

Response Rate and Weights

The Biosolids and Manure survey was sent to a stratified random sample of NY agricultural landowner, using a sampling frame purchased from Farm Market ID that included both commodity produced and farm size. Table 1 below summarizes the survey sample as compared to the NY farm population, as well as the required probability weights for each strata. Since strata had different sampling ratios, it is necessary to apply the appropriate weights and to conduct all analysis using Stata's survey (svy) commands. SVY commands have been shown to provide unbiased error estimates for stratified samples (McDowell and Pitblado 2002).

Table 1: Survey response and weights

		NY Farm Population	Survey Sample	n	P-weight
Hay	<100 acres	7,420	1716	283	4.32
	100+ acres	117	117	38	1.00
Beef	<100 head	1,784	908	303	1.96
	100+ head	56	50	14	1.00
Dairy	<100 head	4,879	880	216	5.54
	100+ head	2,274	760	187	2.99
Corn	<100 acres	12,208	1225	249	9.97
	100+ acres	527	527	184	1.00
				6,183	1,474

A total of 1,474 usable surveys were completed. Additionally, 25 completed surveys were returned with their unique identifiers removed (which means they cannot be included in the analysis because they cannot be properly weighted), 655 surveys were returned from landowners who were ineligible because they had not participated in agricultural production within the previous two years, 12 surveys were returned because the owner was deceased, 335 surveys were returned with an incorrect address, and 50 surveys were returned indicating the individual declined to participate. The resulting response rate is 40.9%, the functional response rate (usable surveys) is 24%.

Location and Commodities

58 of NY's 62 counties are represented amongst respondents, as shown in Table 2.

Table 2: County locations of respondents

County	Weighted n	County	Weighted n
ALBANY	142.1	NIAGARA	314.5
ALLEGANY	201.2	ONEIDA	200.3
BROOME	221.6	ONONDAGA	182.3
CATTARAUGUS	220.3	ONTARIO	443.8
CAYUGA	387.7	ORANGE	77.74
CHAUTAUQUE	408	ORLEANS	171.2
CHEMUNG	180.3	OSWEGO	175.9
CHENANGO	176.2	OTSEGO	211.7
CLINTON	239.1	RENSSELAIRE	125.8
COLUMBIA	145.4	RICHMOND	47.11
CORTLAND	147.7	ROCKLAND	6.165
DELAWARE	246.7	SAINT LAZARE	389.9
DUTCHESS	28.37	SARATOGA	107.6
ERIE	257.1	SCHENECTADY	97.71
ESSEX	86.16	SCHOHARIE	167.6
FRANKLIN	143.2	SCHUYLER	72.46

FULTON	36.69	SENECA	190.1
GENESEE	182.2	STEUBEN	495.9
GREENE	48.48	SUFFOLK	55.74
HERKIMER	216.7	SULLIVAN	157.2
JEFFERSON	566.9	TIOGA	51.96
KINGS	6.165	TOMPKINS	133.4
LEWIS	115.1	ULSTER	57
LIVINGSTON	197	WARREN	7.184
MADISON	205.3	WASHINGTON	211
MONROE	119	WAYNE	252
MONTGOMERY	221.4	WESTCHES	15.15
NASSAU	13.35	WYOMING	266.9
NEW YORK	19.07	YATES	218
Weighted total	10,362		

Representative of NY agriculture, the most common commodities produced by respondents are hay and beef, with dairy and other animals¹ as the other most common animal products. Production seems very diversified, with most reporting multiple commodities in production.

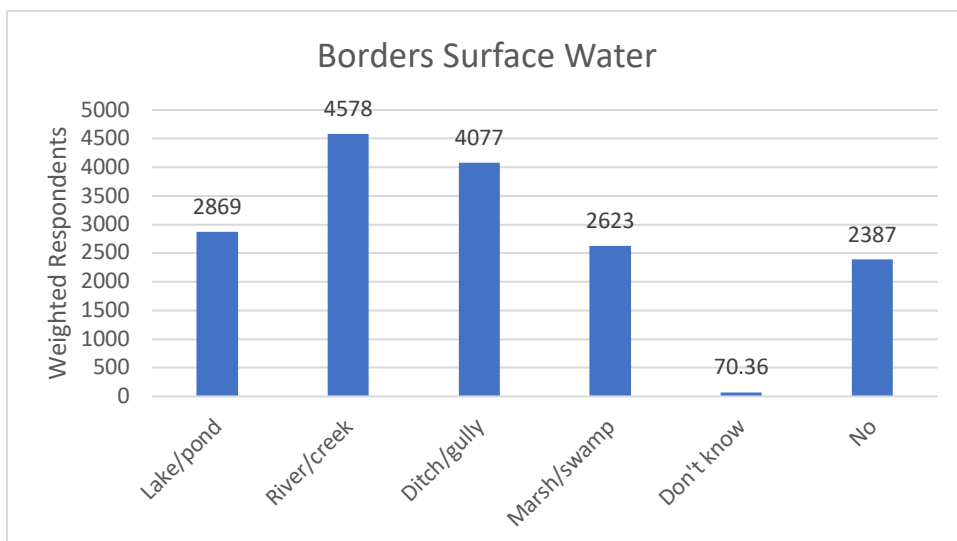
	Weighted n	Weighted %	Additional commodities (weighted %)								Hay &
			Beef &	Dairy &	Poultry &	Pork &	Other animal &	Corn &	Soy &	Wheat &	
Beef	3992	39									
Dairy	1602	15	11								
Poultry	1335	13	25	15							
Pork	691	7	16	7	28						
Other animal	2820	27	42	30	54	49					
Corn	3667	35	33	73	33	52	37				
Soy	1753	17	12	19	14	14	14	44			
Wheat	1047	10	7	11	10	9	8	25	41		
Hay	7932	77	88	95	82	87	85	80	69	70	
Other crop	3711	36	35	41	43	47	48	52	52	59	74

Conservation Behaviors

As expected in NY state, the majority of our respondents report that their properties include or border surface water (Figure 1). Only 23% of respondents report that their property does not border surface water and 1% report that they don't know. The most common reported surface water is a river or creek (44% of respondents).

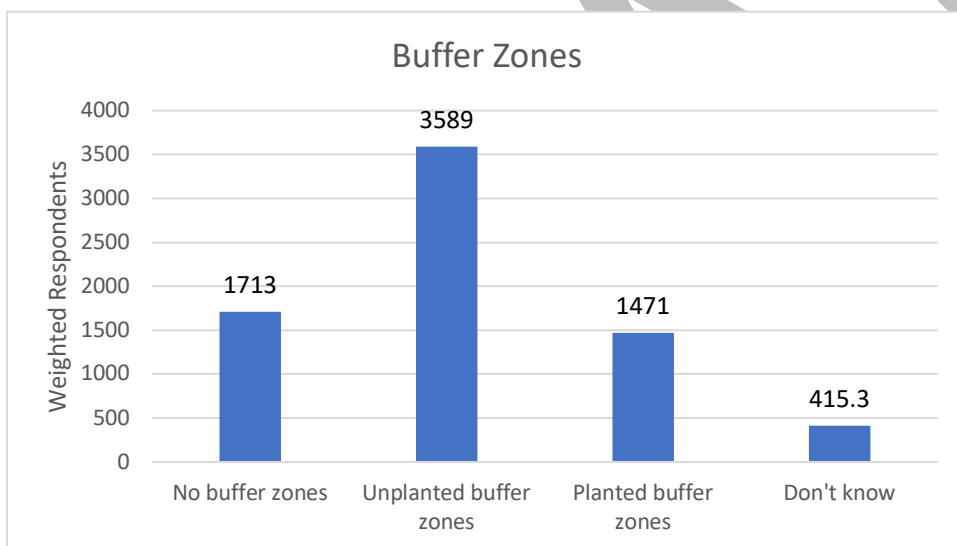
Figure 1: Proximity to surface water

¹ Other animals are not beef, dairy milking cows, poultry, or pork. Reported "other animals" included horses, dairy replacement stock (young dairy cows not milked), goats, sheep, rabbits, alpacas, pheasants, deer, llamas, emus, bees, bison, and donkeys.



Of those respondents who report that their property includes or borders surface water, 50% report that they use unplanted buffer zones around surface water and 20% report that they use planted buffer zones (Figure 2). 24% of respondents whose property includes or borders surface water utilize no buffer zones². The average size of an unplanted buffer zone is 274 feet (CI 124-424). The average size of a planted buffer zone is 188 feet (CI 65-311).

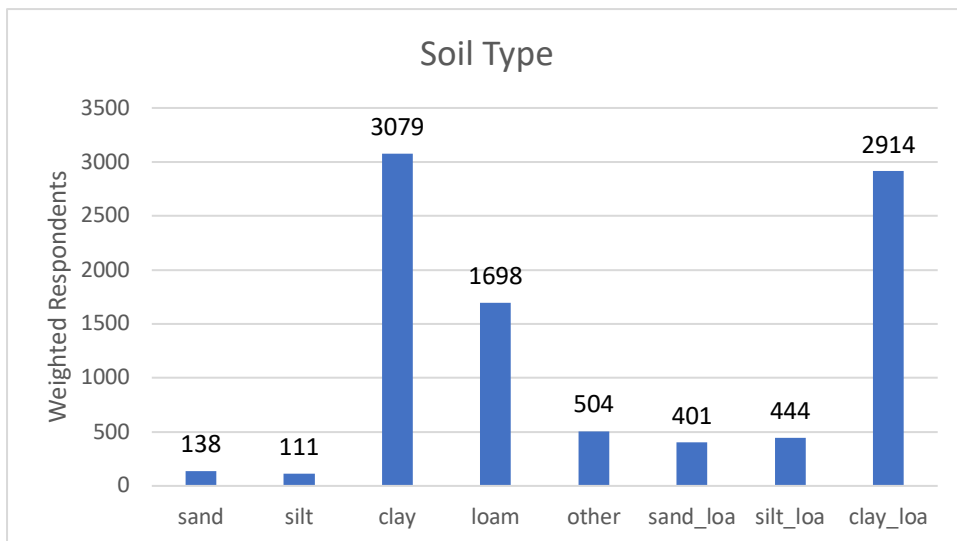
Figure 2: Use of buffer zones around surface water



The most common reported soil types are clay (30%), clay-loam (28%), and loam (16%) (Figure 3).

