Agricultural Modeling Team (AMT) Meeting

March 14th

09:00 AM – 11:00 AM

Meeting Materials

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This meeting will be recorded for internal use to assure the accuracy of meeting notes.

Summary of Actions and Decisions

Decision: The AMT approved the February minutes

Decision : Following a discussion on the 2022 Census of Agriculture form and the 2022 Census of Agriculture instructions, the group decided to not make a decision at this meeting on changing the land use for other haylage; grass silage and greenchop to the leguminous hay land use. ***Further investigation is necessary***.

Action: Tom will work with James to compile information and return to a subsequent meeting to discuss the land use category and nitrogen fixation rates for other managed hay and other haylage; grass silage, and greenchop. An additional discussion will occur on nitrogen fixation rates overall and how it relates to our application.

Action: If you have any state contacts that might have concentration or volume information for poultry litter, please contact Chris Brosch (Chris.Brosch@delaware.gov), Tom Butler (Butler.Thomas01@epa.gov), Zach Easton (zeaston@vt.edu), and Caroline Kleis (Kleis.Caroline@epa.gov) with their contact information.

Meeting Minutes

Statement of purpose:

To discuss the placement of relevant crops into Land Uses, the use of new broiler industry data, and inorganic fertilizer representation in Phase 7.

Decision items:

1. Approve the February minutes
   Decision: The AMT approved the February minutes
2. Announcements:
   - Following last month's meeting, a subgroup determining the relationship between nitrogen loading for new Land Uses was convened. This loading Rate Ratio Group met on March 5th, 2025, to discuss a path forward.

Introduction/Recap: 09:00-09:15 [15 min (Zach Easton, Virginia Tech)]

Zach will seek approval of the February minutes and walk through today's topics.

Other Hay Crops 09:15-09:35 [20 min (5 min presentation 15 min discussion) (Tom Butler, EPA)]

Last month the AMT voted to implement two new agricultural land uses, managed pasture, and managed hay. While implementing these changes we became aware of a N fixing crop within an existing hay category. We feel this is an error and that the crop should be moved to fit with leguminous crops in the nutrient application algorithm. We discussed the implications of this change and decide how to proceed.
Decisional.

Discussion:

Hunter Landis: It's a nitrogen fixer because we know or think that those plants that are legumes are identified in this grouping. Is it known the percentage of the other hays that include these clovers, soybeans, or others, or is it just because they are listed here, we have to assume this crop is fixing nitrogen?

Tom Butler: It's a great question. I can't give you the solid answer because I don't know how they phrase this question in NASS other than this definition, so I couldn't tell you those percentages. There was discussion within the partnership previously. That fixation rate was much higher, and they adjusted that. But I can't tell you anything about percentages. I'm sorry.

Joseph Delesantro: I can't really imagine any way that we would be able to get finer detail on these individual crops here from the census. Even if they did collect that information, it's just really difficult getting any sort of finer data than what they've already reported.

Mark Dubin: As a person who fills out the census, I would agree with that. I don't think you are going to get a further refinement of the breakdown for that based on the questions that are in the form. Unfortunate, but I think it's true.

Chris Brosch (in chat): finer detail isn't available and that's why we lowered the fixing rate.

Tom Butler: Thanks for that clarification, Chris. That's good perspective. I would ask if there's any heartburn in the group to changing the land use for other haylage, grass silage and greenchop to the leguminous hay land use. Given there are no objections we will register this as a decision we've made here as a group.

NOTE* The discussion was ended at this point but raised again after our second discussion topic was completed. For ease of understanding we have placed the related conversations together.

