

Appendix B: Technical Requirements for Entering the Animal Mortality BMPs into CAST

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Background: In June, 2013 the Water Quality Goal Implementation Team (WQGIT) agreed that each BMP expert panel would work with CBPO staff and the Watershed Technical Workgroup (WTWG) to develop a technical appendix for each expert panel report. The purpose of this technical appendix is to describe how a load source reduction value for animal mortality BMPs can be incorporated as an approved BMP in CAST-23. With an expectation of full Expert Panel recommendations being approved in Fall 2021, the practices can be incorporated as planning BMPs in CAST-21. Some aspects of the panel's recommendations may not be applicable until Phase 7 of the Watershed Model.

Q1. What practices will be available for planning scenarios in CAST-21 and as approved BMPs in CAST-23? Are any current planning or approved BMPs affected or superseded by these new practices?

A1. Following adoption of the panel's recommendations the following BMPs will be available in CAST, and reportable to NEIEN, but will not be simulated as part of official Progress scenarios until 2023-2024 Progress.

The previously existing Mortality Composters BMP will be replaced with the new Animal Mortality Disposal – Composting practice (see below for definition). ... ~~[Editor's Note: The current Mortality Composters BMP relates to NRCS 316, is tracked by number of systems and has a 15-year credit duration. The assumption is that the new mortality composting BMP will eliminate the prior practice, but we'll want to discuss this among the WTWG.]~~

The current planning-only BMP for broiler mortality freezers will be eliminated and replaced in favor of the rendering BMP, which includes the use of freezers or refrigeration units to store mortalities prior to transfer to the rendering facility.

Animal mortality disposal – landfill or rendering is the handling, storage and disposal of poultry, livestock or other routine animal mortalities by internment in a landfill or processing at a rendering facility. Landfills may include municipal or private facilities that are willing and able to receive routine animal mortalities. Rendering is a well-established industry that recycles animal carcasses into potentially marketable products such as meal, fat, tallow and water through physical and chemical transformations. Aside from animal type, report number of systems, AU of operation implementing the practice, or dry weight (lbs) of total mortalities disposed this way. ~~[Editor's note: WTWG preference for tons or lbs?]~~

Animal mortality disposal – burial is the handling and disposal of poultry, livestock or other routine animal mortalities by placing the carcass or carcasses below ground into an excavated pit, hole, or trench, which is then covered or capped. Factors such as burial depth, and whether the pit is lined, will vary based on local conditions and requirements. There is possibility of some contamination of soil, groundwater or surface water within 1-2m of the pit.

Animal mortality disposal – incineration is the handling, storage and disposal of poultry, livestock or other routine animal mortalities by thermochemical conversion using combustion, gasification, pyrolysis, or some combination of those methods. The methods result in gaseous and solid byproducts.

Most nitrogen is transformed and lost to the atmosphere, while all phosphorus remains available or land application or transport.

Animal mortality disposal – composting is the handling, storage and disposal of poultry, livestock or other routine animal mortalities by composting. Composting is an aerobic biological process to stabilize organic materials such as animal tissue, which requires addition of dry carbon-rich materials to control release of moisture. Composting of mortalities consists of two phases: active composting (110°F-160°F), and curing (ambient to 110°F). Additional water is generally not needed during the active phase of composting due to the high moisture content of carcasses. Methods of composting may include one or more of the following, alone or in combination: static piles and windrows (a.k.a. passive piles), turned windrows, static aerated windrows, a bin system, a tunnel composter, or in-vessel composter such as a rotating drum. Most nitrogen and all phosphorus is retained in the final compost product for field application or transport. Some nitrogen is transformed and lost to the atmosphere and some is also lost across the surface or via leaching.

Q1. What are the reductions a jurisdiction can claim for planning purposes under these practices in the Phase 6 Watershed Model?

A1. To simulate these practices in the Phase 6 watershed model, the panel's recommended estimates of TN and TP pathways are combined with the panel's estimated loads of animal mortalities, either based on AU of production or inventory (A1(a), including Table B.1), or the reported weight of mortalities (A1(b) including Table B.2). For animal types raised for meat (broilers, turkeys, beef cattle, swine) the AUs are based on production while other animals types the AUs are based on inventory (layers, dairy, equidae). Additionally, there is a third reporting option when only the number of systems is known (e.g., when using NRCS 316 implementation data) and it's presumed that composting is the mortality disposal method (A1(c) including Tables [B-5 and B-6](#)).