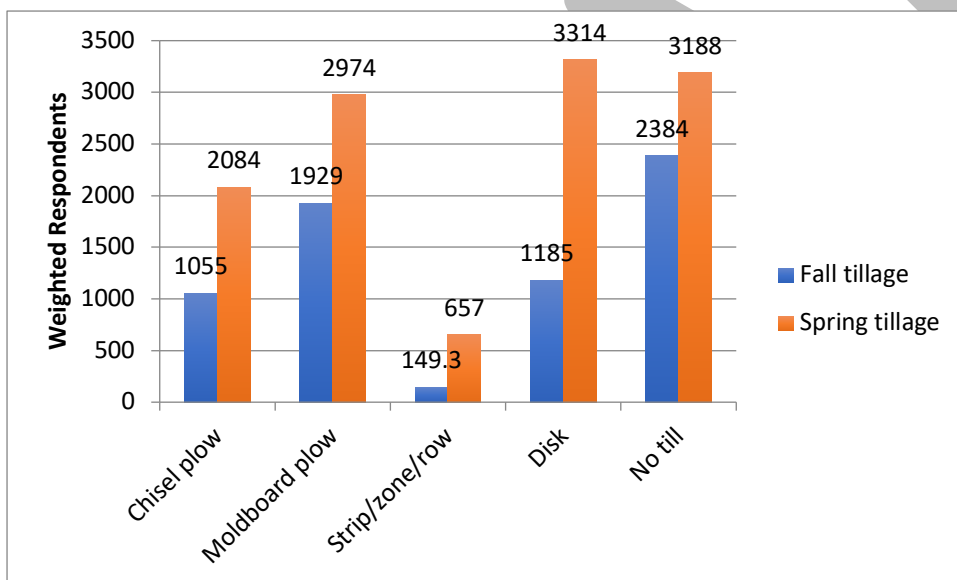
Figure 3: Soil type

² The survey question concerning buffer zones included the following definition of buffer zones: "Buffer zones are strips of land surrounding surface water where there is no crop planted. They provide a 'buffer' between the cropland and the surface water. They may be unplanted or planted with some sort of permanent vegetation such as bushes or trees."



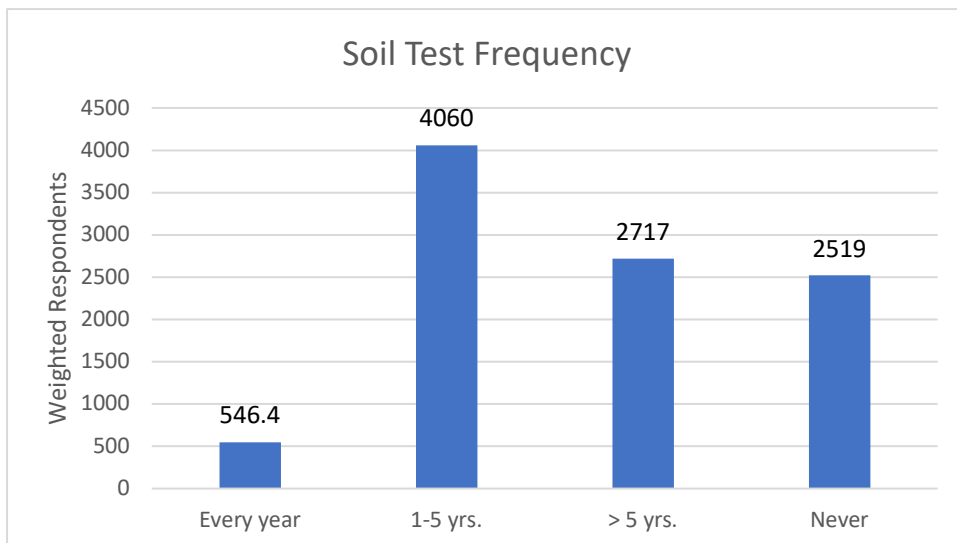
A significant minority (23% fall, 31% spring) of respondents practice no till methods, while moldboard (19% and 29%) and disk (11% and 32%) are the most common types of tillage (Figure 4).

Figure 4: Tillage



A significant minority of respondents (24%) report never testing soil for nutrient content, 39% report testing soil every 1-5 years, 26% greater than every 5 years, and only 5% report testing soil every year (Figure 5).

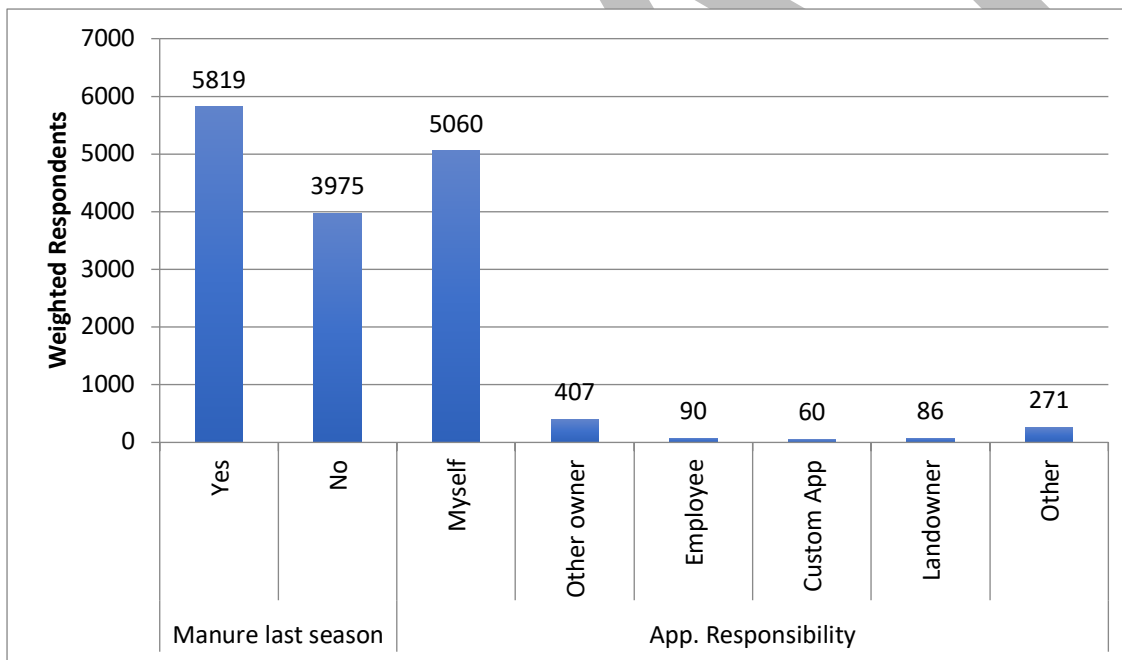
Figure 5: Soil testing



Manure Behaviors

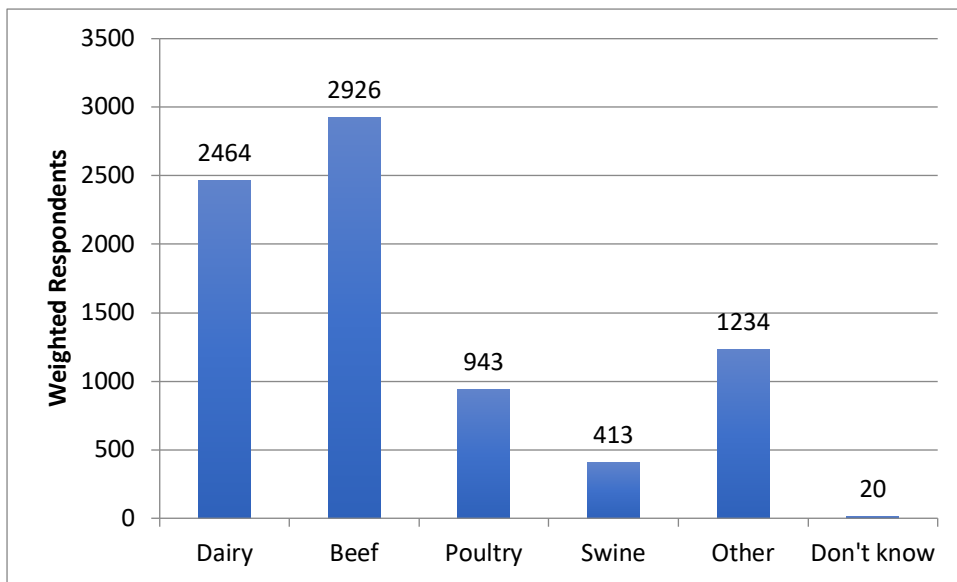
Approximately 64% of respondents applied some form of manure to their land during the last season, and the vast majority (85%) report that they are directly responsible for manure application.

Figure 6: Manure application



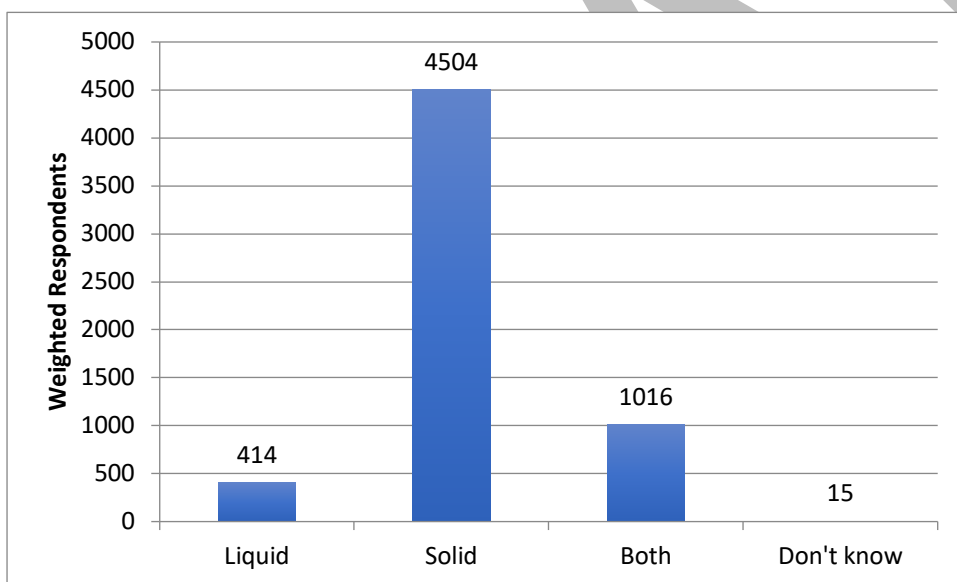
Beef (36%) and dairy (31%) are the most common forms of manure applied.

