
<td>$5.00</td>
<td>$8.00</td>
</tr>
<tr>
<td>Net Profit</td>
<td>$0.85</td>
<td>$8.09</td>
</tr>
</tbody>
</table>

“Niche” Technologies Migrating from High Value Crops to Midwest
Yield Maximization Hierarchy

Maximizing Genetic Potential
- Seeds

Establishing Strong Stand of Targeted Plants
- Seed Treatments
- Selective Herbicides
- Starter Fertilizers

Maximizing Real Time Nutrition & Reproductive Efficiency
- Macro Fertilizers
- Micro Fertilizers
- PGRS
- Foliar Feeds

Managing Diseases and Insects
- Insecticides
- Fungicides
- SAR Enhancers

Maximizing Harvestability
- Harvest Aids
- PGRs

Biologicals

Water Management
- Quality Management
- GPS/Precision Ag
- Scouting
- Soil Analysis
- Data Mgmt
Limitation of Traditional GMOs

Why?
• Simplistic Insertion
• “Two Yards Off Right Tackle”
• Cavalier on Refuge
Medicine Drives AgBio Evolution

Slide 1: The Five Imperatives of Successful Synthetic Biology (DITEC)

<table>
<thead>
<tr>
<th>Design</th>
<th>Insert</th>
<th>Target</th>
<th>Express</th>
</tr>
</thead>
<tbody>
<tr>
<td>Build <em>desirable genes</em> that code for proteins/traits of <em>value</em> to customers</td>
<td><em>insert those genes</em> into host species DNA cleanly with maximum <em>stability</em></td>
<td>Ensure the gene’s activity is at the <em>right place</em> at the <em>right time</em></td>
<td>Make sure the desired proteins are actually <em>produced</em></td>
</tr>
</tbody>
</table>

| Control | Manage the entire system and assure safety through *integrated control* |

- Crude Gene Insertion to Highly Sophisticated Controls
- Rapidly Moving from Molecular to Modular Approaches
  - Automation of Design, Insertion, and Targeting
  - Dramatic Expression and Control Enhancement
Migration of Corn Belt

• Corn Belt is Moving North and West

Source: William W. Wilson, Phd, North Dakota State University, USDA-ERS
How can yields continuously increase with flat nutrient tonnage?
Rationale Targets for “Micronutrition”

1. Enhance the uptake of nutrients
2. Protect macro or micro nutrients from precipitation, leaching, or volatilization
3. Stimulate roots or shoots to take up more nutrients or be more efficient in the use of that nutrient
4. Get a seed off to a good start by delivering nutrients and/or controlling diseases
The Biologics Playing Field

Phyllosphere

• Non-Plant Organisms Have Evolved to Co-Exist and Thrive with Plants
  • Bacteria, Fungi, Viruses
• Roles Only Now Being Understood:
  • Nutrient Availability
  • Plant Regulation
  • Disease Suppression
  • Interaction with Crop Genetics

Very Hot Area for Enhancing Productivity!
Crop Biotechnology: Using bacterially mediated gene transfer tools to insert bacterial proteins into agronomic crops.

Source: Pray, Oehmke, Naseem (2005)
Precision Agriculture Challenges

**Long Term**
- Soils
- Drainage
- Climate

**Annual**
- pH
- N,P,K
- Micros
- OM

**Real Time**
- Moisture
- GDD/Sunshine
- Tissue Samples
- Diseases, Insects, Weeds

**Spatial Referencing (GPS, Satellite Imagery)**

**Decision Support (Big Data)**

**Differential Action**
- Crop Equipment Inputs
- Crops & Varieties
- Planting Rate & Depth
- Fertilizers Applied, Rates
- Pest Control

**Yield Data (Outcomes)**

- Poor Correlations
- Sampling Errors
- Testing Errors
- High Variability
- Erratic Correlations
- Lack of Data

**Attribute Mapping**

- Correlations (Learning)
- Weather Resolution Timing
- Lack of Expertise
- Lack of Trust
- Control/Platforms

**Technology Gaps Platforms**

- Cloud
- Mobile
- PC
- Handheld
- Smartphone
- Servers
- Desktop

- Lack of Expertise
- Control/Platforms
The Precision Ag Complexity Challenge

Precision Ag Survey:

– 25% Fell Equipment Is Too Complex
– 40% Think There is Too Much Incompatibility
– 50% Think That Equipment Changes Too Quickly
– 25% Aren’t Making Money on PA

“Houston, we have a problem”
# The Seven Precision Ag “Systems”

<table>
<thead>
<tr>
<th>Task</th>
<th>Examples</th>
</tr>
</thead>
</table>
| **Guidance Systems**        | • GPS  
                                 • Autosteer                                       |
| **Control Systems**         | • VRT Planting and Population                     
                                 • VRT Fertilizers, Lime, Pesticides 
                                 • Robotics                                         |
| **Monitoring Systems**      | • Yield and Quality Sensors                        
                                 • Drones                                           
                                 • EC, Moisture and Nutrient Monitors          
                                 • Soil Samplers / Testing                          |
| **Spatial Relationship Systems** | • Satellite Imagery                         
                                 • GIS Databases                                    |
| **Interpretation Systems**  | • Agronomic Response Curves                       
                                 • Correlation Development                          
                                 • Statistical Analysis                            |
| **Decision Support Systems**| • Recommendations:                             
                                 ◦ Crops/Population/Variety/Depth                  
                                 ◦ Nutrient Rates/Timing/Forms                      
                                 ◦ Crop Protection                                  
                                 ◦ Harvesting or Water Management                   |
| **Communication Systems**   | • Remote Access/Cloud Systems                     
                                 • Smartphones and Apps                            
                                 • Tablets and Apps                                
                                 • Asset Tracking                                   |
Task Model of Precision Ag

- Guide
- Communicate
- Decide
- Control
- Interpret
- Monitor
- Relate
- Integrate
Precision Ag Flow Chart

- Guide
- Communicate
- Decide
- Interpret
- Relate
- Monitor
- Control

Integrate
Monsanto IFS and Fieldscripts

Monsanto is Pursuing Proprietary Solutions to Attack the “White Space”...

“the data delivery system has to be available to the grower in a form that is easy to use…”

“…ensure that the growers have the best possible experience…”

“…allow data to flow seamlessly between Monsanto, the retailer, and the (farmer)…”

“…for a grower to qualify, they need to have all the Precision Planting components in place on the planter…”
The “Ag Rollup” Is Largely Over

Massive Consolidation at Input Supplier Level!
IT Platform Convergence

- Search
- Cloud
- Smartphone
- Tablets
- PCs
- Music

Competition on **Integrated Platform**, Not Individual Products!
"In terms of user traction they are in crash mode," said Pierre Ferragu at asset manager Alliance Bernstein. "They are getting closer and closer to the ground at an accelerating pace. You should never say never but it is probably too late for them to be acquired by anyone."

More than $2bn was wiped from the stock market value of smartphone maker Blackberry on Friday after financial results suggested its bid to join the personal computing revolution had hit the wall.
Disruptive Technology Meets a Mature U.S. Ag Industry

Suppliers Seek Growth by Acquiring Technologies Which Enable Integrated Solutions for Powerful Customers

Your Suppliers Will Now Play in Multiple Spaces!
Ag Productivity Convergence

Crop Nutrition
- Micronutrition
- Precision Mechanics
- Microfarming

Crop Protection
- IPM
- Precision Decisions (DDM)
- Seed Treatment

Equipment and Cultural Practices
- Cloud Computing
- Data Convergence

Seeds & Biotechnology

Integrated Agricultural Productivity
Changing Production Economics: Historical Net Farm Income

Farm Income Well Above Historical Norms!

F = Forecast.
Data as of August 27, 2013.
Corn Has Been Generating $150-250 Per Acre in Contribution Margin Above Historical Norms!

Gloy et al. Purdue University, March 2011
US Farmland Value Trends

Source: USDA
Farmland Values by Area

2013 Farm Real Estate Value by State
Dollars per Acre and Percent Change from 2012

Average Cropland Value - United States

USDA - NASS
August 2, 2013
Cash Rent Trends
Rates Doubled Since 2007

Figure 1. Average County Cash Rents, $ per Acre, 2012.

