AMT Office Hours Manure and Loading Rates

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1/12/24

Two topics this Month

- Manure
  - How is it calculated?
  - How are manure eligible acres determined?
- Loading rates and ratios
  - What are they?
  - How were they determined?
  - Why do they matter?

Manure: Section 3.2

Animal populations are needed

- Five Year Census of Agriculture
  - cattle, dairy, sheep, goats, swine, pullets, and layers
- USDA-NASS Poultry Production and Value Surveys
  - broilers and turkeys

Manure is generated from the number of animals

- Lbs Dry Manure/animal/Year
- Lbs Dry litter/animal/Year

Pounds of manure or litter are converted to pounds of nutrient

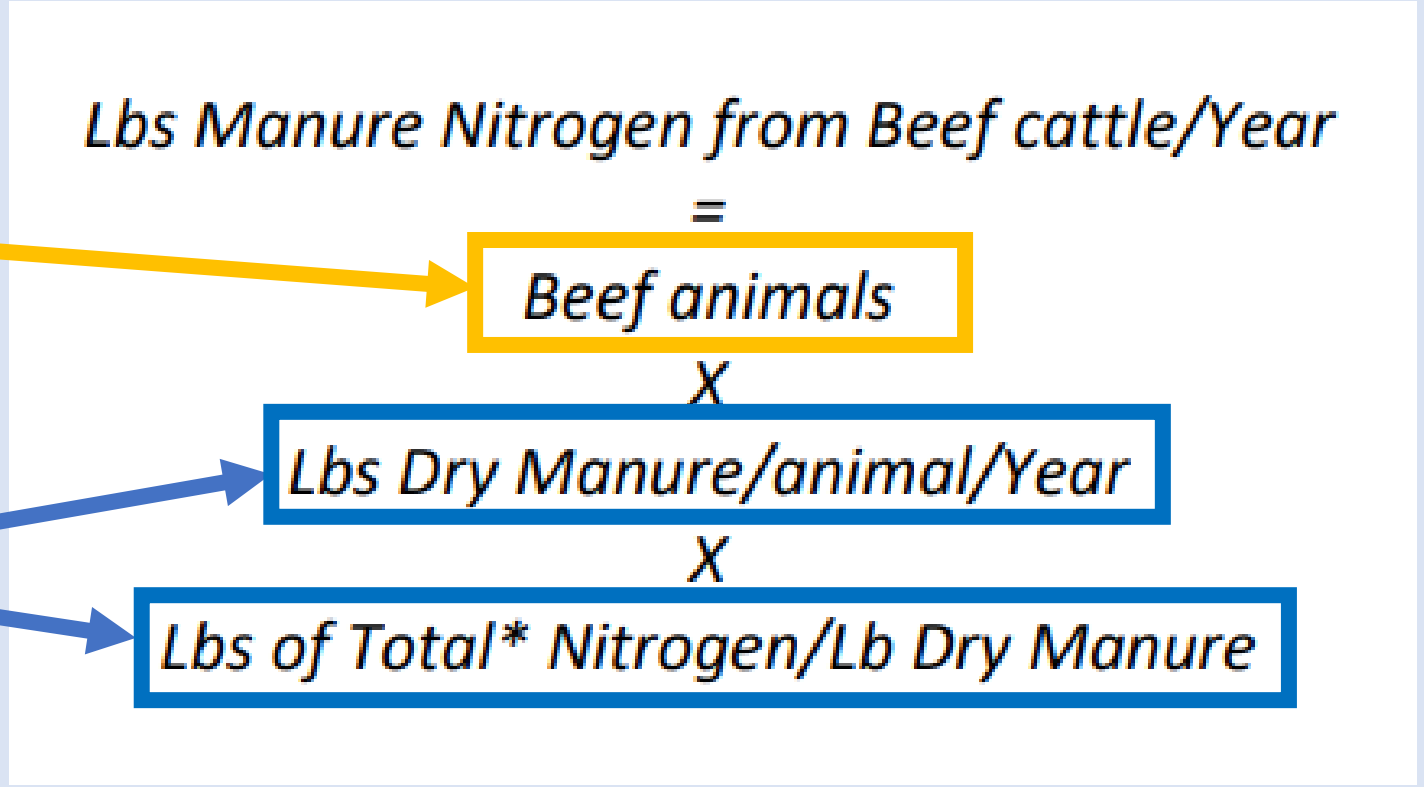
- Book values
  - ASABE 2005
- Expert panels
  - Swine
  - Poultry