Figure 7: Type of manure



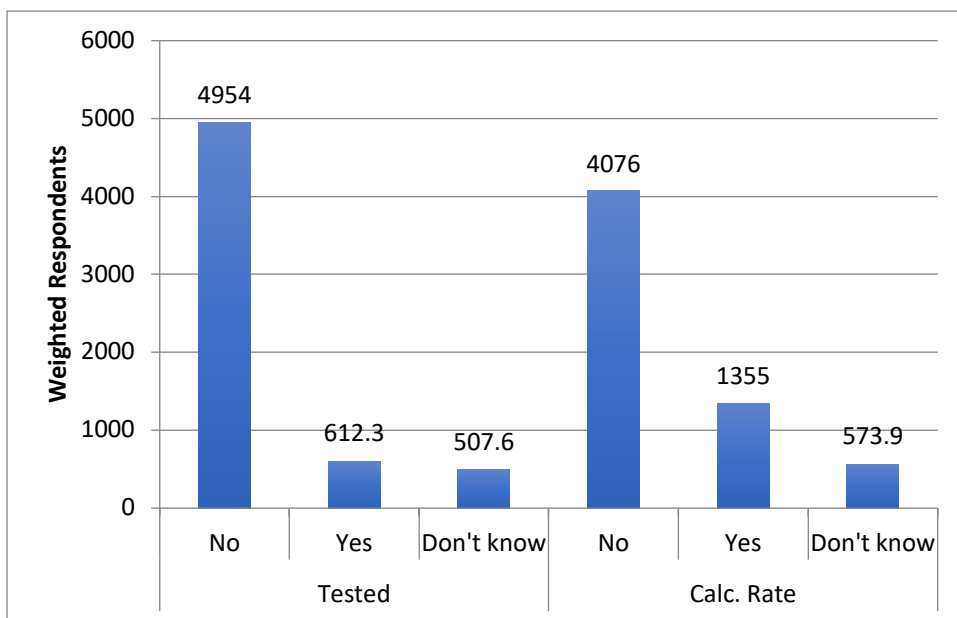
Most respondents apply manure as a solid (76%), approximately 17% apply manure as both a liquid and solid, and only approximately 7% apply manure in liquid form.

Figure 8: Manure form



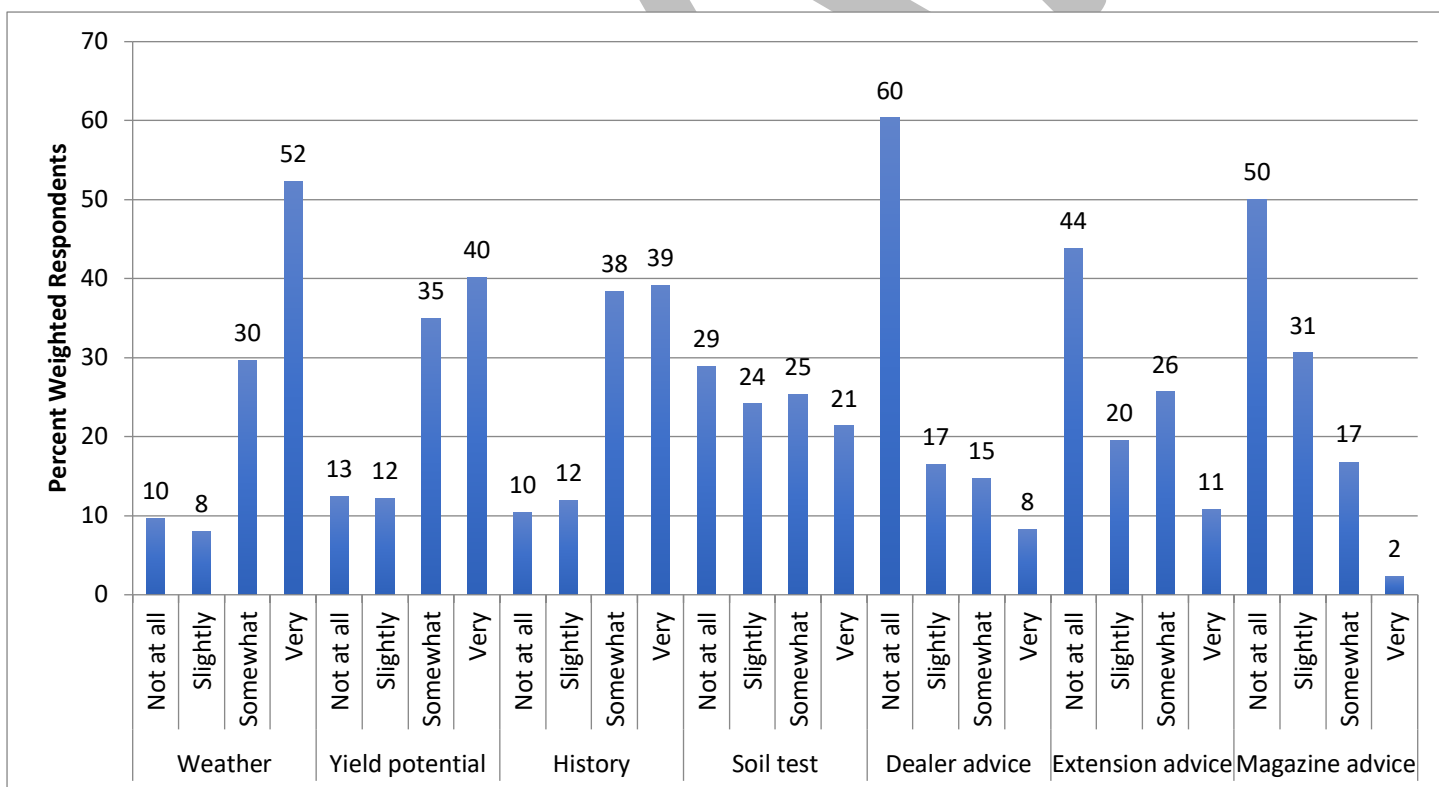
The vast majority of respondents (82%) report that they do not test their manure for nutrient content. 67% of respondents report that they do not calculate a manure application rate (amount per acre), with only 22% reporting that they do calculate a manure application rate.

Figure 9: Manure nutrient testing and calculated application rate



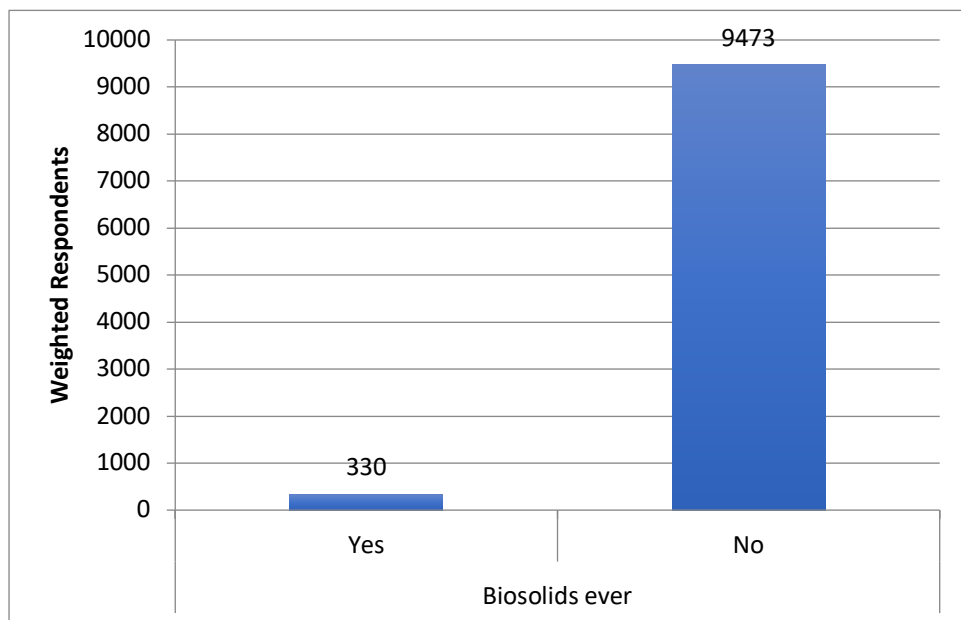
Regarding their importance when making manure application decisions, the majority of respondents agree weather is very important (52%) or somewhat important (30%), yield potential is very important (40%) or somewhat important (35%), and history is very important (39%) or somewhat important (38%). Of relative low importance are soil tests (29% not at all and 24% slightly), advice from dealers (44% not at all and 20% slightly), advice from Cornell Cooperative Extension (44% not at all and 20% slightly), and magazines (50% not at all and 31% slightly).

Figure 10: Importance when making manure application decisions (percentage)



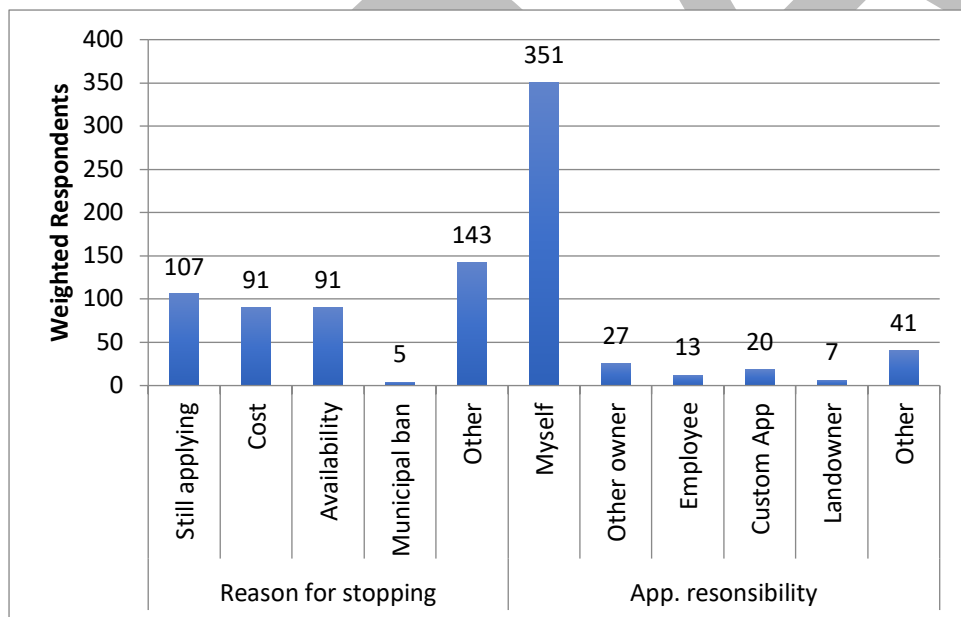
Only 3% of respondents report ever having applied biosolids to land that they manage.

