Better BMP

Better Biosecurity

Better Bottom Line

Poultry
Mortality
Freezer Units

2018

Often Overlooked

"[A]gricultural production – **including manure applied to cropland** – accounts for more than 90 percent of the nutrients [on] the Eastern Shore," according to the Chesapeake Bay Program.

But that **"manure"** being spread on farm fields is actually a combination of things:

- Manure
- Bedding material
- Dead chickens that were composted

Poultry mortality is often overlooked – but it shouldn't be.

Between 75,000 tons to 100,000 tons are generated each year.*

*More recent data for Delmarva suggest earlier estimates were too low.

Mortality Management

Originally, routine mortality was disposed of in large pits in the ground behind the houses.

But because of the impact on surface and groundwater resources, the industry switched to composting about two decades ago.

- Composting is a time-consuming and labor-intensive process.
- Composting also attracts insects and scavenger animals (e.g., foxes, raccoons, buzzards) – all known carriers of disease.
- When done properly, the process transforms chicken carcasses into a nutrient-rich compost for farm fields.

Composting at a Crossroads

But we already have too much nutrient rich material – a problem that is only going to get worse as more and more regulations limit or even ban land application on some farms.

This is a big issue for composting as a practice, because the entire concept is premised upon land application as a second step – there are no real alternative uses for compost.

And in fact, crop farmers don't like to use compost either:

- Bird parts clog the spreader
- Inconsistent nutrient content
- Compost can have less nitrogen and more phosphorous than litter

A Better Alternative

Store routine mortality inside specially designed on-farm freezer units.

A custom vehicle arrives between flocks to take the material off site for rendering into valuable commodities. For example, poultry fat can be used as a feedstock for bio-fuels.

Moreover, there is no residual material requiring land application as a second step like other BMPs (e.g., composters or bio-digesters)

A Proven Practice

This is an off-the-shelf ready and proven practice.

This technology and concept has been used for decades in some parts of the country.

Freezer units are also one of several approved mortality management practices under NRCS Practice Code 316.

Truly Quantifiable Results

The effectiveness of many BMPs is difficult to quantify with any certainty. For example, the efficacy of cover crops or vegetative buffers is subject to the variability of site conditions.

That's not the case with this BMP. We know how much N and P is in a pound of chicken – so we can calculate the exact amount of N and P that's being diverted from land application.

In fact, the Chesapeake Bay Program recently gave the practice "Interim BMP Status" so states can now use this BMP for their TMDL WIP planning.

