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Poultry Litter & the Chesapeake Bay Questions of Scale, Emphasis, and Science

Maryland's new environmental regulations for poultry farms had barely hit the streets when two separate, formal challenges put them on hold. In one, a farmer argued that the rules are too restrictive. In the other, an environmental group argued that they are too lax.

These challenges demonstrate the range of opinions that arose during discussion of the draft regulations and continue today. Opinions differ on several fundamental points: the amount of regulation needed, the practices that pose the most risk, and even the conclusions that can be drawn from existing research.

To help our readers form their own opinions, this issue of *Working Landscapes* presents the viewpoints of several people who have influenced Maryland's regulations or will be affected by them.

The regulations, published in January, are designed to protect Maryland's waters from pollution in poultry manure. Nutrients and other contaminants in poultry litter – a mix of manure and bedding material – can wash into local waterways during rainstorms and seep into groundwater.

The Maryland Department of the Environment and the Maryland Department of Agriculture released the draft regulations in December 2007. The draft was revised twice, as farmers, scientists, and nonprofit organizations attended public meetings and sent written feedback throughout 2008.

The final regulations require discharge permits for large poultry operations, as well as smaller operations with a significant amount of discharge. The permits mandate the use of best management practices in production areas and fields to reduce the risk of nutrient pollution.

The goal draws little to no controversy. Farmers, scientists, regulators, and environmentalists alike value clean water. But the devil lies in the details, and serious questions persist.

Poultry growers and processors, the backbone of the Eastern Shore's farm economy, question whether these regulations make a meaningful contribution toward restoring the Chesapeake Bay. Yet finding consensus on the stewardship role of the poultry industry is critical because the likely alternative – sprawling development – would deliver even greater strain to the Bay.

There is also enormous debate about the storage and use of poultry litter. Poultry litter is usually placed in storage sheds or piled outdoors until farmers are ready to spread it on their fields as fertilizer. Both stages pose a risk to the environment – but how great is the risk?

Some scientists view stockpiles as small hot spots. They prefer to evaluate the use of poultry litter as fertilizer, which can deliver high levels of nitrogen and phosphorus across many acres of soil. The EPA, however, views stockpiles with more concern. Operations that fall under EPA regulations must cover stockpiles that stay in the field for more than 14 days. Maryland has also set a time limit for smaller operations, but a longer one.

Others say time limits aren't needed at all. During the review of Maryland's draft regulations, the Eastern Shore Agricultural Collaborative and the Chesapeake Research Consortium asked a panel of scientists for their opinion on the subject. The panel found that water quality impacts from stockpiles were most often related to improper site selection and storage techniques, instead of the number of days the pile remained in
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Photo: Courtesy of MDE

Regulatory Perspective

DR. BOB SUMMERS

Maryland Department of the Environment

Dr. Summers became Deputy Secretary for the Maryland Department of the Environment in 2007. He has served Maryland for nearly 24 years within the state's environmental programs, with emphasis on the scientific and technical issues that impact water pollution and environmental regulations.

The regulations applying to Maryland poultry growers depend on whether they are considered MAFOs (Maryland Animal Feeding Operations) or CAFOs (Concentrated Animal Feeding Operations). Can you explain the difference?

The key difference is that CAFOs either discharge into the waters of the state or propose to discharge into waters of the state. For example, they might have drainage swales and ditches on their property that convey runoff and associated pollutants to waters of the state.

CAFOs are subject to federal regulations issued by the EPA. Maryland issues the CAFO permits, but the EPA must approve the Maryland permit.

A CAFO permit requires a Comprehensive Nutrient Management Plan, with a more formally defined structure. The people who prepare the plan need to be certified by NRCS. There's a limited pool of those folks available, so we're working with NRCS and the Soil Conservation Districts to improve that situation.

A CAFO also has a 14 day limit on uncovered stockpiles of litter.

When MDE issued the state's permitting regulations in January, we expected the majority of the applications to come from MAFOs. But EPA has done a lot of work to explain how they define a discharge and, based on that guidance, we've found about half of Maryland's poultry growers have chosen to apply for a CAFO permit. We've received about 400 CAFO applications so far.

What are the key requirements for MAFOs?

