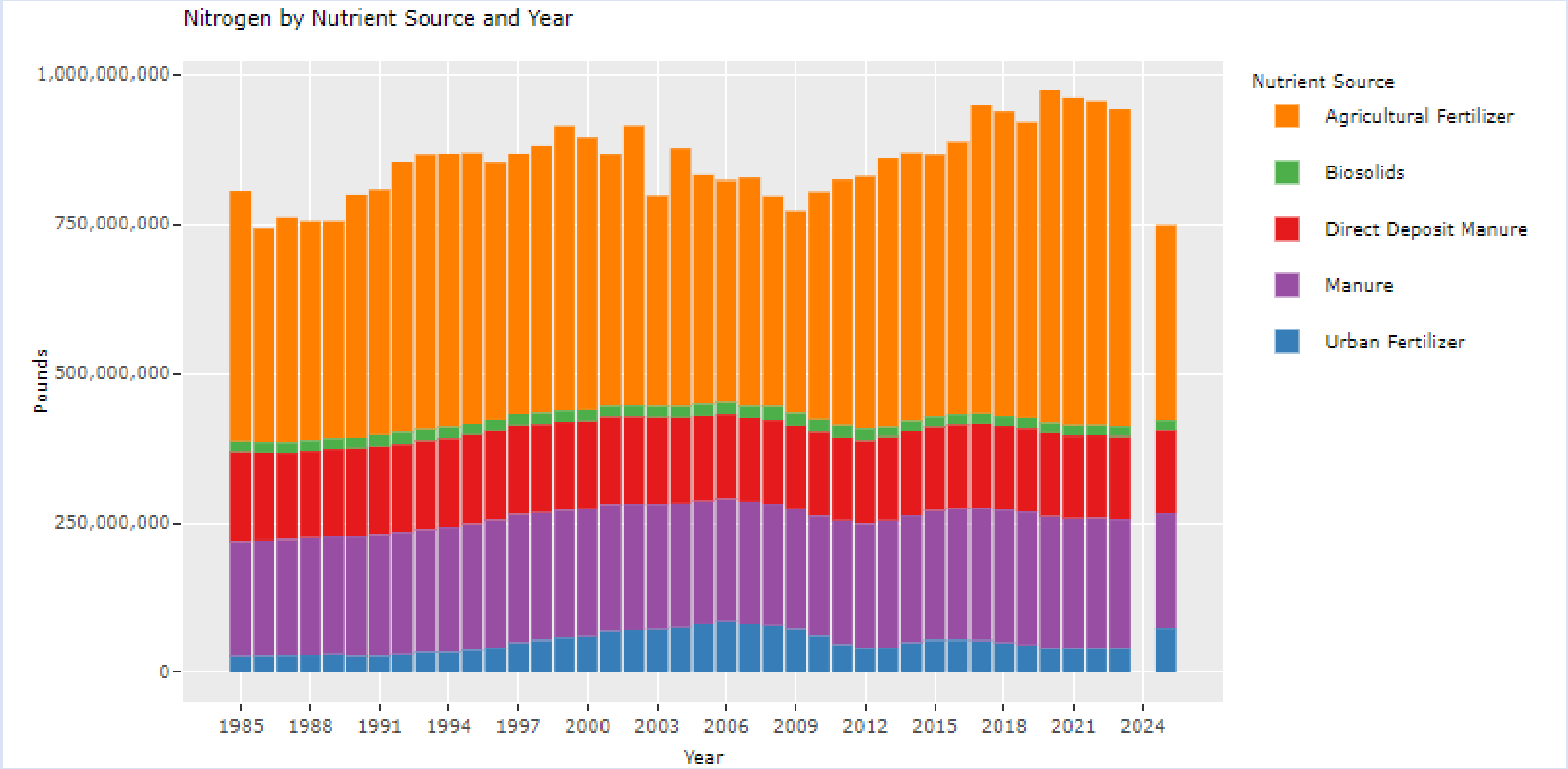
Inorganic Fertilizer application intent in CAST

Tom Butler, EPA

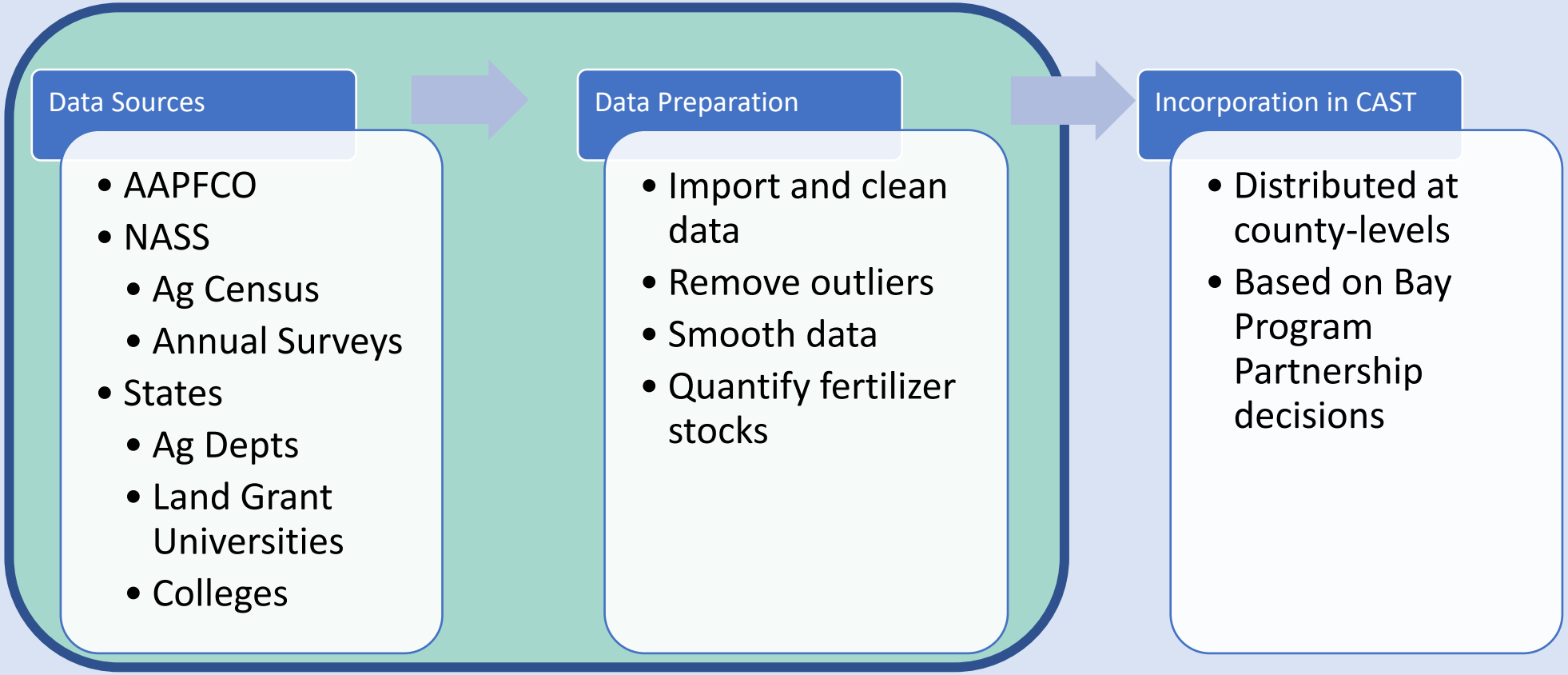
11/8/2024

A quick look at nutrients applied in CAST:



https://cast.chesapeakebay.net/EstuaryTrends/NutrientsApplied

Ag Fertilizer Data Processing Overview



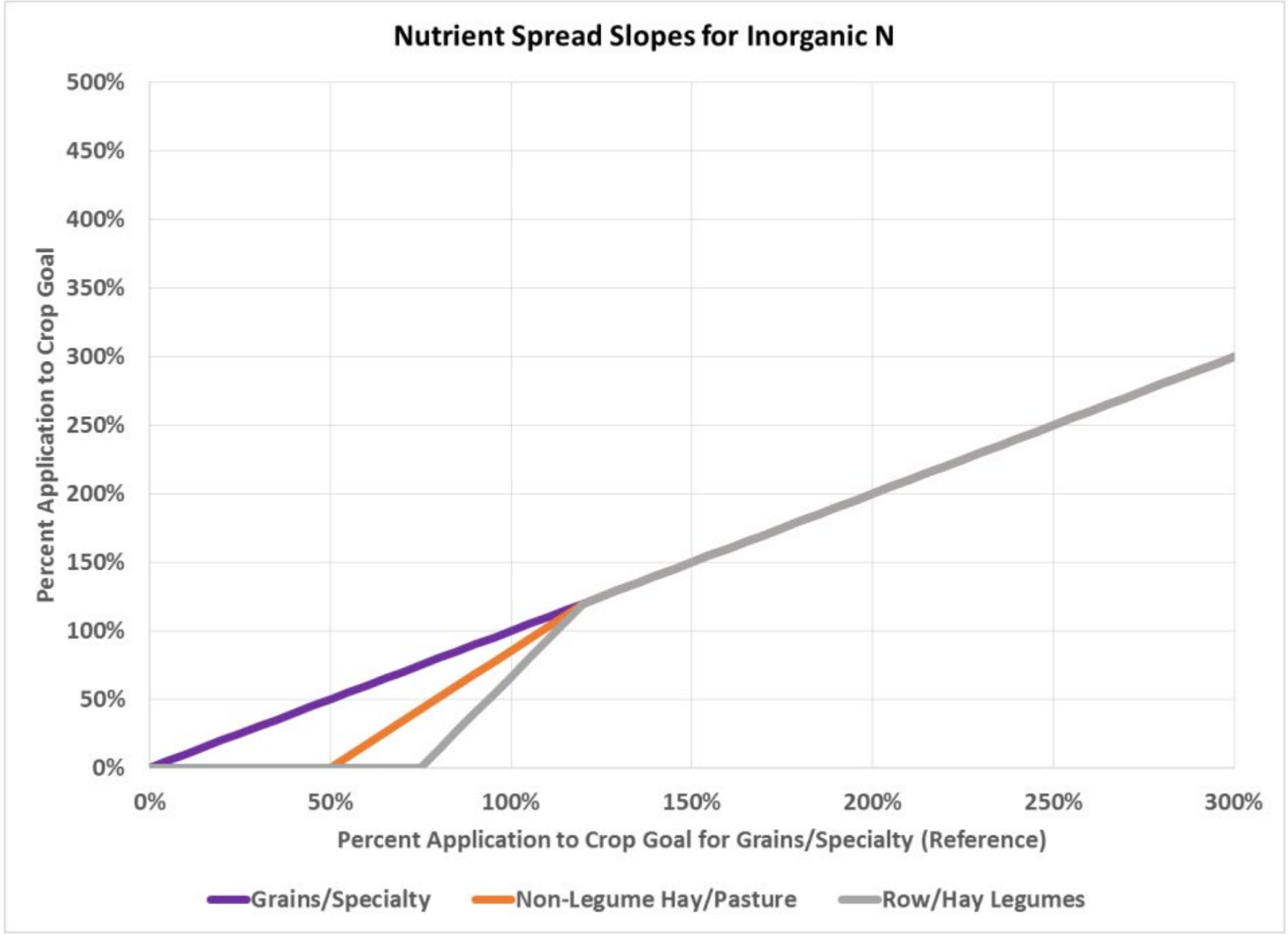


Figure 3-10: Inorganic Nitrogen Application Curves by Crop Group

Fertilizer application

How it currently works:

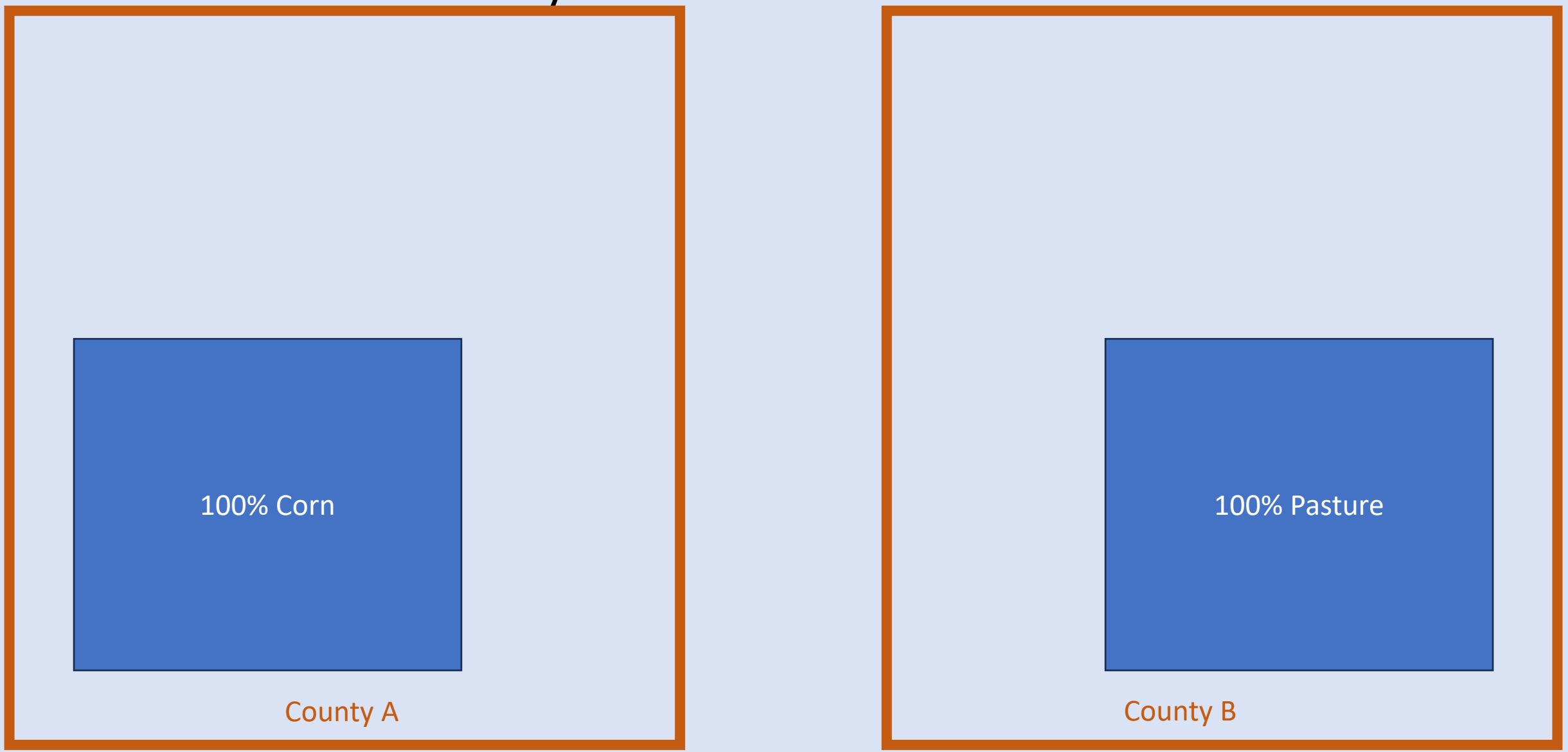
- spread county biosolids using biosolid curves
- spread county manure using manure curves
- calculate remaining expected application for each county
- proportion the fertilizer into county buckets based on remaining expected application
- spread county buckets using fertilizer curves