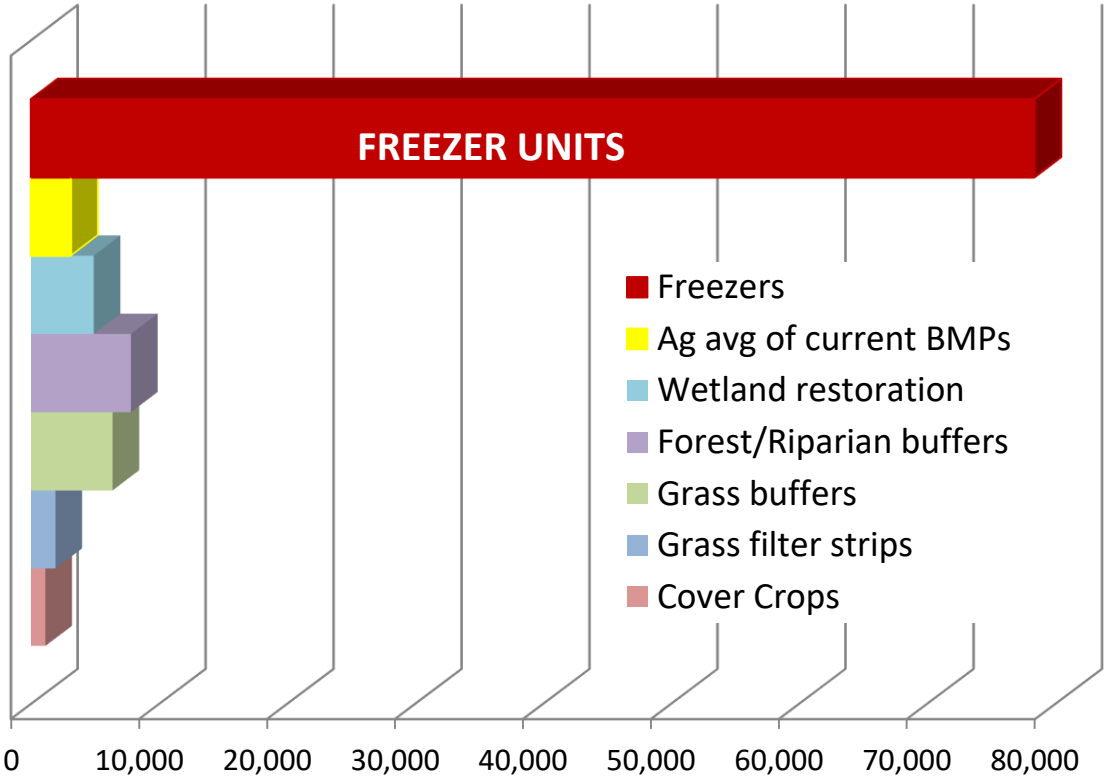
Funding Goes Much Further

This BMP is 85-90% more cost effective than the average of all other agriculture BMPs in reducing phosphorous.

For every dollar spent on the other BMPs, we could get the same impact on phosphorous for only 10 to 15 cents.

Which BMP would you choose to fund with $1 million?

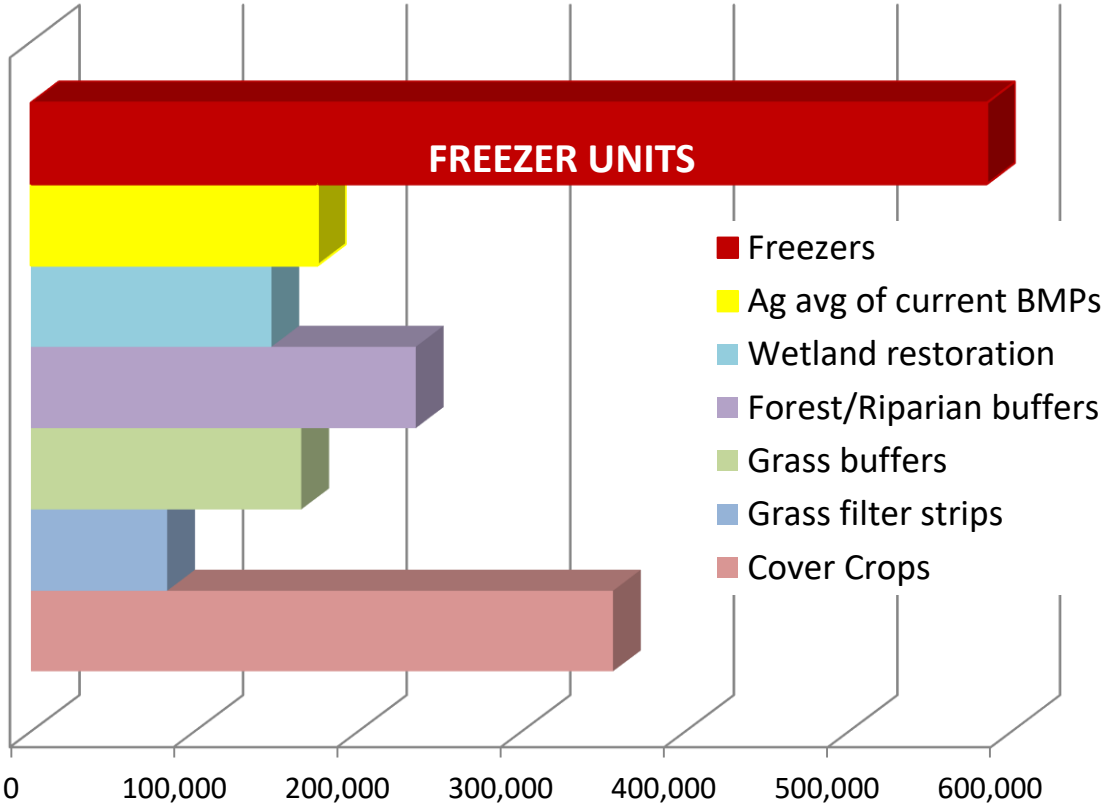
Phosphorous Removed With $1,000,000 Per BMP