There are two major requirements. The first is a current, implemented nutrient management plan, to make sure that the amount of litter applied to the field is no more than needed to meet crop needs, without loss to the environment.

The second is an integrated soil conservation/water quality management plan, to make sure that the litter produced in the poultry houses

is handled in ways that keep it from coming in contact with runoff, and that the production area is clean and rainfall is diverted around it. The plan covers everything from the production area to the field, where the litter is typically staged, with rules about where and how the stockpiles should be placed and shaped to minimize or even eliminate the possibility of runoff.

The permitting regulations do another thing that we think is very important. We heard from farmers that there is not a lot of good data about the kind of nutrient losses that actually occur from poultry operations. So a provision in the permit allows access to the farms for scientific research on runoff and groundwater. We're working with research institutions now to design a study, looking at actual operations instead of controlled plots. We won't conduct the research on every farm, just a random sample.

How will the new regulations improve the management of poultry litter?

They require a suite of measures designed to keep nutrients from poultry litter in the field, in the soil, or in the crops. For example, there should be concrete pads in heavy use areas, and diversions that send runoff away from the production area. We don't want clean water to get in touch with places that litter is handled.

Poultry litter should also be placed in a storage facility and then staged properly in a field prior to land application. There's a lot of concern that rainwater will come in contact with piles in the fields and contaminate groundwater and surface water, so we've limited the amount of time it can be staged in the field. It starts at 90 days. After three years, the limit is 30 days. This gives folks time to make changes to their operation, and start scheduling whole-house clean-ups closer to times that the litter is needed for crops.

In the field, there should be the use of appropriate buffers and setbacks for the application of manure.

Why were the new regulations needed?

A lot of poultry growers are doing the right things. But the regulations are necessary because not everybody is doing them, and not every plan is up to date and integrated.

This permit protects the interests of those farmers who are making the effort to operate properly, using those plans, spending the money for pads and extra storage capacity, to run a very clean operation. The permit sets the minimum requirements and ensures that all farmers are doing those things. If bad actors are out there, it provides us

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Regulatory Perspective, Summers, cont'd.

with the basis for enforcement actions to protect the interests of all citizens who benefit from clean water and the investments of the farmers who are doing their part to control pollution.

What scientific findings helped shape the regulations?

We have monitoring data specifically for Eastern Shore streams with high concentrations of poultry operations in the area. There are elevated nitrogen levels in most of those streams and elevated phosphorus in a lot of them. We need to bring those levels down.

The best management practices have been developed over a period of years, and research at various agricultural universities has demonstrated the loss of nutrients from farms where these practices are not used.

What public feedback did you receive on the permitting process?

Farmers were concerned about paperwork and asked us to allow them to take advantage of existing planning mechanisms. We originally proposed that everyone use the federal Comprehensive Nutrient Management Plan, but many farmers already have these other two plans that essentially do the same thing. So we modified the proposal so that MAFOs can use those plans instead.

Also, we changed the original proposal that would have required all chicken houses of more than 75,000 square feet to have a MAFO permit. Instead, only those with 100,000 square feet or 125,000 birds will need the permit. Those between 75,000 and 100,000 square feet can use a self-certification form that says they will develop plans and follow them, and they'll have plans ready for us to look at if we do an inspection.

People were also concerned that inspectors would be charging onto farms unannounced. That's not how it works. We do not give advanced notice, but we don't come on a farm without permission. If for some reason we're not allowed onto the farm, we'd have to get a court order before we could enter. We'll not be ignoring biosecurity measures. The farmer will know we are there and we'll ask his permission.

What public feedback did you receive on the science behind the regulations?

The Eastern Shore Agricultural Collaborative focused on the issue of storage of litter in the fields and they issued a position paper sug-

gesting that limits on field storage aren't necessary. We didn't feel it warranted a change in what we were proposing, because there is a fair amount of research out there that indicates, in some cases, the storage time can cause a problem for groundwater. In others, it doesn't. It wasn't clear enough to justify a change.

However, we heard loud and clear from the farmers that there isn't a lot of solid information about the impact of their operations, and the position paper helped identify the research that's needed. It will be very valuable in designing the follow-up study.

Also, we originally proposed that the University of Maryland conduct the research, but some folks objected to focusing on them solely, so we made it more general. Now we're talking to a number of potential partners.

Can the regulations be modified when further data are available?

