Act 38 Nutrient Balance Sheet (NBS) Development; Requirement to Include All Nutrient Sources; and Other Important Issues

1

What Types of Nutrient Balance Sheets (NBS) are there?

- Act 38 (Nutrient and Odor Management Act)
  - Option 1 (P removal)
  - Option 2 (N based)
  - Option 3)P-Index)
- Act 49 (Commercial Manure Hauler and Broker)
  - Same as Act 38
- MMP (Chapter 91)
  - Similar to Act 38, but do not include items like the winter matrix

2

Why Does it Matter ?

- When developing NBS's for exported manure, the NBS must include all sources of organic nutrients that will be applied to the importing operations crop management units (CMUs or fields).
- Planning anything less is misleading, does not provide the operation with an accurate picture of Nutrient Balance, places the operation out of compliance, and may lead to surface or groundwater pollution (The whole reason we develop NBSs in the 1st place)
- Examples of other organic nutrient sources include, but are not limited to, other imported manure types, manure generated by the importer's own animals, food processing residuals and biosolids. The NBSs must also include any commercial fertilizer (starter and other) that the importer utilizes.

3

Questions need to be Asked before Development !

- Planners **MUST** ask importing operations questions such as:
  - What manure is actually planned to be applied?
  - Specifically identify all sources of nutrients that are being used.
    - Manure?
    - Starter?
    - Sidedress?
    - Foliar applications?
    - Biosolids?
    - Food Processing Residual?
    - Etc.
  - Does the operator receive manure from more than one source?
    - Who, What(Manure Type), When(Season Applied), where(Fields applied), how?
    - Is it spread on the same fields as other manures or nutrient sources?
  - Does the importer have their own animals and manure that needs to be included?
    - Do you have animal on your farm?
    - What happens with that manure?
    - Will it be spread on the same fields as imported manure?

4

Act 38 Regulations

- The Nutrient Management Regulations under *§ 83.301 - Excess Manure Utilization Plans* describe that the land application of manure exported from an NMP operation must address the risk and impacts of nitrogen and phosphorous loss to waters.
- It's a regulatory requirement and by not writing an ACCURATE NBS puts both You and the Operation at a risk of compliance and enforcement?
  - Operation = Fine
  - Plan Writer = Loss of Certification

5

Technical Manual Reference

- The guidance provided in Appendix 8 Importer/Broker Agreement and NBSs – Page 2 of the Nutrient Management Technical Manual on this issue is as follows: *"Nutrient Balance Sheets (NBS) required under the Program must follow the standardized NBS form and process provided by the Commission. Supplement 3: Nutrient Balance Sheet User Guide provides the format, calculation process, and accepted figures to use when completing a NBS for an importing operation".* Supplement 3 provides guidance for and examples of developing NBS with multiple manure applications to pasture and cropland.

6

What is Being Seen ?

- An increasing number of NBSs are being developed that do not include all nutrient sources utilized on the importing operation.

- Some common examples seen by reviewers include:
  - NBSs for an importer that imports manure from multiple exporting operations but each individual NBS provided by the exporting operation does not account for the manure from the other source(s)
  - NBSs for exported manure applied to pasture without including the uncollected manure applied by the importers grazing animals.
  - NBSs that do not include starter and/or commercial fertilizer that is applied by the importer.
  - Food Processing Residuals (FPR) imported to a field(s) that receive manure (or several manures) from the importer's own animals.
  -

7

Example NBS (Other Nutrient Sources) (EXCEL)

- How to account for commercial fertilizer (starter or other) in a NBS
- Enter commercial fertilizer in the starter (Other) Fertilizer column

		Crop Information			Crop Removal			Starter Fertilizer			Field Residual and Carryover Nitrogen History	
		Insert Empty Row	ete Active	Copy Selected Rows		Insert Selected						
Crop Group ID	Mehlich 3 Soil Test P - For Option 2 enter maximum Soil Test	Crop	Crop Yield	Crop Yield Units	N lbs/A	P_2O_5 lbs/A	K_2O lbs/A	Starter N lbs/A	Starter P_2O_5 lbs/A	Starter K_2O lbs/A	Residual Manure N	Carryover Legume N
Corn Grain after soybeans		Corn for Grain	250	bu/A	250	100	75	5	10	10	Frequently - Summer Crop	Soybeans, 50 bu/A

Starter or other fertilizer used.
Does not include supplemental fertilizer after manure.

Multiples - when completing multiple manure applications, **any starter or other fertilizer needs to be entered into the first instance of a field only.** All other instances of the multiple should have the starter listed as zero or blank.