A1(a) – Reporting method using Animal Units (AUs) of inventory/production to estimate mortality nutrients

Table B.1. Estimated weight of mortality nutrients produced by farms on a per AU (1,000 pounds liveweight) basis.

Type of Farm	Characteristic Animal(s)	Weight of Mortality Nutrients Produced per Farm (Lbs. AU ⁻¹ year ⁻¹)	
		TN	TP
Poultry			
Broiler	6 lb. Market Birds	1.8	0.25
Layer	Laying Hens	2.2	0.40
Tom Turkey	48 lb. Market Toms	2.5	0.33
Hen Turkey	25 lb. Market Hens	2.5	0.32
Swine	270 lb. Market Hog	1.5	0.34
Cattle			
Cow-Calf Herd	Mother Cow	0.65	0.19
Cattle Feedlot	Heifer and Steer Capacity	0.47	0.14

Dairy	Mature Cows (Milking and Dry)	1.9	0.57
Equidae	1,150 lb. Horse	0.34	0.12

Using the values in Table B.1 (for AUs) yields the total amount of TN and TP that is affected by the mortality practices. Each mortality BMP has different transfer efficiencies as described by the expert panel, as summarized in the left-side columns in Table B.3 that are taken from Table ES.3 in the panel report (“mass percentage of carcass nutrients exiting the method”). To understand the pathways of nutrients in terms of the Watershed Model, these transfer efficiencies are converted into coefficients that articulate the fate of those nutrients as they are either: (a) leftover for transport or field application; (b) removed from the overall system or the agriculture sector simulated in the model, or; (c) are lost to the environment from the conceptual “barnyard.”

Table B.2. Potential movement of nutrients during implementation of a disposal method, fallback values.

	Mass Percentage of Carcass Nutrients Exiting the Method (%)					Portion of carcass nutrients that follow one of three fates in the watershed model (a, b, or c)		
	Nutrients recycled with end products in the farm nutrient management plan		Nutrients emitted to the atmosphere	Nutrients leaving the method by all other pathways		(a) “Left for transport or application” coefficient	(b) “Removal” coefficient	(c) “Loss from barnyard” coefficient
	TN	TP	TN	TN	TP	TN/TP	TN/TP	TN/TP
Burial	0	0	0	15	5	0/0	0.85/0.95	0.15/0.05
Composting	80	100	10	10	0	0.8/1	0.1/0	0.1/0
Incineration	25	100	75	0	0	0.25/1	0.75/0	0/0
Landfilling	0	0	0	0	0	0/0	1/1	0/0
Rendering	0	0	0	0	0	0/0	1/1	0/0

If reporting based on production or inventory (AUs): Combining the estimated weights from Table B.1 with coefficients of Table B.2 yields the values in Table B.4, which gives the pounds of TN and TP that either (a) remains for transport or field application, (b) is removed from the system, or (c) is lost to the environment, as it pertains for each of the four BMPs.

For two examples, if a jurisdiction has records that the mortalities from 100 AUs of layers (inventory) are incinerated and the mortalities from 50 AUs of beef (production) are composted

For the layers, using Table B.1 we estimate that we have the following TN and TP amounts for disposal from mortalities:

100 AU x 2.2 lbs TN/AU = **220 lbs TN** from layer mortalities

100 AU x 0.4 lbs TP/AU = **40 lbs TP** from layer mortalities

Applying the coefficients from Table B.2 for incineration we estimate that:

Portion remaining for transport or application (0.25 TN / 1.0 TP) = **55 lbs TN / 40 lbs TP**

Portion "removed" (0.75 TN / 0 TP) = **165 lbs TN / 0 lbs TP**

Portion lost to environment (0 TN / 0 TP) = **0 lbs TN / 0 lbs TP**

For the beef cattle, using **Table B.1** we estimate that we have the following TN and TP amounts for disposal from mortalities:

50 AU x 0.47 lbs TN/AU = **23.5 lbs TN** from beef mortalities

50 AU x 0.14 lbs TP/AU = **7 lbs TP** from beef mortalities

Applying the coefficients from **Table B.2** for composting we estimate that:

Portion remaining for transport or application (0.8 TN / 1.0 TP) = **18.8 lbs TN / 7 lbs TP**