Walkthrough example:

- The total amount of manure is based on animals:

Population data (USDA, or expert study)

Expert panel or ASABE 2005



Walkthrough example:

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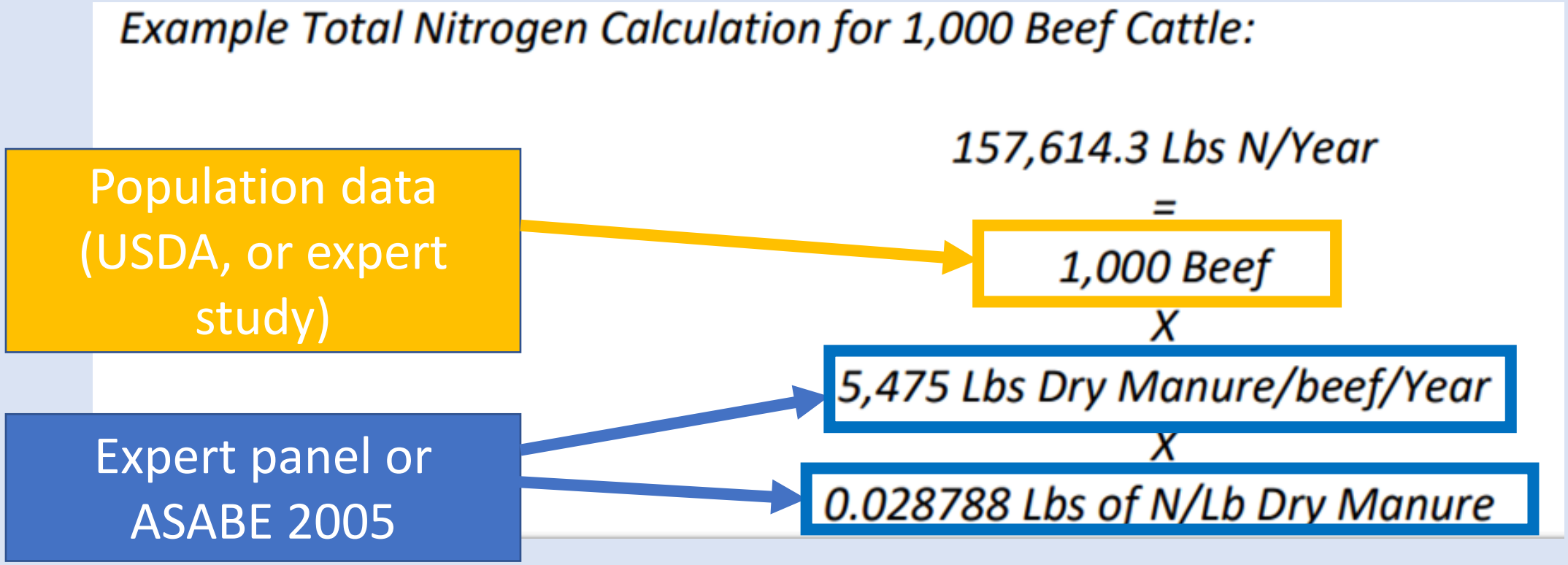
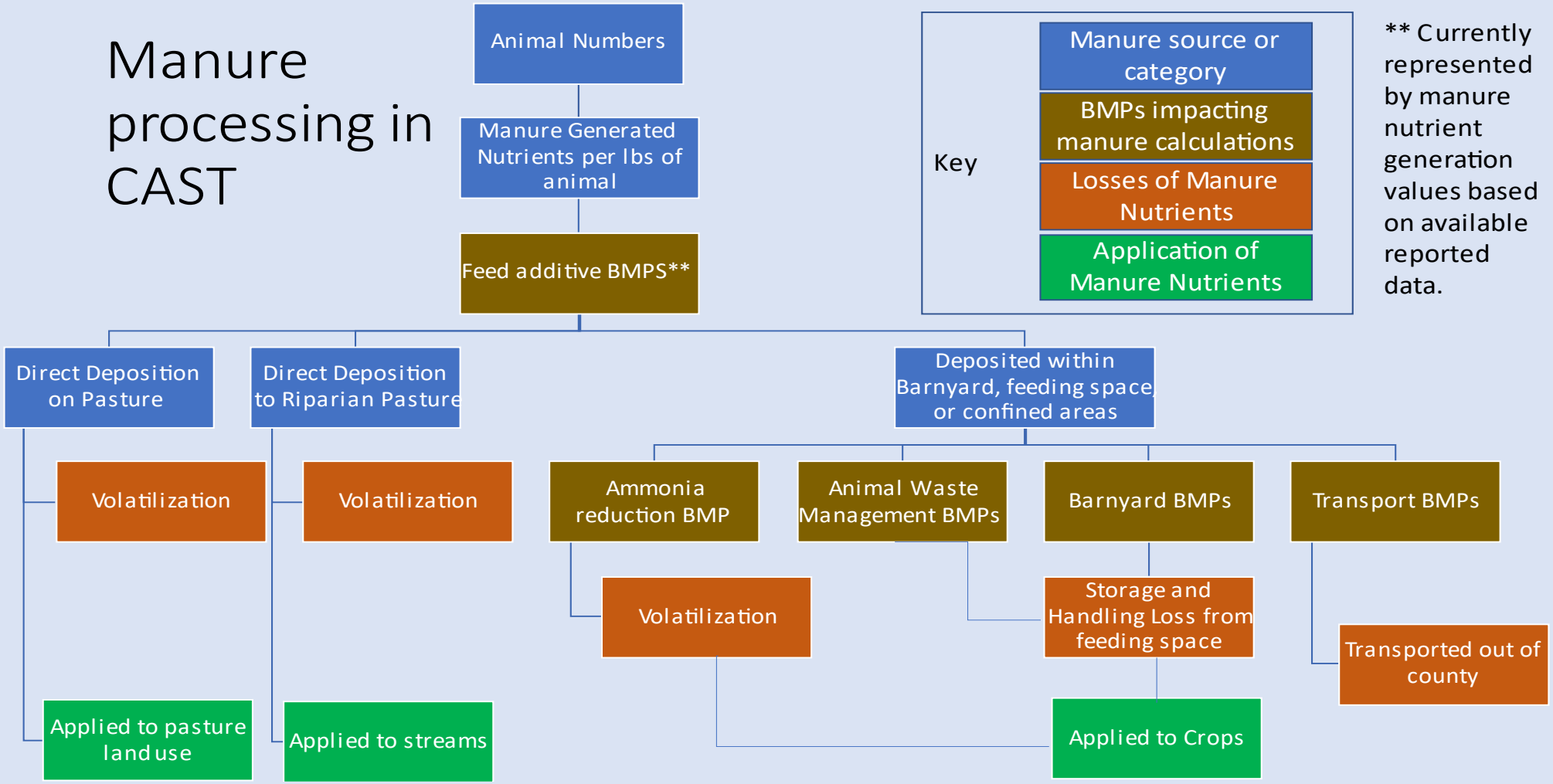


