



Boosting Forage Density with No-Till, Cover Crops & Manure

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Northeast Iowa Dairy & Agriculture Foundation

NET ZERO INITIATIVE

*“An ambitious goal for
ambitious people.”*





- **Mission:** Providing progressive outreach for youth, students, farmers, industry and consumers to strengthen and support a strong agriculture community.
- **Vision:** Stimulating a robust economy, thriving rural communities and engaging consumers for unified support of innovative agriculture practices to ensure a safe food supply.
- Designated as Iowa's first "Center of Excellence for Value-Added Agriculture" by Governor Tom Vilsack in 2000




AGRICULTURE IN IOWA

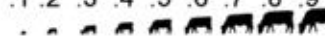


Commodity	State Rank	Value
Corn	1st	2.5 Billion Bushels
Pigs	1st	23 Million Head
Eggs	1st	1.4 Billion Dozen
Ethanol	1st	4.5 Billion Gallons
Biodiesel	1st	350 Million Gallons
Gross Farm Revenue	2nd	\$46.6 Billion
Soybeans	2nd	573 Million Bushels
Dairy Goats	3rd	24,000 Head
Number of Family Farms	3rd	87,000
Cattle on Feed	4th	1.1 Million Head
Turkeys	7th	11.5 Million Birds
Sheep	9th	155,000 Head
Beef Cows	10th	925,000 Head
Milk	11th	210 Billion Pounds.

US BEEF PRODUCTION (ON PUBLIC AND PRIVATE LANDS)

 = 1 percent of US beef cows

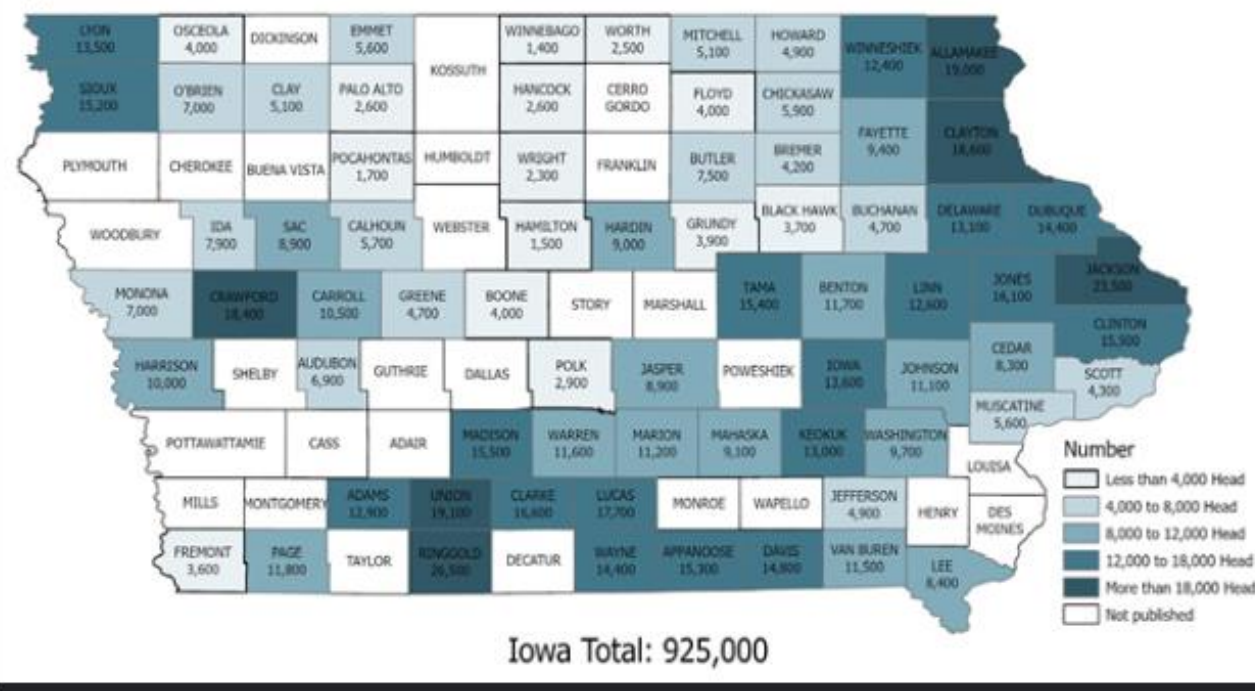
.1 .2 .3 .4 .5 .6 .7 .8 .9

 = fractions of 1 percent



Western Watersheds Project

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Northeast Iowa Dairy & Agriculture Foundation