Portion "removed" (0.1 TN / 0 TP) = **2.35 lbs TN / 0 lbs TP**

Portion lost to environment (0.1 TN / 0 TP) = **2.35 lbs TN / 0 lbs TP**

For easier calculation we can use **Table B.3** which condenses the conversions from Table B.1 and B.2 for this reporting method.* Using the same two examples:

100 AU of layer mortalities, incinerated:

100 AU x 0.55 lbs TN/AU = **55 lbs TN** and 100 AU x 0.40 lbs TP/AU = **40 lbs TP remaining for transport or application**

100 AU x 1.65 lbs TN/AU = **165 lbs TN** and 100 AU x 0 lbs TP/AU = **0 lbs TP removed**

100 AU x 0 lbs TN/AU = **0 lbs TN** and 100 AU x 0 lbs TP/AU = **0 lbs TP lost**

50 AU of beef mortalities, composted:*

50 AU x 0.38 lbs TN/AU = **19 lbs TN** and 50 AU x 0.14 lbs TP/AU = **7 lbs TP** remaining for transport or application

50 AU x 0.05 lbs TN/AU = **2.5 lbs TN** and 50 AU x 0 lbs TP/AU = **0 lbs TP** removed

50 AU x 0.05 lbs TN/AU = **2.5 lbs TN** and 50 AU x 0 lbs TP/AU = **0 lbs TP** lost

*As seen in this example for beef mortalities, there is a slight difference due to rounding if performing calculations manually from Tables B.1 and B.2 (total of 23.5 lbs TN in the example , compared to total of 24 lbs TN when using Table B.3. Differences are negligible and Table B.3 is the streamlined option.

Table B.3. Estimated amount of TN and TP remaining for transport, removed, or lost from barnyard for burial, composting, incineration or rendering/landfill, per AU of animal type

	Burial						Composting					
	Amount left for transport or application		Amount removed		Amount lost from barnyard		Amount left for transport or application		Amount removed		Amount lost from barnyard	
	TN (lbs/AU)	TP (lbs/AU)	TN (lbs/AU)	TP (lbs/AU)	TN (lbs/AU)	TP (lbs/AU)	TN (lbs/AU)	TP (lbs/AU)	TN (lbs/AU)	TP (lbs/AU)	TN (lbs/AU)	TP (lbs/AU)
Broiler	0	0	1.53	0.24	0.27	0.01	1.44	0.25	0.18	0	0.18	0
Layer	0	0	1.87	0.38	0.33	0.02	1.76	0.40	0.22	0	0.22	0
Turkey	0	0	2.13	0.31	0.38	0.02	2.00	0.33	0.25	0	0.25	0
Swine	0	0	1.28	0.32	0.23	0.02	1.20	0.34	0.15	0	0.15	0
Dairy	0	0	1.62	0.54	0.29	0.03	1.52	0.57	0.19	0	0.19	0
Beef	0	0	0.40	0.13	0.07	0.01	0.38	0.14	0.05	0	0.05	0
Other Cattle	0	0	0.55	0.18	0.10	0.01	0.52	0.19	0.07	0	0.07	0
Horses	0	0	0.29	0.11	0.05	0.01	0.27	0.12	0.03	0	0.03	0
	Incineration						Rendering or Landfill					
	Amount left for transport or application		Amount removed		Amount lost from barnyard		Amount left for transport or application		Amount removed		Amount lost from barnyard	
	TN (lbs/AU)	TP (lbs/AU)	TN (lbs/AU)	TP (lbs/AU)	TN (lbs/AU)	TP (lbs/AU)	TN (lbs/AU)	TP (lbs/AU)	TN (lbs/AU)	TP (lbs/AU)	TN (lbs/AU)	TP (lbs/AU)
Broiler	0.45	0.25	1.35	0	0	0	0	0	1.80	0.25	0	0
Layer	0.55	0.40	1.65	0	0	0	0	0	2.20	0.40	0	0
Turkey	0.63	0.33	1.88	0	0	0	0	0	2.50	0.33	0	0
Swine	0.38	0.34	1.13	0	0	0	0	0	1.50	0.34	0	0
Dairy	0.48	0.57	1.43	0	0	0	0	0	1.90	0.57	0	0
Beef	0.12	0.14	0.35	0	0	0	0	0	0.47	0.14	0	0
Other Cattle	0.16	0.19	0.49	0	0	0	0	0	0.65	0.19	0	0
Horses	0.09	0.12	0.26	0	0	0	0	0	0.34	0.12	0	0

A1(b) – Reporting method using known weight of routine mortalities to estimate nutrients

If reporting based on known weight of carcasses, then the weight can be multiplied by the values in Table B.4. The coefficients in Table B.2 would then be applied to yield the estimated load reduction of TN and TP.

