ISSUE: Nutrient Management on Pasture (NY/PA)

NY *- Reconsider nutrient management BMP credit options and/or inorganic fertilizer rates for pasture. Likely requires expert panel support to re-evaluate BMP multipliers/efficiencies.*

PA - *revisit the prohibition of crediting Nutrient Management on pasture / non-cropland acres.*

Per Sept 8 ad hoc discussion:

- *Request for nutrient management on pasture, through creation of a "NM multiplier."*
- *Nutrient spread slopes have created unintended consequences on pasture and hay-land which have a much higher edge of stream load than cropland do.*

Per Oct 9 ad hoc discussion:

- *Add soybean and small grain/soybean (double crop) as "manure-eligible"*
- *States request an adjustment to nutrient spread curves for manure-based on updated understanding of agronomic applications of manure.*

BACKGROUND:

Nutrient Management Practices For Use in Phase 6.0 of the Chesapeake Bay Program Watershed Model

Nutrient Management Multipliers

N Core NM BMP multiplier values for **Other Hay and Pasture were set at 1.00 because the CBP Partnership's modification of the LGU N application recommendations created a uniform and much-reduced N application rate goal for these two agricultural land uses** that included an assumed implementation rate of NM BMPs across the entire CBW. Therefore, the Panel could not apply a N application rate BMP multiplier other than 1.00 to these two land uses.

Land Use	Non NM N Multiplier	NM N Multiplier	Non NM P Multiplier	NM P Multiplier
Full Season Soybeans	**1.2**	**1.0**	1.5	1.0
Grain with Manure	1.3	1.0	3	1.0
Grain without Manure	1.2	1.0	1.5	1.0
Legume Hay	1.2	1.0	1	1.0
Silage with Manure	1.4	1.0	3	1.0
Silage without Manure	1.2	1.0	1.5	1.0
Small Grains and Grains	1.2	1.0	1.5	1.0
Small Grains and Soybeans	1.2	1.0	1.5	1.0
Specialty Crop High	1.3	1.0	2	1.0
Specialty Crop Low	1.2	1.0	2	1.0
Other Agronomic Crops	1.1	1.0	1.5	1.0
Other Hay	1	1.0	1	1.0
Pasture	1	1.0	1	1.0

Nutrient Spread Curves

AgWG DECISION: The AgWG endorsed the recommended changes to nutrient spread curves, size of other cattle, yield goal multipliers, ammonia volatilization values, and double cropping methodology to Scenario Builder as presented by the Agricultural Modeling Subcommittee. (September 7, 2016)

https://cast.chesapeakebay.net/Documentation/ModelDocumentation --> Terrestrial Inputs → 3.4

A fundamental assumption of the Phase 6 Model is that all manure and biosolids estimated to be available to crops in a county must be applied. This means that in counties with high animal populations and little manure transport data, manure and biosolids could be applied above and beyond the organic-eligible goals specified for each crop by the jurisdictions. Likewise, applications could be far lower than the organic-eligible goal in counties with very few animals and low biosolid application**. The Phase 6 Model attempts to simulate all potential cases such as these with a single set of application curves which prioritizes application to higher-commodity crops such as vegetables and corn before applications occur on crops such as pasture, hay and other legumes**. The prioritization curves for manure are shown in Figure 3-8. Rather than creating over a hundred individual curves for all types of crops, the crops were lumped into land use groups.

Figure 3-8 provides a relationship between percent of the crop application goal between different types of agricultural land uses within a given county. The horizontal axis is the percent of crop application goal for grains and specialty crops. The vertical axis is the percent of crop application goal for all land uses. For example, suppose that a county with a manure and biosolids deficit relative to the total crop need has just enough manure to supply 50% of the application goal for grain and specialty crops. The grain and specialty line would specify that they get 50% of their application goal while all other land use groups would receive no manure as they would be at 0% on the vertical axis. As more manure became available, the application to grain and specialty would continue to climb, but applications would also begin, first on non-legume hay and pasture and then legumes. As a county increases the amount of manure relative to the application goal, legumes, pasture, and hay climb faster than grain and specialty such that grain and specialty would only receive 120% of their application goals when there was enough manure for all crops and pasture to receive 120% of their application goals. **Application percentages higher than 120% climb faster for pasture and non-legume hays than for grain and specialty and slower for legumes**.