Discussion [Continued from Later in the Meeting]:

James Martin: I was late joining this morning. I wonder if we could use this opportunity of being ahead of schedule to circle back on the previous decision. I'd like to share a screen with you. What you're seeing is a split screen between the 2022 Census of Agriculture form and the 2022 Census of Agriculture instructions. The line item that you just spoke about and made a decision about is other haylage, grass silage, and green chop, which corresponds with question #7. If you look at question #6 and the definition for question #6, the other dry hay, that I believe is the crop that we use for the vast majority of our dry hay in other hay category. If you notice in the definition and in the question, it also includes the exact same crop mix that is included in other haylage, grass, silage, and green chop. So, following the logic from the last decision, shouldn't all hay go into leguminous hay?

Tom Butler: I'm looking at this for the first time right now. Let me get a chance to finish that.

James Martin: The other thing I'll point out is when folks fill out the census, maybe they use the instructions, maybe they just go based on the question. If you had a heavy clover mix, a heavy soybean mix, a heavy lespedeza mix, or a heavy peanut mix in your dry hay, I would think in row 6 you'd be listing your acres and your tons harvested in that category. In row 7, if you are cutting and harvesting green, which is really the difference between 6 and 7, 6 is dry hay and 7 is green chop, unless you went to the instructions, you probably wouldn't even know that that's

supposed to include mixes. That's just going to be anything cut and harvested green for hay. So, I think that's a bad decision to move the acres listed in #7 in the ag census to leguminous hay simply because the mix might include some unknown percentage of legume. My suggestion would be to agree on a fixation rate for the guesstimate of the fraction of legumes in each of these mixes, apply it, but leave them both in other hay.
Tom Butler: This is a good point to bring up, James. Jess and/or Olivia, I don't know if on the fly could we try and get the list of the crops and the land uses? I'm not exactly sure where other dry hay falls on this one, so I just wanted to be sure that that was clearly in the same place as the other hay category. If they both fix nitrogen, should they both go into nitrogen, or should they both stay the same? I don't know what the nitrogen fixation, if there is one for dry hay, is.
James Martin: My assumption was that other dry hay falls into the other managed hay crop within other hay. I don't know that to be true, but I don't know where else it would go. The rest of them seem to have a closer name match.
Jess Rigelman: I have the hay crops, and its alfalfa hay, haylage or green chop from alfalfa or alfalfa mix, other haylage, silage, and green chop, other managed hay, small grain hay, and wild hay. Wild hay we know is ag open space. So, alfalfa hay and haylage are from alfalfa or green chop are leguminous hay. Other haylage, other managed hay, and small grain hay are all part of hay. So, we don't really have a dry hay per se.
Tom Butler: We are putting this in, but 2022 isn't fully in place in CAST. So maybe that's part of the discussion if that's a newer thing than 2017.
Olivia Devereux: I'm not familiar with the latest ag census. Joseph's been working on that, but I am familiar with all the others and this category has not changed, so I don't think it's different. But of course, that should be verified. My memory in working with all the other ones is that this category has not been one that's changed.
Joseph Delesantro: I'm looking it up right now.
Dave Montali: Are there nitrogen fixation values for all of these things that feed other managed hay, or is it no fixation?
Tom Butler: I don't know where the other dry hay is, and if that's part of other managed hay. So, I don't know if that would be a fixation value there. Jess, do you offhand see if other managed hay has any fixation value, because I know other haylage, grass silage, and green chop do.
Jess Rigelman: No, just that one that we've been talking about. That's the only one.
Tom Butler: Yeah, so none of the other ones have that. So that is a good catch to put one in and move them or put one in and keep them the same. But that is a very good point to have brought up.
Dave Montali: James' point is that it looks like 6 and 7 are exactly the same thing.
Joseph Delesantro: I don't see other dry hay in 2017 census, so I would want to double check this, but it appears that category is new to 2022. Again, I'd like to spend a little more time to double check that.
James Martin: I looked back at 2012, because that's the one that Tom had linked in the presentation. There it was called other tame dry hay. Do you see that in 2017? I don't know what tame means. Maybe some of the ag folks can help me out.
Joseph Delesantro: That is definitely a category that is in our database for CAST, which falls into other managed hay. Other tame hay, which is in dry tons, falls into other managed hay.
Mark Dubin: Tame hay would be something that was planted, versus wild hay is something that existed. So that would be your definition differences there.