8

Example NBS (Other Nutrient Sources) (EXCEL)

- How to account for Other Organic sources in a NBS
- Enter the other organic source as a manure group in a NBS
- Use the manure analyzes results(if available)
- Book Values – Penn State Agronomy Guide Table 1.2-10 or Tech Manual Supplement 1

Clear Manure Group Information	Manure Group Identification	Manure Report Date (most recent)	Laboratory Name	Manure Type	Manure Unit (lbs/ton or 1000 gal)	Total Nitrogen (N) lbs / ton or lbs / 1000 gal	Ammonium N (NH4-N) lbs / ton or lbs / 1000 gal	Total Phosphate (P2O5) lbs / ton or lbs / 1000 gal	Total Potash (K2O) lbs / ton or lbs / 1000 gal	Percent Solids	PSC Value (Enter analytical or book value)	Organic N lbs / ton or lbs / 1000 gal
Clear Manure Group 1	Beef Steer Book Values	Book Values	Penn State Agronomy Guide	Other	lb/ton	14.00	1.00	5.00	8.00	8.00	0.80	13.00
Clear Manure Group 2	Poultry Broiler Litter	2/21/2023	AASL	Poultry	lb/ton	45.30	24.20	37.21	40.60	53.30	0.80	21.10
Clear Manure Group 3	Swine Liquid	3/24/2023	AASL	Swine	lb/1000 gal	14.26	6.75	1.01	11.55	0.88	1.00	7.51

9

Example NBS (Other Nutrient Sources) (EXCEL)

- For situations where NBS's are developed for CMU's that will receive more than one organic nutrient source, they must be treated as multiple applications in the NBS.
- Enter the appropriate information and manure application in the beginning row with the initial multiple application (Mi). Enter the starter or other fertilizer on this row.
- Each additional application of an organic source is completed as a succeeding row in the input sheet and listed as either a middle (M) or final (Mf) manure application.

10

Example NBS (Other Nutrient Sources) (EXCEL)

- **Swine manure generated on Importing Farm(Other Organic Source) with exported Broiler Litter**

Crop Information				Crop Removal			Manure and Application				Balanced Manure Rate			Balance after Manure		
Crop Group ID	Crop	Crop Yield	Crop Yield Units	N lbs/A	P_2O_5 lbs/A	K_2O lbs/A	Manure Group Selection	Planned Application Season	Planned Application Management	Multiple Application	Nitrogen Balanced Manure Rate	Crop Phosphorous Removal Manure Rate	Planned Manure Rate	N Balance	P_2O_5 Balance	K_2O Balance
Corn Grain after Soybeans	Corn for Grain	250	bu/A	250	100	75	Swine Liquid	Spring: 1.2-12	Spring 1.2-12: Incorporated within 5 - 7 days	Mi		89109	6000			
Corn Grain after Soybeans	Corn for Grain	250	bu/A	250	100	75	Poultry Broiler Litter	Spring: 1.2-12	Spring 1.2-12: Incorporated within 5 - 7 days	Mf		2.3	2.0	91	10	-85

11

Option 1 P Removal Option 2 Nitrogen Based Nutrient Balance Sheets	Corn Grain after Soybeans			Corn Grain after Soybeans		
Crop Group Identification						
Fields	F1-5			F1-5		
Acres	25.2			25.2		
NBS Option	Option 1 P Removal			Option 1 P Removal		
Mehlich 3 Soil Test P For Option 2 enter maximum Soil Test For Option 3 enter soil test for PI	ppm P			ppm P		
Crop	Corn for Grain			Corn for Grain		
Planned Yield	250 bu/A			250 bu/A		
Crop Removal Recommendations (lb/A)	N	P2O5	K2O	N	P2O5	K2O
	250	100	75	250	100	75
Soil Test Recommendation (lb/A)						
Other Nutrients Applied (lb/A) (Nutrients applied regardless of manure)	5	10	10			
P Index Application Method						
Double Crop Carry Over N (lb/A)	0			0		
Manure History Description Residual Manure N (lb/A)	20	Frequently - Summer Crop		0	Frequently - Summer Crop	
Legume History Description Residual Legume N (lb/A)	50	Soybeans, 50 bu/A		0	Soybeans, 50 bu/A	
Net Nutrients Required (lb/A)	175	90	65	136	84	-4
Manure Group	Swine Liquid			Poultry Broiler Litter		
Units	lb/1000 gal			lb/ton		
Manure Nutrient Content	N	P2O5	K2O	N	P2O5	K2O
(lbs/ton or 1000 gal)	14.26	1.01	11.55	45.30	37.21	40.60
Application Season: Management (Incorporation, cover crops, etc.)	Spring 1.2-12: Incorporated within 5 - 7 days			Spring 1.2-12: Incorporated within 5 - 7 days		
Availability Factors (Total N or NH4-N & Organic N)	Total N	NH4-N	Org. N	Total N	NH4-N	Org. N
		0.40	0.50		0.40	0.60
P Index Application Method						
N Balanced Manure Rate (ton; gal/A)	27090 gal/A			6.1 tons/A		
P Removal Balance Manure Rate (ton or gal/A; if required by P Index)	89109 gal/A			2.3 tons/A		
	Crop P Removal (lb/A) 90			Crop P Removal (lb/A) 84		
P Index Value						
Planned Manure Rate (ton or gal/A)	6000 gal/A			2 tons/A		
Nutrients Applied at Planned Manure Rate (lb/A)	39	6	69	45	74	81
Nutrient Balance after Manure	136	84	-4	91	10	-85
Supplemental Fertilizer (lb/A)	0	0	0	0	0	0
P Index Application Method						
Final Nutrient Balance (lb/A)				91	10	-85
Multiple Application	Multiple Initial			Multiple Final		