Game Changer For BMP Budgets

Poultry mortality freezer units are 45-50% more cost effective than the average of all other agriculture BMPs in reducing nitrogen.

Nitrogen Removed With $1,000,000 Per BMP



These large numbers on cost effectiveness are hard to believe -- until you consider that this BMP actually removes the material from the farm entirely.

Capacity, Cost & Impact

Poultry Mortality Freezer Unit Calculator per Flock

*Weekly Mortality Based on Region

Data Input (No.)	Poultry Data Item
49	Days of Growth*
67	Days Total**
75,000	Birds
72,225	Birds Caught
5.45	Flocks per Year
3.70%	Mortality Rate
6.43	Finish Bird Wt.*
2.24	Avg Bird Wt. by Day

* Days of Growth entered determines Finish Bird Wt.

** Includes 18 day layout time.

Poultry Weight to Volume Conversion	
45	Lbs of meat per Cu Ft
1,800	Avg. Lbs per Unit

2,775	Collected Birds per Flock
6,202	Collected Lbs. per Flock

D400
40 Cu Ft. Unit Capacity
(1,200 to 1,800 Lb. Range)

Conclusion	
3.45	D400's would be needed for this farm.
3.96	Sized With 15.0% Contingency*
4	Units Recommended for this farm

* 15% Suggested

Catch Day	49
Days till Pick up*	7
Collection Day	56

* Estimated additional days of running cost until Pick up.

Pick Your Local $/Kwh	$/Day per Active Unit	$/Day per Full Unit
0.1265	$1.00	$0.75

Estimated Electric Cost	
Active Unit Days Running	49
Full Unit Days Running	55
Total Unit Days Running	104
Cost per Flock	$91.00