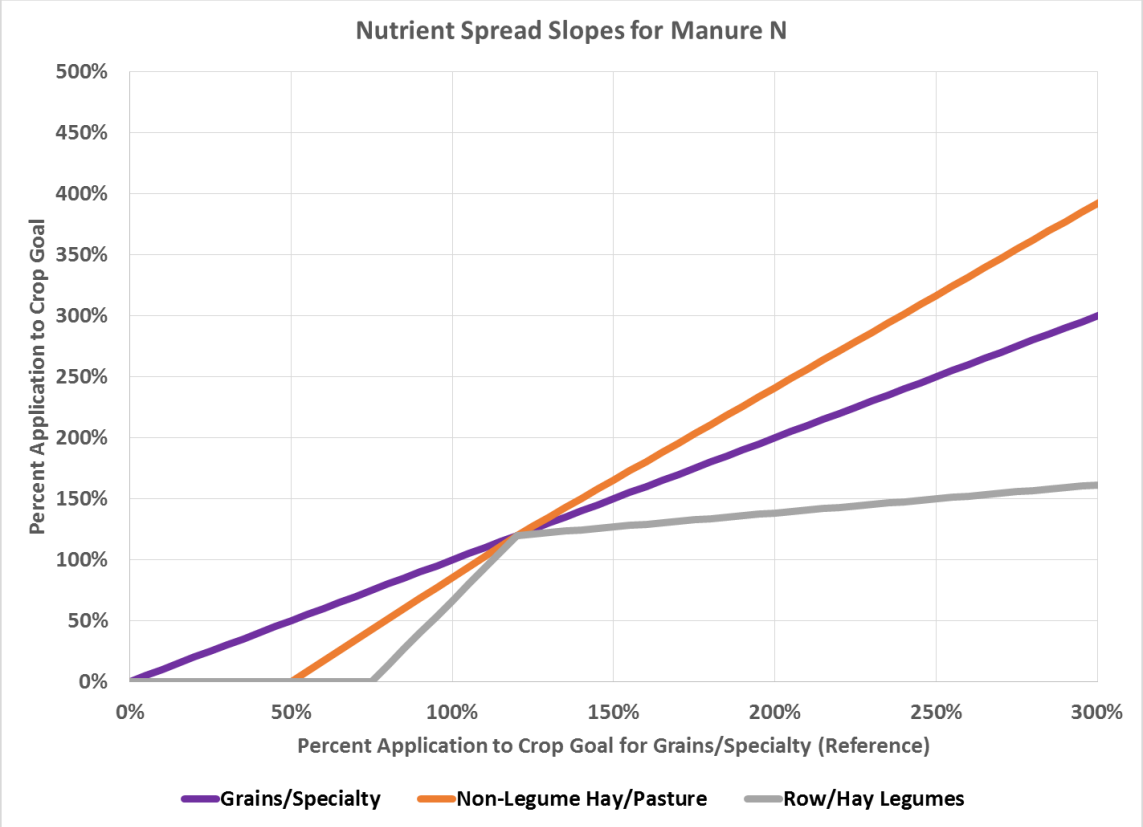

Table 3-15: Land use groups for manure application curves

Curve	Land Use
Grains/Specialty	Grain with Manure
Grains/Specialty	Silage with Manure
Grains/Specialty	Small Grains and Grains
Grains/Specialty	Other Agronomic Crops
Grains/Specialty	Specialty Crop High
Grains/Specialty	Specialty Crop Low
Grains/Specialty	Small Grains and Soybeans
Row/Hay Legumes	Full Season Soybeans
Row/Hay Legumes	Legume hay
Non-Legume Hay/Pasture	Pasture
Non-Legume Hay/Pasture	Other Hay

Adapted from CAST Documentation

Table 2-7: Total nitrogen land use acres, relative rates, and average loading rate

Land class	Land Use	Acres	Loading Rate Ratio	*Average* Loading Rate (lbs/ac/yr)
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
	Small Grains and Grains	291,677	0.84	32.82
Natural	**True Forest: Reference Land Use**	19,550,675	1.00	1.68
Pasture	Ag Open Space	140,316	0.43	5.07
	Legume Hay	728,148	0.74	8.72
	Other Hay	1,294,306	1.04	12.26
	Pasture: Reference Land Use	2,372,549	1.00	11.78

Table 3-32: Uptake or removal per application goal unit

Crop	Nitrogen uptake per yield unit	Phosphorus uptake per yield unit	Application Yield Unit	Estimated from (U)ptake or (R)emoval
Corn for Grain Harvested Area	1.1894	0.2271	bushels	R
Corn for silage or greenchop Harvested Area	11.6252	3.3966	tons	U
Pastureland and rangeland other than cropland and woodland pastured Area	140.5805	22.2666	acres	R
Soybeans for beans Harvested Area	5.3128	0.5442	bushels	R
Wheat for Grain Harvested Area	1.9299	0.3359	bushels	U

Effectiveness Estimates

Nutrient Management is assumed for pasture (1.0 multiplier). Pasture Crop Application Goal (below) is what is applied. A county with excess manure will likely have addition N and P applications on pasture in order to account for the manure's nutrients, should it not be transported out-of-county.

TN: 15 lbs / acre

TP: 4 lbs / acre

Land Use: Pasture

SUGGESTED ACTION:

Facilitate discussions btw AgWG, Modeling WG and/or CAST team on:

- updating "manure-eligible" land uses and subsequent impacts and/or changes for allocation of manure nutrients with the CBWM/CAST
- mechanics and history of nutrient spread slopes and consequences of adjusting them

CHALLENGE:

Estimated manure nutrients in the Bay watershed must be applied somewhere after crop need is met. During development of the Phase 6 CBWM, partners chose the nutrient spread approach above as the best option. This decision was influenced by assumptions regarding on real-world management. Changes may result in unintended consequences. Thorough vetting of this issue is necessary.

LEAD: ?

TIMELINE:

CAST-21 (Sept 2021)

Discussion: Yes

Change: Unlikely, due to CBP partnership-approved mechanics of the Phase 6 CBWM & need for thorough examination of impacts of such changes.

CAST-23 (Sept 2023)
Discussion: Yes
Change: Unlikely, due to CBP partnership-approved mechanics of the Phase 6 CBWM. Depends on thorough examination of impacts of such changes.

Future Watershed Model?
Discussion: Yes, as part of full review of ag inputs & modeling approaches.
Change: Possible

TASK CLUSTER:
BMP Effectiveness

WIP III SNAPSHOT:

Nutrient Application Management Core Nitrogen

State	2019 Progress % Implementation	WIP 2025 % Implementation
DE	70.70%	85.00%
MD	61.70%	63.90%
NY	3.50%	8.10%
PA	10.50%	70.00%
VA	17.70%	39.00%
WV	15.70%	15.90%

Nutrient Application Management Core Phosphorus

State	2019 Progress % Implementation	WIP 2025 % Implementation
DE	70.70%	85.00%
MD	61.70%	63.90%
NY	3.50%	8.10%
PA	4.50%	25.70%
VA	17.70%	39.00%
WV	0	0