DAIRY

BEEF

CONSERVATION





Petes
Photo

Training Tomorrow's Agricultural Professionals

Northeast Iowa Community College



Iowa's Dairy Center: Yearly Feed

Yearly Feed Used 2022

Iowa's Dairy Center

January 1, 2022 to December 31, 2022

Feed Type	Feed Used Ton	% Dry Matter	Dry Matter Used Ton	Cost Per Ton	Total Cost	% Feed Used	% Feed by Cost
Feed Source: Clean-up							
REFUSL	50.61	50.000%	25.31	\$320.0000	\$16,195.84	0.0%	0.0%
Sub Totals:	50.61	50.000%	25.31	\$320.0000	\$16,195.84	0.0%	0.0%

Feed Source: Commodity Blend							
ONFARM PREMIX	1,440.08	59.174%	852.15	\$270.2144	\$389,129.29	0.0%	0.0%
Sub Totals:	1,440.08	59.174%	852.15	\$270.2144	\$389,129.29	0.0%	0.0%

Feed Source: Home Grown							
BALAGE	131.35	58.535%	76.89	\$170.8511	\$22,441.72	2.0%	2.7%
BALAGE2	87.47	59.269%	51.84	\$92.9363	\$8,129.37	1.3%	1.0%
COCKTAIL2	238.26	27.376%	65.22	\$65.7554	\$15,666.79	3.6%	1.9%
CRNSLG20	35.15	34.030%	11.96	\$42.2021	\$1,483.36	0.5%	0.2%
CRNSLG21	2,157.80	35.332%	762.39	\$46.3850	\$100,089.32	32.5%	12.1%
CRNSLG22'	385.15	45.544%	175.41	\$25.0647	\$9,653.73	5.8%	1.2%
CRNSLGE22 Garys	1.31	47.100%	0.61	\$51,810.0077	\$67,612.06	0.0%	8.2%
Cockbale 1	3.51	24.000%	0.84	\$0.0000	\$0.00	0.1%	0.0%
Cocktail1	237.66	22.388%	53.21	\$0.0000	\$0.00	3.6%	0.0%

Feed Type	Feed Used Ton	% Dry Matter	Dry Matter Used Ton	Cost Per Ton	Total Cost	% Feed Used	% Feed by Cost
Sub Totals:	4,855.90	39.514%	1,918.75	\$75.8239	\$368,193.30	73.2%	44.6%



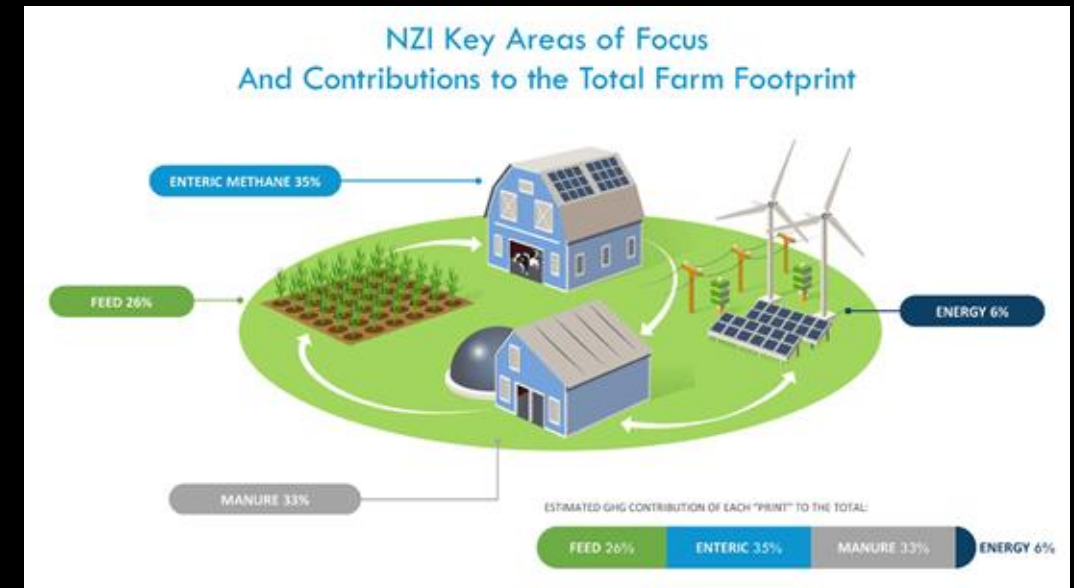
What is the Net Zero Initiative?