Table B.4 – Estimated average carcass composition for TN and TP by animal type, for use if reporting by carcass weight

	TN	TP
Broilers	2.82%	0.375%
Layers	3.97%	0.70%
Turkeys	2.46-2.93% (2.695% average)	0.375%
Swine	2.54%	0.563%
Cattle (beef)	2.827%	0.82%
Dairy	2.827%	0.82%
Equidae	3.2%	0.95%

For example, assume that a state has records of 2,000 lbs of dead birds (broilers) that were transported to a rendering facility and 2,000 lbs of dead hogs that were composted.

For the broilers sent to rendering, we estimate the total nutrients from mortalities using the values in **Table B.4**:

2000 lbs carcass x 0.0282 lbs TN/lbs carcass = 56.4 lbs TN from mortalities

2000 lbs carcass x 0.00375 lbs TP/lbs carcass = 7.5 lbs TP from mortalities

Then we apply the coefficients from **Table B.2** for rendering (0 TN or TP remaining for transport or application; 1.0 TN and TP removed; 0 TN or TP lost):

0 lbs TN and 0 lbs TP remaining

56.4 lbs TN and 7.5 lbs TP removed

0 lbs TN and 0 lbs TP lost

For the hogs that were composted we estimate the total nutrients from mortalities using the values in **Table B.4**:

2000 lbs carcass x 0.0254 lbs TN/lbs carcass = 50.8 lbs TN from mortalities

2000 lbs carcass x 0.00563 lbs TP/lbs carcass = 11.3 lbs TP from mortalities

Then we apply the coefficients from **Table B.2** for composting (0.8 TN and 1.0 TP remaining for transport or application; 0.1 TN and 0 TP removed; 0.1 TN and 0 TP lost):

40.6 lbs TN and 11.3 lbs TP remaining

5.1 lbs TN and 0 lbs TP removed

5.1 lbs TN and 0 lbs TP lost

A1(c) – Reporting method when only the number of systems is known (e.g., for NRCS 316) and presumed to be composters

In this case, it is assumed that the system is a mortality composter, and the number of animals is determined with the following conversion (from CAST detailed source data – Animal):

Table B.5 – CAST conversion rates of animals per system

	Animal count per system
turkeys	3,744
beef	22
broilers	198,096
dairy	84
Swine (hogs for slaughter)	74
horses	7
layers	1,720
other cattle	43

Applying those animal counts and the panel's recommendations (mortality nutrients per AU) translate to the following estimates, using CAST values for 2020.

Table B.6 – Estimated weight of TN and TP remaining, removed, or lost when reporting by number of mortality systems, presumed to be composters

	AUs per system	Amount remaining for transport or application (lbs per system)		Amount removed (lbs per system)		Amount lost from barnyard (lbs per system)	
		TN	TP	TN	TP	TN	TP
turkeys	97.7	195.3	32.2	24.4	0.0	24.4	0.0
beef	19.3	7.3	2.7	0.9	0.0	0.9	0.0
Broilers							
DE	1,446.1	2,082.4	361.5	260.3	0	260.3	0
MD	1,208.4	1,740.1	302.1	217.5	0	217.5	0
NY	1,112.4	1,601.8	278.1	200.2	0	200.2	0
PA	1,109.3	1,597.4	277.3	199.7	0	199.7	0
VA	1,129.2	1,626.0	282.3	203.3	0	203.3	0
WV	772.6	1,112.6	193.2	139.1	0	139.1	0
dairy	113.5	172.5	64.7	21.6	0.0	21.6	0.0
Swine (hogs for slaughter)	20.0	24.0	6.8	3.0	0.0	3.0	0.0
horses	7.0	1.9	0.8	0.2	0.0	0.2	0.0
layers	6.9	12.1	2.8	1.5	0.0	1.5	0.0
other cattle	12.9	6.7	2.4	0.8	0.0	0.8	0.0

For example, if 3 systems are reported and they apply to broilers (using WV in this example), then we estimate that:

3337.8 lbs TN and 579.6 lbs TP remaining for transport or application

417 lbs TN and 0 lbs TP removed

417 lbs TN and 0 lbs TP lost

Q2. What types of projects are eligible to receive credit in the Phase 6 Watershed Model?

