Rapid Review:
Winter Crop Discussions Part 2

June 21, 2022

https://hayandforage.com/article-3745-Winter-cereals-offer-value-in-dairy-rations.html

Recognize Dairy Systems

"Winter Crop"

Fall harvest

→ fall manure

→ winter crop

(spring grazing/greenchop/haylage)

→On-farm N cycling

AgWG Updated State Signatory CAST Concerns (as of 08.18.21)

Bottom Line

Winter cover protects from soil and nutrient losses.

Manure application on bare ground is detrimental to water quality.

Bottom Line

How do we INCENTIVIZE winter cover?

AND DISINCENTIVIZE spreading manure on fallow ground?*

*CAST does not distribute manure on fallow acres.

Factors Impacting Winter Management & Accounting

Cost-share Programs	$/ac categories & rules
Existing Regulations & Enforcement	Winter manure application rules
Census of Agriculture	Indicates agricultural land uses @ 5-year intervals
BMP Definitions (Nutrient/Sediment Reduction Credits)	Reduced N efficiencies for manured cover crops
Land Use Loading Rates	Double Crop LU → Relative to corn for grain w/o manure

Proposed Winter Crop

Baseline:
Fallow Ground
+ soil residual N + **manure N**

Proposed BMP:
Winter Crop (on-farm forage/haylage)
+ soil residual N + **manure N**

Phase 6 Cover Crop BMP

Traditional Cover Crop (no harvest*)

- Baseline: **Fallow Ground** + soil residual N + zero applied N
- BMP Option 1: winter cereal/legume mix + soil residual N + **zero applied N**
- BMP Option 2: winter cereal/legume mix + soil residual N + **50 lbs N/ac fall manure (70% of Option 1 Efficiency)**

Commodity Cover Crop (harvest)

- Baseline: **Commodity small grain** + soil residual N + **30 lbs N/ac**
- BMP: Commodity small grain + soil residual N + **zero fall-applied N**

***Can we include dairy forage/feed systems?**

Is “Winter Crop” already represented in CBP Land Uses?

Sector	LoadSource	LoadSourceMinor	LoadSourceDescription
Agriculture	Full Season Soybeans	Row Crops	Soybeans that are not double-cropped
Agriculture	**Double Cropped Land**	Row Crops	Double-cropped land represents areas that have two crops grown on the same acre between January and December. Crops eligible for double-cropping vary by state and may include alfalfa, barley, rye, small grain hay, sorghum for silage, soybeans, triticale, wheat, corn for silage or greenchop, and other haylage, grass silage, and greenchop. No other land use includes double cropping.
Agriculture	**Silage with Manure**	Row Crops	Includes the crops corn and sorghum for silage or greenchop that is **not double-cropped** and receives fertilizer and manure where available
Agriculture	**Small Grains and Grains**	Row Crops	Includes canola, oats, rye, wheat, barley, buckwheat, emmer and spelt, and triticale that is **not double-cropped**
Agriculture	**Grain without Manure**	Row Crops	Includes the crops corn and sorghum for grain that is **not double-cropped** and receives only inorganic fertilizer
Agriculture	**Silage without Manure**	Row Crops	Includes the crops corn and sorghum for silage or greenchop that is **not double-cropped** and receives only inorganic fertilizer
Agriculture	Specialty Crop Low	Row Crops	Includes aquatic plants, orchards, Christmas trees, asparagus, nursery stock, short-rotation woody crops, sunflower seed, berries, peas, lima and snap beans
Agriculture	Other Agronomic Crops	Row Crops	Includes summer fallow, idle cropland, sod, tobacco, cotton, sweet corn, peanuts and dry edible beans
Agriculture	Grain with Manure	Row Crops	Includes the crops corn and sorghum for grain that is not double-cropped and receives inorganic fertilizer and manure where available
Agriculture	Specialty Crop High	Row Crops	Includes bedding/garden plants, cut florist greens, potted plants, mushrooms, other nursery and greenhouse crops, greenhouse vegetables, fruits and vegetables grown outside that are not included in Specialty Crop Low

Pulled from https://cast.chesapeakebay.net/Home/SourceData 5/18/2022

Table 1. Phase 6.0 land uses and their corresponding relative to "corn, grain - no manure" ratios derived from published and unpublished literature (identified by italicized numbers) and from best professional judgment calculations (identified by italicized letters).