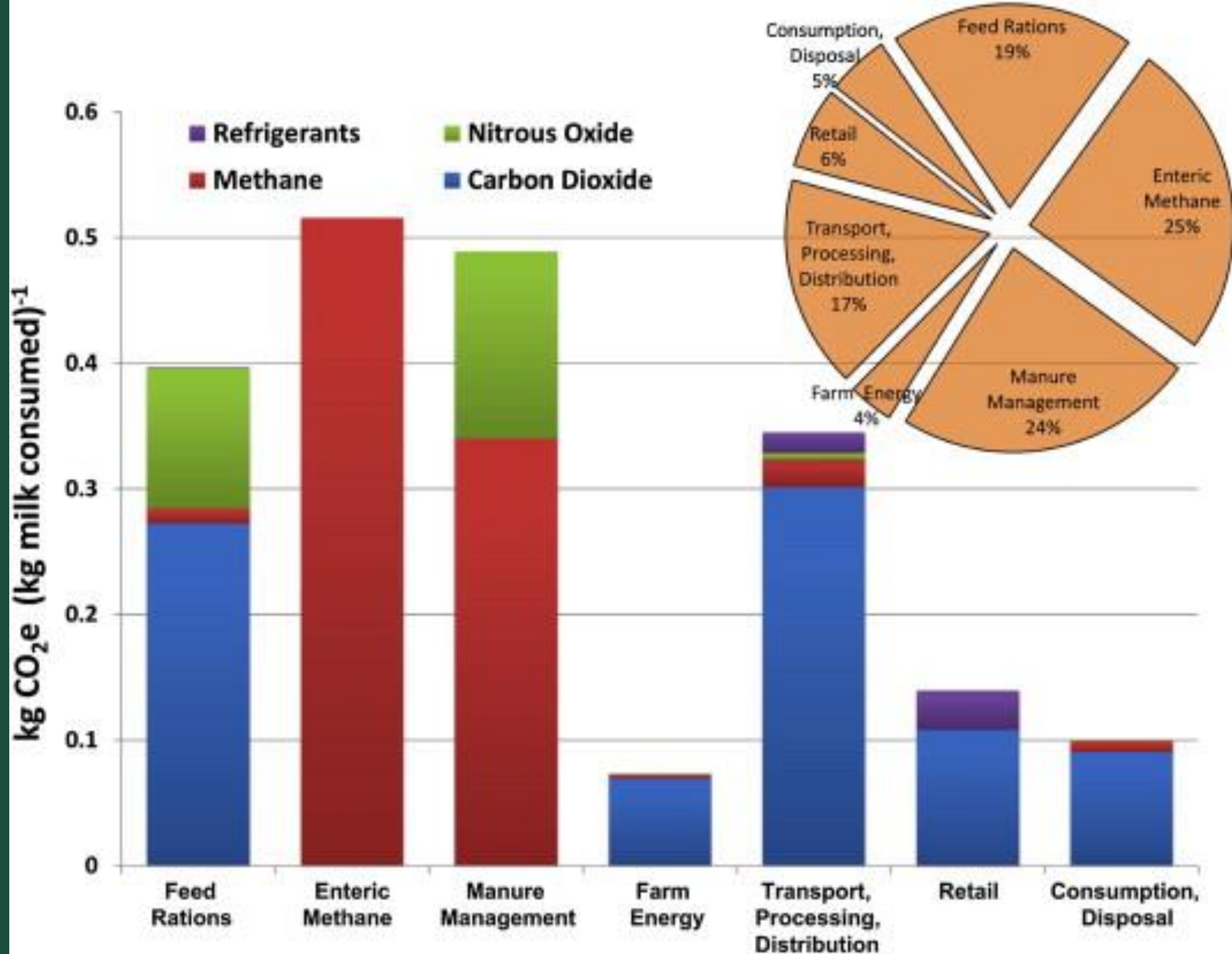
NZI is:

- About a collective effort benefiting all farms – not about making every farm achieve net zero status.
- A pathway for farms to voluntarily contribute – it is not mandatory.
- About providing opportunities for farms of all sizes to adopt technologies and practices and create revenue streams – it is not just for big farms.
- An effort that considers a range of technologies and practices on farms of varying sizes, designs and geographies – it is not a one-size-fits-all approach.