How we think it SHOULD work:

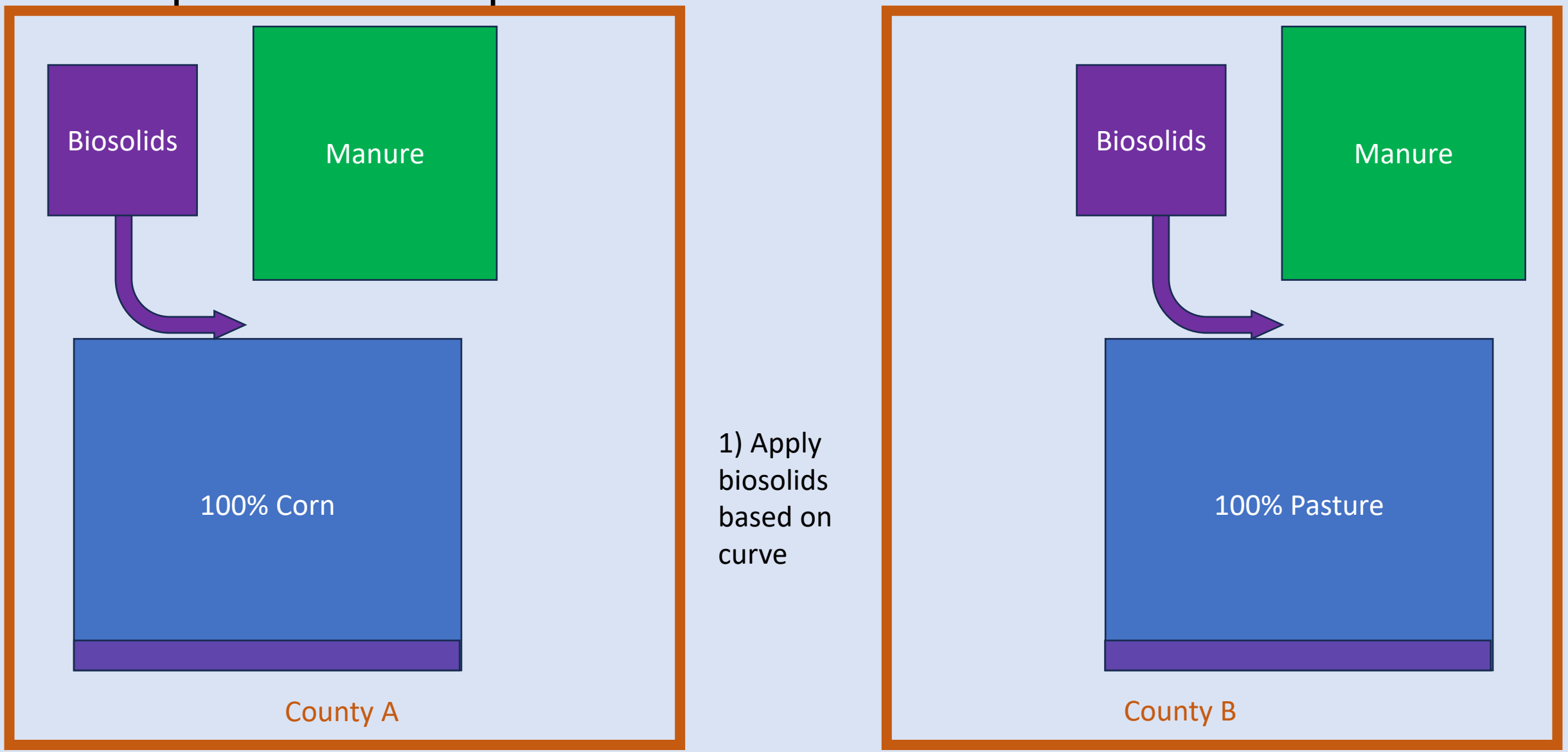
- spread county biosolids using biosolid curves
- spread county manure using manure curves
- spread watershed bucket using fertilizer curves

Watershed

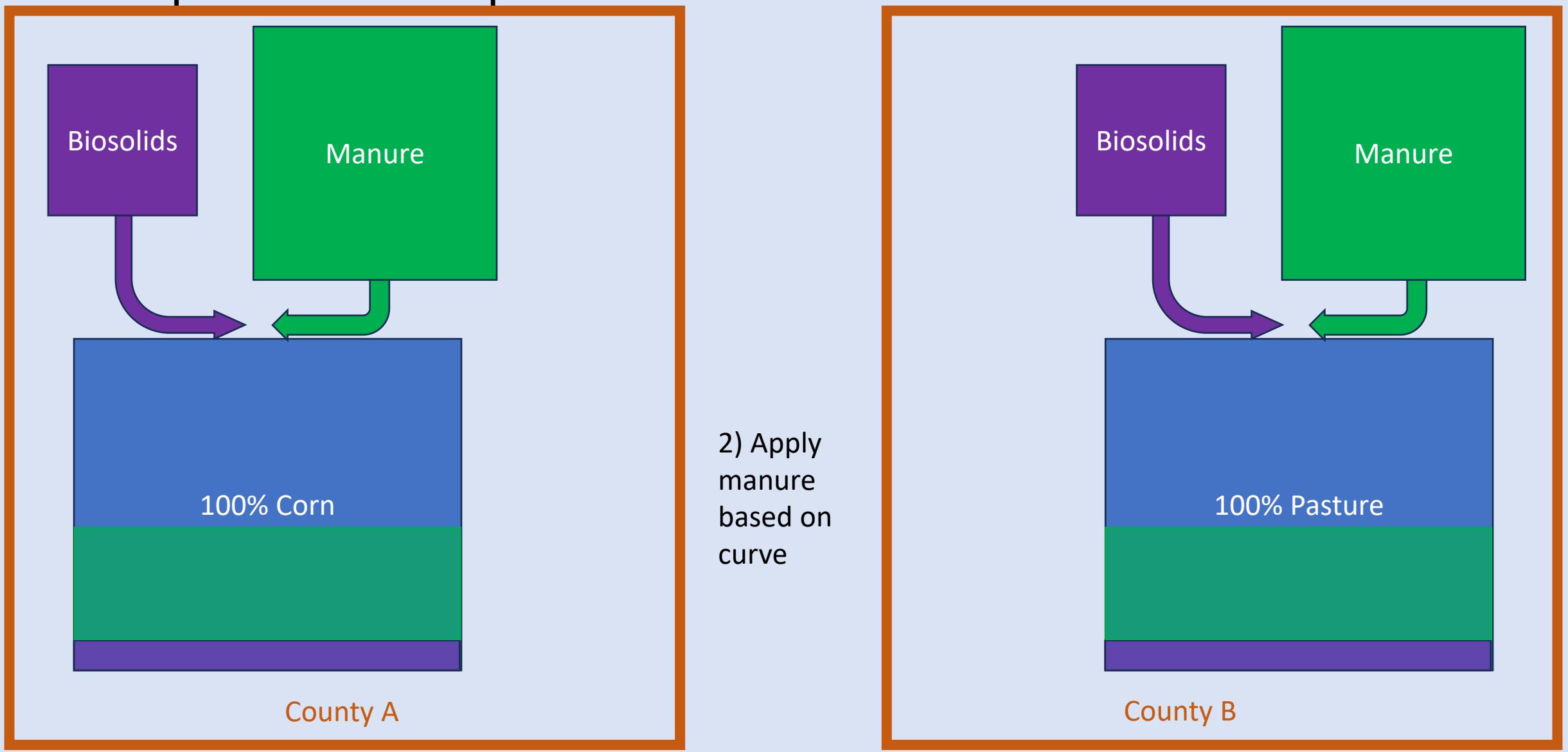
How it currently works:



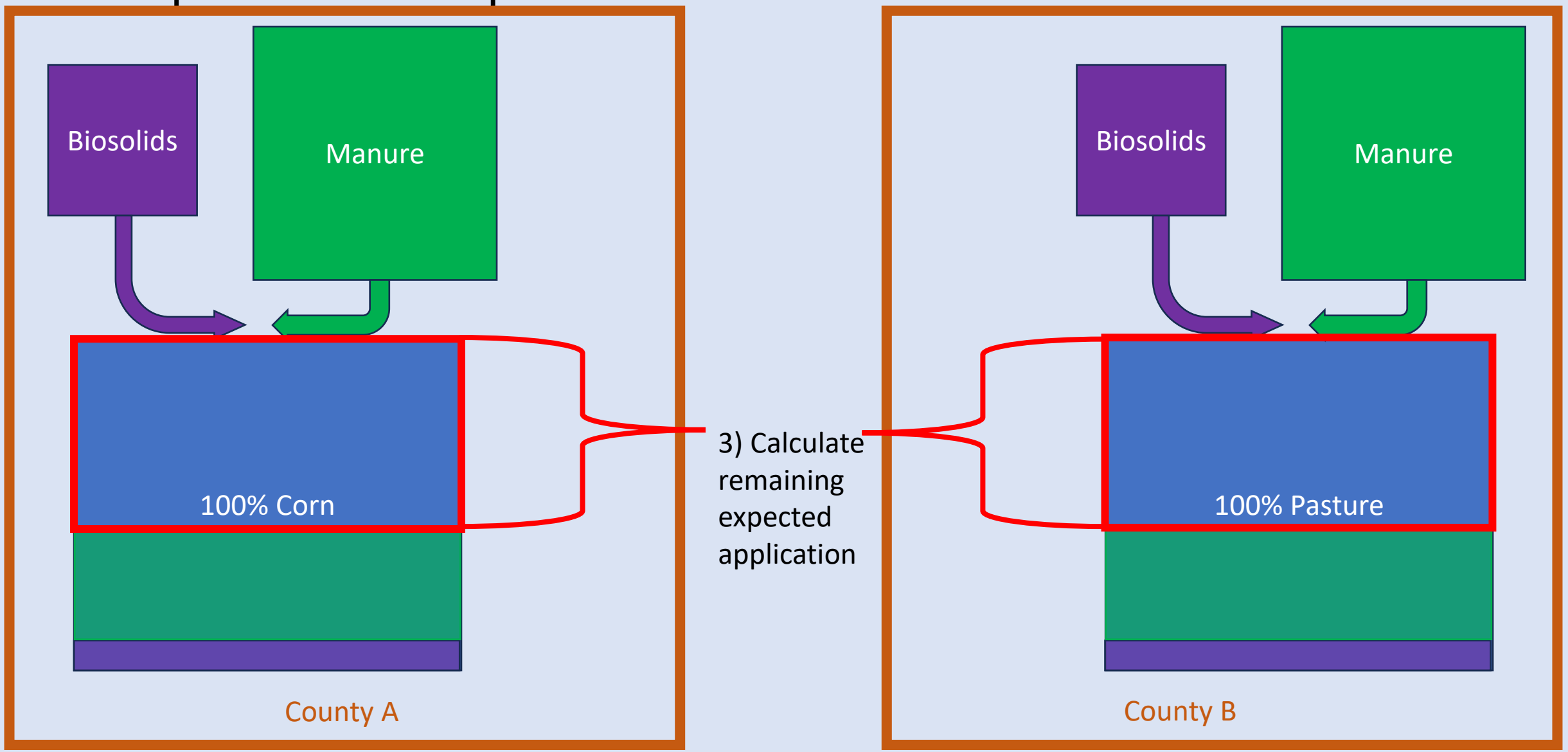
Fertilizer

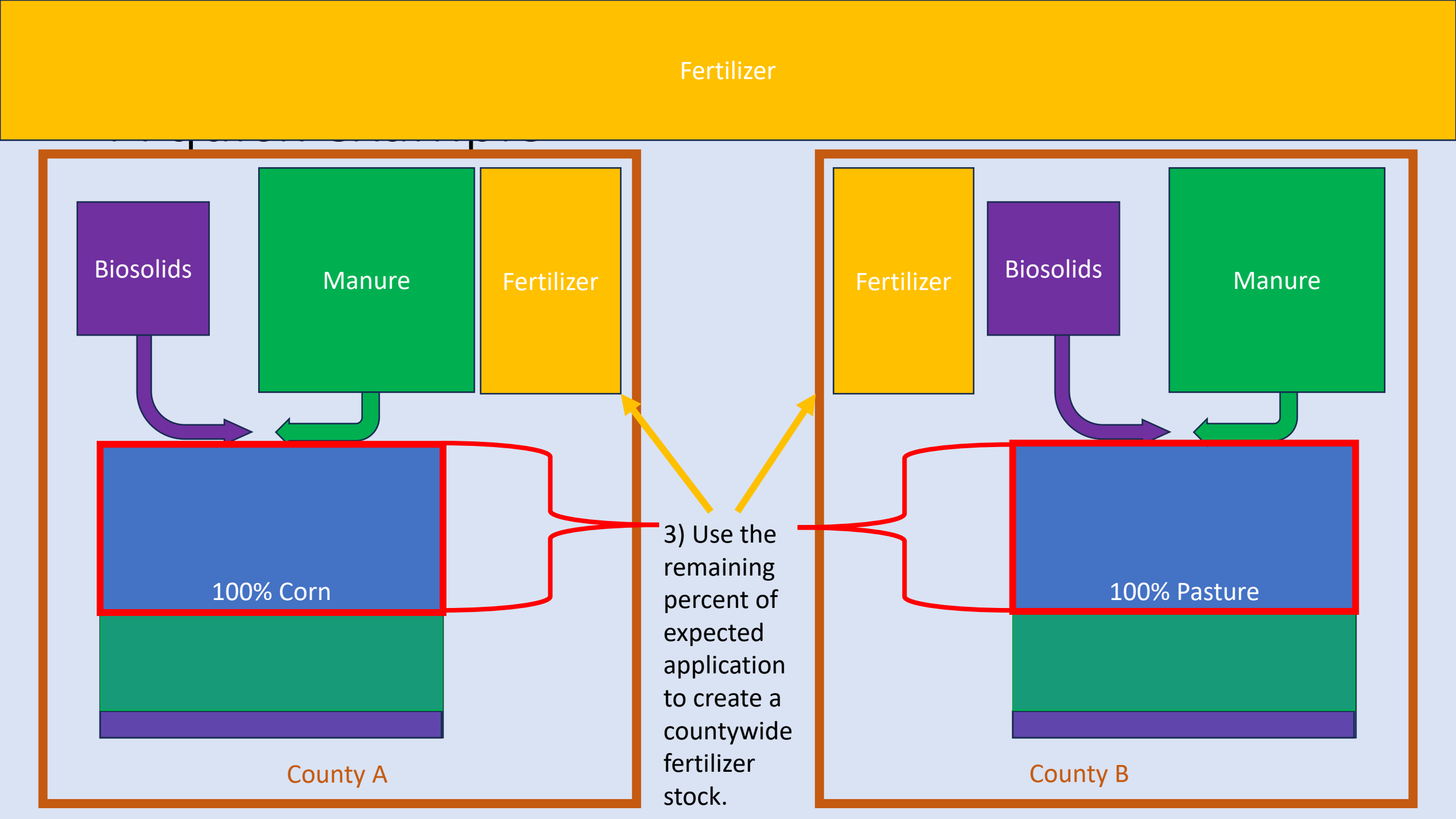

Biosolids
Manure
100% Corn
County A
1) Apply biosolids based on curve
Biosolids
Manure
100% Pasture
County B