Figure 11: Ever applied biosolids



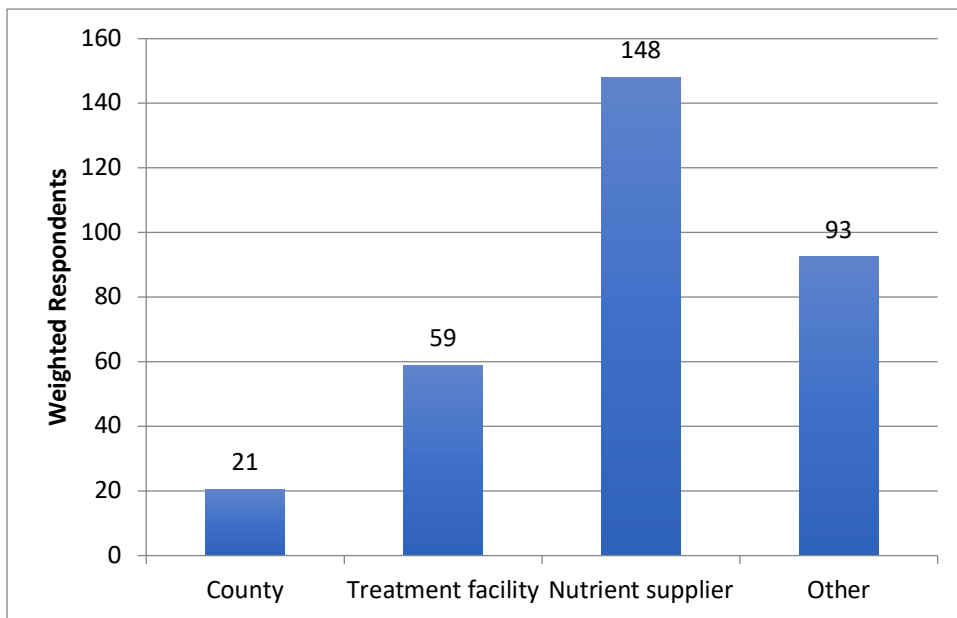
Of those who have ever applied biosolids, approximately 25% are still applying biosolids, 21% stopped for cost, and 21% stopped because of availability. Of those who have ever applied biosolids, 77% report they have primary responsibility for application.

Figure 12: Reasons for stopping biosolids application and responsibility for application



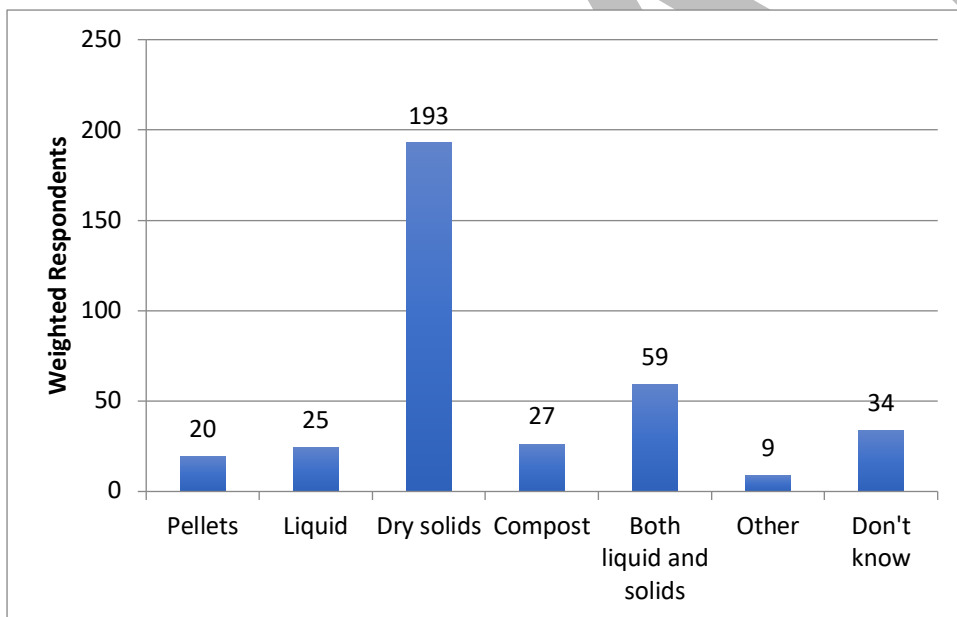
Of those who have ever applied biosolids, the most common way they were acquired was from a nutrient supplier (46%). Of the respondents who chose "other", responses included their municipality, custom applicators, and a variety of third party sellers.

Figure 13: Where biosolids acquired



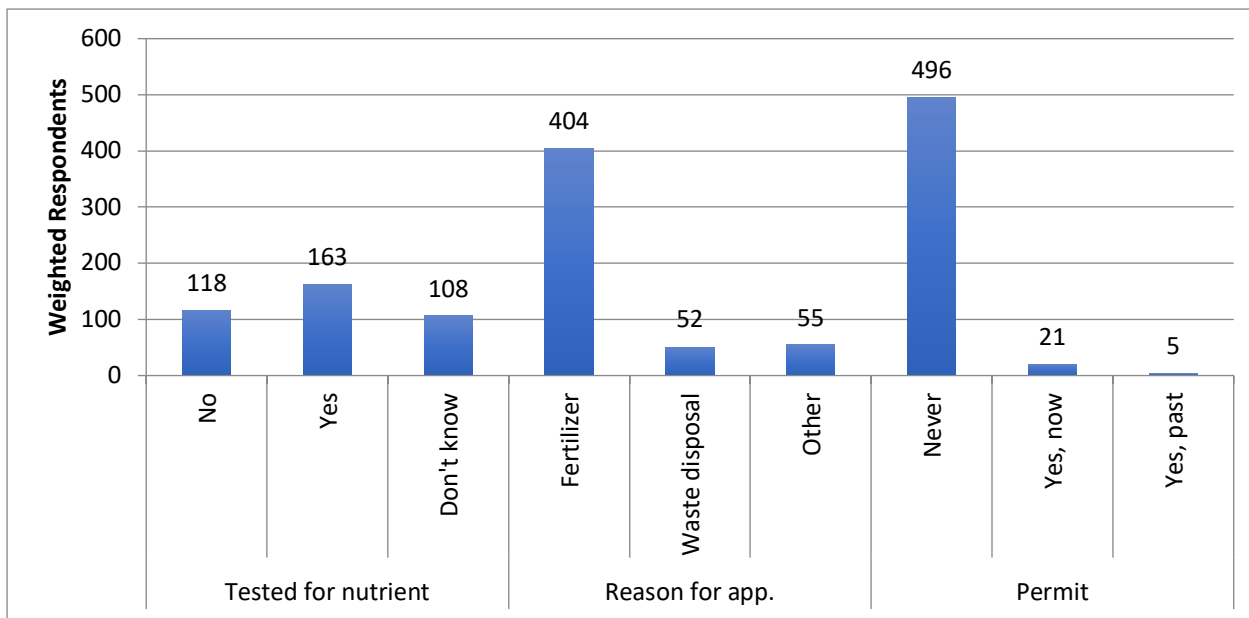
Of those who have ever applied biosolids, 53% have applied it as dry solids, 16% as both liquid and solids, 7% as compost, and 7% as liquid only. Only 5% have applied as pellets and 3% in another form, while 9% do not know the form in which biosolids were applied.

Figure 14: Form of biosolids applied



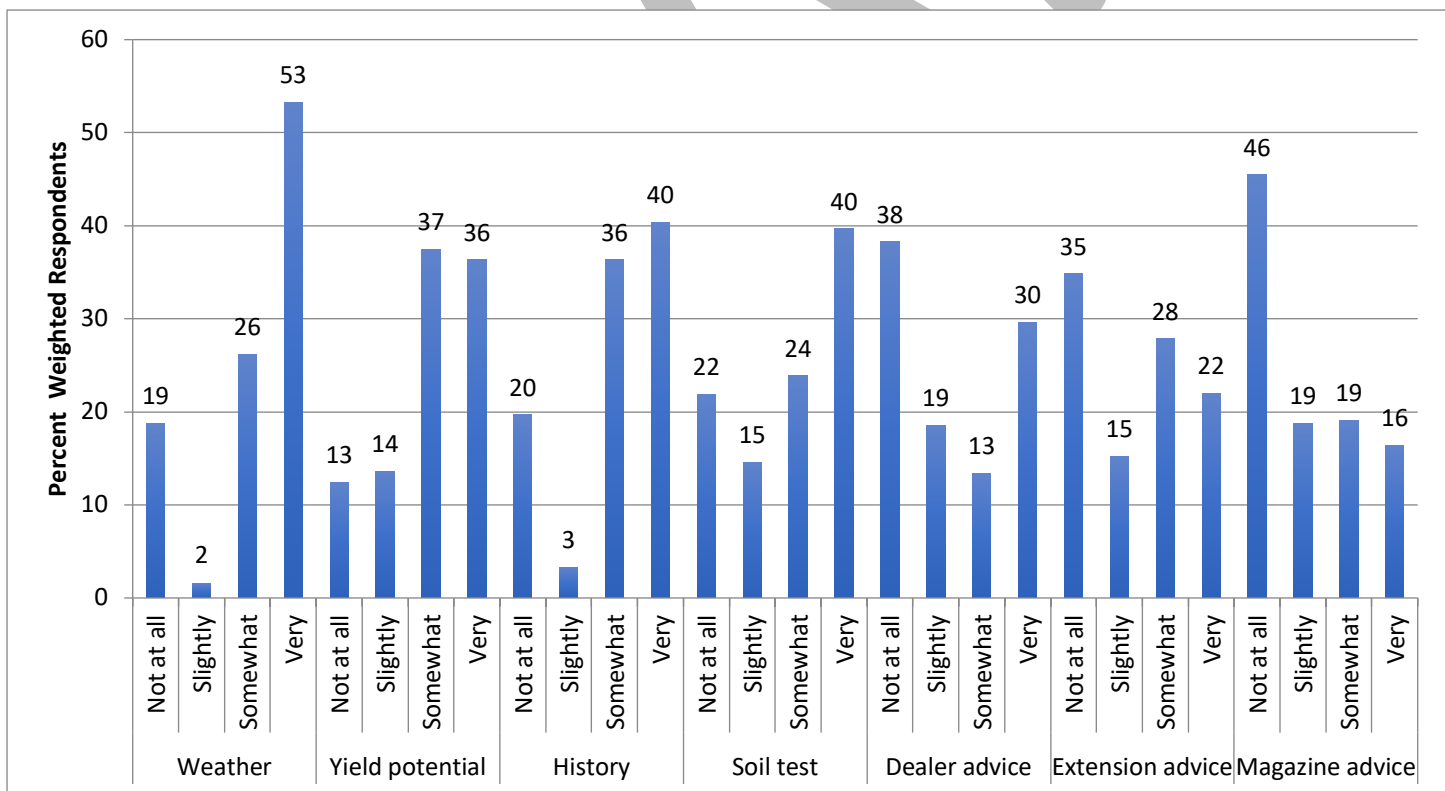
Of those who have ever applied biosolids, 42% report that the biosolids were tested for nutrient content, 30% report it was not, and 28% don't know. 79% report that fertilizer was the primary reason for application. 95% report that they have never held a biosolids application permit, which indicates that they either hired a permitted third party to do the application or they applied only Class A biosolids.