Joseph Delesantro: We're talking about very little amounts of nitrogen, but if there is this name change from 2017 to 2022, and other tame hay is now other dry hay, and those are interchangeable, that's something I will need to know.
Dave Montali: Is this biggest component of other managed hay, historically, other tame hay?
Tom Butler: I have not looked that up. I just looked up other haylage, and that was 25% of other hay. This, I would suspect, be big.
James Martin: I think it is. I think the other tame dry hay, which I presume to be identical to other dry hay, that's the vast majority of the acres. I don't know where this data comes from, if all hay and forage crops are lumped into one of these four categories in the ag census, I'm not sure where we get our acres of Timothy grass or whatever.
Joseph Delesantro: A lot of those are extrapolated forward based on the more detailed reporting that we have in the past. So, a ratio of those mixtures from the past is then applied to the combined newer categories that we have now, to extrapolate those finer categories of hay in graphs forward. I say forward. I mean forward from when they were last reported, but into the present based on the combined census categories we have now.
James Martin: Sorry to dump this on you, and happy that you guys were ahead of schedule, and I was able to join. I would be happy if you want to move on with the meeting, and maybe we can just have a consensus to reverse the previous decision, suspend the previous decision, until we can look into this further.
Tom Butler: I don't have an issue with that, because this is coming out for the first time, so I want to make sure that we have a handle rather than force it through. It's not my call. Who would second that? Do we have objections to what James proposed?
Joseph Delesantro: To inform that discussion, I'm wondering, James, if you could just say exactly what it is that you would like us to follow up on there.
James Martin: If folks are ready based on what I'm showing here to reverse your previous decision and leave haylage, silage, and green chop in the other hay category, rather than putting it into leguminous hay, I'm fine with that. I do think that the group needs to spend some time looking hard at the nitrogen fixation data for all of these crops, and I don't mean just hay. I mean across the board to make sure we have fixation plugged in and that fixation is playing well with our manure and fertilizer spread procedure. I would think fixation goes first and then we continue to try and meet plant need with the addition of manure and hay. These are the things that I would think the group needs to think hard about and figure out, for example, #4 the alfalfa and dry hay, is there any reason to think the fixation rate for alfalfa and alfalfa mixtures cut and dried before being put up should be any different than alfalfa and alfalfa mixtures cut and put up green? It's the same crop mix. Maybe it should have the same fixation rate similarly, and I presume it's the way it works now in Phase 6. This other haylage, grass silage, and green chop has fixation associated with that now, and it is currently in other hay. Just because we assign a fixation rate doesn't mean it has to go into leguminous because, I'll be honest, most of this hay is probably not leguminous. The small grain mixes, there can be small grain mixed in there. Shouldn't that go into cropland category? Because they've lumped all of these things together, I think it's really difficult for us to divvy it up in the model. I just can't see the logic of the decision when the two definitions of item 6 and item 7 are identical or nearly identical at least in terms of their crop content or potential crop content. So, my thought would be that they both stay in other hay, and they get some fixation. I don't know what that value should be.
Tom Butler: Thanks, James. I guess it did come up earlier that that value for item 7 had previously been 175lbs and was put down to 30 as a result of that discussion. I'm not the expert on that.