Week	Weekly* Mortality (%)	Day (No.)	Bird Wt.	Daily** Mortality (%)	Running (%)	Birds (No.)	Birds (Lbs.)	Total Birds (No.) Running	Running Total (Lbs.)	Running Average Bird Wt.	Freezer Units On (No.)
1	1.19%	1	0.010	0.170%	0.170%	128	1	128	1	0.01	1
		2	0.018	0.170%	0.340%	128	2	255	4	0.01	1
		3	0.032	0.170%	0.510%	128	4	383	8	0.02	1
		4	0.058	0.170%	0.680%	128	7	510	15	0.03	1
		5	0.105	0.170%	0.850%	128	13	638	28	0.04	1
		6	0.189	0.170%	1.020%	128	24	765	53	0.07	1
		7	0.363	0.170%	1.190%	128	46	893	99	0.11	1
2	0.48%	8	0.413	0.069%	1.259%	51	21	944	120	0.13	1
		9	0.470	0.069%	1.327%	51	24	995	144	0.14	1
		10	0.535	0.069%	1.396%	51	28	1047	172	0.16	1
		11	0.608	0.069%	1.464%	51	31	1098	203	0.18	1
		12	0.692	0.069%	1.533%	51	36	1150	239	0.21	1
		13	0.787	0.069%	1.601%	51	40	1201	279	0.23	1
		14	0.895	0.069%	1.670%	51	46	1253	325	0.26	1
3	0.35%	15	0.975	0.050%	1.720%	38	37	1290	362	0.28	1
		16	1.062	0.050%	1.770%	38	40	1328	401	0.30	1
		17	1.157	0.050%	1.820%	38	43	1365	445	0.33	1
		18	1.261	0.050%	1.870%	38	47	1403	492	0.35	1
		19	1.373	0.050%	1.920%	38	51	1440	544	0.38	1
		20	1.496	0.050%	1.970%	38	56	1478	600	0.41	1
		21	1.630	0.050%	2.020%	38	61	1515	661	0.44	1
4	0.33%	22	1.756	0.047%	2.067%	35	62	1550	723	0.47	1
		23	1.891	0.047%	2.114%	35	67	1586	790	0.50	1
		24	2.036	0.047%	2.161%	35	72	1621	862	0.53	1
		25	2.193	0.047%	2.209%	35	78	1656	939	0.57	1
		26	2.362	0.047%	2.256%	35	84	1692	1023	0.60	1
		27	2.544	0.047%	2.303%	35	90	1727	1113	0.64	1
		28	2.740	0.047%	2.350%	35	97	1763	1210	0.69	1
5	0.35%	29	2.896	0.050%	2.400%	38	109	1800	1318	0.73	1
		30	3.061	0.050%	2.450%	38	115	1838	1433	0.78	1
		31	3.236	0.050%	2.500%	38	121	1875	1554	0.83	1
		32	3.421	0.050%	2.550%	38	128	1913	1683	0.88	1
		33	3.616	0.050%	2.600%	38	136	1950	1818	0.93	2
		34	3.822	0.050%	2.650%	38	143	1988	1962	0.99	2
		35	4.040	0.050%	2.700%	38	152	2025	2113	1.04	2
6	0.41%	36	4.203	0.059%	2.759%	44	185	2069	2298	1.11	2
		37	4.373	0.059%	2.817%	44	192	2113	2490	1.18	2
		38	4.549	0.059%	2.876%	44	200	2157	2690	1.25	2
		39	4.733	0.059%	2.934%	44	208	2201	2898	1.32	2
		40	4.924	0.059%	2.993%	44	216	2245	3114	1.39	2
		41	5.123	0.059%	3.051%	44	225	2289	3339	1.46	2
		42	5.330	0.059%	3.110%	44	234	2333	3573	1.53	2
7	0.59%	43	5.475	0.084%	3.194%	63	346	2396	3919	1.64	3
		44	5.624	0.084%	3.279%	63	356	2459	4275	1.74	3
		45	5.776	0.084%	3.363%	63	365	2522	4640	1.84	3
		46	5.933	0.084%	3.447%	63	375	2585	5015	1.94	3
		47	6.094	0.084%	3.531%	63	385	2649	5400	2.04	4
		48	6.260	0.084%	3.616%	63	396	2712	5796	2.14	4
		49	6.430	0.084%	3.700%	63	406	2775	6202	2.24	4
8	0.86%	50	6.540	0.123%	3.823%	92	603	2867	6805	2.37	4
		51	6.717	0.123%	3.946%	92	619	2959	7424	2.51	5
		52	6.894	0.123%	4.069%	92	635	3051	8059	2.64	5
		53	7.071	0.123%	4.191%	92	652	3144	8711	2.77	5
		54	7.248	0.123%	4.314%	92	668	3236	9378	2.90	6

Using flock size and finished bird weight (or grow out days), this matrix calculates the amount of freezer capacity a farm needs (4 units).

It also calculates the amount of power needed ($91 per flock).

It also determines the amount per year of nitrogen (956 lbs.) and phosphorous (128 lbs.) diverted from land application.

Mortality Nutrient Content*		
	N (Lbs)	P (Lbs)
Per Flock	176	24
Per Year	956	128
*Bud Malone:	N @.0283/lb	P @.0038/lb

Better BMP Verification

"[V]erifying that practices are being implemented correctly and are reducing nutrient and sediment pollution as expected will be critical in measuring success."

