How we can build more resilient farms and food systems in the face of a changing climate

- Whatever we choose to call it, Heat trapping gases of C02, N02, and methane have increased dramatically, we are getting warmer especially with winter and nighttime averages

What is the premise for a changing climate

Burning fossil fuels, deforestation, desertification

- How is this being done? Through the release of CO2 that is a heat trapping gas that is raising the temperature of the oceans and our atmosphere. 1.53 degrees (Fahrenheit) since 1880
- Models predict that we will warm another 2-6 degrees Celsius this century. 7.6 Degrees Fahrenheit
- **Result-Longer growing seasons**

Climate change causes are not shared equally

- 80% of global emission come from 20% of the world's pop.
- An average American leaves a carbon footprint that is 2000 x's larger than a person in poverty
- Consumption, lifestyles, consumerism- we are all guilty in some way.

Photosynthesis and Respiration tell us much about climate change

- **Photosynthesis:** C02 + H20 > C6-H12-06 + 02 (in the presence of sunlight)
- **Respiration:** Carbon dioxide plus water yields sugars plus oxygen
- C6-H12-06 + 02 > C02 plus H20 –(C02 is a by-product of cellular respiration and the burning of fossilized plants for our energy use) Heat and gases are released that trap heat in the earth's atmosphere
- **More photosynthesis occurring, more sugars being produced, more respiration and heat released at night, contributing to warmer nights during the growing season. Suggestion that this is occurring at the expense of protein and mineral content. C-4's**

Crop and livestock systems have a huge impact on emissions

- Estimates range from 9-20% of green house gases come from agriculture
- If you add energy usage to produce pesticides, fertilizer, machinery usage, trucking and shipping, N02 (nitrous oxide), methane release from livestock, that figure jumps to 25-30%

HOW IS OUR WEATHER CHANGING IN WESTERN IOWA?

- Getting a little warmer and a little wetter, Falls are a little drier
- Annual precipitation has gone up about 8% over the last 100 years- 34 inches now
- More of the increase has come in the first half of the year- cool and wet springs
- Warmer nights and winters have been the two predominant temperature changes
- Longer growing seasons, frost-free days-from 1968 to the present-increase of 5 days. From 1900 to the present-8-9 days
- Changing migration patterns
- Increased summer precipitation and soil moisture have suppressed surface heating- 100 degree days not increasing
- Heavy precipitation events have been increasing-how to keep the water in the soil?

Resource scarcity, resource degradation and climate change all go hand-in-hand

Reducing exposure

How to manage soil and water in the future

Can microclimates affect CO2 and “weather” at ground level? How does it affect the whole farm?

What we do on our farm = Diversity, over 50 fields, plant more than 20 species every year

Early spring annuals-oats, barley, wheat, field peas, cool season grasses

Late spring annuals-corn, soy, alfalfa, clovers

Controlling weeds without pesticides and maintaining excellent yields

Ridge-till soybeans

Late Summer annuals-turnips, millet, sorghum-sudan, vetch, radish, buckwheat, etc.

Hairy Vetch and Rye for seed harvest

Winter annuals, rye, triticale, hybrid rye-no-till drilling soybeans in rye stubble

Cutting rye for hay on June, 9, 2014

What about complete no-till in organics? Planted on June 13, 2014

Giant Ragweed

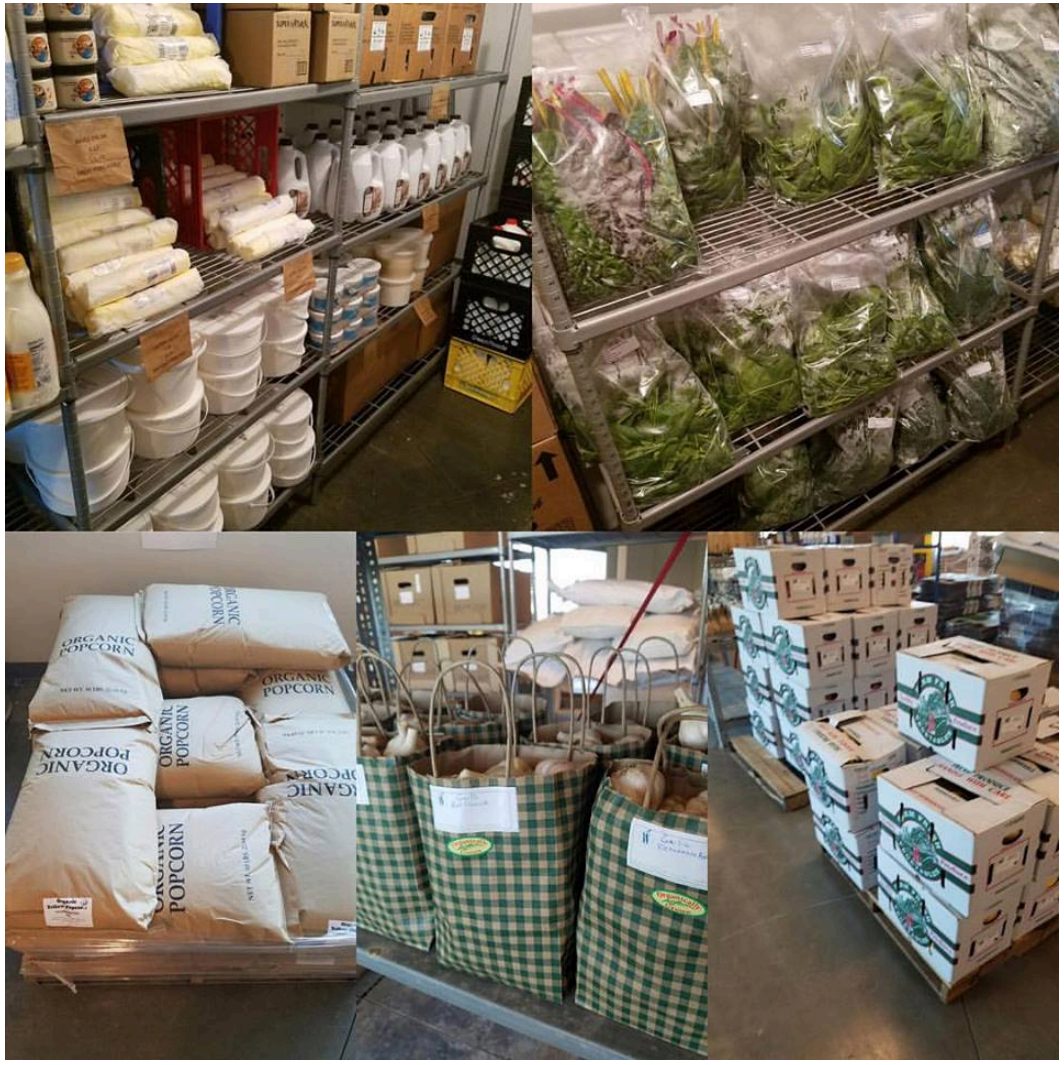
Organic Hog Production-how to better care for our animals in our changing climate

Organic Beef Production-Does a closed system mean better health and resilience to climate change? Pinkeye

Composting: role of microbes to feed the soil and improve soil health, produce stable carbon, no purchased N-35 years

Trees and shrubs provide so many services besides storing C02-wind protection, wildlife habitat, pollinators, etc.

Local food stays closer to home at “Farm Sweet Farm”

Milk and Honey: Local foods restaurant owned by Daniel and Ellen Rosmann

Farm Table Procurement and Delivery