What happens once we generate manure nutrients?

Manure processing in CAST



- Manure nutrients stay in their county of origin UNLESS they are transported

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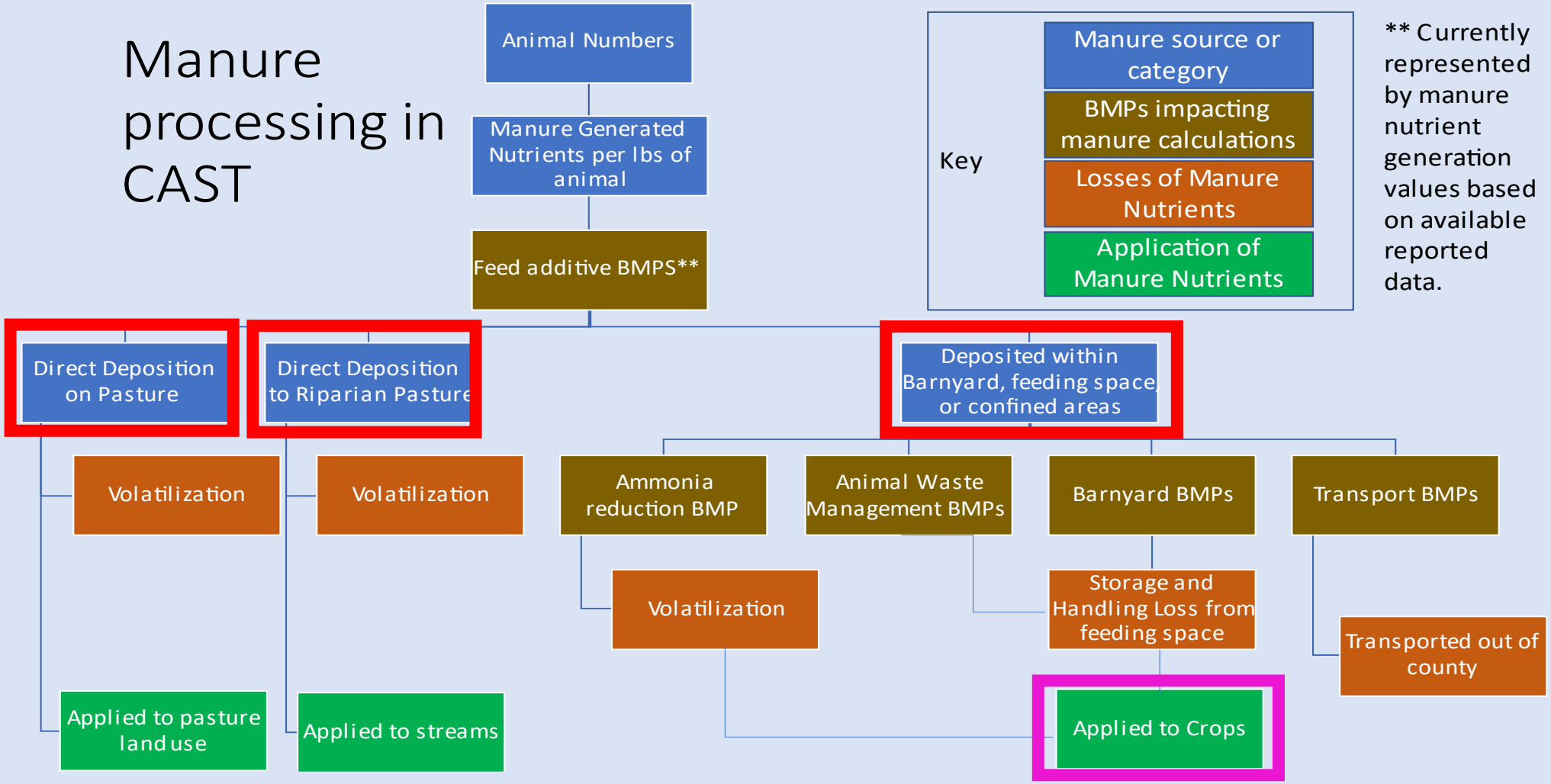
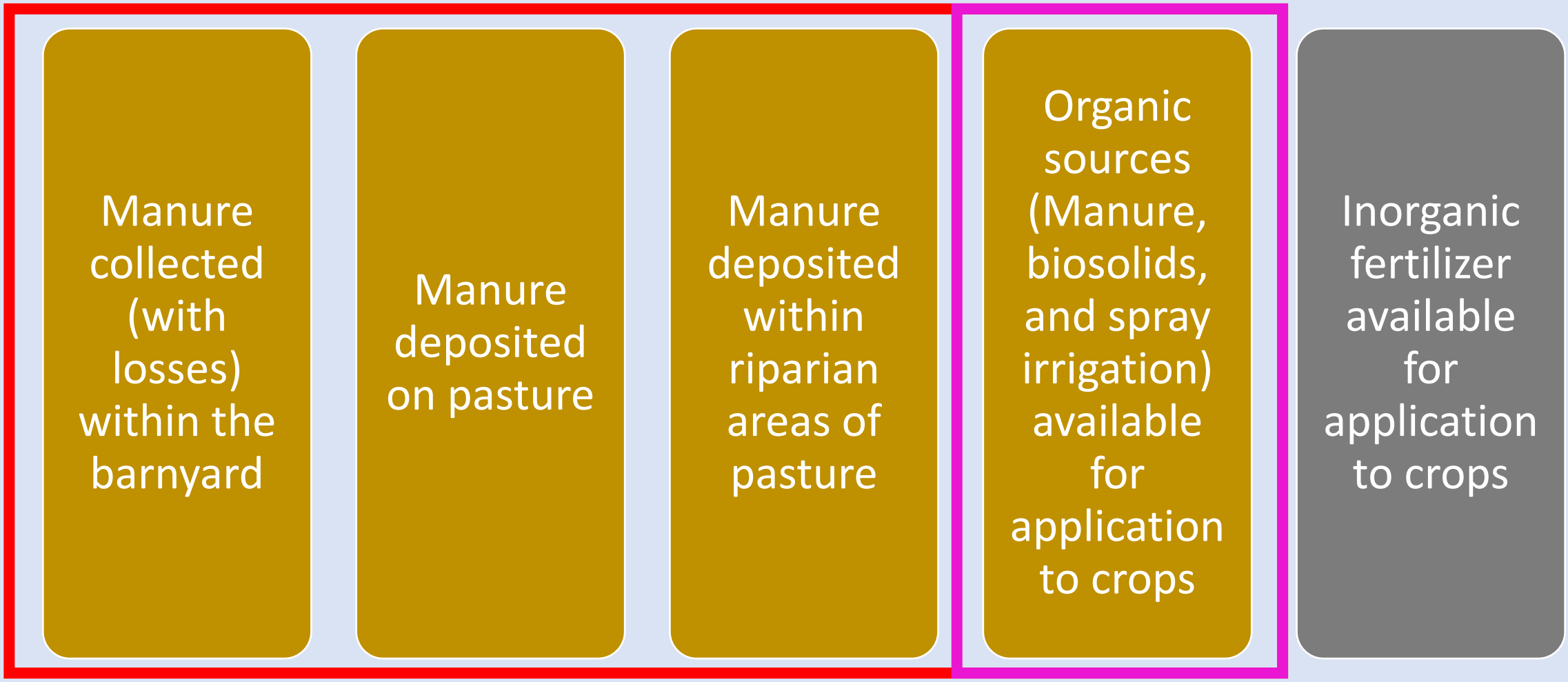
Manure processing in CAST



