Creating opportunities for in-season manure applications using cover crops and alternative forages: Stories from northeast Wisconsin

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NPM

222,000 dairy cows – 512,000 all cattle and calves[1]

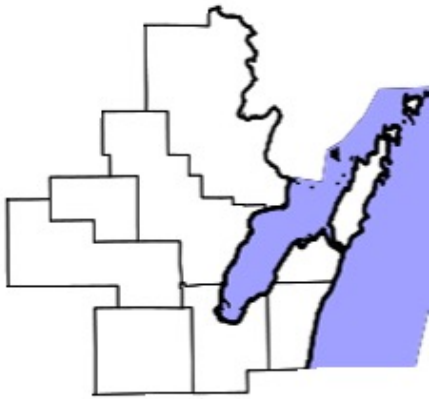
210,000 acres of corn silage[1]

293,000 acres of hay/haylage[2]

1.28 million acres total cropland[2]

Variable climate – 1900-2300 GDDs, 30-33 inches precipitation[1]

Diverse soils – Glacially derived and mucks, PD to EWD, varying slopes



Northeast Wisconsin

[1]USDA-NASS (2021). 2021 Wisconsin Agricultural Statistics. https://www.nass.usda.gov/Statistics_by_State/Wisconsin/Publications/Annual_Statistical_Bulletin/2021AgStats-WI.pdf
[2]USDA-NASS (2018) Census of Agriculture 2017 State and County Profiles – Wisconsin. https://www.nass.usda.gov/Publications/AgCensus/2017/Online_Resources/County_Profiles/Wisconsin/index.php

Region of Nutrient Wealth

220,000 dairy cows

- Estimated total – 20M lbs N, 9M lbs P_2O_5, 25M lbs K_2O[1,2]

UW first-year "book values" [3]

- Liquid dairy manure (<4% DM, <1 hr to incorporated)
  - 7 lb N, 3 lb P_2O_5, 11 lb K_2O per 1,000 gallons
- Slurry dairy manure (4-11% DM, <1 hr to incorporation)
  - 12 lb N, 6 lb P_2O_5, 17 lb K_2O per 1,000 gallons

[1]Estimated 0.71 lbs N, 0.12 lbs P_2O_5, and 0.33 lbs K_2O per cow per day, 65% N loss in handling, storage and application, 95% recovery of P_2O_5 and K_2O
[2]USDA-NRCS (2008) Agricultural Waste Field Handbook, Part 651. Chapter 4. Agricultural Waste Characteristics https://directives.sc.egov.usda.gov/OpenNonWebContent.aspx?content=31475.wba
[3]Laboski C. and Peters, J. (2012) Nutrient Application Guidelines for Field, Vegetable, and Fruit Crops of Wisconsin.. https://cdn.shopify.com/s/files/1/0145/8808/4272/files/A2809.pdf

Manure Applications to Corn Silage

- 2010 statewide data[1]
- 55.6% acres applied in fall and 43.9% in spring

Manure Applications to Alfalfa

- Typical applications after 1st and 3rd crop
- UW recs 3,000 to 5,000 gallons / acre[2]

Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec

[1]Mitchell, P.D., Knuteson, D., Beach, J., and Genskow. K. (2021). Preliminary Assessment of the Potential Economic Impacts of Proposed Changes to NR151 for Agricultural Operations. University of Wisconsin-Madison. https://aae.wisc.edu/pdmitchell/wp-content/uploads/sites/15/2021/09/UW_NitrateReport_091521.pdf

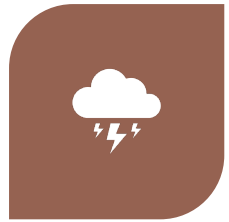
[2]Rankin, M. (2006). Applying Manure to Alfalfa. University of Wisconsin-Madison. https://fyi.extension.wisc.edu/forage/files/2014/01/AlfManureFOF.pdf

Manure Management Considerations

Balance resource efficiencies and overall operational risk

Ground and surface water quality

Local and state regulations



Weather challenges

Storage capacity

Labor, equipment, custom haulers

Potential Rotation Alterations

- In-season application windows to growing crops
  - Winter cereal forage followed by corn silage
  - Sorghum-sudan
  - Italian ryegrass
  - Grass alfalfa mix

Apr	May	June	July	Aug	Sept	Oct
Apr	May	June	July	Aug	Sept	Oct

Agronomics

- Cereal rye vs triticale
- Drilled after silage at 90 to 110 lbs/acre
- Harvested at boot or heading
  - Late May, early June
- Short-season silage
  - Planted after or pre-harvest

Applications

- August/Sept (cereal)
- May/June (silage)

Challenges

- Planting/harvest timing
- Disease bridging
- Insect/slug pressures

Forage

- Yield
  - Cereal - 1 to 4 DM ton/acre
  - Corn silage – reduced 1 to 2 DM ton/A
- Quality
  - Highly dependent on harvest timing
  - Rye - 47 to 56% NDF, 13 to 19% CP

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Cereal Rye/Triticale to Corn Silage

Stute, J., Shelley, K., Mueller, D., and Wood, T. (201X). Planting Winter Rye after Corn Silage: Managing for Forage. https://ipcm.wisc.edu/download/pubsNM/Rye_090507_final.pdf

Sorghum-Sudangrass

Agronomics

- Drilled or planted after winter cereal forage or 1st cut alfalfa at 15 to 20 lbs/acre
- Single cut system harvested Oct/Nov
  - Double cut – July/Aug, Oct when at 30 to 40”
- Photoperiod sensitive varieties tend to be higher yielding

Applications

- May/June
- July/August if harvested

Challenges

- Cool growing season
- Moisture at harvest
  - Wideswath to aid drying
- Prussic acid/nitrates

Forage

- Yield
  - Single cut – 5 to 10 DM tons/acre
  - Double cut – 3 to 6 DM tons/acre
- Quality
  - Lower energy forage, compared to corn silage, more suitable for pregnant heifers
  - Single cut – 55 to 60% NDF, 5 to 7% CP

Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec

Akins, M. (2018). Alternative Forage Options for Dairy Heifers. Forage Focus. https://fyi.extension.wisc.edu/heifermgmt/files/2018/05/Akins-2018-Heifer-forage.pdf

Agronomics

- Drilled early spring at 20 to 30 lbs/acre
- Harvested 14 to 18”
  - 25(ish) day cutting cycle
- Fertility needed

Applications

- May
- July, August, Sept

Challenges

- Weather dependent
- May overwinter

Forage

- Yield
  - 2 to 5 DM tons/A
- Quality
  - Impacted by fertility - 45 to 50% NDF, 15 to 20% CP

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Italian Ryegrass

Alfalfa – Meadow Fescue

Agronomics

- Meadow fescue overseeded at 4 to 6 lbs/acre in August of production year 2
- Harvested 25-to-30-day interval
  - 4 to 5 cut system

Applications

- May – Aug/Sept

Challenges

- Changing forage composition
- Ensiling

Forage

- Yield
  - 8 to 9 DM ton/acre
  - 16 DM ton/A max
- Quality
  - Averages 20% CP, low NDF (dependent on grass %)

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Benefits

- Increase nutrient, labor, equipment, custom hauler efficiencies
- Application options for optimal soil and weather conditions
- Reduction of manure storage pressures
- Forage options for various cow groups
- Spread agronomic, operational and economic risks
- Adapt to emerging regulations

Challenges

- Harvest timings and costs
- Agronomic risks
- Storage options
- Ration development

Crop Rotation Alterations

Questions?

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