If the follow-on study shows that field storage of poultry litter should have a different time limit – or no time limit at all – we will make modifications to the permit.

What is the current status of the regulations and permits?

The regulations are in effect now. But the permits are on hold while the challenge from the Waterkeeper Alliance is adjudicated. The other challenge was withdrawn.


Applications for the permits were still due by February 27. So for now, growers should have submitted their application materials along with copies of whatever Nutrient Management Plans or Comprehensive Nutrient Management Plans they have, or have underway. (For details and forms, visit www.mde.state.md.us and click on General Permit for Animal Feeding Operations.)



Photo by E. Remsburg

Science Perspective



Photo: Courtesy of J. McGrath

DR. JOSH MCGRATH

Univ. of MD Cooperative Extension

Dr. McGrath is a nutrient management and soil fertility specialist who has conducted extensive research on water quality issues related to agriculture. He has advised both the Maryland Departments of Agriculture and the Environment on poultry litter issues and recently served on the panel of experts convened by the Eastern Shore Agricultural Collaborative to assess the scientific research on stockpiles.

In the universe of problems plaguing the Bay, is pollution from poultry litter a concern?

That's a question that a lot of people would like to have answered. We don't know exactly what portion of nutrients can be attributed to poultry litter.

Environmental systems are complex, and there is a huge amount of variation that clouds the process with poultry litter. From any one field study of nutrient runoff from poultry litter, very controlled and consistent, the pollution coming off that field over about twelve months can have a huge range.

Of course, practices on land directly impact water quality. The pollution load to the Bay is linked to the amount of water coming into the Bay and where it comes from. To look at low hanging fruit, you want to address problems that affect the largest number of acres, combined with the amount of water it contributes and the concentration of pollution in that area. Now, poultry is a limited region when you look at the total Bay watershed, but it is very highly concentrated in parts of the landscape.

I would argue that it's impossible to come up with a quantitative value for the impact of poultry litter on water quality. That's what policymakers want, but ultimately quantity is not as important as the need for better management practices: let's look at those practices and bring the impact to its bare minimum.

Can you describe the focus and findings of poultry litter research?

Most research has been on the use of poultry litter as fertilizer. The science on stockpiles is very minor. Those studies have been very small and demonstration in nature – not very comprehensive and without quality review.

The focus comes back to acreage. Scientists want to go after the biggest impact first, the acreage where the manure is spread. Stockpiles, from the scientific standpoint, aren't significant. From the

public or policy viewpoint, it's the opposite. The pile is extremely visible. But the amount of nutrients that leave the land over a period of years is ultimately controlled by acreage.

Do Maryland's nutrient management plans address potential problems with using poultry litter as fertilizer?

Yes. They were among the first, most proactive, and maybe most restrictive in the nation. Maryland farmers have to apply nitrogen based on crop requirements and are only allowed to apply phosphorus where it is needed or has little risk of reaching surface waters. The new regulations are complicated, but generally they address the animal production area, which differs somewhat from Maryland's existing nutrient management regulations.

Does the use of poultry litter for fertilizer pose any greater risk than other manure?

Nitrogen and phosphorus from different sources don't behave differently. The question is what is wasteful, what can be controlled. Any form of manure can be leaky with improper management. The problem is not the source, but its management.

With manures, we don't have the ability to control the ratio of phosphorus to nitrogen like we can with chemical fertilizer. In the past, we knew nitrogen leached, so we learned to apply it based on crop needs. But we can still over-apply phosphorus, and there's been an historic buildup in the soil. If you view soil as a cup, it can hold a certain amount of phosphorus. It's a large cup, but after fifty years of manure application we may have overflowed it in some places – especially in areas that coincide with places that we raise animals.

But there's nothing wrong with poultry litter, just where we put it. We need to move it off those nutrient-saturated fields and put it somewhere else. Lots of places still need it. We need to rank and grade fields for their capacity to use poultry litter efficiently.

Will emerging technology help to manage poultry litter?

Yes. The next step forward is to improve how we incorporate litter to the soil. Even if we apply litter at the right rate, it's on the surface where it can interact with rainfall and become runoff. That first runoff event is the biggest nutrient loss. Now there's equipment developed by the USDA Agricultural Research Service that puts litter under the surface. We're hoping to bring it here this year for field trials.