Center for U.S. Dairy Goals to be achieved by 2050:

- Becoming carbon neutral or better
- Optimizing water use while maximizing recycling
- Improving water quality by enhancing use of manure and nutrients





Four Key Areas of Focus

Feed production & practice changes:

- ✓ No/low-till farming and cover crops
- ✓ Renewable fertilizers
- ✓ Precision agriculture

Manure handling & nutrient management:

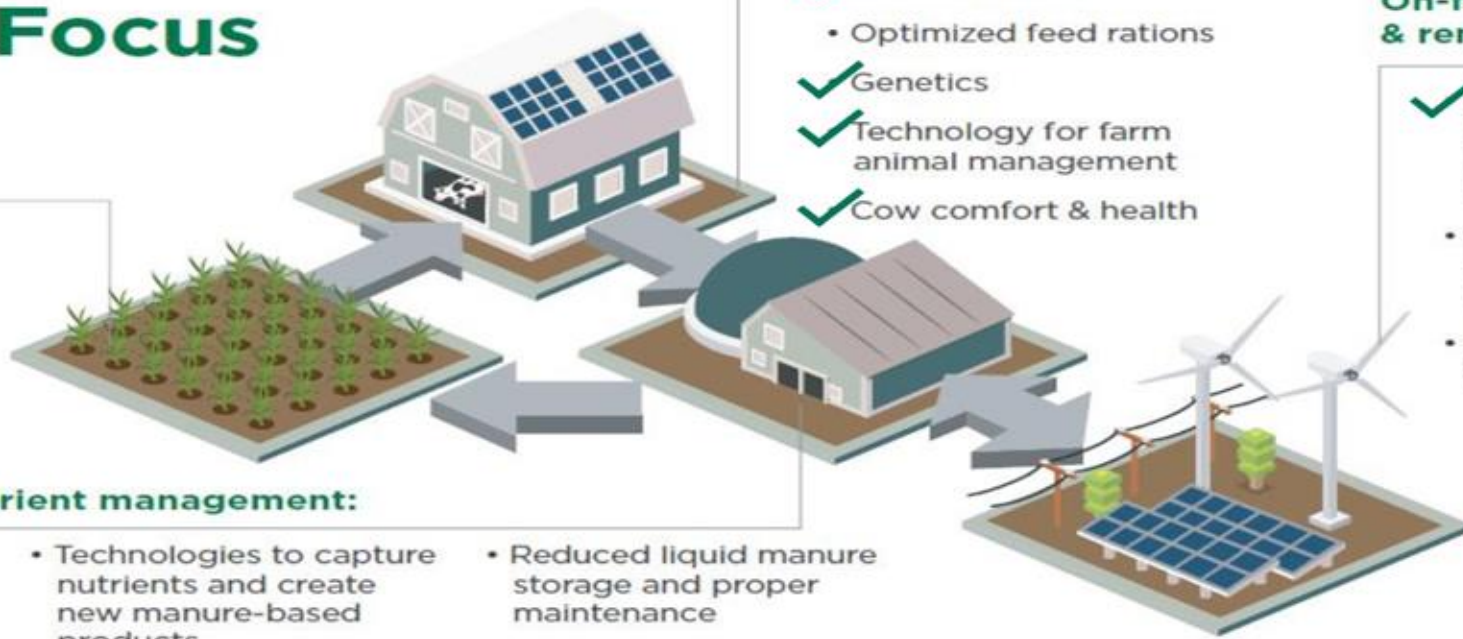
- ✓ Nutrient Management Planning (NMP)
 - Anaerobic digesters turn manure into biogas
- Technologies to capture nutrients and create new manure-based products
- Reduced liquid manure storage and proper maintenance

Cow care & efficiency:

- ✓ Feed additives
 - Optimized feed rations
- ✓ Genetics
- ✓ Technology for farm animal management
- ✓ Cow comfort & health

On-farm energy efficiency & renewable energy usage:

- ✓ LED lighting, variable speed vacuum pumps, high-efficiency refrigeration, and fans
- Conversion of biogas into electricity and/or renewable natural gas
- Renewable energy sources from wind/solar



Visuals do not represent all possible practices, technologies or benefits. Each farm can voluntarily contribute to net zero efforts based on their individual operation.

