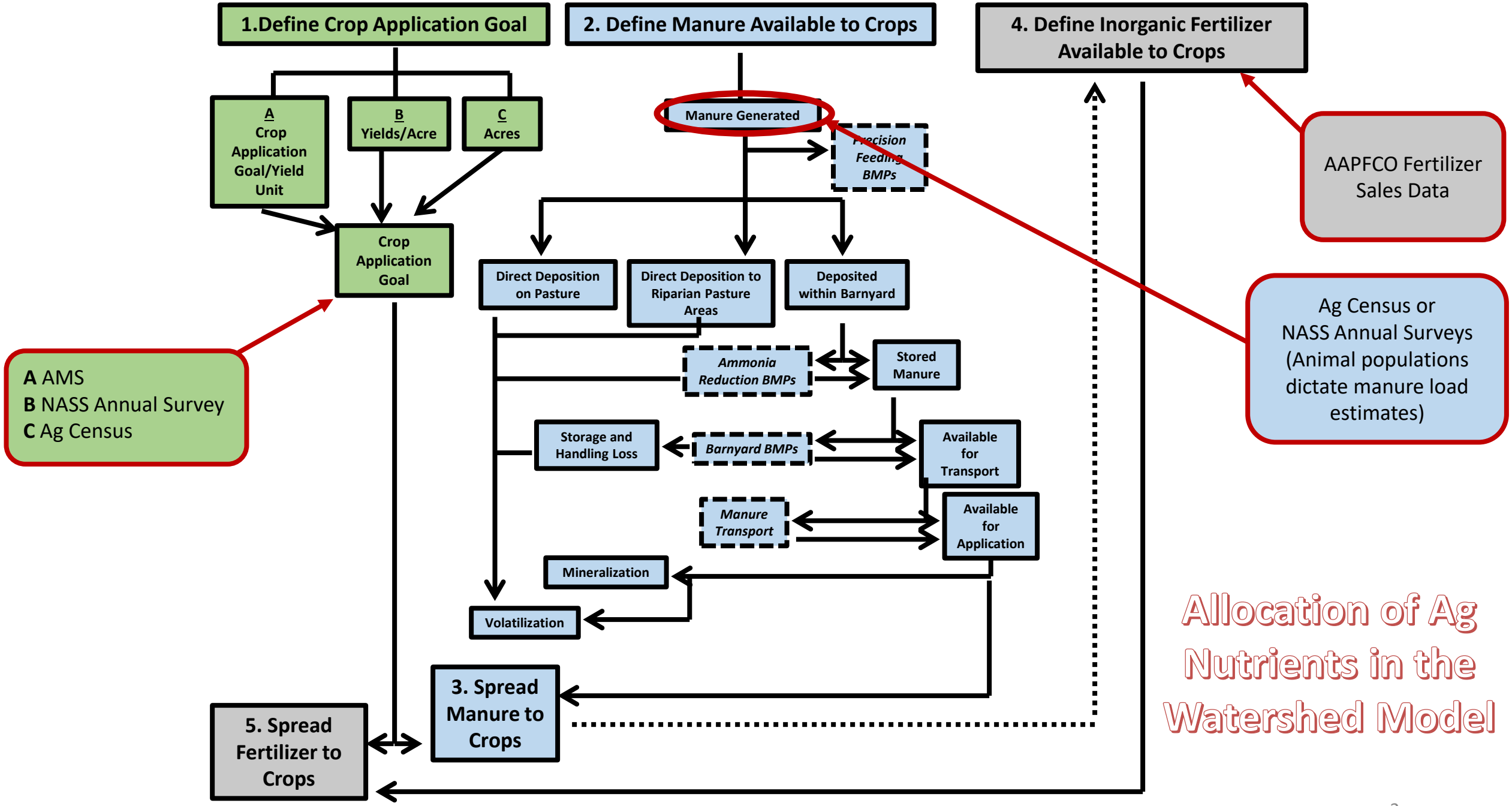
Rapid Review:
Animal Data Sources

April 21, 2020



Allocation of Ag Nutrients in the Watershed Model

AMS= Agricultural Modeling Subcommittee

Why Do We Use the USDA- NASS Data?