Figure 15: Nutrient testing, reason for application, and permits



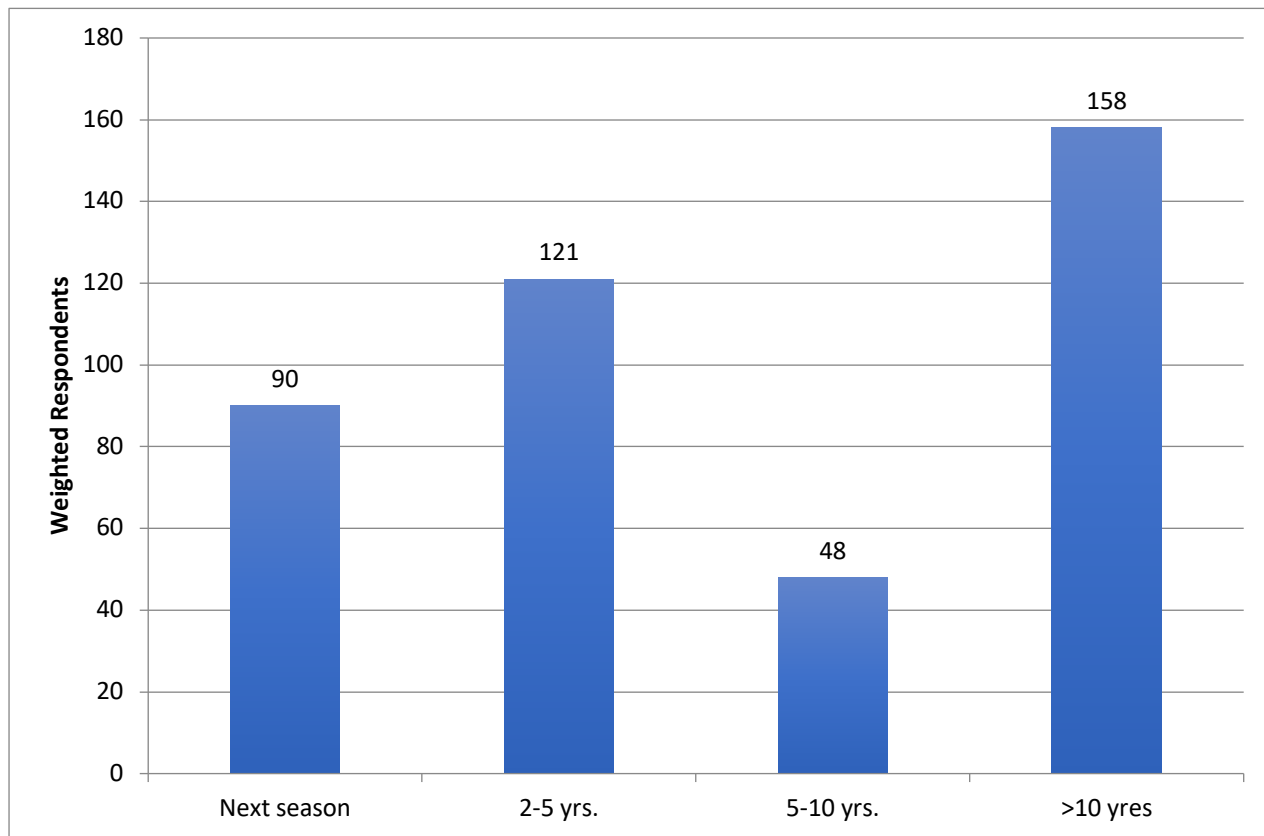
Regarding their importance when making biosolids application decisions, the majority of respondents agree weather is very important (53%) or somewhat important (26%), yield potential is very important (36%) or somewhat important (37%), history is very important (40%) or somewhat important (36%), and soil tests are very important (40%) or somewhat important (24%). Of relative lower importance are advice from dealers (38% not at all and 19% slightly), advice from Cornell Cooperative Extension (35% not at all and 15% slightly), and magazines (46% not at all and 19% slightly).

Figure 16: Importance when making biosolids application decisions (percentage)



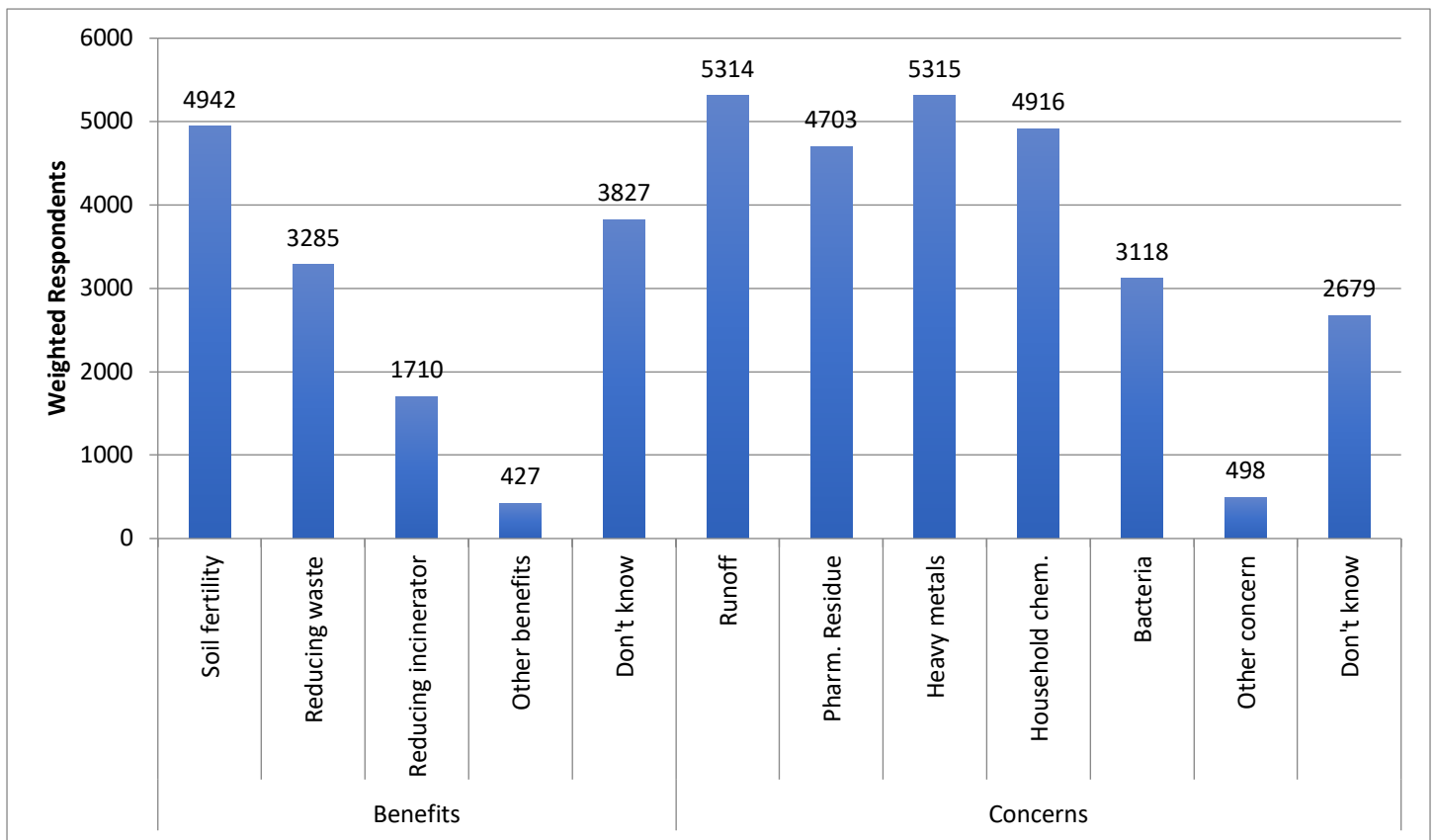
Regarding future plans to use biosolids, 83% report that they have no future plans to apply biosolids. Of those who plan to apply biosolids in the future, approximately 22% report that they plan to apply next season, approximately 29% within the next 2-5 years, approximately 11% within the next 5-10 years, and approximately 38% in more than ten years.

Figure 17: Future biosolids application plans



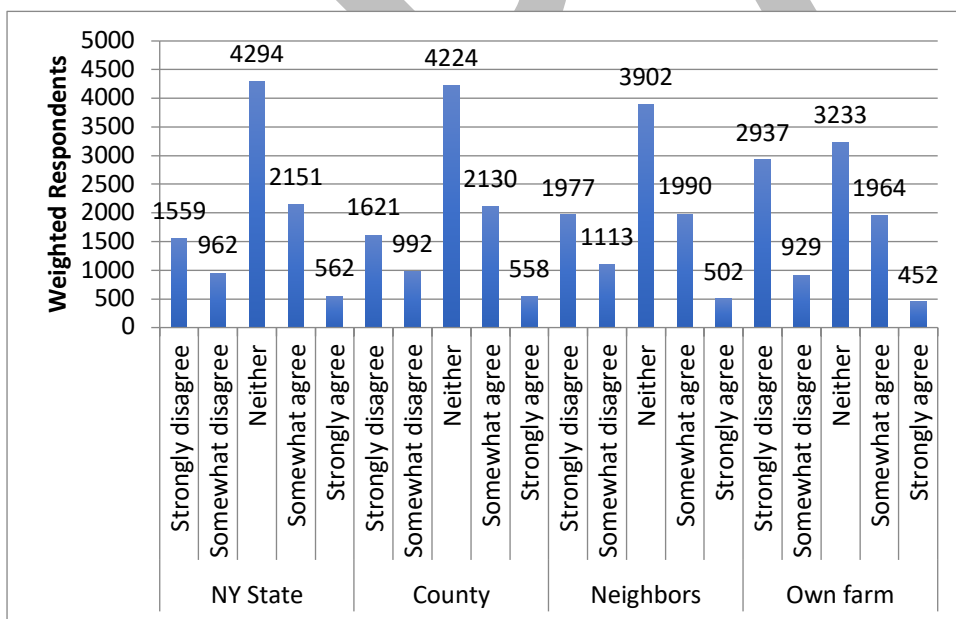
When asked about the benefits and concerns of biosolids land application, 48% of respondents report soil fertility as a benefit, approximately 31% reducing waste, approximately 17% reducing incinerator use, 4% other benefits, and 37% report that they don't know any benefits. Regarding concerns, approximately 51% report runoff as a concern, 45% pharmaceutical residue, 52% heavy metals, 47% household chemicals, 30% bacteria, 5% other concerns, and 26% report that they don't know any concerns.