Fertilizer


Biosolids
Manure
100% Corn
County A
2) Apply manure based on curve
Biosolids
Manure
100% Pasture
County B

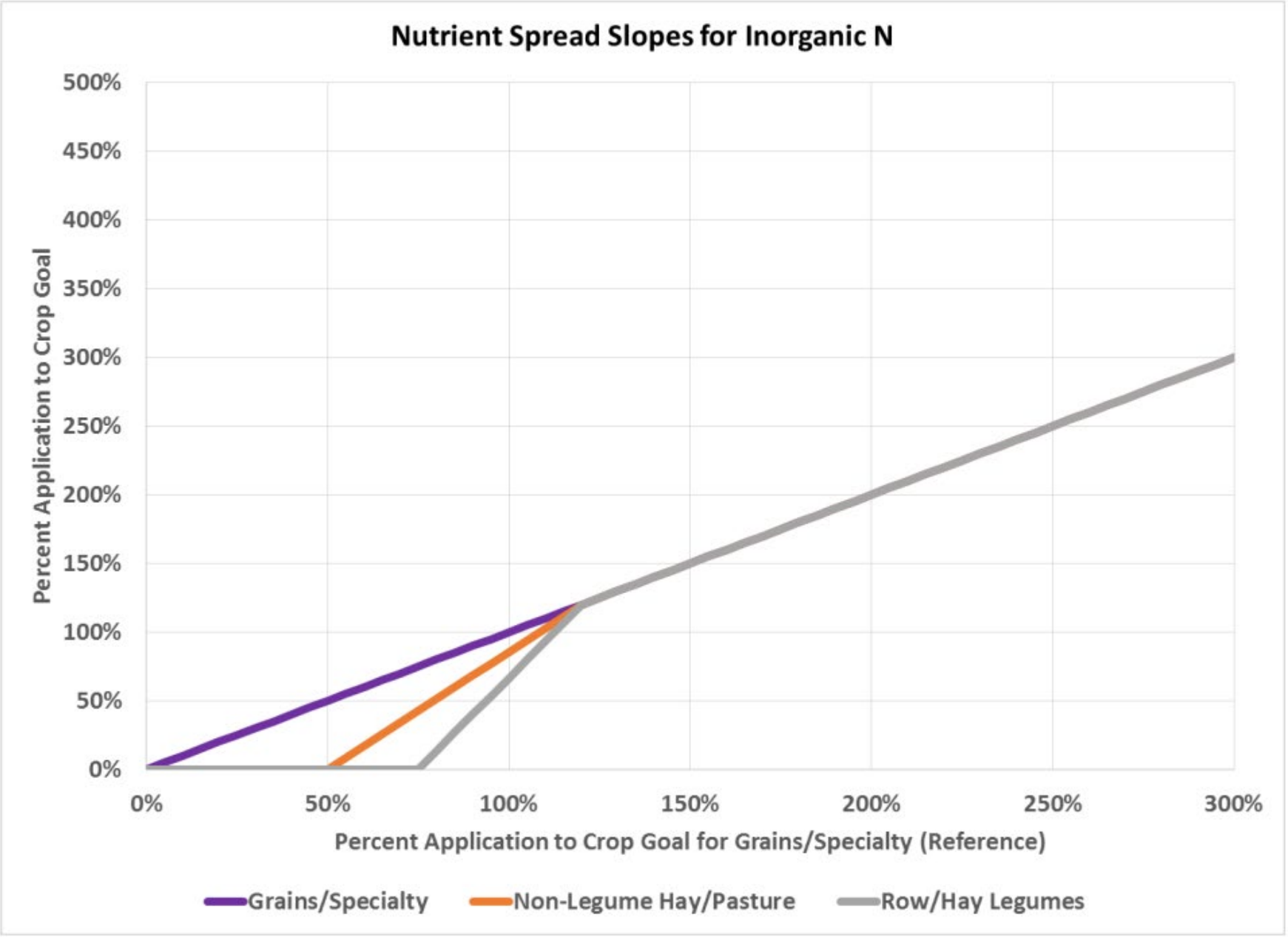
Fertilizer


Biosolids
Manure
100% Corn
County A
3) Calculate remaining expected application
Biosolids
Manure
100% Pasture
County B


Fertilizer
Biosolids
Manure
Fertilizer
100% Corn
County A
3) Use the remaining percent of expected application to create a countywide fertilizer stock.
Fertilizer
Biosolids
Manure
100% Pasture
County B

INSE

- Insert spread AFTER pooling nutrients at the county scale



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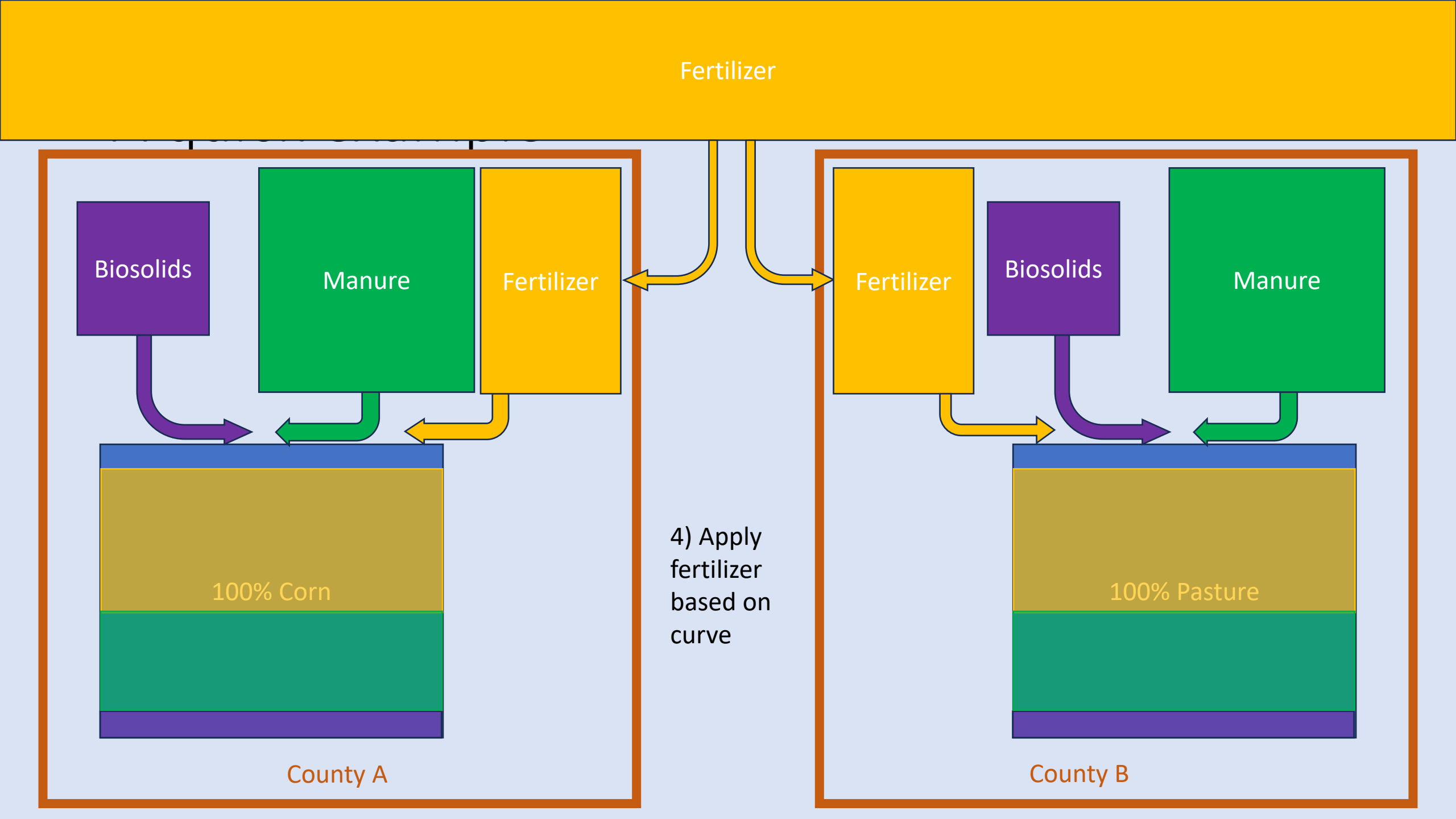