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Photo: Courtesy of J. Rhodes



JENNY RHODES

Poultry Grower

Jenny Rhodes owns four poultry houses in Queen Anne's County that produce approximately 80,000 broilers per flock. Rhodes has been in the poultry business for 21 years. She is also an agriculture educator at the University of Maryland Extension in Queen Anne's County and previously served ten years as their nutrient management advisor.

How do you handle the use and management of poultry litter?

Dealing with litter has become a little easier for me because of windrowing. Windrowing is a process for in-house composting. I was introduced to the concept at a Delmarva Poultry Industry grower committee meeting.

Before windrowing, my usual management was to use a cruster – a machine that takes off the top, wet layer of the litter. The litter was then placed in my manure building until spring when it was removed and spread in the field for corn production.

With windrowing, you don't take the manure out of the house after each flock. The litter is windrowed inside the house with a special machine. The litter then goes through a natural process where microbes heat up the manure and kill any bad pathogens contained in the litter. I reuse the final product as bedding in the chicken house. The results are better quality litter, which results in a better bird.

Windrowing is a pretty new tool here on Delmarva, so I am not aware of any impacts on nitrogen content in the litter. Windrowing has helped me to keep the litter inside the chicken houses while producing a better bird.

I do the windrowing after each flock leaves the farm, about five times a year. The only time manure is removed from the chicken houses will be when a complete clean-out is performed. As of right now I will not be doing a complete clean out for at least several years.

Does any of your poultry litter become fertilizer?

All litter becomes fertilizer. My farm is called a "no-land farm," which means I don't have any land to spread manure on. Luckily, my dad, brother, and son are grain farmers and can use all the litter I produce. Other poultry producers may sell their litter, use it themselves in their grain operation, or use the barter system – the farmer who takes the litter pays for the windrowing, crusting, and clean-out, in exchange for

the valuable litter.

Do you think that pollution from poultry litter is a burning issue for the Bay?

When poultry litter is handled correctly, it shouldn't have much impact on water quality. The procedure of handling manure correctly starts when it leaves the poultry house. Manure should be spread in the field as close to crop uptake as possible and incorporated into the soil. Incorporation of the litter into the soil will give the farmer the most bang for his buck and help protect water quality and our Bay.

Today, farmers use a prescription approach for applying manure to the soil. A soil test looks at nutrient levels in the soil, the litter is analyzed for nutrient content, and then a prescription is written – a nutrient management plan – which matches the nutrient needs of the crop.

Are the new permitting regulations needed? Will they be effective in addressing concerns about water quality?

The new permitting will not help the water quality of the Bay. We already have a nutrient management plan and a soil and water plan. Also, when new regulations are drafted, they need to be based on scientific research. At this point, I don't feel that some parts are based on scientific research. And they aren't practical. A farmer can't clean out a house – on average three to four houses – get manure out of the poultry house, into the fields and spread in the time frame they have allotted.

We are already doing the best management practices available to us. Many farmers in Queen Anne's County have a manure shed and cement pads on the end of their chicken houses. We are fortunate to have cost share money available to help us with these practices. And we all worked with our Soil Conservation District and NRCS personnel to implement them.

The regulations just add more paperwork and another government entity to deal with. Growers are very confused about the new water and air quality regulations. I am grateful that MDE had public hearings on the proposed regulations and listened to us, and made some changes before they published the final regulations. I am also grateful that the Delmarva Poultry Industry hosted three meetings to help farmers understand the federal regulations.

How will the permitting regulations affect the agricultural community?

One of the challenges to the regulations hasn't been resolved yet, but the regulations that were issued include a yearly fee of \$1,200. This will

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Agricultural Perspective

Photo by J. Dindinger

BILL MASON

Queen Anne's County Farmer

Bill Mason raises barley, wheat, corn, soybeans, and other crops on more than 800 acres. Nearly 500 acres are certified organic and more are making the transition. Horizon Organic Dairy purchases much of his organic crop, and he also sells produce from a farm stand. Most of the conventional grain, raised on no-till fields, goes to Carmean Grain and Southern States.

What role does poultry litter play on your farm?