- Manure nutrients stay in their county of origin UNLESS they are transported

Agriculture nutrient categories



How does CAST determine acres with manure?

Fraction of Silage acres with Manure =

- 0.85

Fraction of Grain acres with Manure =

- [(0.1311) X (Natural Log of(Total Animal Units/Total Acres Harvested Cropland))] + 0.5196

Note* If the fraction of this results in a value below 0.18 it should equal 0.18, and any result above 0.81 should equal 0.81

How does CAST determine acres with manure?

Acres of Silage with Manure =

- Acres of total silage crops X 0.85

Acres of Grain with Manure =

- Acres of total grain crops X [(0.5196) + (0.1311) X (Natural Log of(Total Animal Units/Total Acres Harvested Cropland))]

Questions?

Loading rates and ratios Section 2.2

- What is a loading rate?
  - The average load per acre, expressed as pounds per acre per year going to a stream or waterbody
- What does a loading rate do?
  - Distributes all the nutrients in a sector to various scales
- Why is it important?
  - We need to know how different areas contribute nutrients based on what exists there

How do we distribute nutrients within a sector?

1. Get a total load for the watershed from monitoring data

Chesapeake Bay Average Loads			

How do we distribute nutrients within a sector?

1. Get a total load for the watershed from monitoring data
2. Split this into broad classes (Crop, Pasture, Urban, Natural, etc.)

Chesapeake Bay Average			
Land class			
Cropland			
Pasture			

How do we distribute nutrients within a sector?

1. Get a total load for the watershed from monitoring data
2. Split this into broad classes (Crop, Pasture, Urban, Natural, etc.)
3. Break out the load to the partnerships desired specificity (Land Use)

Chesapeake Bay Average			
Land class	Land Use		
Cropland	Double Cropped Land		
	Full Season Soybeans		
	Grain with Manure		
	Grain without Manure: **Reference land use**		
	Other Agronomic Crops		
	Silage with Manure		
	Silage without Manure		
	Small Grains and Grains		
	Specialty Crop High		
	Specialty Crop Low		
Pasture	Ag Open Space		
	Legume Hay		
	Other Hay		
	Pasture: **Reference Land Use**		

How do we distribute nutrients within a sector?

- How exactly do we divide the loads into land uses?
  - Reference land use
    - Experts identified which land use had the biggest impact within its class
  - Loading rate ratio
    - Relationships of each land use to the class reference
  - Loading rate
    - (Reference land use lbs/acre/year) X (Loading rate ratio)

Chesapeake Bay Average			
Land class	Land Use	Loading Rate Ratio	Loading Rate (pounds per acre per year)
Cropland	Double Cropped Land	0.79	30.9
	Full Season Soybeans	0.71	27.7
	Grain with Manure	1.4	54.7
	Grain without Manure: **Reference land use**	1	39.1
	Other Agronomic Crops	0.45	17.6
	Silage with Manure	1.62	63.3
	Silage without Manure	1.16	45.3
	Small Grains and Grains	0.84	32.8
	Specialty Crop High	1.34	52.4
	Specialty Crop Low	0.31	12.1
Pasture	Ag Open Space	0.43	5.1
	Legume Hay	0.74	8.7
	Other Hay	1.04	12.3
	Pasture: **Reference Land Use**	1	11.8

Questions?