NET ZERO INITIATIVE



WHO DOES THIS BENEFIT?



IOWA dairy farm families

ARE COMMITTED TO SUSTAINABILITY FOR THE FUTURE HEALTH AND WELL-BEING OF:



OUR COMMUNITIES

OUR BUSINESSES



OUR COWS



OUR EMPLOYEES

OUR PLANET



OUR CONSUMERS



FARM Conservation Practice Benefits

Practice(s)	Environmental Benefit(s)
Cover crops	Biodiversity, Soil health, GHGs, Water quality
No-till	Biodiversity, Soil health, GHGs, Water quantity and quality
Strip-till, reduced till, or other conservation tillage	Biodiversity, Soil health, GHGs, Water quantity and quality
Crop rotation	Biodiversity, Soil health, GHGs, Water quality
Intercropping	Biodiversity, Soil health, GHGs, Water quantity and quality
Contour buffer strips or strip cropping	Biodiversity, Soil health, GHGs, Water quality
Riparian buffers or filter / buffer strips	Biodiversity, Soil health, GHGs, Water quality
Field borders	Biodiversity, Soil health, GHGs, Water quality
Grassed waterways	Biodiversity, Soil health, GHGs, Water quality
Prescribed grazing	Biodiversity, Soil health, Water quantity and quality
Compaction prevention	Soil health, Water quantity and quality benefits
Stabilized stream crossings	Biodiversity, Soil health, GHGs, Water quality
Water and sediment control basin	Biodiversity, Soil health, GHGs, Water quality
Tile drainage with water treatment	Soil health, GHGs, Water quantity and quality



WHAT WE'RE DOING



1. Shelterbelt- Campus
2. Oak Savanna, Short Grass Native Grasses and Forbs
3. Native Grass and Forb Seedlings
4. Butterfly Garden
5. Native Flowers
6. Shelterbelt- Dairy Center

1. Bioswale
2. Constructed Wetland
3. Grassed Waterway
4. Wetland Restoration
5. Water & Sediment Control Basin
6. Pond Restoration
7. Permeable Pavers

1. Infiltration Trench
2. Rain Garden
3. Water & Sediment Control Basin
4. No-Till and Cover Crop
5. Soil Health Project
6. Tree Canopy
7. Erosion Control





GRASSED WATERWAY

Constructed to convey runoff from concentrated-flow areas, terraces, or diversions where erosion control is needed



WETLAND & POND RESTORATION

Wetland: A way to return a former or degraded wetland to a condition that is a close approximation of its original condition

Pond: Ponds reflect the fertility of its agricultural land and proper management is important to keep the pond healthy





PERMEABLE PAVERS

A stormwater management practice used to decrease stormwater runoff and allow water to infiltrate into a layer or rock





INFILTRATION TRENCH

A long, narrow, rock-filled trench that treats the water quality volume, helps to preserve the natural water balance on a site, can recharge groundwater and preserve baseflow.





RAIN GARDEN

A landscaped depression that captures rainwater runoff from roofs, driveways, streets, or parking lots before infiltrating and percolating it down through the natural soils



NO-TILL & COVER CROP

No-till: Maintains most of the crop residue on the soil surface throughout the year. Benefits to soil include increasing organic matter, improving soil tilth, and increasing productivity.

Cover crop: Growing a crop of grass, small grain, or legumes primarily for seasonal protection and soil improvement. This practice is used to control erosion, add fertility and organic material to the soil, improve soil tilth, increase infiltration and aeration of the soil, and improve overall soil health.



Changes in Iowa Soil Organic Matter:

- Pre-settlement Iowa prairie soils likely ranged from **6-10% organic matter.**
- Today's Iowa cropland soils typically range from **2-4%.**
- Around a **50% loss in organic matter**, with disturbance (tillage) being the main culprit for the loss.
- Each time the soil is tilled, oxygen is stirred into it, stimulating microbial action to decompose organic matter at an accelerated rate.