It comes into play because of organic farming. We can't use commercial fertilizer, but poultry litter is allowed. I've been using it for four years. We have a nutrient management plan and soil test every year. We apply it to the ground we plant corn in. We rotate our crops, corn with soy or barley in between, every other year or every third year.

Where do you get your poultry litter?

Two sources: Perdue and a local dealer who cleans houses in Talbot, Caroline, and Queen Anne's Counties.

What is the value of poultry litter to your farm?

People who use poultry litter can tell you, it has a lot of good nutrients in it. It helps you grow nice crops.

Are there any drawbacks to using poultry litter?

Poultry litter is more expensive and more difficult to handle. It's got to be delivered and spread. It's slow work. And the price for poultry litter has gone up. When I started using it, the price per ton was in the 10 dollar range. Now it's in the 30 to 40 dollar range. I think that's partly because the demand is greater. The chicken industry, because of the price of the shavings they have to replace in the chicken house, isn't cleaning out litter as often as they used to. So the quantity of litter is perhaps down, based on the information that I'm getting. It's getting harder to come by. Ten years ago they couldn't get rid of it.

Do nutrient management plans address the use of poultry litter for fertilizer?

Yes. You don't want to over-apply it. We follow the nutrient management plan. But phosphorus has risen a bit over the past few years since we've been using poultry litter. We're trying to cut the use of poultry litter in half by using cover crops to provide nitrogen.

How extensive is the use of poultry litter on fields among your colleagues?

Most apply just a little bit, for corn, to supplement their commercial fertilizer. Most con-

ventional farmers are on a sort of rotation, to plant corn every other year, so they use the litter about every other year, too. They try to work it in the same day, to keep it from volatilizing, either by disking it or plowing it into the soil. There may be some farmers with chicken houses that spread it on every year, but most of those situations have been corrected. You don't see many stockpiles. And I don't think many of them are over-applying it. If soil test tells us two tons will do it, we're not going to buy three. We can't afford to waste the money.

What would you do differently if you didn't have poultry litter?

I could still grow soybeans and hay organically, but I would have to alter my rotation. I have 100 acres of organic barley, and in the next six weeks we'll over-seed the barley with clover, harvest the barley, then let clover grow all summer and plow it down next spring for corn production. That produces the nitrogen we need.

What is your opinion about Maryland's new regulations for poultry litter?

I don't know the details yet, but I've heard about the storage issue. Some guys have cleaned out their houses this winter and have to do something with the litter. The University of Delaware study says that if you peak the pile, there's no runoff. I guess the Maryland authorities don't believe it.

This could be an issue for me, if a guy can bring manure tomorrow but I can't use it until May. I plant my crops later than most people. Most want manure in late March or early April, but I haven't even plowed my ground yet. That gives me a small window. I shouldn't be getting my manure until a week or two before I need it. Sometimes on the same day, but probably never over a month. I guess we might have to buy covers or canvases or put up a shed. Around here, we thought the Soil Conservation District was going to have some money to help farmers without chicken houses build some storage facilities. That didn't fly because of budget constraints. But we'll still need to follow the regulations.

What do you see as the future of farming?

It's going to get tougher with the price fluctuations. You have to really watch the markets and push the pencil. But most farmers would rather be out there on a tractor. You need to talk to people, be informed. Depends on the good Lord and how much rain we get. Then there's development. The neighbors slowly encroach, and they don't like the dust that gets on their car roofs. It gets tougher each year, but I'm pulling forward. My daughter would like to farm, too, so I hope to be here for years to come. ☀



Photo: Courtesy of J. Gladstone

JILLIAN GLADSTONE

Waterkeeper Alliance

Jillian Gladstone is the advocacy and outreach coordinator for the Waterkeeper Alliance, an umbrella organization that connects and supports a network of independent Waterkeepers in the Bay region and beyond.

Why are Waterkeepers in the Bay region concerned about poultry litter?

The Bay and its Eastern Shore tributaries suffer from serious nutrient pollution. A 2006 EPA report showed that only 5% of the waters of the Eastern Shore have good water quality. And we know that agriculture is the number one source of pollution to the Bay. What's more, MDE has linked high levels of both nutrients and bacteria in the waters of the lower Eastern Shore to the high concentrations of poultry production located there.

The EPA has said that livestock and poultry contribute the same amount of nutrient pollution to the Bay as people do, yet human waste is treated before it is released into the environment. That's not true for the billion pounds of poultry litter produced each year on the Eastern Shore.