Example NBS (Other Nutrient Sources) (EXCEL)

- **Commercial Fertilizer added as starter other nutrients**
- **Swine manure generated on Importing farm (other organic source)**
- **with exported Broiler Litter**
- **Other organic sources completed as multiple manure applications**

12

Manure Management Plans and Winter Application

- NBSs can be used for nutrient application in an operators Manure Management Plan (MMP). This has been approved by DEP
- Winter manure applications need to be more closely "watched".
- If a MMP operation would like to winter spread manure, they must use Option 3 (P-Index). Winter application was removed from Option 1 (P removal) and Option (2) N Recommendations in the Excel balance sheets.

13

Nutrient Balance Sheets and Pasture

- How do you develop a planned application rate when exporting manure to a pasture.

For example a farmer wants to apply poultry litter to a pasture used by 10 beef finishers.

How to complete a NBS for a pasture with uncollected manure and imported manure using Option 1 P removal or Option 2 N based planning.

Step 1 – <u>Talk to the importing farmer and get the grazing and field particulars.</u>

- Collect the following information
- Animal using the pasture. Animal weight or ages.
- Grazing Information. When the animals are on pasture (months of the year, days and hours per day)
- Field information, soil test, crop, streams, etc.
- Imported manure information (analyses results)

14

Nutrient Balance Sheets and Pastures

Create a Nutrient Balance Sheet for imported poultry litter applied to a pasture

Example: A farmer wants to import poultry litter in late fall at a rate of at least 2 ton/A to a pasture. The 10 acre pasture has other sources of nutrients including uncollected manure from grazing beef animals. The animals include 10 steers grazing for 240 days during the year. They have free access to a pasture and are fed in the barn with water tank available in southwest corner of pasture. No surface water, ground water, or wells within setback restrictions. The pasture is mixed grasses and with an estimated 3 ton/ Acre yield. The farmer applies 3 - 50 lb. bags / acre of triple 15 fertilizer in the spring.

(This is the information you need to glean from the farmer)

Calculate how much uncollected steer manure is applied and how much poultry litter can be applied.

15

Nutrient Balance Sheets and Pastures

Field Information

Field Size	10 Acres
Crop	Established Pasture - Grass Hay (No Legume)
Distance to water	None within setbacks (setback for mechanically applied manure only)
Soil Test Info.	Yes P_2O_5 – 22 PPM K_20 – 52 ppm (Will try Option 1 P removal NBS as a teachable moment)

Other Fertilizer applied 3 bags(50 lb.) 15-15-15 per acre

$$\frac{3\ bags\ fertilizer}{Acre} \times \frac{50\ lbs\ fertilizer}{1\ bag} \times \frac{0.15\ lbs\ N}{1\ lb\ Fertilizer} = \frac{22.5\ lbs\ N}{Acre} = \frac{23\ lbs\ N}{Acre}$$

$$150\ lbs\ fertilizer \times \frac{0.15\ lbs\ P_2O_5}{1\ lb\ Fertilizer} = \frac{22.5\ lbs\ P_2O_5}{Acre} = \frac{23\ lbs\ P_2O_5}{Acre}$$

$$150\ lbs\ fertilizer \times \frac{0.15\ lbs\ K_2O}{1\ lb\ Fertilizer} = \frac{22.5\ lbs\ K_2O}{Acre} = \frac{23\ lbs\ K_2O}{Acre}$$

16

Nutrient Balance Sheets and Pastures

Grazing Information

Days on pasture 240 days
Hrs. Day on pasture 18 hours
Animals have free access to pasture (Fed in barn. Water available in pasture)

Where animals have unrestricted access to a pasture and barn use the following guidelines:
Fed in barn and water available in the pasture 18 hours / day on pasture
Fed and watered in barn 12 hours / day on pasture.

17

Nutrient Balance Sheets and Pastures

To determine:
Animal Weights

Use farm records or Agronomy Facts 54
Tech Manual Supplement 5

Species: Beef Steers – Finishers
Weight: 950 lbs.

Table 1. Standard animal weights used to calculate animal equivalent units to identify concentrated animal operations.