1980s: Early CBP Partnership Decision

- Public data set → *model inputs transparent*
- Predictable and reliable → *in terms of access & QA/QC*
- Breadth of coverage → *data back to 1985*
- Parity in data quality across jurisdictions

CRITICAL [modeling] CONCEPT:

Consistency More Important Than Accuracy

Two options for new data sets:

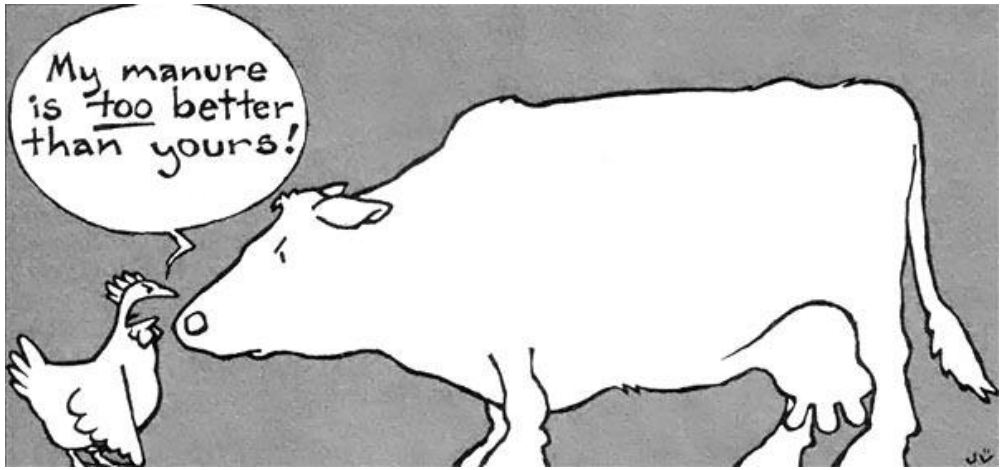
- Provide data all the way back through 1985.
  OR
- Use the **trend** in new data sets for the years available.

https://itsadeliverything.com/accuracy-vs-precision-in-estimation

How Do We Use the 5-Year Ag Census Data?

Animal Inventory & Sales

- Estimate Populations By County
- Define Feed Space Acres
- Estimate the "Manure Bucket" for the CBW
  - Manure nutrients applied to crops, directly deposited to pasture and riparian areas, and left in the feed space.



https://www.motherearthnews.com/homesteading-and-livestock/manure-fertilizer-zmaz83mazraw

Crop Acres By County

- Used in Conjunction with
  - High-Resolution Mapped Land Cover Data to Improve Land Use Assumptions
  - Yield Data & Crop Application Goals to Allocate Annual Fertilizer & Manure Applications Across the Watershed

CRITICAL CONCEPT

Source for ***distribution*** of statewide populations can change.

Example: MD provides fraction of cattle in every county for the year 2020, and these fractions are used to distribute TOTAL statewide cattle populations from the Census of Agriculture.

Census
100 Cattle

Outside Watershed **15%**

County A **35%**

County B **0%**

County C **50%**

MD Data
(75 Cattle)
100 Cattle

Outside Watershed **25%**

County A **25%**

County B **10%**

County C **40%**

Source of ***TOTAL*** statewide populations will not change for Phase 6 Watershed Model.

What About Annual Data?

National Agricultural Statistics Service (NASS) Annual Surveys

- Incorporated every two years (milestone)
  - When the watershed model “opens” for changes

- Yield data for the following major crops:
  - Alfalfa Hay; Barley; Buckwheat; Corn for Grain; Corn for Silage; Oats for Grain; Rye for Grain; Sorghum for Grain; Sorghum for Silage; Soybeans for Beans; and Wheat for Grain

- Broiler & Turkey Sales Data (state-level)

Animal Populations- Data Source Summary

Animal Type		Population Source
Swine	5-yr	Census of Agriculture (Inventory and Sales)
Layers and Pullets	5-yr	Census of Agriculture (Inventory and Sales)
Broilers and Turkeys	Annual & 5-yr	NASS Annual Survey (Sales) Census of Agriculture (Inventory)
All Other Livestock	5-yr	Census of Agriculture (Inventory)

**Distribution of TOTAL* statewide populations down to counties, regardless of population source, is based upon Census of Agriculture distribution to counties*

Comparison:
Industry vs. NASS Population Data

Swine

- Commercial swine numbers in the VA (2017)

Turkeys

- Commercial turkey populations in VA & WV (2017)

Layers

- Hillandale layer data (2021)

Poultry

- Poultry Litter Subcommittee Report (2015)
  - Includes recommended population estimate methodology
  - Report focused on litter N & P concentration data

Incorporation of Hillandale Layer Population Data into CAST

Problem: CAST does not account for millions of layers across two PA counties.