Mark Dubin: From a historical perspective for Phase 6, we struggled with this as well. Really the thought behind what was done was that there was a feeling that, yes, there are some of the legumes mixed in, but they wouldn't be the majority of the crops that were being represented, and that the more significant majority were not fixation crops. So, it was felt that it wasn't the perfect fit. But, having it in the existing category that's represented in Phase 6 now was the more appropriate representation versus leguminous hay, which was specified in the census where you're looking at that more specifically. Just wanted to get that historical perspective for why it's the way it was for Phase 6.
Jess Rigelman: James had mentioned that the two alfalfas had different fixation rates, and I'm not going to argue whether or not either were right or wrong but remember that fixation is based on yield unit, and one is a per acres and one is per dry ton. So, we need to keep that in mind if we do look at fixation that the yield unit is what it's based on, and that's what matters. So, that's why those are drastically different or seem drastically different.
James Martin: Yeah, I think it's going to be really hard to set a fixation rate for other dry hay and other haylage, grass silage, and green chop, when we have no real idea how much of the acreage or tonnage reported in the ag census is what mix, what percentage mix, and which crops. I don't think there's any way to scientifically set a value here other than to say it probably should be 0 and it should probably be lower than the individual pure stand of clover, lespedeza, soybeans, or peanut, all four of which are leguminous.
Tom Butler: I think it's a good point, James. I know that it's set fairly low. I think it's 30 pounds for acre for the mix.
James Martin: Are you sure that's per acre, per Jess' earlier point? Or is it per ton?
Tom Butler: For #7 for other haylage; grass silage, and greenchop, that one I believe is per acre. I'm fairly certain. Jess, you can correct me.
Jess Rigelman: That is correct.
Tom Butler: I know that it is a lower rate, and it was 175 per acre and now it's to 30.
James Martin: When was it 175?
Tom Butler: I think there was a presentation in 2019 or 2017.
Jess Rigelman: It was in there for CAST 17. It's one of the fixes we made for CAST 19 and someone found that that was so high, so I don't know when it was found, but it went in for CAST 19.
Tom Butler: Thanks, Jess. So, it is a good point, and I think the question becomes should for CAST other haylage, grass silage, and green chop, as well as other managed hay have the same nitrogen fixation? If the answer is yes, should they both go towards leguminous, or should they both stay in other hay? I don't think we should push for this today if no one is comfortable, I'm just trying to get in my head the questions.
James Martin: I think that's right, Tom. If we move them into leguminous, our previous decisions about other managed hay become moot because essentially there will be no acres of hay. They'll all be leguminous hay, right? What we're saying is if we make that change, every acre that's reported in numbers 4, 5, 6, and 7, which is representative of all hay and forage crops, are considered leguminous hay.
Tom Butler: That would definitely change some acres. I don't know what, but it would be pretty big I imagine. I'll open it up to the group here what you guys feel comfortable with. James has proposed these two questions and suggest we look at this. Can we get an indication from others that that's the direction to go?