Also, a lot of poultry farmers use manure sheds to store excess litter, but when we drive through or fly over the area we also see lots of uncovered stockpiles and lots of manure sheds used to store equipment rather than poultry waste. Certainly the sheds aren't being used across the Shore as effectively as they could be. EPA studies have shown that there is runoff from open piles of poultry litter, so that's a problem. And even though a lot of farmers use poultry litter properly as fertilizer, we see runoff when the litter is applied too densely to be used by the crops.

So we have good reason to believe that litter runoff is contributing to a lot of the water pollution in the area.

What concerns did you have with the proposed regulations?

We were really concerned about the allowance for uncovered stockpiles of litter. Maryland set the time limit for 90 days, which is longer than in the early version of the regulations and isn't supported by the research on the subject. What the studies do show is that litter left uncovered for any amount of time is going to produce polluted runoff. The EPA recommends not leaving litter uncovered for more than 14 days.

We also wanted to see public access to nutrient management plans. This request was recently

upheld in court. The farmers create these plans to describe the amount of nutrients they apply to the land and if it includes animal waste. Ideally, these plans should be based on the amount of land, as well as the soil quality, the nutrients already stored in the land, and the nutrients already in the surrounding waterways. Until now, Maryland plans were not shared with the public. We've really had no idea how the plans are being written, or if they contemplate all of these issues. We don't know if the practices on land reflect what's in the plan, or if the plans are being enforced. It's an issue of transparency.

Why did the Waterkeepers file a formal challenge to Maryland's regulations shortly after they were issued?

We argue that the 90 day limit on uncovered stockpiles is not protective enough of the Bay. The challenge was filed by the Waterkeeper Alliance, as well as the Assateague Coastkeeper and Lower Susquehanna Riverkeeper.

Do you see any other major problems with the regulations?

The Maryland regulations don't address ammonia at all. The Chesapeake Bay Program reported that one-third of the nitrogen in the Bay is coming from ammonia deposition—ammonia that moves into the air and falls into water. On the Eastern Shore, the majority of that ammonia is entering the air from agricultural sources, like poultry litter. This is the largest unregulated source of ammonia in the Bay region, and the public has no way to know how much is being released by the poultry industry, as it would with any other major industry. Recently, the industry successfully killed a bill that would have provided this important health information to the public.

Do you think these types of rules can be enacted and still allow agriculture to remain a viable industry on the Eastern Shore?

Yes. There's no reason why integrators like Perdue and Tyson and Mountaire shouldn't control the litter, as well as the birds, the feed, and the fuel. If they took responsibility for handling the waste—either by storing it properly or transporting excess litter out of the Bay watershed—they would relieve poultry growers of the pressure they're currently feeling.

The fact is, pollution permits have been required of other livestock industries since 1972 when the Clean Water Act went into effect. They are issued to poultry operators in most other states, and it hasn't driven any of these industries out of business yet. ☀



Photo by Emily Zygmunt

National Policy

HANK ZYGMUNT

U.S. Environmental Protection Agency

Hank Zygmunt is the Agricultural Advisor for the EPA's Mid-Atlantic region. His work includes building partnerships to address environmental solutions, supporting the need for new markets and alternative energy technologies for manure, working with state agencies and poultry integrators to implement the EPA CAFO rule, and addressing research needs.

Is poultry litter a serious issue for water quality on the Eastern Shore?

Based on the recent Report to the Citizens of the Chesapeake Bay Region, agriculture contributes 42% of the total nitrogen load and 46% of the total phosphorus load to the Bay.

Based on these figures, 12% of the total nitrogen and 15% of the total phosphorus load from agriculture comes from poultry operations across the watershed. Maryland poultry operations contribute 17% of the nitrogen and 26% of the phosphorus. I would also point out that these poultry estimates are likely to increase because these figures do not account for nitrogen emissions from poultry houses.

Reducing these impacts will require investing in alternative energy technology, developing new markets for poultry-related by-products, and exploring innovative approaches such as trading market credits.

Is the use of poultry litter as crop fertilizer an efficient way to use up those nutrients?

On a national scale, poultry operations account for about 60% of the nitrogen and 70% of the phosphorus that is transported away from the fields where litter has been traditionally used as fertilizer.