Figure 18: Benefits and concerns of biosolids application



Respondents were asked if they support the application of biosolids in NY state, their county, by their neighbors, and on their own farm (this type of series of questions is called a Bogardus Social Distance Scale). For state, county, and neighbors, respondents are predominantly neutral regarding biosolids application: 47%, 47%, and 44%, respectively. Respondents are slight more negative about biosolids application on their own farms, with only 19% somewhat agreeing and 4% strongly agreeing.

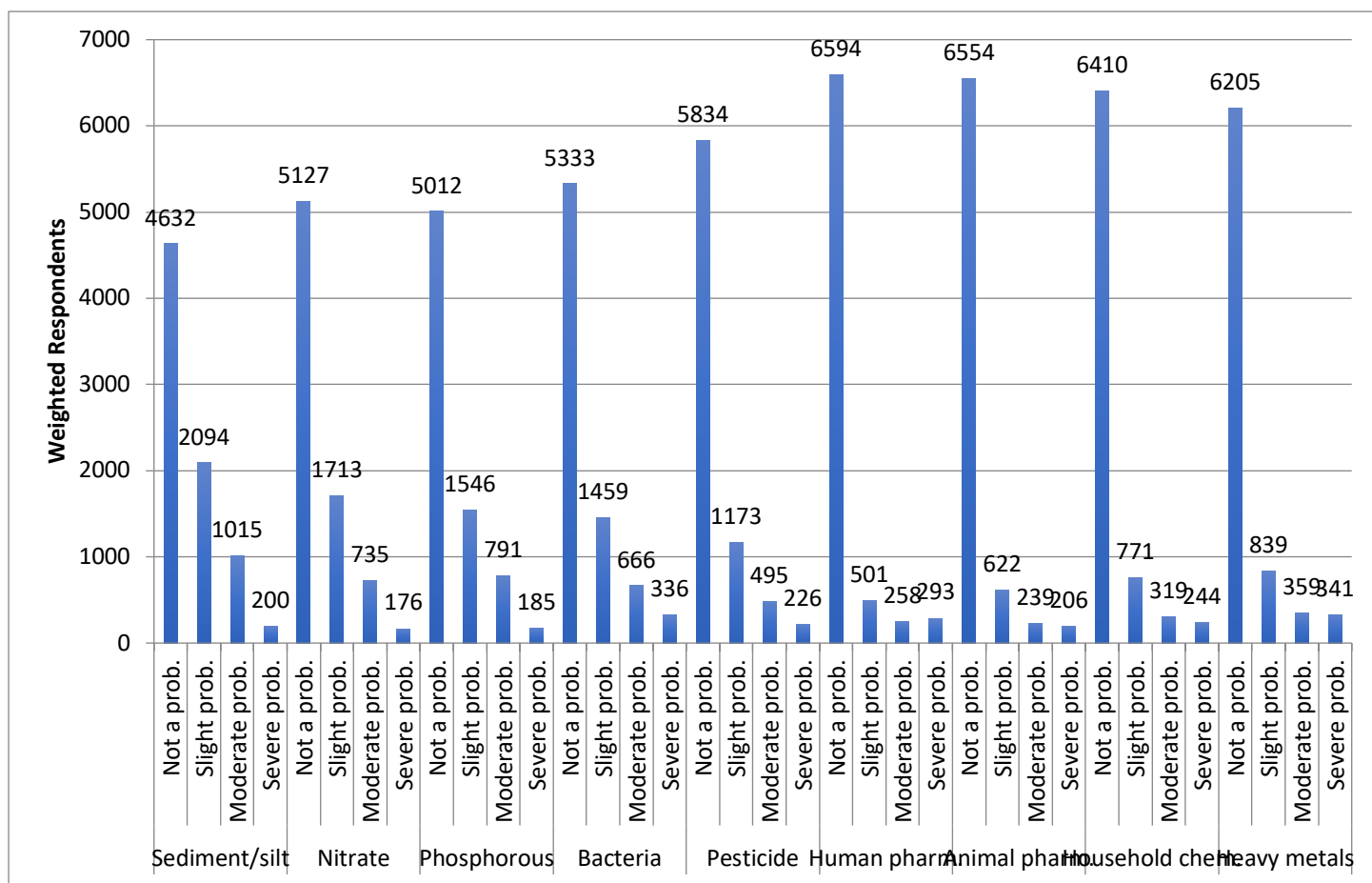
Figure 19: Support for application of biosolids (Bogardus social distance scale)



Pollution Concerns

When asked about water pollution concerns, most respondents indicated that sediment (58%), nitrate (66%), phosphorous (67%), bacteria (68%), pesticide (75%), human pharmaceutical residue (86%), animal pharmaceutical residue (86%), household chemical residue (83%), and heavy metals (80%) were "not at all a problem" in their area.

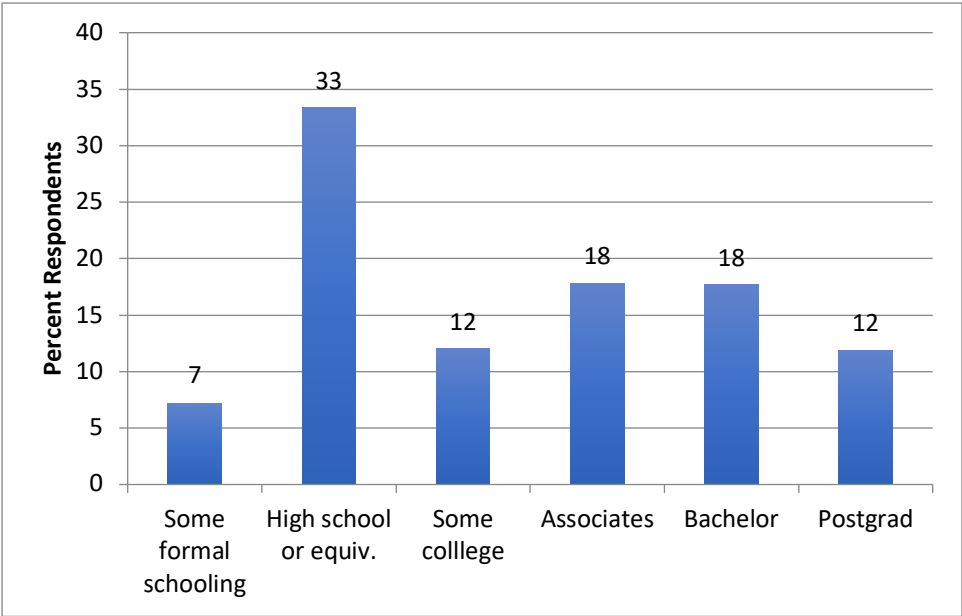
Figure 20: Water pollution concerns



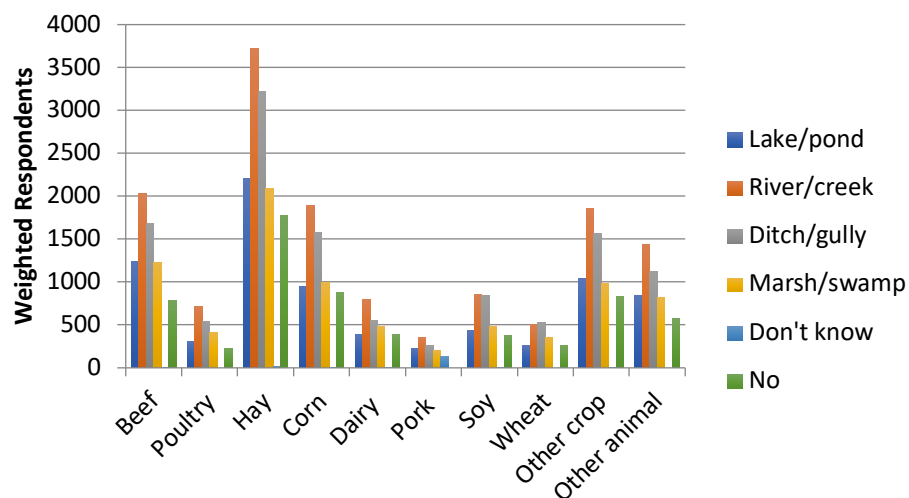
Sociodemographics

The average age of respondents was 63 years, 83% were men, average 2018 household income was \$172,019, with an average percentage from agriculture of 38%. 33% of respondents report a high school degree or equivalent.