A2. Any mortality management practice or method that meets the definitions above and treats routine animal mortalities from one of the animal groups listed in Q1/A1. Practices or methods used for catastrophic mortality events are not eligible under this set of practices. Practices or methods that are also used to treat manure should not be reported twice, i.e., they should not be reported as both mortality and manure treatment practices.

Q3. How do the new BMPs relate to existing NEIEN practices and what will jurisdictions need to submit to NEIEN to receive credit for ~~broiler mortality freezer~~ these practices upon ~~its~~ approval for progress?

A3. For now, these BMPs are for planning purposes only until CAST-23, but they can be reported into NEIEN immediately, but though they will not be credited for progress until 2023-2024 Progress.

The table below summarizes the new BMPs' proposed names in NEIEN ~~and how they relate to existing BMPs within NEIEN~~. Please note that each BMP is applicable to any animal type (except goats and sheep), which will also need to be specified in the NEIEN submission. **Editor's Note:** This will be updated based on WTWG and jurisdictional input.

Table B.7 –Proposed NEIEN and CAST BMP names based on expert panel recommendations

NRCS CP number or other common names if applicable	BMP name based on EP recommendations	Measurement unit(s)	Proposed NEIEN BMP name	Proposed CAST BMP Name
*NRCS316	Mortality composting	Systems OR Tons of carcasses OR AUs treated		Animal mortality disposal – composting
	Rendering	Systems OR Tons of carcasses OR AUs treated		Animal mortality disposal – rendering or landfill
	Landfill	Systems OR Tons of carcasses OR		Animal mortality disposal – rendering or landfill

		AUs treated		
	Burial	Systems OR Tons of carcasses OR AUs treated		Animal mortality disposal – burial
	Incineration	Systems OR Tons of carcasses OR AUs treated		Animal mortality disposal - incineration

*NRCS316 can involve any of the BMP types described here, but the default practice is assumed to be composting if unknown.

Specifically, the jurisdictions will need to report the following into NEIEN:

- **BMP Name:** Practice name (e.g., Animal mortality disposal - incineration, Animal mortality disposal – burial, Animal mortality disposal – Composting, Animal mortality disposal – Rendering or landfill)
- **Measurement Names:**
 - Unit – Each practice can be reported in terms of the animal carcasses weight (tons) OR in terms of the animal units (AUs) serviced by the mortality BMP OR # of systems (for composting only)
 - Animal Type – You will be asked to report the animal type (e.g., “Broilers”)
 - ~~For Animal mortality disposal – incineration and Animal mortality disposal – composting you will also be asked for:~~
 - County From – FIPs code associated with the county in which the mortalities were generated
 - County To – FIPs code associated with the county to which treated end products were transported
- **Geographic Location:** Qualifying NEIEN geographies including: Latitude/Longitude; or County; or Hydrologic Unit Code (HUC12, HUC10, HUC8, HUC6, HUC4); or State in which the facility is located
- **Date of Implementation:** Year the mortality treatment was done (specific MM/DD/YYYY is required for NEIEN)
- **Load sources:** Permitted feeding operation, non-permitted feeding operation, feeding operation

Q4. What should a jurisdiction include in CAST in order to receive credit for these practices?

A4. Jurisdictions must include the animal type and either the production/inventory of the operation (AUs) or the weight (tons) of carcasses disposed using the BMP. Since these are also transport BMPs, the user must also know the county in which the carcasses originated and the county to which they are transported. If only the number of systems is known, then assumptions about the number of animals will be made to estimate changes in the load (see Tables B-5 and B-6).

Q5. What should a jurisdiction report for the county where the carcasses were transported if the carcass nutrients are not reapplied to agricultural land?

A5. In these situations, jurisdictions may leave the county receiving transport field blank so it is a null value in the same way jurisdictions currently report manure that is no longer within the agricultural system or sector, for example, treated manure resold as soil amendments at home improvement stores.

Q6. Which land use categories are eligible to receive nutrient reduction credit from mortality BMPs in the Phase 6 Watershed Model?