<table>
<thead>
<tr>
<th>Land Quality</th>
<th>Expected Corn Yield</th>
<th>2012 Rent</th>
<th>Projected 2013 Rent</th>
<th>Percent Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excellent</td>
<td>Over 190 Bu per acre</td>
<td>373 $ per acre</td>
<td>384 $ per acre</td>
<td>2.9%</td>
</tr>
<tr>
<td>Good</td>
<td>170 - 190</td>
<td>317 $ per acre</td>
<td>326 $ per acre</td>
<td>2.8%</td>
</tr>
<tr>
<td>Average</td>
<td>150 - 170</td>
<td>268 $ per acre</td>
<td>272 $ per acre</td>
<td>1.5%</td>
</tr>
<tr>
<td>Fair</td>
<td>Less than 150</td>
<td>212 $ per acre</td>
<td>214 $ per acre</td>
<td>0.9%</td>
</tr>
</tbody>
</table>


Table 2. History of Cash Rents for Mid 1/3 of Cash Rent Leases.

<table>
<thead>
<tr>
<th>Year</th>
<th>Excellent</th>
<th>Good</th>
<th>Average</th>
<th>Fair</th>
</tr>
</thead>
<tbody>
<tr>
<td>$ per acre</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2007</td>
<td>163</td>
<td>164</td>
<td>144</td>
<td>120</td>
</tr>
<tr>
<td>2008</td>
<td>241</td>
<td>207</td>
<td>172</td>
<td>138</td>
</tr>
<tr>
<td>2009</td>
<td>267</td>
<td>221</td>
<td>187</td>
<td>155</td>
</tr>
<tr>
<td>2010</td>
<td>268</td>
<td>231</td>
<td>189</td>
<td>156</td>
</tr>
<tr>
<td>2011</td>
<td>319</td>
<td>271</td>
<td>220</td>
<td>183</td>
</tr>
<tr>
<td>2012</td>
<td>379</td>
<td>331</td>
<td>270</td>
<td>218</td>
</tr>
<tr>
<td>2013</td>
<td>396</td>
<td>339</td>
<td>285</td>
<td>235</td>
</tr>
</tbody>
</table>

Source: National Agricultural Statistical Service
Ten Year Input Cost Increases

$76 \text{ B (2.3 X)}$

$33 \text{ B}$

$2.8 \text{ X Fert}$

$2.2 \text{ X Seeds}$

$2.6 \text{ X Fuel}$

$1.6 \text{ X Chem}$

### Farmland Productivity and Returns

#### How can you pay $235 to $396 in cash rent when the return to operator AND land is $211 to $333?

<table>
<thead>
<tr>
<th></th>
<th>High Productivity</th>
<th>Low Productivity</th>
<th>Lower Productivity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Corn (Price)</td>
<td>Soybeans (Price)</td>
<td>Corn (Price)</td>
</tr>
<tr>
<td>Price</td>
<td>$4.80</td>
<td>$10.75</td>
<td>$4.80</td>
</tr>
<tr>
<td>Yield</td>
<td>195</td>
<td>56</td>
<td>183</td>
</tr>
<tr>
<td>Gross revenue</td>
<td>$936</td>
<td>$602</td>
<td>$878</td>
</tr>
<tr>
<td>Non-land costs</td>
<td>$563</td>
<td>$350</td>
<td>$555</td>
</tr>
<tr>
<td>Operator and land return</td>
<td>$373</td>
<td>$252</td>
<td>$323</td>
</tr>
<tr>
<td>Operator and land return (2/3 corn, 1/3 soybeans)</td>
<td>$333</td>
<td>$291</td>
<td>$211</td>
</tr>
</tbody>
</table>

1 High and low productivities represent yields and prices from central Illinois budgets. The lower productivity category is included for comparison purposes.

2 Operator and land return given 2/3 of acres are in corn and 1/3 are in soybeans.

---

*Corn and Soybean Digest*, July 17, 2013
“...agricultural land values registered no gain in the second quarter relative to the first quarter of 2013...the last time there was no quarterly increase in agricultural land values was in 2009...”
Farm Debt

Highest Debt Levels Since the 1980s!

F = Forecast. The GDP chain-type price index is used to convert the nominal (current-dollar) statistics to real (inflation adjusted) amounts (2009=100).
Data as of August 27, 2013.
Institutional Farmland Ownership
Iowa

.....62% of Iowa farmland is now owned by farmland investors and other non-farmers, up from 60 percent in the 2007 survey and 55 percent in 2002, constituting over a 10% fall in farmer ownership over the last decade...