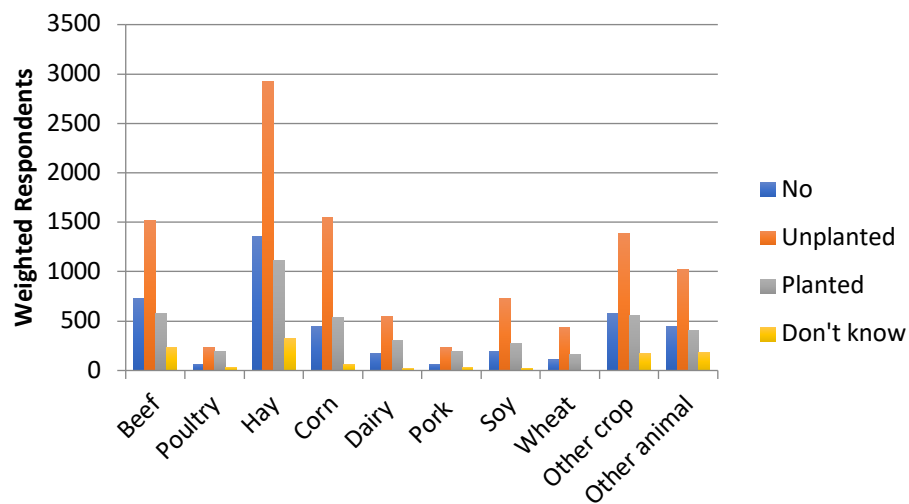
Figure 21: Level of education (percentage)