– 2014 CBP report titled Strengthening Verification of Best Management Practices

The easiest way to ensure these practices are being implemented correctly is to make the practices themselves easier to implement.

Imagine a foolproof BMP that also was less costly to operate:

- Full farmer compliance
- All predicted benefits realized
- Less resources for enforcement leaving more for implementation

Better Bottom Line For Growers

Growers Can Save Thousands in Operational Costs Annually

This management method is much more cost-effective than composting.

- Drastic reduction in the amount of time and labor spent.
- No money spent on fuel and maintenance for a tractor.

The average farm on Delmarva can realize thousands of dollars a year in operational savings. And that savings is after subtracting the cost of powering the units and the flock collection fee -- so that money can be added directly to the bottom line.

Improved Quality of Life

Eliminate the smells, flies and scavengers associated with composting.

- Much better for the grower's family – and the neighbors.
- In fact, freezer units were recently added to the industry's Good Neighbor Relations BMP List.

Less smell and fewer eyesores mean <u>less opposition to new operations</u>.

Composting Compromises Biosecurity

The industry has beefed up biosecurity procedures in recent years, but many efforts – foot baths and log books – focus on human activity. The very real risks posed by animals and insects have been confirmed in several recent research studies.

The composting shed often serves as an open-air food source for local scavengers including raccoons, foxes and buzzards.

Better Biosecurity

transmission pathways

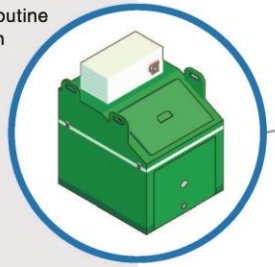
There are several potential transmission pathways for pathogens. Equipment, people and pests (flies or scavengers) that have come into contact with a pathogen (via wild birds, waterfowl or litter/feces) all have the potential to spread disease. For example:

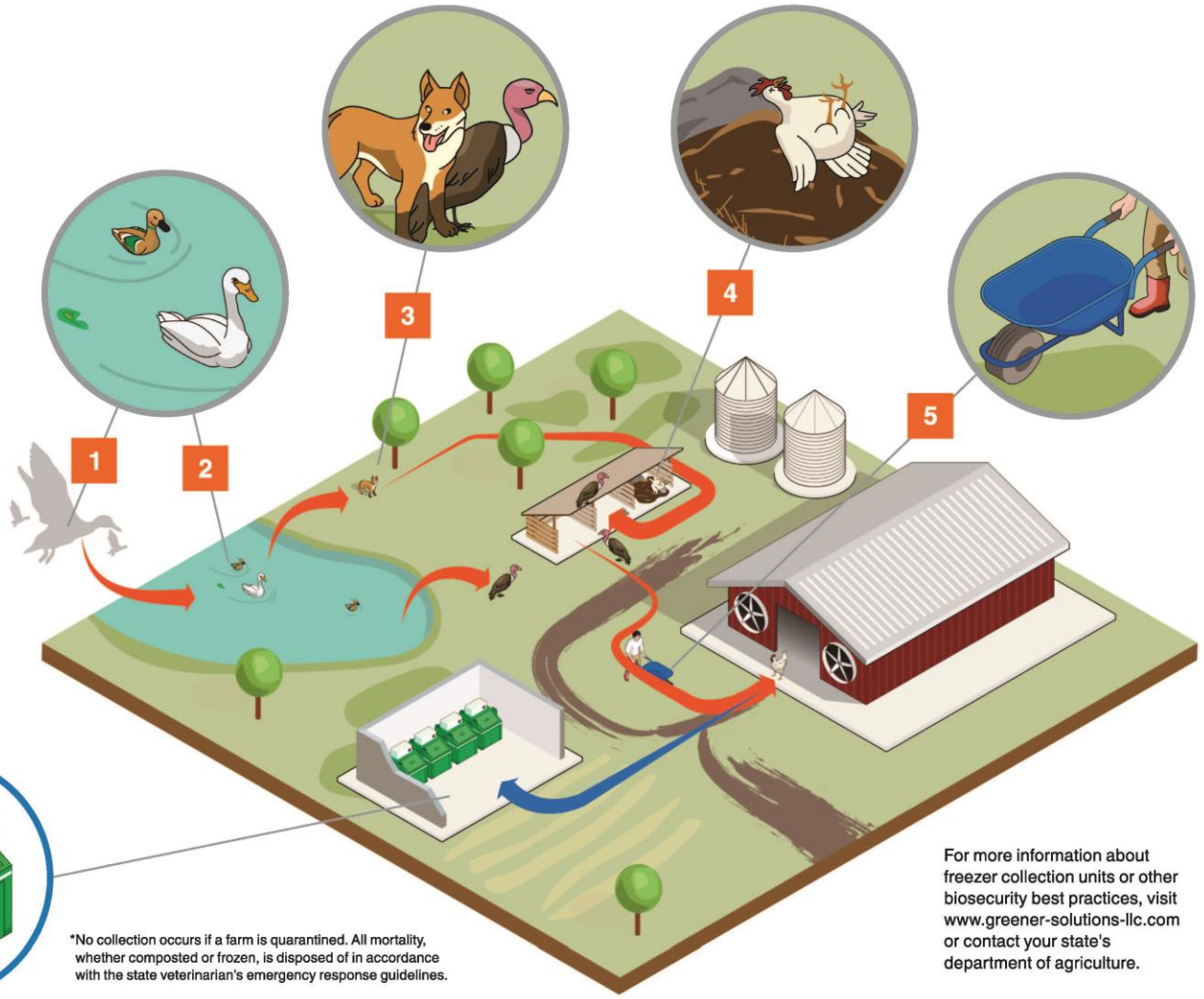
Wildlife to Farm

1. Migratory waterfowl (ducks, geese and swans) can serve as carriers for disease.
2. The birds shed the disease in their feces, contaminating lakes, streams and ponds.
3. Local animals (foxes, raccoons and vultures) come into contact with the disease at nearby waterways.
4. Those same animals then travel to the composting sheds of nearby farms looking for food.
5. Once introduced, the disease spreads to poultry through animal, fly or human activity on the farm.

Prevention

Instead of composting, dispose of routine mortality in sealed freezer collection units. This will reduce the number of animals and flies on the farm, thereby reducing the risk of transmission. A custom collection vehicle arrives between flocks to empty the units.*

