

## **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.

## **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.**

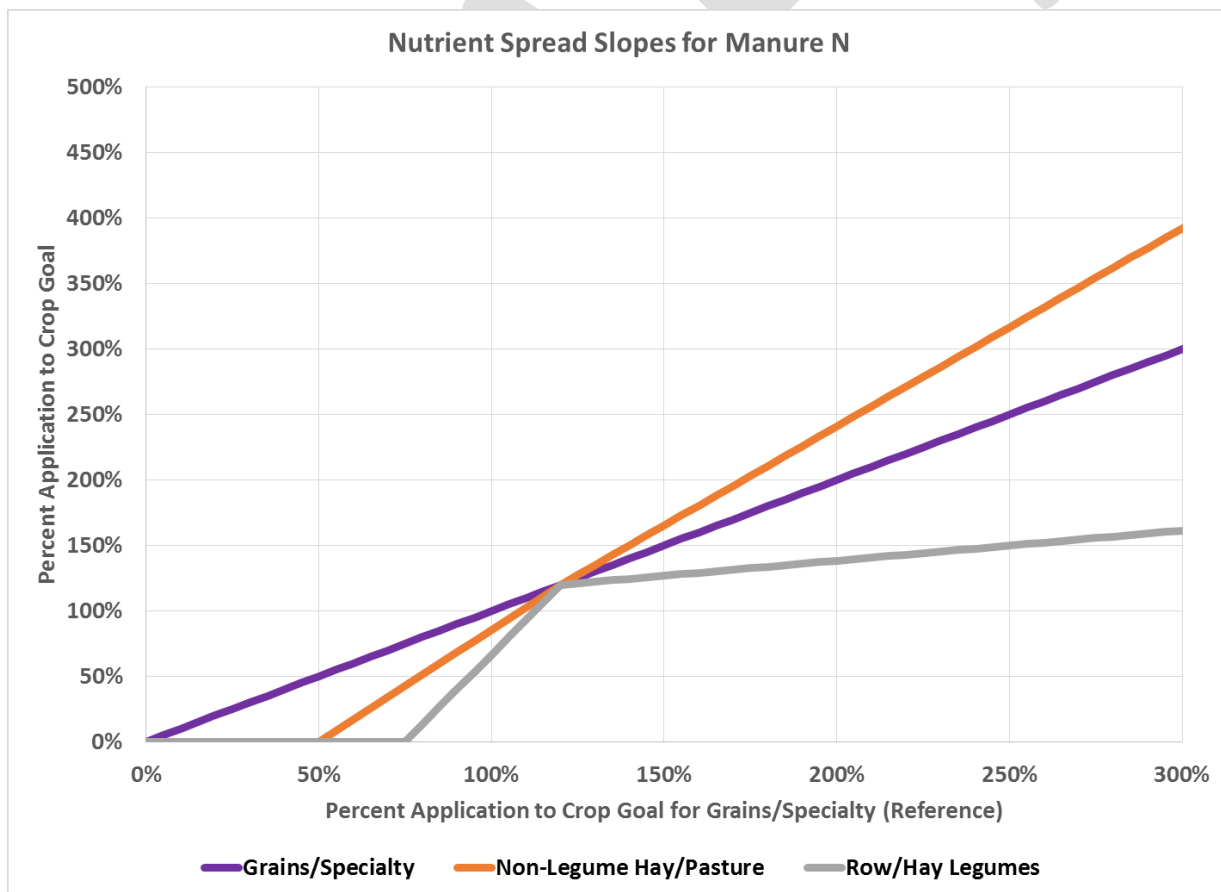


Figure 3-8: Manure nitrogen application curves by crop group

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 | <u>Average Loading Rate</u><br>(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                                       |
|            | <b>Grain without Manure: Reference land use</b> | 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    | <b>True Forest: Reference Land Use</b>          | 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                                      |
|            | <b>Pasture: Reference Land Use</b>              | 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:**

Schedule a review of the impacts of nutrient spread curves on Edge-of-Stream losses with CBPO staff.

**CHALLENGE:**

State concerns overlap with CBP partnership-approved Phase 6 Expert Panel recommendations. Guidance needed from Water Quality GIT.

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 the how manure may be managed when treated as excess (i.e. a waste disposal issue).

**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 & need for 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<br>% Implementation | WIP 2025<br>% 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<br>% Implementation | WIP 2025<br>% 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                            |