TYPE OF ANIMAL	STANDARD WEIGHT (LB) DURING PRODUCTION (RANGE)
Dairy, Holstein/Brown Swiss	
Calf: 0–1 year	420 (90–750)
Heifer: 1–2 years	1,000 (750–1,250)
Cow	1,450
Bull	1,700
Dairy, Guernsey/Ayrshire	
Calf: 0–1 year	350 (70–630)
Heifer: 1–2 years	865 (630–1,100)
Cow	1,200
Bull	1,600
Dairy, Jersey	
Calf: 0–1 year	275 (50–500)
Heifer: 1–2 years	675 (500–850)
Cow	1,000
Bull	1,200
Beef	
Calf: 0–8 months	300 (100–500)
Replacement heifer: 8 months to 1 year	500 (300–700)
Finishing: 8–24 months	950 (500–1,400)
Replacement heifer: 1–2 years	875 (700–1,050)
Bull	1,500
Cow	1,400
Backgrounding cattle	500 (300–700)

TYPE OF ANIMAL	STANDARD WEIGHT (LB) DURING PRODUCTION (RANGE)
Poultry, Turkey	
Tom brooder: 0–6 weeks	3.36 (0.22–6.5)
Hen brooder: 0–6 weeks	2.74 (0.22–5.25)
Hen regular: 6–12 weeks	11.13 (5.25–17)
Hen heavy: 6–16 weeks	14.63 (5.25–24)
Tom: 6–18 weeks	25.25 (6.5–44)
Poultry, Duck	
Starter: 0–17 days	1.36 (0.22–2.5)
Finisher: 17–38 days	4.88 (2.5–7.25)
Developer: 0–196 days	3.21 (0.22–6.2)
Layer	6.85 (6.2–7.5)
Poultry, Game Birds	
Guinea, growing: 0–14 weeks	1.91 (0.06–3.75)
Guinea, mature	3.75
Pheasant, growing: 0–13 weeks	1.53 (0.05–3.0)
Pheasant, mature	3.0
Chukar, growing: 0–13 weeks	0.52 (0.04–1.0)
Chukar, mature	1.0
Quail, growing: 0–13 weeks	0.26 (0.02–0.5)
Quail, mature	0.5
Swine	
Nursery pig	35 (13–57)
Wean to finish	143 (13–273)

18

Nutrient Balance Sheets and Pastures

To determine
Manure Production & Nutrient Values

PSU Agronomy Guide Table 1.2-10
Tech Manual Supplement 1)

Table 1.2-10. Typical Pennsylvania average daily production and total nutrient content of manure.

Animal Type	Daily Production	Manure Percent Dry Matter	Analysis Units	Ammonium Nitrogen (NH_4^+)	Organic Nitrogen	P_2O_5	K_2O
Beef							
Cow, solid	90 lb/AU/day	12	lb/ton	1	10	7	10
Cow, liquid	11 gal/AU/day		lb/1,000 gal	10	22	16	27
Calf	106 lb/AU/day	12	lb/ton	2	9	7	10
Finishing cattle, solid	49 lb/AU/day	8	lb/ton	1	13	5	8

19

Nutrient Balance Sheets and Pastures

Determine amount of uncollected manure generated during the year:
Uncollected manure generated by ten steers grazing for 18 hours per day for 240 days

$$10 \text{ steers} \times \frac{950\ lbs}{steer} \times \frac{1\ AU}{1{,}000\ lbs} \times \frac{49\ lbs\ manure}{AU/day} \times 240\ days \times \frac{18\ hrs}{24\ hrs} \times \frac{1\ ton}{2000\ lbs} = 41.9\ tons\ manure$$

Determine amount uncollected manure application rate (tons /A)
Uncollected manure application rate = tons uncollected beef manure ÷ field acres

$$\frac{41.9\ tons\ uncollected\ beef\ manure}{10\ Acres} = 4.19\ tons/Acre$$

Now we can complete the Nutrient Balance Sheet

20

Nutrient Balance Sheets and Pastures

Create a manure group in the NBS for the uncollected manure and imported manure
Beef Steer Book Values – PSU Agronomy Guide Table 1.2-10 Tech Manual Supplement 1
Imported Poultry Litter – Manure Analysis (or Possibly Book Values)

Clear Manure Group Information	Manure Group Identification	Manure Report Date (most recent)	Laboratory Name	Manure Type	Manure Unit (lbs/ton or 1000 gal)	Total Nitrogen (N) lbs / ton or lbs / 1000 gal	Ammonium N (NH4-N) lbs / ton or lbs / 1000 gal	Total Phosphate (P2O5) lbs / ton or lbs / 1000 gal	Total Potash (K2O) lbs / ton or lbs / 1000 gal	Percent Solids	PSC Value (Enter analytical or book value)	Organic N lbs / ton or lbs / 1000 gal
Clear Manure Group 1	Beef Steer Book Values	Book Values	Penn State Agronomy Guide	Other	lb/ton	14.00	1.00	5.00	8.00	8.00	0.80	13.00
Clear Manure Group 2	Poultry Broiler Litter	2/21/2023	AASL	Poultry	lb/ton	45.30	24.20	37.21	40.60	53.30	0.80	21.10