- Current population data source: USDA Census of Agriculture
- Challenge: USDA-NASS privacy protection

Action Taken

- Population data acquired from Hillandale
  - QA/QC against CAFO permits & NMPs
  - ~5 million layers
- Review & Analysis of Census of Ag county & state totals
  - Published data underestimates layers (order of magnitude)

Current Status

- Hillandale pop. data can be incorporated in FUTURE VERISON of Phase 6 CAST (*as a change product*) *with partnership approval*.
- Hillandale & other alt. data can be incorporated in Phase 7 CAST *with partnership approval*.

References

Incorporating Private Industry Data Into CAST – Nov AgWG: Link
Commercial Agricultural Production Data Decisions – Nov AgWG: Link

AgWG Governance Dec 2021 Survey: *considerations for incorporating industry data*

Summary of Points Made

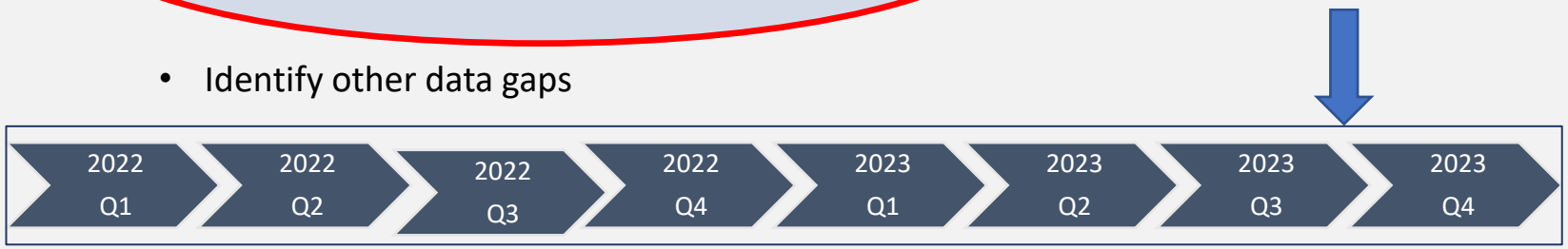
- Need most complete/accurate data
- Consistent with previous poultry data refinements
- NASS data inaccurate/incomplete
- Industry data critical to success
- Need standard of quality across all types of data (data equity)
- Need to establish acceptable degree of error
- Load impacts not accounted for in WIPs (backward & forward through time)

Next Steps

Ad Hoc Group to Address Questions & Knowledge Gaps

- Why must changes in one county affect far reaches of watershed?
  - Can we change that?
- Standardization of process for industry data
  - QA/QC
  - Addressed duplication & equity
- Standard of quality across all types of data (data equity)
- Shared understanding of available data sets & use
  - Feasibility of incorporating alternative data sets
  - Consideration of data privacy
- Shared understanding of NASS data sets
  - Opportunities and constraints
- Identify other data gaps

Next version of CAST?



Manure Generation – Nutrient Content

Manure Generated

Data Currently Used in the Phase 6.0 Model

Animal Type	Manure Source	Lbs Dry Manure/Animal/Yr	Lbs TN/Lb Dry Manure	LbsTP/Lb Dry Manure
Beef	Use Beef - Cow (confinement) from ASAE* 2005 for manure values	5,475.00	0.028788	0.006467
Dairy	Use Lactating Cow, Dry Cow and Heifer from ASAE 2005 for manure values	4,404.33	0.042221	0.006764
Other Cattle	Estimated based upon weighted average combination of Beef and Dairy from Census of Agriculture	1,605.07	0.035504	0.006616
Horses	Use average of Horse- Sedentary and Horse - Intense Exercise from ASAE 2005 for manure values	3,102.50	0.031672	0.005941
Hogs for Breeding	Swine Characterization Report;	220.62	.294653	Varies
Hogs for Slaughter	Swine Characterization Report;	97.09	0.106841	Varies
Sheep and Lambs	Use ASAE 2003 for manure values	240.9	0.038182	0.007909
Goats	Use ASAE 2003 for manure values	680.91	0.034615	0.008462
Pullets	PLS Report; See Appendix A	12.95	Varies	Varies
Layers	PLS Report; See Appendix A	17.89	Varies	Varies
Broilers	PLS Report; See Appendix A	Varies	Varies	Varies
Turkeys	Turkey Characterization Report;	7.62	Varies	Varies

*Now ASABE- American Society of Agricultural and Biological Engineers

3-year trends (up or down) can be applied to existing values in this table.

(requires 3 consecutive years of data)

Data must be collected in a similar fashion as was done for:

- Poultry Litter Subcommittee Report
- Swine Characterization Study
- Turkey Characterization Study

Available in Section 3 of Model Documentation