Data summary of Relative NO3-N Loading Estimates for Phase 6.0 Land Uses J.J. Meisinger			
	Phase 6.0 Land Uses (italicized numbers are citations, italicized letters are footnotes)	**Avg. ratio (# obs) to Corn, grain - no manure**	**Std. Error Mean**
1	Corn or sorghum, grain - eligible for manure *(1,2,3,10,11)*	1.40 (12)	0.20
2	Corn or sorghum, silage - eligible for manure *(10)*	1.62 (1)	NA
3	Corn or sorghum, grain - no manure *(standard of reference)*	1.00 (NA)	NA
4	Corn or sorghum, silage - no manure [A]	1.16 (NA)	NA
5	Small-grain w/ soybean double-crop - no manure *(9)*	0.79 (2)	0.09
6	Soybean, full-season - no manure *(3,4,5,10)*	0.71 (6)	0.11
7	Small-grain w/ forage establishment - eligible for manure [B]	0.84 (NA)	NA
8	Other agronomic crops (e.g., cotton, tobacco, peanuts) *(15)*	0.45 (1)	NA
9	Pasture, direct deposition - eligible for manure *(12,13,14)*	0.23 (10)	0.05
10	Hay, legume or legume-grass mix *(6,7)*	0.17 (4)	0.02
11	Other hay, (e.g., peren. grass, orch. grass, tall fescue) *(12,13)*	0.24 (4)	0.06
12	Agr. open space (e.g., peren. grass, tall fescue) *(8)*	0.10 (2)	0.01
13	Specialty crops - high input (e.g., potatoes, sweet corn) *(10)*	1.34 (1)	NA
14	Specialty crops - low input (e.g., orchards, beans, peas) [C]	0.31 (NA)	NA

Land class	Land Use	Acres	Loading Rate Ratio	Loading Rate (pounds per acre per year)
Cropland	Double Cropped Land	165,396	0.79	30.87
	Full Season Soybeans	282,456	0.71	27.74
	Grain with Manure	389,811	1.4	54.7
	Grain without Manure: Reference land use	451,318	1.00	39.07
	Other Agronomic Crops	417,838	0.45	17.58
	Silage with Manure	392,156	1.62	63.30
	Silage without Manure	69,204	1.16	45.33
	Small Grains and Grains	291,677	0.84	32.82
	Specialty Crop High	35,525	1.34	52.36
	Specialty Crop Low	125,509	0.31	12.11

[Phase 6 Model Documentation
Chapter 2: Average Loads]

SECTION 2 LAND USE IN 2017

2017 Census of Agriculture

Report how the acres in Box D on the previous page were used.

- For acres used for more than one purpose, report them in the first item that applies.
- Report each acre only once on this page.
- Report acres in CRP, WRP, FWP, and CREP in the most appropriate land use below.

		Mark "X" if None	Number of Acres
1. Cropland			
a. Cropland harvested *INCLUDE* • *land from which field crops were harvested or hay was cut* • *land used for vegetables* • *land used for nursery and greenhouses (rounded to the nearest acre)* • *land used for orchards, vineyards, citrus groves, Christmas trees, short rotation woody crops, fruits, nuts, and berries (bearing and nonbearing)* 0787		☐	
b. Cropland on which all crops failed or were abandoned – Exclude land in orchards and vineyards 0790		☐	
c. Cropland in summer fallow (cultivated cropland on which no crops or hay were harvested during the 2017 growing season). 0791		☐	
d. Cropland idle or used for cover crops or soil-improvement but not harvested and not pastured or grazed. 1062		☐	
2. Pasture			
a. Permanent pasture and rangeland 0796		☐	
b. Woodland pastured. 0794		☐	
c. Other pasture and grazing land (including rotational pasture) that could have been used for crops without additional improvements. 0788		☐	

SECTION 8 HAY AND FORAGE CROPS

1. Were any hay or forage crops cut or harvested from this operation in 2017?

INCLUDE
- *your landlord's share and crops grown under contract*

EXCLUDE
- *crops grown on land rented to others*

1152 1 ☐ **Yes** - Complete this section 3 ☐ **No** - Go to SECTION 9

2. All land from which dry hay, haylage, grass silage, or greenchop was cut or forage was harvested in 2017. Exclude straw, corn silage, and sorghum silage. 1021

Mark "X" if None	Acres Harvested	Acres Irrigated
☐		

3. Report gross value of hay and forage sold from this operation in 2017. Include the value of your landlord's share, marketing charges, taxes, hauling, etc. Exclude dollars for items produced under production contracts 1328

Mark "X" if None	Gross Value of Sales (Dollars)
☐	$ .00

For items 4 through 7, when both dry hay and haylage were cut from the same acres, report acres for each type. If two or more cuttings were made from the same acres, report acres for that item only once, but report total quantity harvested from all cuttings.