A6. In the Phase 6 Watershed Model, nutrient reductions from mortality BMPs ~~could~~can be applied to permitted feed operations or non-permitted feed operations. If neither land use is provided, the credit will be applied to the default category, “feed operations”, and the reduction ~~credit would be~~is distributed proportionally between permitted and non-permitted feed operation land uses.

Q7. Are these BMPs annual or cumulative practices?

A7. When reporting as number of systems, the practices are cumulative (credit duration = 15 years, unless reporting as RI-2, with credit duration = 5 years). If reporting in weight of mortalities or AUs, the practice must be reported annually. These BMPs are all annual practices.

Q8. How does this relate to the previous planning BMP for “Broiler Mortality Freezers”?

A8. Back in 2019 the AgWG established a planning BMP for “broiler mortality freezers” that used value from Felton et al (2009) – part of Simpson and Weammert-Lane (2009) – to estimate a manure transport credit of 29 lbs N and 4.9 lbs P per ton of dead broiler carcass transported out of the county or watershed. The proposed new BMP for “mortality disposal – landfill or rendering” encompasses the same practice, but as part of the larger “rendering” practice that will be available as an approved BMP starting in CAST-23.

Q9. Is this practice mutually exclusive with other practices?

A9. No.

Q10. Are reported mortality BMPs assumed to have an Animal Waste Storage Facility on the property?

A10. No. Animal Waste Storage BMPs must be reported separately in order to receive simulated reductions for those practices.

Q11. How do mortality BMPs relate to other barnyard practices in the Phase 6 Model, such as Animal Waste Management Systems, Barnyard Runoff Controls and Loafing Lot Management?

A11. These practices should be tracked and reported separately. It is likely that many facilities with a mortality storage or disposal systems will also have a combination of other barnyard practices employed on-site to control runoff from feeding and loafing lot areas. States may report multiple barnyard practices and mortality practices for the same site if applicable.

Q12: How does the existing “Mortality Fraction” in CAST relate to the panel recommendations?

A12: The mortality fraction in CAST determines the maximum portion of dead animals eligible for mortality practices. It is a single value for each animal type (seen below in Table B-8).

Table B-8. Current CAST mortality fraction and proposed new mortality fraction for CAST23 based on panel's mortality estimates

Animal Name	Mortality Fraction	Proposed mortality fraction
turkeys	0.07	<u>0.15</u>
pullets	0.10	<u>0.08 (using layers as proxy)</u>
dairy	0.06	<u>0.10</u>
goats	0.06	<u>0.03 (using other cattle as proxy)</u>
broilers	0.05	<u>0.05</u>
beef	0.06	<u>0.09</u>
hogs for slaughter	0.06	<u>0.05</u>
layers	0.10	<u>0.08</u>
hogs and pigs for breeding	0.06	<u>0.08</u>
horses	0.06	<u>0.01</u>
other cattle	0.06	<u>0.03</u>
sheep and lambs	0.06	<u>0.03 (using other cattle as proxy)</u>

The proposed change to the mortality fraction will be incorporated in CAST23.

In Phase 6, the mortality fraction will act as an upper limit for the amount of nutrients from the feedspace load source that can be removed through the mortality disposal BMPs described in this appendix.

Q13: How is the redeposition of nitrogen from incineration or composting practices simulated through an edge of tide load adjustment?

A13: For incineration and composting practices, a portion of the nitrogen released to the atmosphere is assumed to be —volatile species of N (NH₃ or NO_x), which may be redeposited within the Chesapeake Bay Watershed.— This load adjustment is calculated at edge-of-tide, using assumed proportions in Table

B-9 for the proposed mortality practices, which are consistent with values applied for similar manure treatment technologies (manure combustion and manure composting).

Table B-9. Estimated portions of TN assumed to be N₂, NH₃ or NO_x.

	% of manure TN removed into air	assumed % of air emissions by type		
		<u>N₂</u>	<u>NH₃</u>	<u>NO_x</u>
Incineration	75	90	-	10
Composting	10	-	100	-

Q14: What if my loads change in unexpected ways?

A14: Since the mortality disposal practices are simulated the same as manure treatment and manure transport practices in Phase 6 CAST, there are helpful documents (fast facts, FAQs) available on CAST to explain how such BMPs can affect loads: <https://cast.chesapeakebay.net/Documentation/BMPs>

See also:

https://cast-content.chesapeakebay.net/documents/CASTManureQA_20200521.pdf