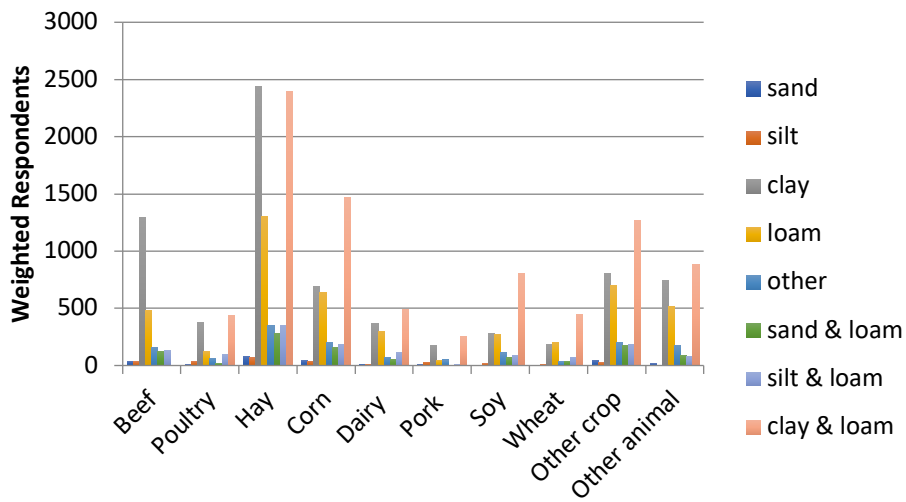
Proximity to Water by Commodity



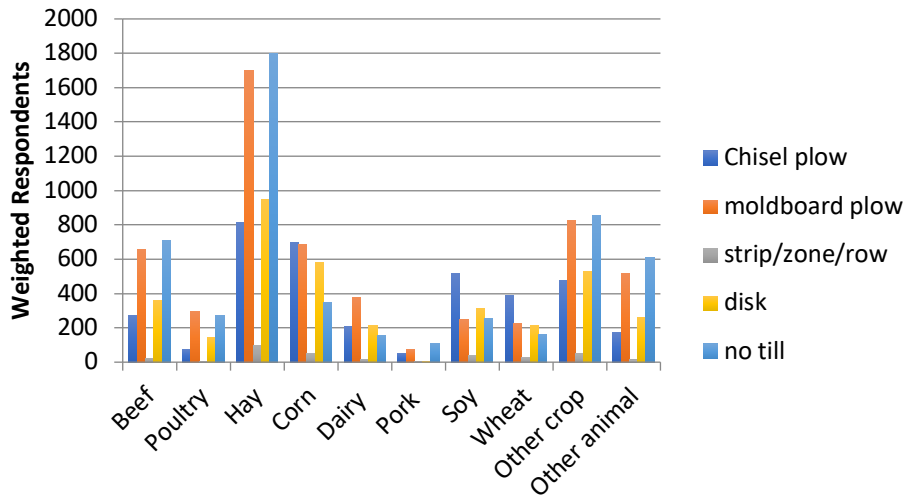
Buffer Zone by Commodity



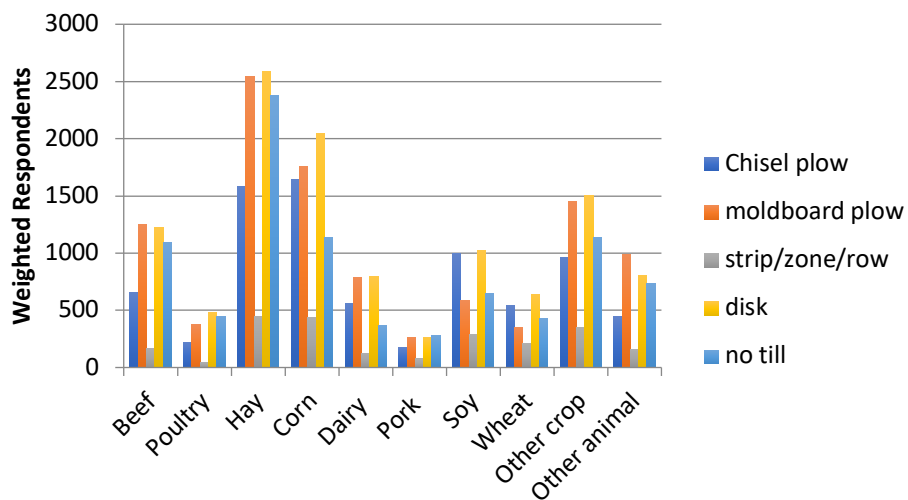
Soil Type by Commodity



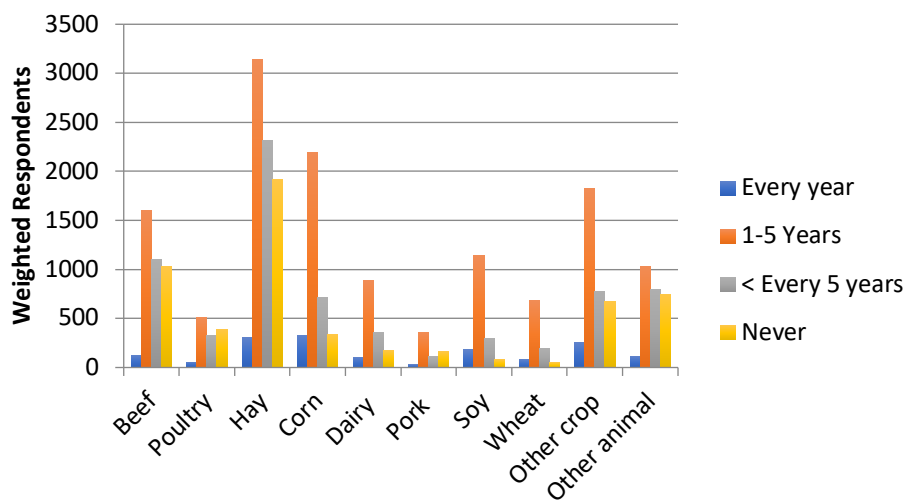
Fall Tillage by Commodity



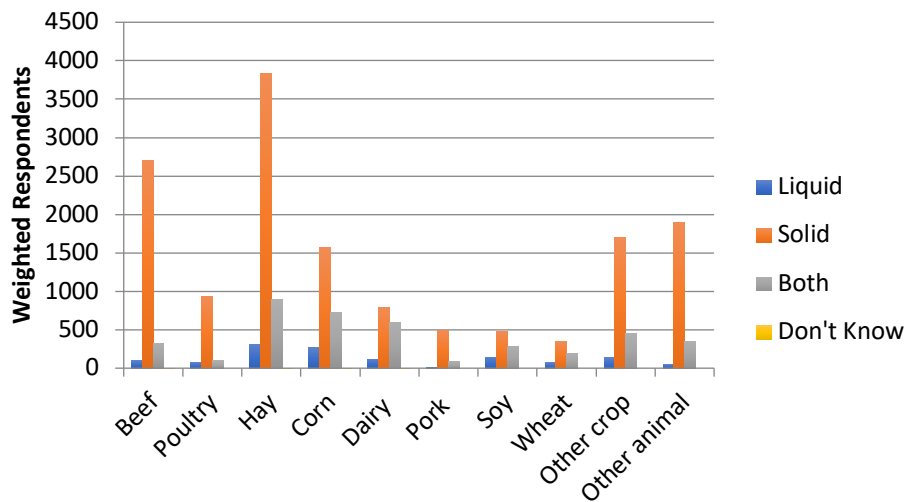
Spring Tillage by Commodity



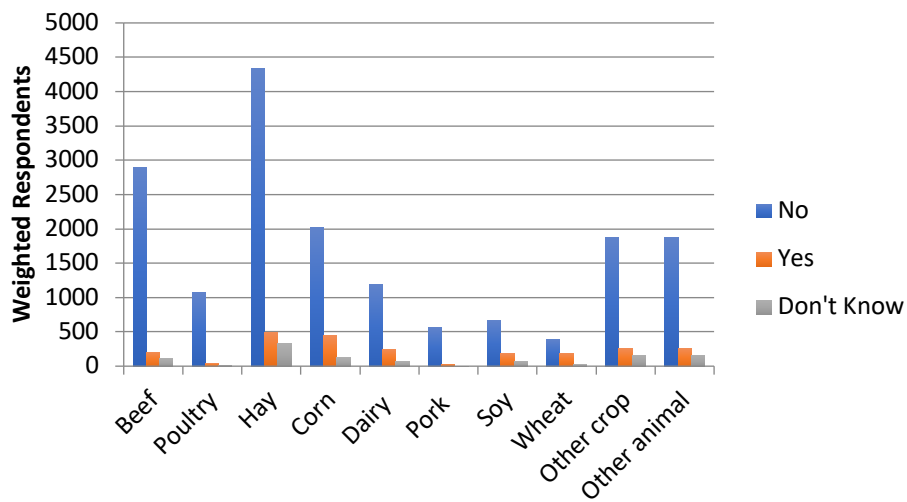
Soil Test Frequency by Commodity



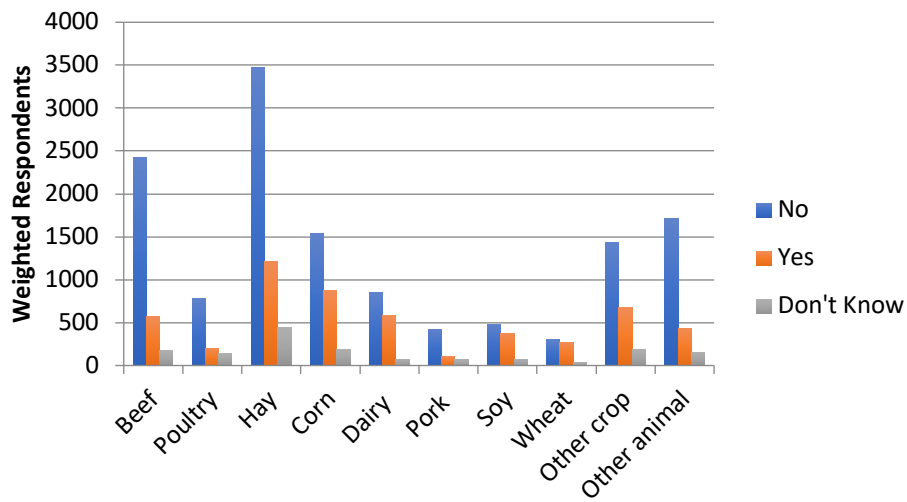
Manure App. Form by Commodity



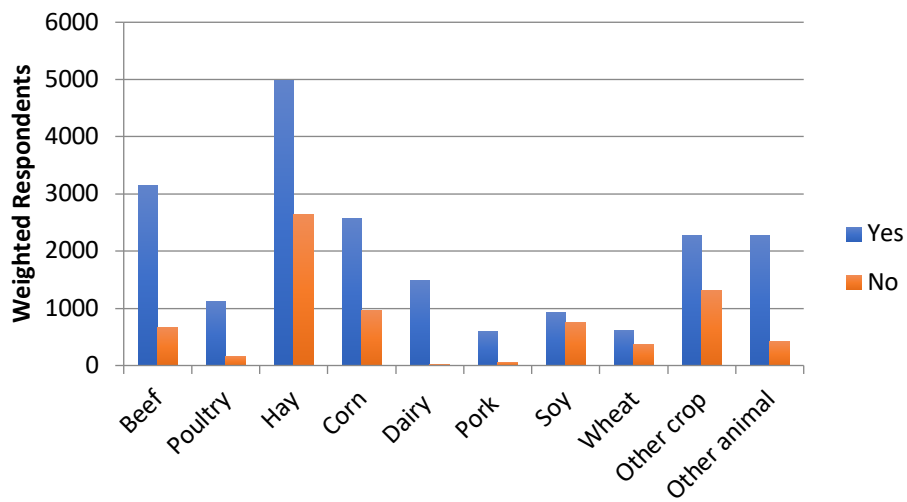
Manure Tested by Commodity



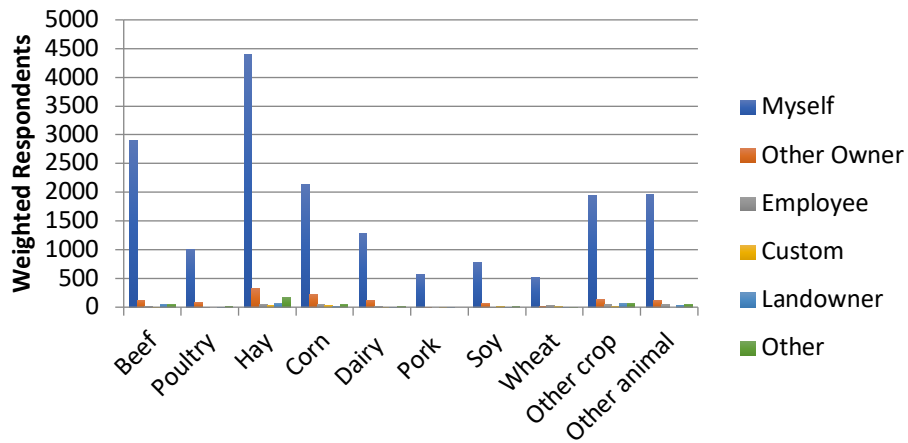
Manure Rate Calc. by Commodity



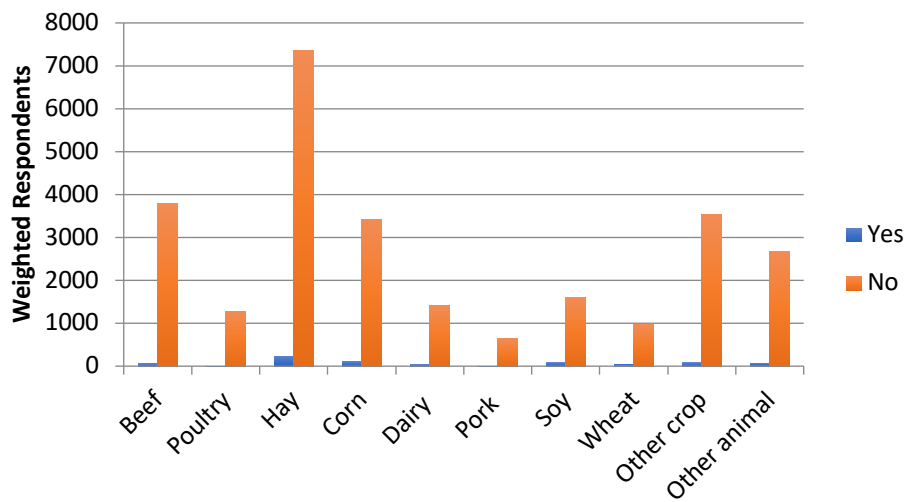
Manure Prev. Season by Commodity



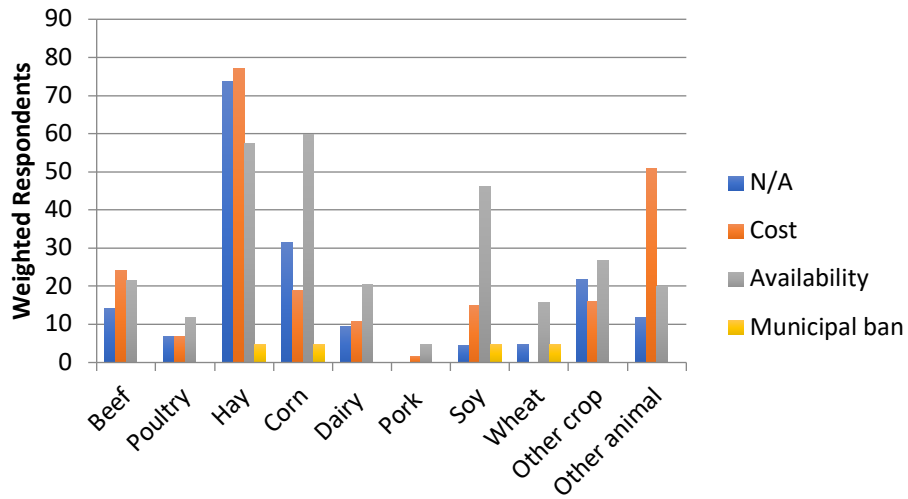
Manure App. Responsibility by Commodity



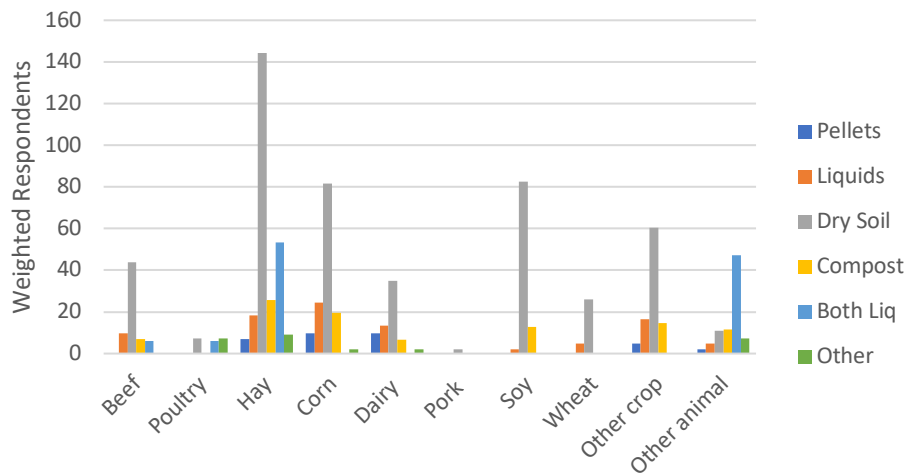
Biosolids Applied by Commodity



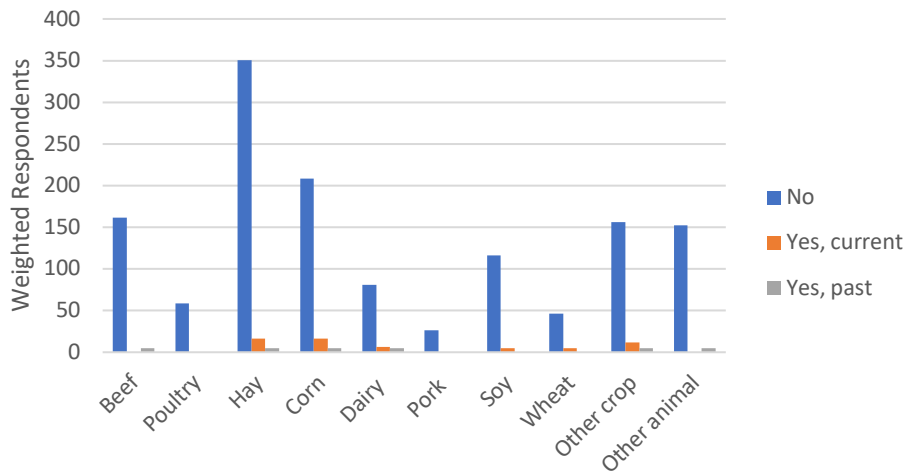
Reason Stop Biosolids by Commodity



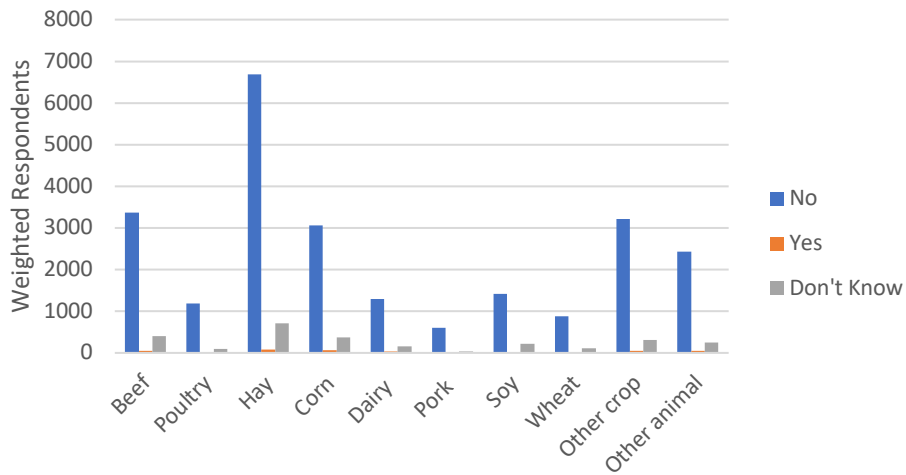
Biosolids Form by Commodity



Biosolids Permit by Commodity



Biosolids in the Future by Commodity



Water Pollution Concerns by Commodity