1% of organic matter in the top 6 inches of soil can hold approximately 20,000 gallons of water/acre



THE DYNAMIC DUO

No-Till + Cover Crops

- No-Till and Cover Crops have 90% less soil loss than many conventional systems.
- Adopting system can increase organic matter by .1% per year
 - Equivalent to an extra 2000 gallons/ac or 1 tanker fire truck per acre per year



Photo by Neil Sass



Cover Crops at Iowa's Dairy Center

- **Cover Crop Mix**
 - YieldMax Forage Cocktail Mix
 - BMR Sorghum Sudan, Italian Ryegrass, Hairy Vetch, Berseem Clover
 - Planting Date: June 1st
 - Three harvest events, 40 days apart
- **Triticale**
 - Planting Date: October 1st
 - Harvest Date: Early May
- **Fall Cover Crop Mix**
 - Triticale, Koga Annual Ryegrass, Hairy Vetch, Tillage Radishes



Soil Test Points



SOIL TESTING AT IOWA'S DAIRY CENTER



Plots & Study

NICC in cooperation with NRCS set up 11 plots in the spring of 2020

- Plots 1-8 were part of an existing nitrogen study
- Plot 9 is an area of fill from campus construction that is now seeded down to native prairie
- Plots 10 & 11 are a long term study on a 3 crop/2 year rotation. This plot was tilled in 2021
 - Note - Plots 10 & 11 are no longer farmed by NICC

As part of the study, soil samples are taken in June of each year and submitted for analysis using the Haney, Wet Aggregate, and PLFA tests to help determine any change to soil health.



Plot	Soil Test	Crop Rotation
1	Haney, Wet Aggregate, PLFA	Corn/Rye Cover Crop
2	Haney, Wet Aggregate	Corn/Rye Cover Crop
3	Haney, Wet Aggregate	Corn/Rye Cover Crop
4	Haney, Wet Aggregate	Corn/Rye Cover Crop
5	Haney, Wet Aggregate, PLFA	Corn/Rye Cover Crop
6	Haney, Wet Aggregate	Corn/Rye Cover Crop
7	Haney, Wet Aggregate	Corn/Rye Cover Crop
8	Haney, Wet Aggregate	Corn/Rye Cover Crop
9	Haney, Wet Aggregate, PLFA	Prairie
10	Haney, Wet Aggregate, PLFA	Rye, Sorghum, Corn
11	Haney, Wet Aggregate,	Rye, Sorghum, Corn

Haney Test Key Properties

Soil Organic Matter - “The House” where soil biology lives.
Like to see increase over time.

Sample ID	2020 Value (%)	2021 Value (%)	2022 Value (%)	2023 Value (%)	Change (absolute %) 20'-23'
1	3.7%	3.9%	3.9%	4.3%	+0.6%
2	4.2%	4.1%	4.0%	4.1%	-0.1%
3	3.6%	3.8%	4.2%	4.2%	+0.6%
4	3.9%	4.0%	4.4%	4.3%	+0.4%
5	4%	4.2%	4.3%	4.4%	+0.4%
6	3.8%	3.6%	3.9%	4.2%	+0.4%
7	4.1%	4.5%	4.9%	4.6%	+0.5%
8	4.4%	4.5%	4.4%	4.5%	+0.1%
9	3.3%	3.0%	3.1%	3.8%	+0.5%
10	4%	4.4%	4.1%	No longer farm	+0.1%
11	3.6%	Insufficient quantity to test	3.9%	No longer farm	+0.3%

Haney Test Key Properties

Soil Health Calculation – Range from 0-30+
Over 7 is good. Like to see increase over time.

Sample ID	2020 Value	2021 Value	2022 Value	2023 Value	Change (absolute value) 20'-23'
1	6.53	15.17	19.15	10.61	+4.08
2	3.94	17.22	18.6	11.46	+7.52
3	7.7	13.54	23.82	9.22	+1.52
4	6.16	14.63	27.99	12.84	+6.68
5	7.12	14.68	15.99	12.39	+5.27
6	5.18	13.97	12.63	11.67	+6.49
7	4.69	16.17	21.15	16.56	+11.87
8	9.68	13.79	14.57	15.43	+5.75
9	4.69	8.17	10.56	8.00	+3.31
10	7.22	15.3	11.31	Did not farm	+4.09
11		Insufficient			+2.2



“Iowa community college is first to adopt 100 percent no-till cover crops”

- NICC Calmar officials showed off their land stewardship projects to Iowa Secretary of Agriculture Bill Northey
- Under Secretary for Farm Production and Conservation in USDA 2018-2021