Fertilizer
Biosolids
Manure
Fertilizer
100% Corn
County A
4) Apply fertilizer based on curve
Fertilizer
Biosolids
Manure
100% Pasture
County B

There is a slight catch:

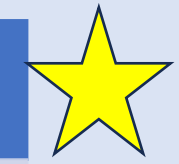
- The implementation applies fertilizer regardless of the land uses in each county.
  - This might overlook the intended process.

Fertilizer application

How it currently works:

- spread county biosolids using biosolid curves
- spread county manure using manure curves
- calculate remaining expected application for each county
- proportion the fertilizer into county buckets based on remaining expected application
- spread county buckets using fertilizer curves

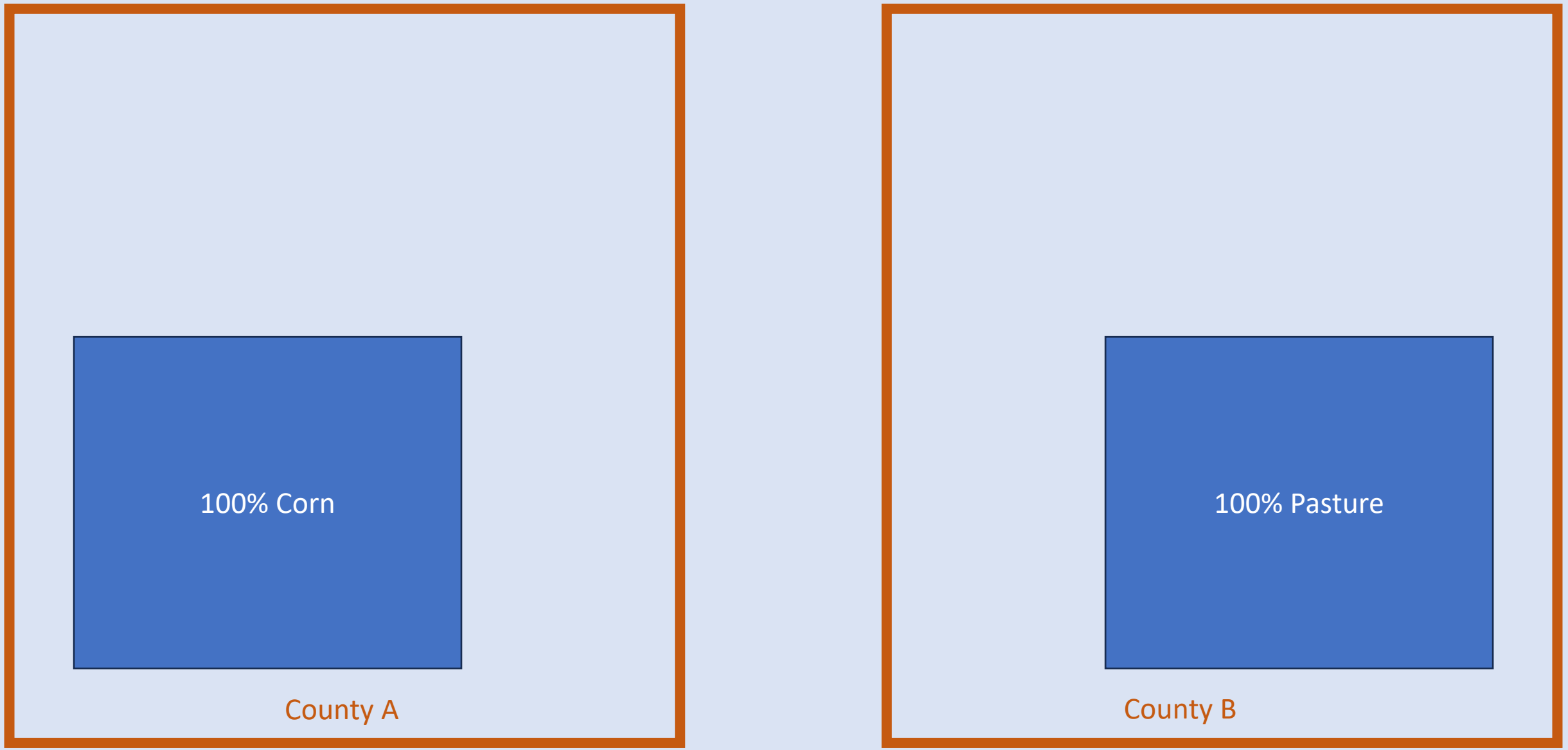
How we think it SHOULD work:



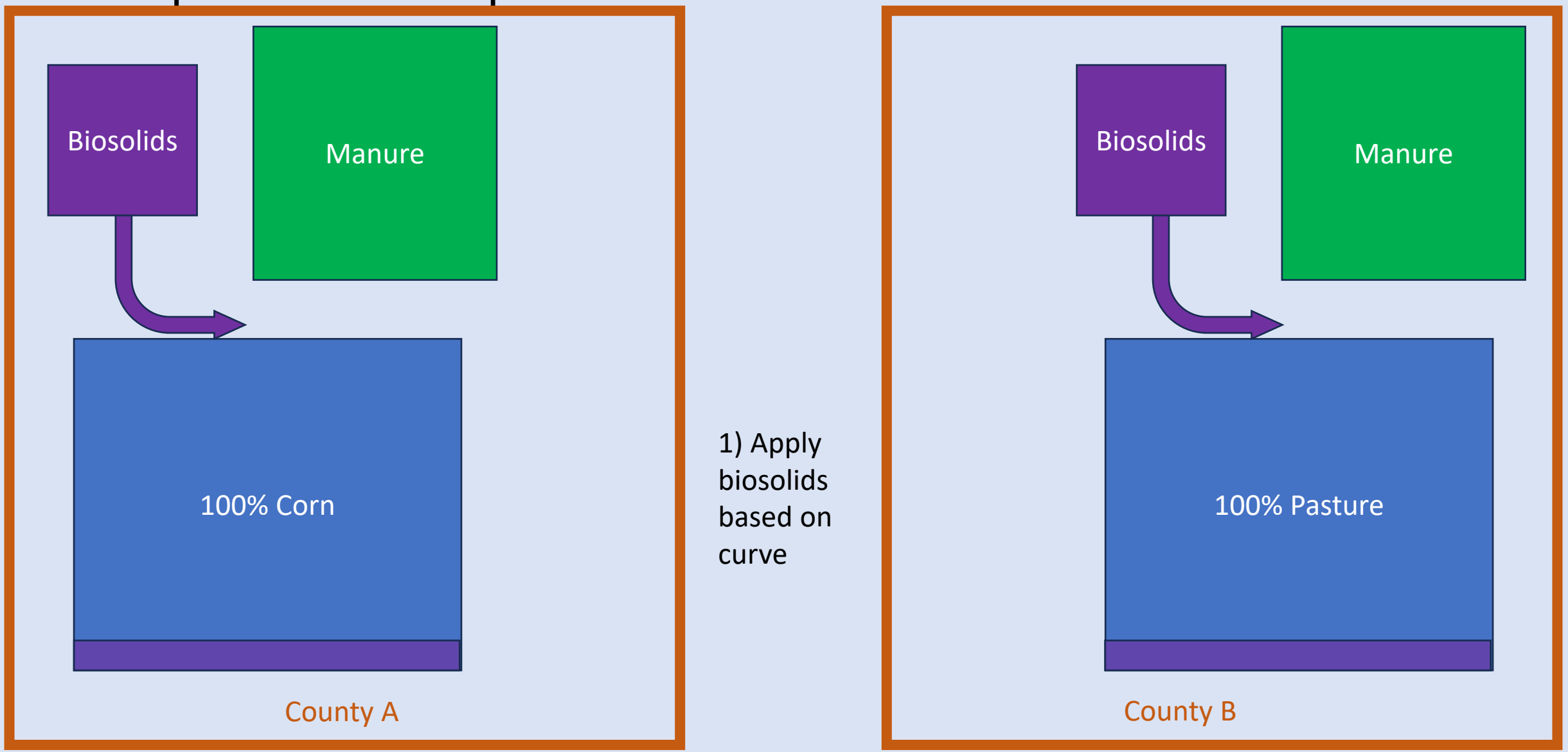
- spread county biosolids using biosolid curves
- spread county manure using manure curves
- spread watershed bucket using fertilizer curves

Watershed

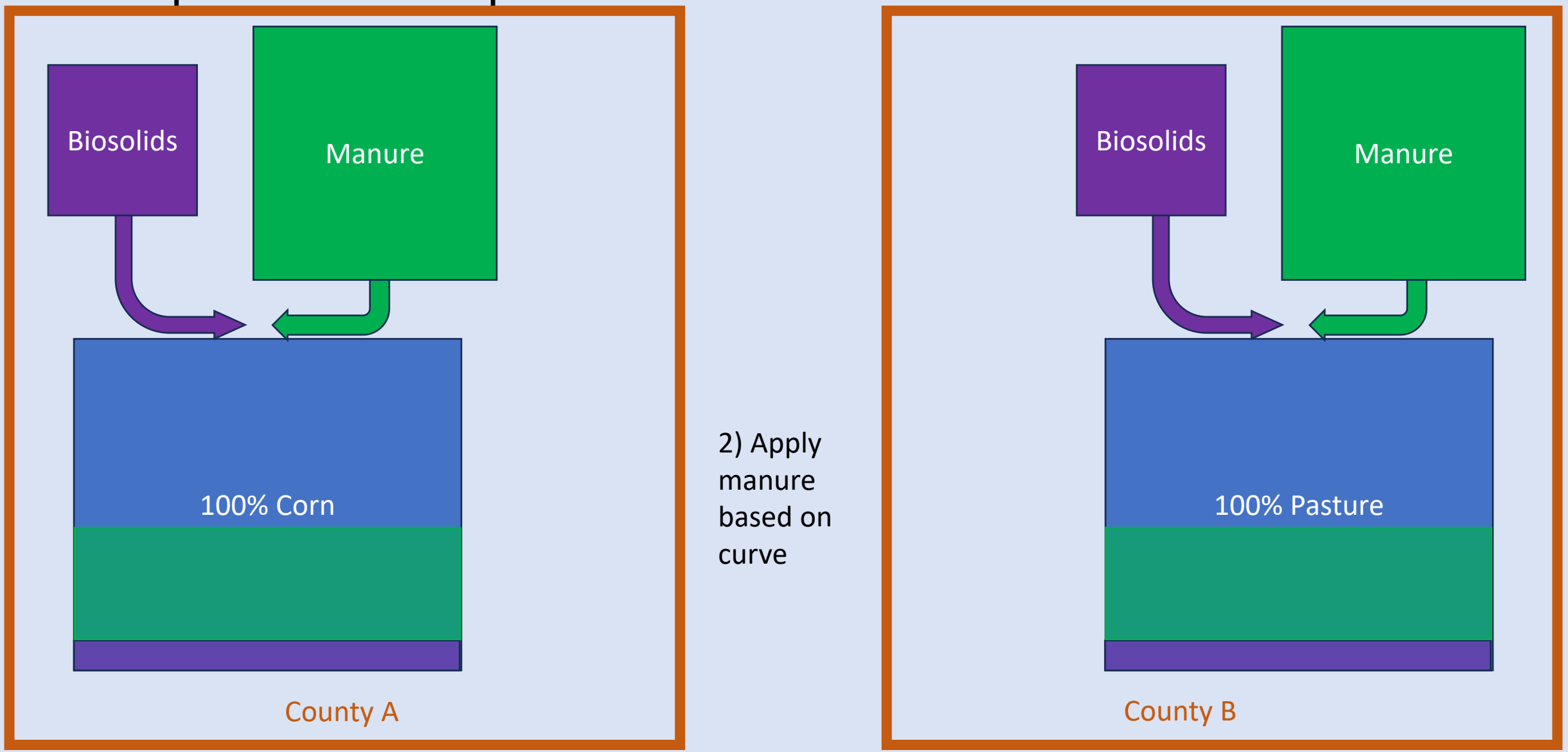
How we think it should work:



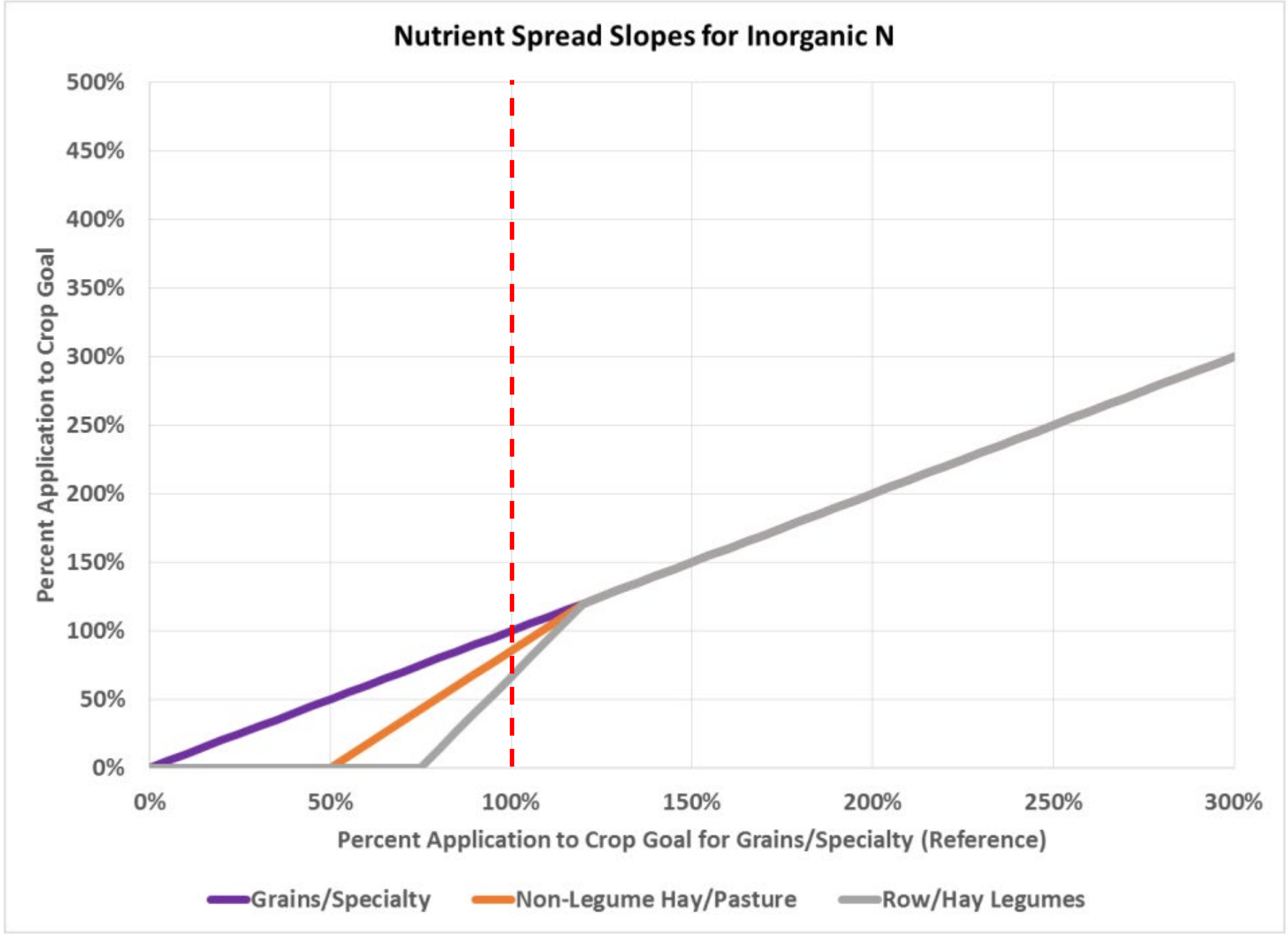
Fertilizer


Biosolids
Manure
100% Corn
County A
1) Apply biosolids based on curve
Biosolids
Manure
100% Pasture
County B

Fertilizer


Biosolids
Manure
100% Corn
County A
2) Apply manure based on curve
Biosolids
Manure
100% Pasture
County B

- Insert spread WITHOUT pooling nutrients at the county scale



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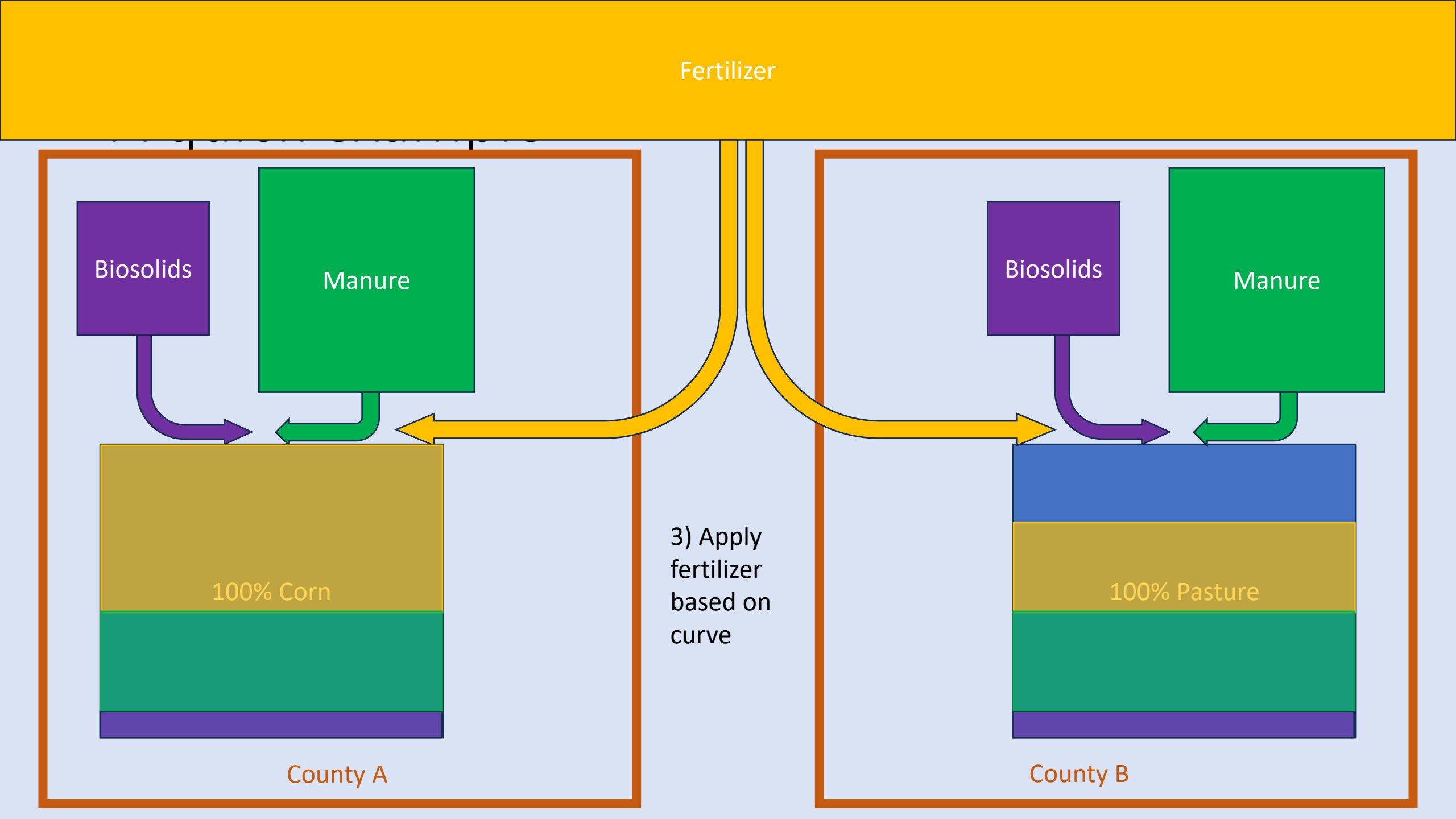
Fertilizer
Biosolids
Manure
100% Corn
County A
3) Apply fertilizer based on curve
Biosolids
Manure
100% Pasture
County B

The takeaway:

Currently: each county has an expected application based on the crops within the county

- Meaning, if the only crops in a county are things like pasture, they get fertilizer applications.

Original intent: Application curves are applied universally across the entire watershed.

- This would allow applications to target grains and specialty first across the entire watershed BEFORE pasture.

So, what now?

- We should establish what the original intent was for fertilizer application
- Decide if what is proposed here aligns with the initial intent

Questions?