Many farmers have relied upon poultry litter as a well balanced fertilizer. But the constituents of poultry litter mean that about three to four times more times phosphorus is bound together with the nitrogen. So over-application is still possible with a nitrogen-driven nutrient management plan. This has led to a steady build-up of phosphorus in soils throughout the Delmarva region. And litter is often applied to corn fields. Corn is a very leaky crop, so a fair amount of nitrogen can be lost from those fields to ground and surface waters.

And while using low-level phosphorus fields sounds good at first, phosphorus still builds up and binds to the soil. Once you get the build-up, it won't just go away. Under certain conditions,

phosphorus can run off into sensitive waterways for many years.

The sheer quantity of litter is also a challenge. A few years ago, the USDA indicated that there was a surplus of poultry litter throughout the Bay watershed. The most recent estimate of litter produced on Delmarva is 750,000 tons annually, although we need an updated analysis to account for advancements in feed management.

It's our understanding that the Perdue-AgriRecycle pelletizing plant uses 8 to 10% of the litter. That leaves the poultry industry and their growers with a huge amount of litter for land application either within or beyond the Bay watershed. Urbanization compounds the problem by reducing the lands that have traditionally received poultry litter as fertilizer.

There's also a geographic and historic challenge: Eastern Shore farmland has a high water table and a lot of old drainage ditches. During rain events it can be a perfect conduit for moving pollution into the Bay.

Creative, long-term solutions need the full support of all Bay partners, including poultry integrators and energy companies, to address surplus amounts of litter that cannot be agronomically applied to the land. It is the EPA's understanding that there are very limited discussions about building poultry-to-energy alternatives, even though federal grants are available.

Don't nutrient management plans protect fields from excess nutrients in poultry litter?

Nutrient management specialists have made great strides in developing proper plans on a field-by-field basis. But there is an overriding concern about the phosphorus index used to develop the plans. The index needs to be updated to include the best, most up-to-date, scientific data that will help reduce phosphorus built up in the soil.

We already have very, very high levels of phosphorus in some areas of the Eastern Shore. Without the best available phosphorus index, we are developing plans that in some cases allow additional amounts of poultry litter to exacerbate the existing environmental problem. Scientists are aware of these concerns and are having discussions to make needed adjustments.

What is your perspective on time limits for stockpiles in the field?

The stockpiling of poultry litter has been controversial in some states. The EPA allows an uncovered stockpile of litter in the production area for up to 14 days. Then the grower should cover the pile to reduce any

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Zygmunt, cont'd.

pollutants discharging into waters of the state during rain events. The EPA feels that there are many ways for the grower to manage its litter – by having properly sized storage sheds, reducing the volume of litter with more frequent house cleanings, improving coordination with integrators, and including a schedule for reducing litter in the nutrient management plan.

Some recent studies, including one from the University of Delaware, suggest that there is no appreciable difference in the discharge from covered and uncovered stockpiles. However, in the EPA's preliminary review, we note that runoff was recorded in all of the plots sampled. We point to this finding in light of the EPA's requirement to achieve zero discharge in the production area.

Virginia and Pennsylvania allow uncovered stockpiles of litter for only up to 14 or 15 days. Our research does not support allowing uncovered stockpiles for 90 to 150 days. It's not a prudent practice when discharges from the piles can enter the waters of the state and place the grower in a vulnerable compliance situation.

But these days there seems to be far less litter stockpiled on the Delmarva. We feel that this is largely because of the combined support from state agricultural and environmental agencies, along with NRCS, poultry organizations, and land grant universities.

How do Maryland requirements relate to EPA requirements?

Maryland has developed two regulatory programs for animal feeding operations. One is the Concentrated Animal Feeding Operation (CAFO), which reflects EPA's CAFO regulations. EPA plans on approving Maryland's CAFO program in the near future.

The other is the Maryland Animal Feeding Operation (MAFO) program. The MAFO program defines a discharge less stringently than the CAFO regulations. It also includes a provision to regulate poultry operations based on their square footage requirement, and it addresses groundwater concerns.

MDE has been working with EPA to help growers understand the CAFO definition of a discharge, so that growers understand which category applies to them. As a result, more than 400 poultry growers have come forward to apply for a CAFO permit. To me, that's a compliment to all agencies and people involved with cleaning up the Bay.