"Farmers can batten down the hatches, cut their spending and get by in hard times," Berg said. "If investors have paid $8,000 to $10,000 an acre for land that's not earning a decent return, how long will they hang in there before they move to greener pastures?"
...Consequences of the “Bull”

• Supply Expansion
  – More Corn Acres
  – Yield Enhancement Focus
  – Foreign Production

• Demand Destruction
  – Ethanol Plant Shutdowns
  – Livestock Liquidation
  – Grain Export Drop

• Asset Prices and COBD
  – Higher Land Prices
  – Input Volume/Prices Up
  – Equipment Purchases Up

“The Cure for High Prices is High Prices”
My Ag Macro Outlook

- Get Ready for Short Term Ag Downturn
  - “the market has gotten ahead of itself”
  - Moderating Prices with High CODB
- QE3 Unwind Success Could Impact Severity
  - More Severe Downturn if Unwind Goes Poorly
  - Continued Boom if Inflation Results
- Ethanol Support Critical
  - Severe Downturn if Ethanol Support Wanes
- More Stable Expansion in 2016-2017
  - Asset Values Moderate
  - Global Demand Reaccelerates

Long Term Investors and True Believers Will Be Able to Invest at More Attractive Valuations

Over-levered Players and Short Term Speculators Will Get Washed Out

Secular Uptrend

Cyclical Industry
Investing in Ag: Huge Gaps in Capital Spectrum

Successful Ag Investors Will Be Less Dogmatic and Stage Agnostic
MacroGain Partners and Open Prairie Ventures
Process and Focus

**Ag Business Need**
- Sector Rollups
- Family Transitions
- Growth Capital Recaps
- Shareholder Realignment
- Orphan Products
- Minority Investments
- Strategic Partnerships
- Advantaged Startups
- Emerging Technology

**“Deal Sponsor”**
- Strategize on Needs
- Assemble Financial Model
- Build Investment Story
- Identify Capital Sources
- Help Sift Through Options
- Assist on Diligence
- Post Closing Support

**Capital Sources**
- Private Equity $25-200 mm
- Private Equity $10-25 mm
- Private Equity $3-10 mm
- Venture Capital $1-5 mm
- Angel Investors $0.2-2.0 mm
Open Prairie Ag Venture Investments

- Biopesticide Company Based in Kalamazoo, MI
- $15 mm raised from three VC Firms: Open Prairie, Pangea Ventures, SWMF
- Developing insecticides derived from peptides produced by spiders
- Three Primary Offerings:
  - Traditional Biopesticide
  - Metabolite-Derived Synthetic Pesticide
  - Alternative Trait to Bt Based GMO
- Broad IP portfolio under development
- Favorable, fast-tacked, EPA “Green” regulatory process

- Ag Biologics Company Based in St. Louis, MO
- $7 mm raised from three VC Firms: Open Prairie, Rockport, Pangaea
- Creating a non-GMO platform technology to optimize the production of NOPABs (Naturally Occurring Plant Associated Bacteria) to improve plant health and increase yield and disease resistance
- Focus on both traditional row crops (corn, soy) as well as high value niche crops (vegetables)
- Initial sales targeted in 2014
- Substantial focus on genomics and bioinformatics; expanding intellectual property portfolio

VC Investments Target 20-40% Annual Returns on Capital
OP III: Agricultural Opportunities Fund

• **Stage Focus**
  - Invest across all stages, variable with fund size
  - $50-$75mm Fund: 40% early-stage, 40% growth stage, 20% later stage
  - Identify strategic syndicate partners for all stages of opportunities

• **Strong Pipeline Of Near-Term Opportunities**
  - Strong demand from large corporates for new technologies creates pull market
  - Innovative companies searching for a venture community that is still being built
  - Numerous syndicates but few leads as large venture players pivot from clean tech

• **Sector Focus – *In the Field* Strategy Focused on Production**

<table>
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<tr>
<th>Specialty Fertilizers, Nutrients &amp; Soil Amendments</th>
<th>Specialty Chemicals &amp; Biopesticides</th>
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Agrifood’s Future is Bright!

Please Contact Me If:
1. You Are Seeking a Capital Partner for a Project or Deal
2. You Have an Interest in Investing in Ag Deals
3. You Are Interested in Testing New Technologies

Thanks!