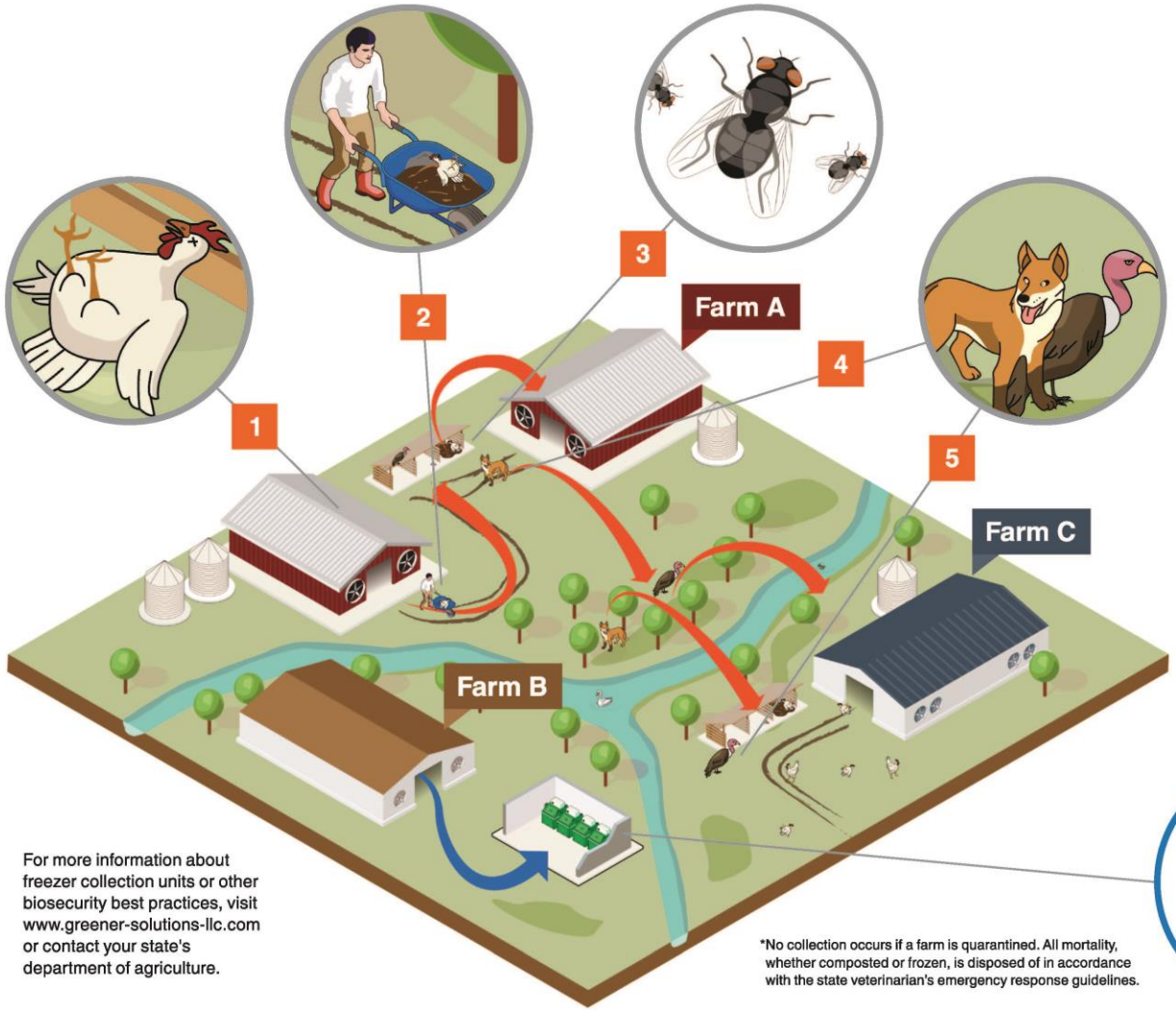




*No collection occurs if a farm is quarantined. All mortality, whether composted or frozen, is disposed of in accordance with the state veterinarian's emergency response guidelines.

For more information about freezer collection units or other biosecurity best practices, visit www.greener-solutions-llc.com or contact your state's department of agriculture.

Better Biosecurity



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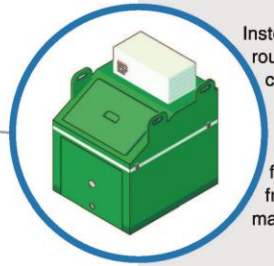
Farm to Farm

1. The first chickens begin dying from an infection, but the infection is not detected immediately.
2. During that time, dozens of diseased birds are taken to the composting shed for routine disposal.
3. Carcass composting attracts flies that can spread infection to other houses and nearby farms.
4. Wild animals (vultures, foxes and raccoons) visit the composting shed nightly for food.
5. Those same animals then carry the virus miles away as they visit nearby waterways or other farms for food.

Containment



Instead of composting, dispose of routine mortality in sealed freezer collection units.* This will reduce the number of animals and flies on the farm, thereby reducing the risk of spreading a disease to nearby farms. Had "Farm A" been using freezer collection units, "Farm C" may have been spared.

Thank You

Please contact us with your suggestions and questions:

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