Ohio Farmer Attitudes About Climate Change

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Byrd Polar Research Center

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3rd National Climate Assessment Report—Agriculture Section

KEY MESSAGES
1. Climate disruptions to agricultural production have increased in the past 40 years and are projected to increase over the next 25 years. By mid-century and beyond, these impacts will be increasingly negative on most crops and livestock.

2. Many agricultural regions will experience declines in crop and livestock production from increased stress due to weeds, diseases, insect pests, and other climate change induced stresses.

3. Current loss and degradation of critical agricultural soil and water assets due to increasing extremes in precipitation will continue to challenge both rainfed and irrigated agriculture unless innovative conservation methods are implemented.

4. The rising incidence of weather extremes will have increasingly negative impacts on crop and livestock productivity because critical thresholds are already being exceeded.

5. Agriculture has been able to adapt to recent changes in climate; however, increased innovation will be needed to ensure the rate of adaptation of agriculture and the associated socioeconomic system can keep pace with climate change over the next 25 years.

6. Climate change effects on agriculture will have consequences for food security, both in the U.S. and globally, through changes in crop yields and food prices and effects on food processing, storage, transportation, and retailing. Adaptation measures can help delay and reduce some of these impacts.
USDA Corn CAP Grant
(OSU—Moore, Lal, Dick, Lekies)

- The Climate and Corn-based Cropping Systems CAP (CSCAP) is a transdisciplinary partnership among 11 institutions creating new science and educational opportunities. The CSCAP seeks to increase resilience and adaptability of Midwest agriculture to more volatile weather patterns by identifying farmer practices and policies that increase sustainability while meeting crop demand.
Measuring GHG—Rattan Lal

Long-term No-till Corn-Soybean Plots (OARDC, Wooster)

Waren Dick
Drainage – USDA ARS (Norm Fausey)

Stone Lab Course SENR 5194
Climate and Sustainability

Lake Erie Algal Bloom/hypoxia in Sandusky Bay
National Council for Science and the Environment  CAMEL Project

http://www.camelclimatechange.org/

BACKGROUND ON OHIO’s AGRICULTURE
Ohio Agricultural Crop Values (2012)

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Planted All Purpose Acres</th>
<th>Harvested Acres</th>
<th>Yield</th>
<th>Production</th>
<th>Price per Unit</th>
<th>Value of Production in Dollars</th>
</tr>
</thead>
<tbody>
<tr>
<td>CORN</td>
<td>3,650,000</td>
<td>200,000</td>
<td>123.00</td>
<td>448,550,000 BU</td>
<td>7.09 $ / BU</td>
<td>3,183,054,000</td>
</tr>
<tr>
<td>CORN, SILAGE</td>
<td>200,000</td>
<td></td>
<td>16.00</td>
<td>3,200,000 TONS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SOYBEANS</td>
<td>4,600,000</td>
<td>4,590,000</td>
<td>45.00</td>
<td>206,550,000 BU</td>
<td>14.60 $ / BU</td>
<td>3,015,650,000</td>
</tr>
<tr>
<td>HAY &amp; HAYLAGE</td>
<td>1,170,000</td>
<td></td>
<td>2.39 TONS / ACRE, DRY BASIS</td>
<td>2.79 TONS / ACRE, DRY BASIS</td>
<td>537,185,000</td>
<td></td>
</tr>
<tr>
<td>HAY &amp; HAYLAGE, ALFALFA</td>
<td>65,000</td>
<td>410,000</td>
<td>3.00 TONS / ACRE, DRY BASIS</td>
<td>1.23 TONS / ACRE, DRY BASIS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HAY</td>
<td>1,100,000</td>
<td></td>
<td>2.12 TONS / ACRE</td>
<td>2,320,000 TONS</td>
<td>193.00 $ / TON</td>
<td>445,080,000</td>
</tr>
<tr>
<td>HAY, ALFALFA</td>
<td>350,000</td>
<td></td>
<td>2.80 TONS / ACRE</td>
<td>880,000 TONS</td>
<td>231.00 $ / TON</td>
<td>208,280,000</td>
</tr>
<tr>
<td>HAY, (EXCL ALFALFA)</td>
<td>750,000</td>
<td></td>
<td>1.80 TONS / ACRE</td>
<td>1,350,000 TONS</td>
<td>162.00 $ / TON</td>
<td>218,700,000</td>
</tr>
<tr>
<td>WHEAT, WINTER</td>
<td>500,000</td>
<td>450,000</td>
<td>69.00</td>
<td>31,050,000 BU</td>
<td>7.94 $ / BU</td>
<td>246,537,000</td>
</tr>
<tr>
<td>WHEAT</td>
<td>500,000</td>
<td>450,000</td>
<td>69.00</td>
<td>31,050,000 BU</td>
<td>7.94 $ / BU</td>
<td>246,537,000</td>
</tr>
</tbody>
</table>

Source:
http://www.nass.usda.gov/Quick_Stats/AgOverview/stateOverview.php?state=OHIO

Ohio Corn Production (2012)
Ohio Soybean Production (2012)

Source:
http://www.nass.usda.gov/Quick_Stats/Ag_Overview/stateOverview.php?state=OHIO