Olivia Devereux (in chat): The change to legume fixation went into CAST-19d as Jess mentioned. It was released on Update released on July 10, 2018.
https://cast.chesapeakebay.net/About/UpgradeHistory
Olivia Devereux: Tom, do you want to go state by state? I know that what's grown varies state by state. I do remember being dragged out into a pasture in New York so that they could show me the amount of alfalfa. It was an unforgettable experience, and I want to thank our New York partners for helping me understand that. But that does illustrate that there are differences across the watershed and perhaps we should go state by state to discuss this.
Tom Butler: Cassie, are you wanting to hold up on this, or where do you stand?
Chris Brosch (in chat): DE is stand aside regardless.
Cassie Davis: After this discussion, if we could put these links in the chat, I can circle back with our agricultural market staff and our partners at the Upper Susquehanna Coalition who work directly with farmers and see if this situation is true for New York.
James Martin (in chat):
https://www.nass.usda.gov/AgCensus/Report_Form_and_Instructions/2022_Report_Form/2022_CoA_Questionnaire_Final.pdf
https://www.nass.usda.gov/AgCensus/Report_Form_and_Instructions/2022_Report_Form/2022_Census_of_Agriculture_Report_Form_Guide.pdf
Tom Butler: Scott from PA? Kate? Anyone from Pennsylvania on the line?
Kate Bresaw: Scott is here. I am hesitant to respond without communicating with him. Let me see if I can ping him.
Tyler Trostle: Scott's a little bit sidetracked, he got pulled in lots of different directions. I won't answer for him, but I will say let's just take a moment to talk about it offline and come back with an answer after we can have some internal discussions.
Tom Butler: Dave?
Dave Montali: What's the question?
Tom Butler: The question is do we want to wait right now, or what are our concerns with this? There are two questions we ultimately want to answer. 1) should 6 and 7 have the same fixation rate? 2) should they remain in other hay or switch to leguminous hay? Those are two things we need to address. I'm trying to get a feel, and it sounds like we already have people who don't want to act on this now, so I'm just trying to get a feel for everyone in the group as to where they stand. If they need more information on this or if just getting these links and talking amongst yourselves is sufficient.
Dave Montali: Personally, my thought is, yes, they both need to be the same, at least conceptually, with the way this stuff is written. It looks like we are talking about the same thing. I don't think I can ask anybody how farmers in West Virginia fill out the ag census and get any kind of answer to that. So, I think we ought to treat them the same. I don't think we should stick with our decision that we made earlier now that James has brought this up.
Tom Butler: Jeff, did you have something to add? Is Ken on? Tammie, do we have you or Curt? Do we have Lisa or Candiss?
Candiss Williams: I don't have any input on this.
Tom Butler: That's fine. Alex, any input?
Alex Soroka: Stand aside.
Tom Butler: Ok, Zach?
Zach Easton: I think I agree with Dave. They should both be treated the same, and I think my preference would be to move them to leguminous, even if it's a small fixation rate.

Dave Montali: I'm not so sure. It just seems like leguminous for the pure alfalfa and those things are very real. I'll accept James' comments that we are anticipating a small percentage of the things that are in this definition to be driving it and if other dry tame hay is our big thing, then we would be calling all our hay leguminous.
Elizabeth Hoffman (in chat): Our state computers hate the teams platform so I will type it out -- 1) what is the "decision"?
Tom Butler: That's fair. Elizabeth, the decision is to undo the decision and look at this.
Cassie Davis: If we could get a clear ask of what we are looking for, that would be helpful for when I go to reach out to our partners.
Tom Butler: The questions that we have are do you feel that other dry hay and all other haylage; grass silage, and greenchop, have the same nitrogen fixation associated with them? The second part of that is do you feel that those mixtures should be considered leguminous or just other hay? I think those are the things we should be asking.
Cassie Davis: So that's a little different than the question of how our farmers are interpreting section 9.
Tom Butler: My interpretation on it would be if they are considered leguminous or not would be related to do your farmers report leguminous varieties in those? But I understand your point there. Is there a better way we could phrase these questions for outreach, James?
James Martin: The immediate question is on the prior decision. It sounds like folks at least want to rethink that. So, I would ask that we all agree we're going to put that decision on hold. We're going to revisit it at the next meeting. At that next meeting, the question will be the other dry hay category which is in our crop list as other managed hay I believe, and the other haylage, grass silage, and green chop, which land use should those two crops go in? To do that, I think we should take a look at the acreages by state of each of these four crop types, figure out what the acreages are. I don't think it makes any sense to retain an other hay category if we're going to move everything that is reported in the current ag census into leguminous. I don't know why we would do that, personally, but that's the question. Which land use category should these crops go to? The second question is what fixation rate should we set for these two crops? The third question we should visit is how does fixation play into our nutrient spread process both for manure and for fertilizer?
Elizabeth Hoffman (in chat): Happy to undo the prior decision in an effort to better understand it. MD supports.
Tom Butler: For right now, I am going to ask a general question. Are we ok not making our initial decision, and are we ok holding off? There's no decision on where this goes today. If you are ok undoing our prior decision, you don't need to say anything.
Kate Bresaw (in chat): I have to step away for the remainder of the meeting.
Elizabeth Hoffman (in chat): Tom, not to be annoying but -- the prior decision was just related to the crop name to CAST land use crosswalk, NOT the decision around state ability to report managed hay and managed pasture, right? I missed the last 2 AMTs so I just want to be clear. Thanks!
Tom Butler: As of now, regardless of what we just talked about, the group made 5 decisions in February:

1. Two new Land Uses Managed Hay and Pasture
2. Four manure application groups
3. Defined managed and unmanaged hay and pasture
4. Acres of managed Land Uses will be state reporting each year by November 1st
5. Assigned Non-Nutrient Management multipliers for Nitrogen and Phosphorous

The only thing that we've undone today was what we had done at the start of this meeting, and that was to move other haylage; grass silage and greenchop. We had decided to move it to leguminous hay. We have undone that. It is currently sitting as it does in other hay. We will then have to have discussion on this land use as well as other managed hay and where those should sit. Related but not necessarily exactly tied to that, is just nitrogen fixation in general.

Decision: Following a discussion on the 2022 Census of Agriculture form and the 2022 Census of Agriculture instructions, the group decided to not make a decision at this meeting on changing the land use for other haylage; grass silage and greenchop to the leguminous hay land use. ***Further investigation is necessary***.
Action: Tom will work with James to compile information and return to a subsequent meeting to discuss the land use category and nitrogen fixation rates for other managed hay and other haylage; grass silage, and greenchop. An additional discussion will occur on nitrogen fixation rates overall and how it relates to our application.

Poultry Industry Data 09:35- 10:20 [45 min (15 min presentation 30 min discussion) (Chris Brosch, DDA)]

Previous efforts revealed data deficiencies which proved prohibitive for the adoption of poultry industry datasets. We heard about a possible new method to fill these deficiencies for broilers in Phase 7. Informational.

Discussion:
Chris Brosch (in chat): Historical context for my presentation:
https://www.chesapeakebay.net/files/documents/workshop_presentation_-_glancey-dubin.pdf
https://www.chesapeakebay.net/files/documents/pls_update_-_9aug12.pdf
https://www.chesapeake.org/stac/presentations/268_3A%20Terrestrial%20Inputs%20Appendices.pdf
Dave Montali: Our West Virginia Department of Ag folks say we can't meet our manure transport goals because there's not as much manure. The West Virginia husbandry was tailing the rest of the world in that we were slower to go to litter build up and less frequent cleanouts. I think we are still on that side of the curve. When I talked with them about miscanthus grass, they didn't know what that was. So, I don't think that any kind of reversal of that is happening here. I understand the issue. I thought before that if you say your manure gets more concentrated, but you've got less of it, maybe the way we have things set up now, we know the mass, we can assume that the total calculation of N&P is the same, I think it impacts manure transport because we don't have monitoring of what we're hauling. But, if we go to make this change, are we going to have the different husbandry in different regions, at different times, from 1985-present?
Chris Brosch: Not surprised on the miscanthus issue because we're growing it here, and that would be a heck of a trip to a place that grows a lot of trees. So, I'm sure you guys are still using pine shavings in West Virginia. But the main point about the differences across the landscape, we don't know until we look. We are sure that they are slightly difference, because that's what the original subcommittee report said. So, I think we are going to end up making some judgement calls at the end of this process based on the limitations of data, and we have some understanding historically that we can bring to the table to make those judgement calls if we're more data limited when we revisit it. I definitely recommend you click those first two links and

just scroll through those slides so that you can refamiliarize yourself with just how different West Virginia is.

Olivia Devereux: Chris was pointing out that the data have changed over time, yet the modeling time period is 1985 through the future. So, it makes sense to me that we have either some data that changed over time or we have kind of a midpoint of the entire modeling period. Maybe you all can discuss how that change over time in poultry weight, poultry litter concentration, and all of that is handled in the model.