21

Nutrient Balance Sheets and Pastures

Each manure application is completed as separate row in the input sheet

The Crop Group ID **must be identical for multiple manure applications to work**
Check the Crop Group Id Count column. Exact field IDs will end in 1. .2 for each replicate

Go to Index | Insert Empty Row | Copy Row Down | Delete Active Row | Copy Selected Rows | Insert Selected Rows

Crop Group ID	Crop Group Id Count	Fields in Group	Acres	Manure Plan Option	Mehlich 3 Soil Test P - For Option 2 enter maximum Soil Test	Crop	Crop Yield	Crop Yield Units	Crop Removal N lbs/A	Crop Removal P_2O_5 lbs/A	Crop Removal K_2O lbs/A	Starter Fertilizer Starter N lbs/A	Starter Fertilizer Starter P_2O_5 lbs/A	Starter Fertilizer Starter K_2O lbs/A	Field Residual and Carryover Nitrogen History: Residual Manure N	Field Residual and Carryover Nitrogen History: Carryover Legume N
Pasture Grazing/Fall Poultry Option 1 P Removal	Pasture Grazing/Fall Poultry Option 1 P Removal.1	P1	10	Option 1 P Removal		Established Pasture (without legume)	3	ton/A	150	45	120	0	0	0	Continuously - Summer Crop	Legume N credit does not apply to this crop
Pasture Grazing/Fall Poultry Option 1 P Removal	Pasture Grazing/Fall Poultry Option 1 P Removal.2	P1	10	Option 1 P Removal		Established Pasture (without legume)	3	ton/A	150	45	120	0	0	0	Continuously - Summer Crop	Legume N credit does not apply to this crop

22

Nutrient Balance Sheets and Pastures

Option 1 P removal completed information

Note: Manure application rates won't likely allow applying imported poultry manure. The application rate will be very low.

Insert Empty

Crop P removal rate Exceeded

Crop Group ID	Manure and Application				Balanced Manure Rate		
	Manure Group Selection	Planned Application Season	Planned Application Management	Multiple Application	Nitrogen Balanced Manure Rate	Crop Phosphorous Removal Manure Rate	Planned Manure Rate
Pasture Grazing/Fall Poultry Option 1 P Removal	Beef Steer Book Values	Grazing	Grazing anytime with nutrient uptake during growing season	Mi		4.4	4.19
Pasture Grazing/Fall Poultry Option 1 P Removal	Poultry Broiler Litter	Late Fall: 1.2-12	Late Fall 1.2-12: Spring grass hay, small grains or Summer corn, annuals with green manure cover crop	Mf		0	2

23

Nutrient Balance Sheets and Pastures

Crop P removal rate exceeded

Option 1 P removal
Can't have negative P_2O_5 balance after manure

Option 1 P Removal Option 2 Nitrogen Based Nutrient Balance Sheets	Pasture Grazing/Fall Poultry Option 1 P Removal			Pasture Grazing/Fall Poultry Option 1 P Removal		
Crop Group Identification						
Fields	P1			P1		
Acres (Go to Index)	10			10		
NBS Option	Option 1 P Removal			Option 1 P Removal		
Mehlich 3 Soil Test P For Option 2 enter maximum Soil Test For Option 3 enter soil test for PI	ppm P			ppm P		
Crop	Established Pasture (without legume)			Established Pasture (without legume)		
Planned Yield	3 ton/A			3 ton/A		
Crop Removal Recommendations (lb/A)	N	P2O5	K2O	N	P2O5	K2O
	150	45	120	150	45	120
Soil Test Recommendation (lb/A)						
Other Nutrients Applied (lb/A) (Nutrients applied regardless of manure)	23	23	23			
P Index Application Method						
Double Crop Carry Over N (lb/A)	0			0		
Manure History Description Residual Manure N (lb/A)	35	Continuously - Summer Crop		0	Continuously - Summer Crop	
Legume History Description Residual Legume N (lb/A)	0	Legume N credit does not apply to this crop		0	Legume N credit does not apply to this crop	
Net Nutrients Required (lb/A)	92	22	97	80	1	63
Manure Group	Beef Steer Book Values			Poultry Broiler Litter		
Units	lb/ton			lb/ton		
Manure Nutrient Content (lbs/ton or 1000 gal)	N	P2O5	K20	N	P2O5	K20
	14.00	5.00	8.00	45.30	37.21	40.60
Application Season: Management (Incorporation, cover crops, etc.)	Grazing anytime with nutrient uptake during growing season			Late Fall 1.2-12: Spring grass hay, small grains or Summer corn, annuals with green manure cover crop		
Availability Factors (Total N or NH4-N & Organic N)	Total N	NH4-N	Org. N	Total N	NH4-N	Org. N
	0.20				0.60	0.60
P Index Application Method						
N Balanced Manure Rate (ton; gal/A)	32.9 tons/A			2.9 tons/A		
P Removal Balance Manure Rate (ton or gal/A; If required by P Index)	4.4 tons/A			0 tons/A		
	Crop P Removal (lb/A) 22			Crop P Removal (lb/A) 1		
P Index Value						
Planned Manure Rate (ton or gal/A)	4.19 tons/A			2 tons/A		
Nutrients Applied at Planned Manure Rate (lb/A)	12	21	34	54	74	81
Nutrient Balance after Manure	80	1	63	26	-73	-18
Supplemental Fertilizer (lb/A)	0	0	0	0	0	0
P Index Application Method						
Final Nutrient Balance (lb/A)				26	-73	-18
Multiple Application	Multiple Initial			Multiple Final		