Secretary of Ag Northey visits NICC Calmar campus



Technology and Cow Comfort

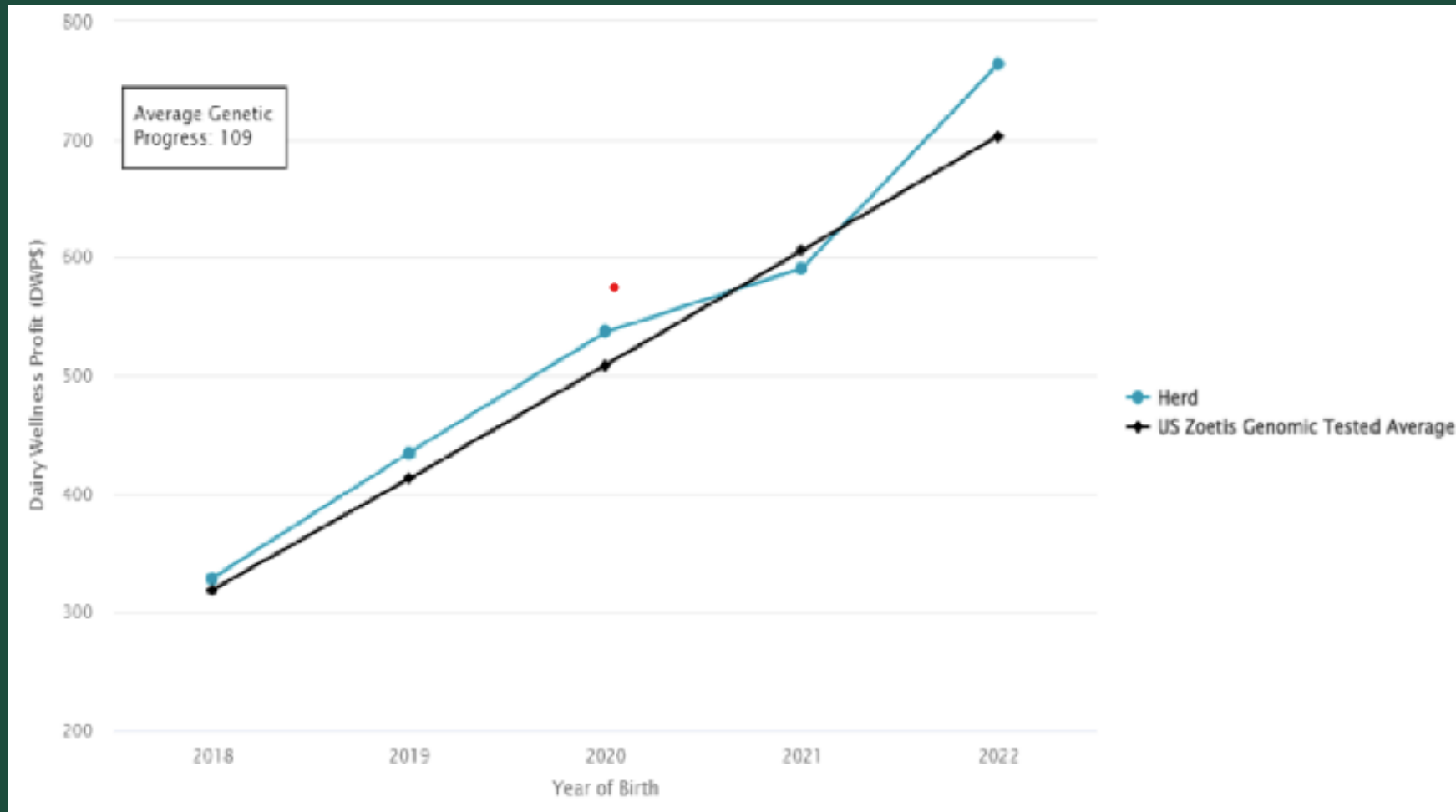
Happy Cows = Healthier Cows



Improvements in Sustainability through Genomic Selection

- Zoetis has done research into impacts of selecting for higher genetic animals
 - In a major study across many large commercial herds – the following was discovered
 - When comparing the top 25% for DWP\$ vs. the bottom 25% for DWP\$
 - The top 25% requires 45% less antibiotic use than the bottom 25%
 - More healthy and ultimately more profitable
 - The top 25% has 10% reduced Methane (CH₄) than the bottom 25%
 - Longer herd life – less impacts of having to raise replacements

Progress for Dairy Wellness Profit Index (DWP\$) – Industry Avg = +\$79 NICCC = +\$109



QUESTIONS?



HAPPY COWS COME FROM CALMAR!



Make a Difference.