Chris Brosch: I look forward to that discussion, Olivia. It's a great observation. I'm not sure the beginning in time that existed for the poultry litter subcommittee report, but I know it was not 1985 for all the data. So, they've got a period already in the report. We want to add another more recent period. What we do have through the whole simulation is the feed efficiency from the industry. Thinking out loud, the feed efficiency might be something we could use to adjust that pre-record bird volume for manure and concentration and kind of estimate how much more wasteful the biology was back then, in absence of something better. In a short amount of time if there were stones that weren't turned over by Glancey and the team, I think we're just as limited to be able to find those now. But that was one thing we knew we could get our fingertips on which was not widely discussed in 2015 when the report came out.

Olivia Devereux: You said that one operation represented some really high percent of the industry. Was that for broilers or layers? Help me understand which one. I know they are managed very differently. The sizes are different, the feed is different. They're in the house a lot longer for layers. Which one is it? Or do you have both?

Chris Brosch: Only venturing upon answering the question for broilers. Since we have one layer operation in Delaware, I don't have representative samples of manure concentrations for layers. The same exact answer for pullets. One operation, so no representative data.

Olivia Devereux: I wonder where those pullets are coming from. Outside the watershed?

Chris Brosch: Other states grow pullets. Delaware's pullet farm grows for Maryland laying operation and the Delaware laying operation's pullets come from the market. They shop around.

Mark Dubin: As you said, we've done a lot of work in the past there, and I would say that the greater emphasis could be on building the foundation that was laid out from the previous work that's been done. Updating it would be, in my mind, a primary on that. I know some of the work that we did with Virginia Tech on turkeys we were able to go back in time and find data from various labs to help with some of that historic information on there. So, with the Poultry Litter Subcommittee, we did a lot of digging, and there might be some opportunities to find some information on there through some of the university labs and so forth. Like you said, it's probably not going to be any easier because some of the folks that we work with aren't with us or are retired, and they have a tendency to get lost over time. The emphasis on there for updating would be well-served.

Gary Shenk: I think people really understand this point, and I just want to make it really quickly. The absolute value is important, but the trend is the most important thing for the way that we use these data. So, I think we're talking about that, but I just wanted to put an exclamation point on that.

Chris Brosch: Yeah, that's precisely why I was resistant to revisiting this previously, because I didn't fully understand how the volume portion of the equation was changing, and I could see the trend in the concentrations and the bird numbers as we got a little bit of growth in the shore in the mid-aughts. We were going to have a perfect storm of bad data without collecting