Ohio Winter Wheat (2012)

Source:
http://www.nass.usda.gov/Quick_Stats/Ag_Overview/stateOverview.php?state=OHIO
Ohio OAT PRODUCTION (2012)

Let’s Compare Ohio Corn Belt Farmers and Amish Farmers
## Comparison of 2 Ohio Farming Types

<table>
<thead>
<tr>
<th>NW OHIO CORN BELT</th>
<th>AMISH North Central Ohio</th>
</tr>
</thead>
<tbody>
<tr>
<td>• 235 acres corn and soybeans</td>
<td></td>
</tr>
<tr>
<td>• Grain for export is common</td>
<td></td>
</tr>
<tr>
<td>• 60% land rented</td>
<td></td>
</tr>
<tr>
<td>• 2/3 have off-farm jobs</td>
<td></td>
</tr>
<tr>
<td>• High rate of GMO crops</td>
<td></td>
</tr>
<tr>
<td>• Intensification of production through mechanization and crop varieties that respond to high levels of chemical fertilizer</td>
<td></td>
</tr>
<tr>
<td>• 80-100 acres mixed rotation of corn, spelt, oats, and hay for dairy cow production</td>
<td></td>
</tr>
<tr>
<td>• Usually several varieties of corn planted principally for silage and grain feed for dairy cows and horses.</td>
<td></td>
</tr>
<tr>
<td>• Mostly farm on self-owned land</td>
<td></td>
</tr>
<tr>
<td>• Side business is common</td>
<td></td>
</tr>
<tr>
<td>• Intensification through use of milking machines</td>
<td></td>
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</tbody>
</table>

### OHIO CORN-SOYBEAN FARM

Bret Davis (Delaware, OH)
NEW ORDER AMISH FARM

- 3 DAUGHTERS
- 2 SONS
- GRANDMOTHER
- 120 ACRES
- 70 AC TILLABLE
- 15 AC PASTURE
- 35 AC WOODS
- 50 JERSEY COWS
- 20 HOGS
- 150 CHICKENS
- 6 DRAFT HORSES
- 5 YEAR ROTATION
  - HAY
  - CORN
  - CORN SILAGE
  - OATS
  - WHEAT
  - ROTATIONAL
  - GRAZING USED
  - MILKING MACHINE

CROP ROTATIONS

Traditional Amish farms are diversified and usually include dairy cows as well as other livestock. A 4 - 5 year rotation including: hay, corn, oats and wheat or spelt (emmer wheat) is the foundation of Amish agriculture. Manure (10 - 12 T/A) is applied to the hay fields going into corn.

Field 1
Field 2
Field 3A
Field 3B
Field 4
Field 5
Field 6
Field 7
Riparian Zone

Courtesy of Richard Moore and Debbie Stinner
Right and Left handed Plowing

Amish Corn Field Next to Oats
Waiting for the Bobolinks to Nest before Plowing

Amish Dairy Farmers in South Fork of Sugar Creek

Source: Alex Joannon (in preparation 2014)
SURVEY RESULTS

USDA CORN and CLIMATE group (2012)—4778 farmers across the Corn Belt.

Moore’s team (2012)—50 farmers in Holmes County Ohio (Amish, Mennonite)

Farmers’ Attitudes about Climate Change (2012)

<table>
<thead>
<tr>
<th></th>
<th>Corn Belt</th>
<th>SC Non Amish</th>
<th>SC Amish</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human</td>
<td>7.80%</td>
<td>14.29%</td>
<td>8.33%</td>
</tr>
<tr>
<td>Human Natural Combo</td>
<td>33.10%</td>
<td>4.76%</td>
<td>0.00%</td>
</tr>
<tr>
<td>Natural</td>
<td>24.60%</td>
<td>33.33%</td>
<td>8.33%</td>
</tr>
<tr>
<td>Insufficient Evidence</td>
<td>30.90%</td>
<td>33.33%</td>
<td>83.33%</td>
</tr>
<tr>
<td>Not Occurring</td>
<td>3.50%</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
</tbody>
</table>
USA CORN BELT FARMERS ATTITUDES ABOUT CLIMATE CHANGE: “Insufficient Evidence to know with certainty whether climate change is occurring or not”.


Corn Farmers’ Attitudes about Climate Change

Corn Belt

SC Amish
Corn Farmers’ Attitudes about Climate Change--water


Map 12. Experienced significant problems with saturated soils or ponding over the past five years (2007−2011), percent.

Corn Farmers’ Attitudes about Climate Change--rain


Map 26. More frequent extreme rains (Q50), percent concerned or very concerned.
Concerns about Excess Water Issues
(percent concerned or very concerned)

Source: J.Arbuckle ASA presentation October 24, 2012

Support for Collective and Individual Mitigation
(percent agree or strongly agree)

Source: J.Arbuckle ASA presentation October 24, 2012
Some factors to consider

• Flexibility of production—more varieties, shorter season varieties, different crops
• Timing of a response to a system perturbation
• Cover crops and Less tillage=less GHG
• Build a resilient system to increased number and intensity of weather events

THANK YOU