	Mark "X" if None	Acres Harvested	Acres Irrigated	Total Tons Harvested		OR	Total Number of Bales	Average Weight per Bale	
4. Alfalfa and alfalfa mixtures for dry hay. . . 0103	☐				Tons, dry	OR			Lbs., dry
5. Haylage or greenchop from alfalfa or alfalfa mixtures 1070	☐				Tons, green				
6. Other dry hay from barley, clover, fescue, lespedeza, oats, rye, timothy, wheat, wild, Bermuda grass, Sudangrass, etc. 4111	☐				Tons, dry	OR			Lbs., dry
7. All other haylage, grass silage, and greenchop. 1073	☐				Tons, green				

SECTION 10 FIELD CROPS

1. Were any field crops, such as corn, soybeans, wheat, etc., harvested from this operation in 2017?

INCLUDE
- *your landlord's share and crops grown under contract*

EXCLUDE
- *crops grown on land rented to others*

1011 1 ☐ **Yes** - Complete this section 3 ☐ **No** - Go to SECTION 11

	Acres Harvested	Acres Irrigated
2. Acres from which field crops were harvested in 2017. Report multiple cropped acreage only once 1780		

3. Fill in the columns below for all field crops harvested from this operation in 2017. Enter the crop name and code from the table below.
- Report production in the units specified next to the crop.
- Include the value of your landlord's share, marketing charges, taxes, hauling, etc.
- Exclude from sales dollars for items produced under production contracts.

Enter Field Crop Name	Enter Code	Acres Harvested	Total Production Harvested	Acres Irrigated	Gross Value of Sales (Dollars)
					$ .00
					$ .00

et of paper.

FIELD CROPS	CODE	FIELD CROPS	CODE
Beans, dry edible - exclude chickpeas and limas (hundredweight)	554	Hops (pounds)	623
Bentgrass seed (pounds)	560	Indian corn (pounds)	695
Bermuda grass seed (pounds)	563	Jojoba (pounds)	626
Birdsfoot trefoil seed (pounds)	566	Kentucky bluegrass seed (pounds)	629
Bromegrass seed (pounds)	569	Lentils (hundredweight)	635
Buckwheat (bushels)	575	Lespedeza seed (pounds)	638
Camelina (pounds)	608	Lima beans, dry (hundredweight)	557
Canola, edible (pounds)	614	Mint, peppermint (pounds of oil)	047
Chickpeas, all (garbanzos) (hundredweight)	2816	Mint, spearmint (pounds of oil)	050
Clover, crimson clover seed (pounds)	593	Mint, tea leaves (pounds)	767
Clover, red clover seed (pounds)	671	Miscanthus (tons)	641
Clover, white clover seed (pounds)	761	Mustard seed (pounds)	650
Corn for grain or seed (bushels)	067	Oats for grain or seed (bushels)	076
Corn for silage or greenchop (tons)	070	Orchardgrass seed (pounds)	653
Cotton, Pima (bales) - include cottonseed in value of sales only	644	Peanuts for nuts (pounds)	656
Cotton, Upland (bales) - include cottonseed in value of sales only	581	Peas, Austrian winter peas (hundredweight)	548
Dill for oil (pounds)	596	Peas, dry edible (hundredweight)	659
Emmer and spelt (bushels)	599	Peas, dry southern/cowpeas (bushels)	584
Fescue seed (pounds)	602	Popcorn (pounds shelled)	662
Flaxseed (bushels)	605	Potatoes - report in SECTION 12	
Guar (pounds)	617	Proso millet for grain or seed (bushels)	665
Herbs, dried (pounds)	620	Rapeseed (pounds)	668
		Rice (hundredweight)	677
		Rye for grain or seed - exclude ryegrass (bushels)	686
		Ryegrass seed (pounds)	689
		Safflower (pounds)	692
		Sesame (pounds)	701
		Sorghum for grain or seed - include milo (bushels)	082
		Sorghum for silage or greenchop - exclude sorghum-sudan crosses (tons)	085
		Sorghum for syrup (gallons)	704
		Soybeans for beans (bushels)	088
		Sudangrass seed (pounds)	713
		Sugarbeets for seed (pounds)	716
		Sugarbeets for sugar (tons)	719
		Sugarcane for seed (tons)	725
		Sugarcane for sugar (tons)	722
		Sunflower seed, non-oil variety (pounds)	776
		Sunflower seed, oil variety (pounds)	773
		Sweet corn for seed (pounds)	740
		Switchgrass (tons)	647
		Timothy seed (pounds)	746
		Tobacco (pounds) - Report to the nearest tenth acre	094
		Triticale for grain (bushels)	749
		Vetch seed (pounds)	755
		Wheat, durum for grain or seed (bushels)	578
		Wheat, other spring for grain or seed (bushels)	728
		Wheat, winter for grain or seed (bushels)	572
		Wheatgrass seed (pounds)	758
		Wild rice (hundredweight)	764
		Other seeds, specify above (pounds)	770
		Other field crop, specify above (pounds)	752