24

Nutrient Balance Sheets and Pastures

Option 1 P removal with <u>Other Fertilizer removed</u>

Crop P removal rate still exceeded with 150 lbs. 15-15-15 removed

Crop Group ID	Starter Fertilizer: Starter N lbs/A	Starter P_2O_5 lbs/A	Starter K_2O lbs/A	Manure and Application: Manure Group Selection	Planned Application Season	Planned Application Management	Multiple Application	Balanced Manure Rate: Nitrogen Balanced Manure Rate	Crop Phosphorous Removal Manure Rate	Planned Manure Rate
Pasture Grazing/Fall Poultry Option 1 P Removal Other Fertilizer removed	0	0	0	Beef Steer Book Values	Grazing	Grazing anytime with nutrien uptake during growing season	Mi		9	4.19
Pasture Grazing/Fall Poultry Option 1 P Removal Other Fertilizer removed				Poultry Broiler Litter	Late Fall: 1.2-12	Late Fall 1.2-12: Spring grass hay, small grains or Summer corn, annuals with green manure cover crop	Mf		0.6	2

25

Nutrient Balance Sheets and Pastures

<u>Encourage importing farms to get a soil test. Option 2 N based planning can be used</u>

Note: A soil test (with a soil test P of less than 200 ppm) will allow N based planning.

Use Penn State AASL Soil Fertility Recommendations

Example: Pasture 1 Soil Test Results: P_2O_5 - 22 PPM K_20 – 52 ppm

ESTABLISHED PASTURE (WITHOUT LEGUME) Crop Code: 1081

Nitrogen Recommendation (lb N/A):

Yield Goal (T/A) 2	3	4	5	6
100	150	200	250	300

Phosphorus Recommendation (lb P2O5/A):
(Optimum soil test P: 30 - 50 ppm)

Soil test P (ppm)	Yield Goal (T/A) 2	3	4	5	6
0	160	170	180	190	200
5	140	150	160	170	180
10	120	130	140	150	160
15	100	110	120	130	150
20	70	90	100	110	130
25	50	70	80	90	110

Potassium Recommendation (lb K2O/A):
(Optimum soil test K: 100 - 200 ppm)

Soil test K (ppm)	Yield Goal (T/A) 2	3	4	5	6
0	140	180	220	260	300
10	130	170	210	250	290
20	130	170	210	250	290
30	120	160	200	240	280
40	120	160	200	240	280
50	110	150	190	230	270
60	100	140	180	220	260

26

Nutrient Balance Sheets and Pastures

Option 2 Nitrogen Based Planning

- **Select Option 2 Nitrogen Requirement for Manure Plan Option**
- **Enter the Soil Test P value in ppm (Mehlich 3)**
- **Enter the Soil Test Recommendations**

Go to Index | Insert Empty Row | Copy Row Down | Delete Active | Copy Selected Rows | Insert Selected

Crop Group ID	Fields in Group	Acres	Manure Plan Option	Mehlich 3 Soil Test P - For Option 2 enter maximum Soil Test	Crop	Crop Yield	Crop Yield Units	N lbs/A	P_2O_5 lbs/A	K_2O lbs/A	Soil Test Recs User N lbs/A	Soil Test Recs User P_2O_5 lbs/A	Soil Test Recs User K_2O lbs/A	Starter N lbs/A	Starter P_2O_5 lbs/A	Starter K_2O lbs/A
Pasture Grazing/Fall Poultry Option 2 N Based	P1	10	Option 2 Nitrogen Requirement	22	Established Pasture (without legume)	3	ton/A	150	45	120	150	70	140	0	0	0
Pasture Grazing/Fall Poultry Option 2 N Based	P1	10	Option 2 Nitrogen Requirement	22	Established Pasture (without legume)	3	ton/A	150	45	120	150	70	140	0	0	0