Do you think the Maryland regulations will be effective?

The EPA believes that most livestock and poultry producers will comply with state and federal regulations while remaining economically viable. With NRCS providing technical and financial support and CSREES providing education and outreach, producers will continue to become more aware of their Clean Water Act responsibilities. In Maryland, similar to other states, NRCS and technical service providers will work with producers to develop and update nutrient management plans. Two other important organizations that can help promote compliance are the Delmarva Poultry Industry and the Maryland Farm Bureau.

What types of research or alternative solutions are needed?

We need to create new markets that complement traditional ways of managing litter. We should continue to look at alternative energy. We could also use poultry litter as an excellent organic fertilizer to replace commercial fertilizers used on state lands. All involved parties need to step up their support for creating a future environment where poultry litter is not viewed as a by-product that can cause pollution but as resource that can help society in a variety of ways.☀

Agricultural Perspective, Rhodes, cont'd.

affect our bottom line. Our margins are thin as it is, and to add a \$1,200 fee is ridiculous.

It's troubling that I have implemented many best management practices and I am still labeled as a CAFO. Nobody wants to be a polluter, but in order for all of us to survive there has to be some level of discharge. We just want to grow good quality, safe food, and do the right things along the way. But between the regulations and the economy, it's putting a real squeeze on farmers. I don't know what's going to happen, but I am afraid the average consumer will not realize these effects until there is no food in the grocery stores, or when all our food is being produced outside this country.

Do you recommend any other solutions?

It would be useful to have a good risk assessment tool for farmers and their operations. Some poultry companies do this on a small scale for their growers. As farmers, we could work with our Soil Conservation Districts and NRCS staff, let them come to our farms and complete an assessment of our operations, which should satisfy the EPA, MDE, and other regulatory entities. It is much better for us as farmers to be proactive rather than reactive.☀

**Science Perspective,
Dr. McGrath, cont'd.**

Also, poultry growers have really improved how they manage the feed. Lots of people believe that the amount of manure and litter produced per bird has come way down in recent years.

Were Maryland's new regulations and permitting requirements needed? If so, will they be effective?

Ultimately, we need to minimize the contributions that each segment of the population makes in polluting the Bay. And we definitely don't want people stockpiling litter inappropriately. So we did need to address storage and production facilities, and encourage best management practices. But I don't know how effective these specific regulations will be. They focus on covering the tops and bottoms of stockpiles and the number of days in storage, but the scientific consensus is that those factors will have a minimal effect on reducing impact. There's plenty of low-hanging fruit out there and workable best management practices. If all the resources being invested in developing these permits were put towards developing new best management practices, we could improve water quality. Writing a permit isn't the same thing as reducing pollution.☀

Poultry Litter & the Chesapeake Bay, cont'd.

the field. The panel shared their recommendations with MDE, and the Hughes Center for Agro-Ecology supported them (see www.agroecol.umd.edu/).

Certainly, the regulation of poultry litter has spawned a wide range of opinions. But farmers, regulators, environmentalists, and scientists agree on one vital point: the science on this subject is incomplete.

The Hughes Center hopes to gain consensus on the most important knowledge gaps and fund projects that will address them. The Center has already funded several research projects on Maryland's poultry industry, including:

- The rates and methods for applying poultry litter to farm fields
- The reduction of phosphorus in poultry litter by changing the diet of broiler chickens
- The economic contribution of the Delmarva poultry industry
- The environmental benefits of converting poultry litter into pellets

The Center supports the call for more detailed research on best management practices, as well as a better understanding of the ways in which nutrients are released into the air through emissions of ammonia from poultry operations. Emerging science may also provide new solutions – such as alternative energy and better pelletizing processes – that will help us make better use of poultry litter while safeguarding the Bay.

Maryland's regulations are the most recent chapter on this topic, but there are certainly more to come. These interviews reveal significant points of disagreement that, together, emphasize the need for convening stakeholders and beginning to build consensus on this topic, outside of the regulatory framework. In the days to come, the Center will begin to identify partners for this effort and work toward achieving a sound science solution that strikes the critical balance between essential economic activity and protection of the natural resources that Marylanders value so deeply.☀

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