[2017 Census of Agriculture]

Double Crop Land Area Example

Harvested Crop Land Area = 5,000 acres (harvested cropland acres)

Sum of area of all crops = 8,000 acres (sum of crops)

8,000 – 5,000 = 3,000 (area needed to be double cropped)

Crop group 1 (corn, beans) = 2,500 acres

Crop group 2 (winter grains) = 3,000 acres

Double cropped area is 2,500. Adjusted double crop acres because not enough to double crop 1 and 2.

Each crop within its group is apportioned to the 2,500 acres using the original proportions of the crop types

Assign appropriate plant and harvest dates and application timing to those double cropped crops

https://www.chesapeakebay.net/channel_files/40307/agwg_20201013_updated.pdf

What did the Expert Panel Say?

Evidence is compelling that cover crops are a critical tool for reducing N losses due to fall manure applications and the overall impact of cover crops in this setting can be very high and result in large reductions in overall N losses in concentrated dairy producing regions of the CBW. (p.18 Recommendations Report)

Fall manure dairy situation – important enough to be credited in some way. (p.40 Appendix of panel member meeting minutes)

Discussion & What Next?

Are we accounting for forage in the land uses?

- Go to county NASS data & evaluate

How can CBP help states further incentivize winter planting?

- Ag Modeling Team?
- Expert Panel Revision?

Resources:

CAST Issue Tracker (AgWG)

Cover Crop Expert Panel (2016)

Chesapeake Assessment Scenario Tool (CAST)

- Source Data

AgWG CAST-21 Workplan Ad-Hoc Group

- July 2021 Materials (Winter Crop Discussion)

AgWG Charlie White Presentation Jan 2021

- Nitrogen Retention by Cover Crops with Fall Manure Applied

AgWG Ken Staver Presentation Dec 2020

- Review of 2017 Cover Crops Expert Panel

Reference Slides

(Staver) Cover Crops
Dec 2020 AgWG Presentation

Many studies but many gaps. Consistent findings:

• Winter cereals respond to higher soil N, producing more biomass and moving more soil nitrate-N into above-ground biomass as soil N availability increases.

• The reference cover crop used in past panel reports (cereal rye planted at 2 bu/acre) when planted in early or standard planting periods is capable of taking more N out of the soil than is generally available postharvest in summer annual row crop settings.

• Reducing cover crop uptake potential by reducing planting rates, or delaying planting, increases the likelihood that nitrate will be leached out of reach of cover crop roots before uptake can occur.

• Increasing the fall soil nitrate pool by applying manure or inorganic N will increase winter cereal N uptake but also increase the potential for nitrate leaching.

(White) Nitrogen Savaging in Forage Systems Jan 2021 AgWG Presentation

Concluding Thoughts

- Winter cover crop growth is N limited

- When manure is applied in the fall, cover crop growth responds to scavenge the manure N

- Fall manure applications did not increase subsoil NO3 until spring, when leaching rates slow down and summer-planted crops can recover the N in the profile

- Availability of N at soil surface from fall manure applications may have a small effect on reducing cover crop scavenging ability in the subsoil during low N demand periods of cover crop growth (late winter)

- Spring cover crop growth has a high N demand and cleans up the soil profile N equally in manured and non-manured treatments

- Not sure how to handle this in the Bay Model, but please consider whether there is a “double penalty” for the fall manure + cover crop practice

Comments: AgWG Ad Hoc July 2021

Corn silage rotation is high loading (manure applied)

Whether CC is harvested or not- doesn't change anything (tracking N fate)

Winter cover is beneficial

- Harvest potential negates N reduction credit in CAST
- Data collection challenges for winter cover BMPs

Want to encourage winter cover

- N reduction credit will provide incentive

Lingering Questions: AgWG Ad Hoc July 2021

Use BMP we already have in CAST?

- CAST is annualized loads- is this another version of double cropping?

Create a new land use in Phase 7?

Better understanding of dominant dairy rotations?

Process question- modifying Expert Panel definition

- What was the intention of the Cover Crop EP?
- Is this an Expert Panel question or something else? (e.g., land use)