27

Nutrient Balance Sheets and Pastures

Option 2 Nitrogen Based Planning

- **The nitrogen balanced manure application rate will be displayed**
- **Cannot exceed the N based manure application rates**
- **3 ton/A poultry litter could be applied in this example**
- **Supplemental fertilizer after manure (N – P – K) completed in the final multiple**

Go to | Insert Empty

Crop Group ID	Manure Group Selection	Planned Application Season	Planned Application Management	Multiple Application	Nitrogen Balanced Manure Rate	Crop Phosphorous Removal Manure Rate	Planned Manure Rate	N Balance	P_2O_5 Balance	K_2O Balance	Suppl. N	Suppl. P2O5	Suppl. K2O	Final Nitrogen Balance	Final P2O5 Balance	Final K2O Balance
Pasture Grazing/Fall Poultry Option 2 N Based	Beef Steer Book Values	Grazing	Grazing anytime with nutrient uptake during growing season	Mi	35.7	6	4.19									
Pasture Grazing/Fall Poultry Option 2 N Based	Poultry Broiler Litter	Late Fall: 1.2-12	Late Fall 1.2-12: Spring grass hay, small grains or Summer corn, annuals with green manure cover crop	Mf	3.2	0.2	2.0	34	-40	10	34	0	10	0	-40	0

28

Nutrient Balance Sheets and Pastures

Remember to include applicable Field notes

There are **four scenarios** that require notes to be included in the Nutrient Balance Sheet Summary Notes table.

- **Crop Removal Recommendation Basis –** Use the following note: "Nutrient balances in Row M for P_2O_5 and K_2O are based on crop removal (Row A) and should not be used to determine additional fertilizer needs."
- **Manure Applied to Pastures –** If uncollected manure is accounted for Row C – Other Organic Sources Applied, the following information should be included in the Nutrient Balance Sheet Summary Notes table: animal group(s) using the pasture; number of animals in each animal group; grazing season length; amount of hours/day animals are planned to spend on the pasture; and the location of feed and water in grazing scenarios where animals have unrestricted access to both a barn and/or lot where manure is collected and a pasture.
- **9,000 Gallon Rate Limit –** Explanation of how planned manure application rates that exceed a total of 9,000 gallons will be handled including a note that adequate drying time occur between the separate applications.
- **Winter Manure Application –** see notes below

The **NBS summary notes** should also be utilized to assist the operator in implementing the planned NBS. Examples of such notes would include:

1. For the application of other organic sources, the notes must include the type of material and the application rate.

Pennsylvania Act 38/Nutrient Management Program/Technical Manual
October 2021
Appendix 8 Importer/Broker Agreement and NBSs – Page 9

111

29

Nutrient Balance Sheets and Pastures

- **Remember to enter applicable Field notes in the Input Page**

Go to / Insert Empty	Balanced Manure Rate			Balance after Manure			Supplemental Fertilizer			Final Nutrient Balance			User Note - Enter notes directly for each Crop Group here. Note that are repeated can be copied from one CMU and pasted in another.
Crop Group ID	Nitrogen Balanced Manure Rate	Crop Phosphorous Removal Manure Rate	Planned Manure Rate	N Balance	P_2O_5 Balance	K_2O Balance	Suppl. N	Suppl. P2O5	Suppl. K2O	Final Nitrogen Balance	Final P2O5 Balance	Final K2O Balance	Field Notes
Pasture Grazing/Fall Poultry Option 2 N Based	35.7	6	4.19										Grazing includes 10 beef steers on pasture 18 hours / day for 240 days from April to November. Cattle have free access to pasture.
Pasture Grazing/Fall Poultry Option 2 N Based	3.2	0.2	2.0	34	-40	10	34	0	10	0	-40	0	

30

Nutrient Balance Sheets and Pastures

Option 1 P Removal Option 2 Nitrogen Based Nutrient Balance Sheets	Pasture Grazing/Fall Poultry Option 2 N Based			Pasture Grazing/Fall Poultry Option 2 N Based		
Crop Group Identification						
Fields	P1			P1		
Acres (Go to Index)	10			10		
NBS Option	Option 2 Nitrogen Requirement			Option 2 Nitrogen Requirement		
Mehlich 3 Soil Test P For Option 2 enter maximum Soil Test For Option 3 enter soil test for PI	ppm P 22			ppm P 22		
Crop	Established Pasture (without legume)			Established Pasture (without legume)		
Planned Yield	3 ton/A			3 ton/A		
Crop Removal Recommendations (lb/A)	N 150	P2O5 45	K2O 120	N 150	P2O5 45	K2O 120
Soil Test Recommendation (lb/A)	150	70	140	150	70	140
Other Nutrients Applied (lb/A) (Nutrients applied regardless of manure)	23	23	23			
P Index Application Method						
Double Crop Carry Over N (lb/A)	0			0		
Manure History Description Residual Manure N (lb/A)	35	Continuously - Summer Crop		0	Continuously - Summer Crop	
Legume History Description Residual Legume N (lb/A)	0	Legume N credit does not apply to this crop		0	Legume N credit does not apply to this crop	
Net Nutrients Required (lb/A)	92	47	117	80	26	83
Manure Group	Beef Steer Book Values			Poultry Broiler Litter		
Units	lb/ton			lb/ton		
Manure Nutrient Content (lbs/ton or 1000 gal)	N 14.00	P2O5 5.00	K2O 8.00	N 45.30	P2O5 37.21	K20 40.60
Application Season: Management (Incorporation, cover crops, etc.)	Grazing anytime with nutrient uptake during growing season			Late Fall 1.2-12: Spring grass hay, small grains or Summer corn, annuals with green manure cover crop		
Availability Factors (Total N or NH4-N & Organic N)	Total N 0.20	NH4-N	Org. N	Total N	NH4-N 0.60	Org. N 0.60
P Index Application Method						
N Balanced Manure Rate (ton; gal/A)	32.9 tons/A			2.9 tons/A		
P Removal Balance Manure Rate (ton or gal/A; If required by P Index)	4.4 tons/A Crop P Removal (lb/A) 22			0 tons/A Crop P Removal (lb/A) 1		
P Index Value						
Planned Manure Rate (ton or gal/A)	4.19 tons/A			2 tons/A		
Nutrients Applied at Planned Manure Rate (lb/A)	12	21	34	54	74	81
Nutrient Balance after Manure	80	26	83	26	-48	2
Supplemental Fertilizer (lb/A)	0	0	0	26	0	25
P Index Application Method						
Final Nutrient Balance (lb/A)				0	-48	-23
Multiple Application	Multiple Initial			Multiple Final		

Option 2 Nitrogen based planning will likely work for importing manure to pastures.

Note: Nutrient Balance after Manure is carried forward to Net Nutrients Required for multiple manure applications.

Supplemental fertilizer after manure (N – P – K) completed in the final multiple when soil test recommendations are used.

31

Nutrient Balance Sheets and Pastures

Nutrient Balance Sheet Summary

Importing Farm:

Whole Farm Note:

Group P Index Fields

Create / Update NBS Summary

Fall manure applications require at least 25% cover unless the crop management unit is planted to a cover crop in time to allow for appropriate growth to control runoff until the next growing season, or the manure is injected or mechanically incorporated within 5 days using minimal soil disturbance techniques consistent with no-till farming practices.

Crop Group	Fields	Acres	Crop	Manure Group	Application Season	Application Management	Multiple Designation	Planned Manure Rate[1]		Starter/Other Fertilizer (lb/A) N	P_2O_5	K_2O	Supplemental Fertilizer (lb/A) N	P_2O_5	K_2O	Nutrient Balance (lb/A)[2] N	P_2O_5	K_2O	Notes
Pasture Grazing/Fall Poultry Option 2 N Based	P1	10	Established Pasture (without legume)	Beef Steer Book Values	Grazing	Grazing anytime with nutrient uptake during growing season	Mi	Grazing	See Notes	15	15	15							Grazing includes 10 beef steers on pasture 18 hours / day for 240 days from April to November. Cattle have free access to pasture.
Pasture Grazing/Fall Poultry Option 2 N Based	P1	10	Established Pasture (without legume)	Poultry Broiler Litter	Late Fall: 1.2-12	Late Fall 1.2-12: Spring grass hay, small grains or Summer corn, annuals with green manure cover crop	Mf	2	Tons/A				34	0	10	0	-40	0	

32

How are Food Processing Residuals Handled?

- Food Processing Residuals (FPRs) are under the authority of DEPs Bureau of Waste. FPRs must be applied according to DEPs Food Processing Residual Manual. The SCC will assist as our authority allows but the take home is "this does not fall under our programs, and you have to contact DEP".
- The SCC has worked with DEP to develop a guidance document (Supplement to Nutrient management Technical Manual) for when FPR and manure are comingled.
- This supplement is intended to provide guidance for operators that utilize food processing waste and/or sewage sludge as a nutrient source or soil amendment for agronomic purposes. It discusses the statutory and regulatory requirements for the land application of these materials when used alone and when mixed with manure. These requirements include coverage under general permits for municipal and residual waste.

33

Setback Guidance Document

- 2016 document titled **A Comparison of Land Application Setback Requirements for Various Regulatory Programs in PA**
- Includes all sensitive areas that may be encountered and the setbacks for the following programs:
  - NMP
  - NBS
  - MMP
  - Biosolids
  - Food Processing Residual

34

Conclusion

- In conclusion, NBS development must take into consideration all sources of nutrients that may be utilized on the importing operations fields. When more than one type of organic nutrient source (manure, biosolids, etc.) will be applied to any importing field, it must be planned as a multiple application in the NBS.

35