the third piece of the puzzle. Now that I understand where it came from at least in large part, I'm much more confident that we can get a representative trend.
Dave Montali: Our Phase 6 characterization of litter based on the Poultry Litter Subcommittee, was that representative of a scenario where you clean outhouses with every flock, or whether it was buildup? I think the answer I got was it was a mix of things. So, when we're thinking about how things change over time, it seems to me like the Phase 6 characterization is more of an intermediate period where a portion of the operations had moved to build up litter in the house. What you say now, we need to understand Phase 3. I think we still may need to understand Phase 1, and do you think there's any way to back out those kinds of characteristics for the early day scenarios where the houses were cleaned out with every flock?
Alex Soroka (in chat): Does the feed efficiency count the nitrogen content of feed and conversion to bird N? So, if we tried to create a mass balance of N efficiency of conversion of grain to bird, then we would also learn about volatile losses of N from the house/compositing processes.
Chris Brosch: I believe through time that there was always a mismatch of husbandry practices. Of course, in 1985, there was very little nutrient management. There were very few manure structures, but the value of litter was better recognized than when the industry was taking off in the 50s and 60s. So, thinking about those 3 phases, I'm going to consider them your Phase 1 talking about the early days of our simulation, Phase 2 capturing the Poultry Litter Subcommittee report we have, and Phase 3 what's in front of us today. The second phase was probably still quite full of variability, but much fewer farms were doing cleanouts every flock because the price alone was cost prohibitive and there were emerging signs to suggest that inoculation of that bedding with the previous flock's litter was good for chicks' gut health. What put us into Phase 3, as I understand it, was an increase in the prevalence of bad bacteria in the litter and perhaps inconsistent treatment of that littler with windrowing practices. We get a lot of chick mortality if we don't get great heat between flock windrow, to the point where many of the integrators have responded by doing annual cleanouts. At the end of Phase 2, we had some integrators not cleaning out for as many as seven years on some of these farms.
Dave Montali: I get that. When I asked our Department of Ag folks, they said we're still in that mode of cleaning out less frequently. He recognized, too, that some places do it sometimes up to seven years, but that's not everything and that's not necessarily the norm. But my point was when we started dealing with this and characterizing litter, we were operating under the assumption they were cleaning out every flock, and a key date is the mid 90's. That's the key date for the start of the trend and, at that point in time, West Virginia had very little build up kind of operations. I was saying three or four years ago that because the buildup is becoming more prevalent, there's less manure to transport. That's what folks were telling me. When I ask the question what does the Poultry Litter Subcommittee work represent, is it representative of very frequent clean outs or very infrequent cleanouts? The answer was it was a mixture. Are you saying that the Poultry Litter Subcommittee is the intermediate scenario? Is that how you think about it?
Chris Brosch: When you use the manure broker as the point of sampling for volume, you are not sensitive to the husbandry practices because it's buried. We can tell how long the period was between cleanouts on a farm that uses the same broker and relate the volume to that span of time, but we don't have to, and we don't. We relate it to the number of birds. So, we look up Farm A and we see a transport in 2016 and 2020. So, in your mind, that's a four year clean out, and all the model cares about is the animal units and the change in tons and the concentration. The husbandry is buried, and that's why Gary made the point, I presume, about trends because

the husbandry is implicit, and that's ok. It doesn't need to be explicit, and if we were to rewrite the report with explicit husbandry, we would get a far too specific piece of documentation adding additional reporting requirements from the industry that aren't necessary for the model and burdensome for the states that prepare the data.

Paul Bredwell: Chris' speculation of the three phases, I think you are on to something there. I suspect there's probably another variable and that is the sub-therapeutic use of antibiotics, too. We've pulled that out of the toolbox. We use it, when necessary, but antibiotic use has gone down. Now I think you are going to maybe see it start creeping back up again. I don't know if this no antibiotics ever was a fad type thing, but we've zeroed in on ways to treat the birds that aren't using drugs that are specific to humans. That was really, I think, the driver way back when. Regarding Chris' comment about the feed conversion ratio, that has obviously gotten better over the years, and we can use that as a normalizer in this discussion. I've had the opportunity to speak with some senior professionals, senior people within the integrated companies, and I think we will be able to get a hold of that as long as it's kept private. They all have their own feed formulations. They're very similar, of course corn and soybean being the biggest percentage of the feed. I said this before, I'll say it again, I'll probably say it many times. If the poultry industry can help in this discussion and data collection, we are happy to do that. I've heard over the years that there's a huge increase in production of poultry on the peninsula and in the watershed, and it can increase, but we always have to remember that it can only increase to a certain point. If there's capacity within a processing plant, then certainly we can increase the capacity of that plant, but we can only put those birds through there at a certain line speed. Line speed waivers can increase that line speed if there's. If there's not a line speed waiver in place at a plant, it can't increase that line speed. So, if we go down this road, it'll give us a better opportunity to understand how much processing has increased, if any has at all. You all know as well as I do that the integrators can, from time to time, come into a producer and say, hey, you really need to update your farm. Your facilities just aren't up to snuff. Make sure the mortality rate is low. So, while new farms have gone in certainly or new houses have gone in, it's likely that we will see a number that have gone out of service too. I know as we've talked about over the years trying to understand how many poultry houses are out there and trying to figure out a way to do that effectively and efficiently, I'm not sure we've ever gotten down to a point where we can count roofs and whether that barn is an operation or not. So, this would give us an opportunity to have a better understanding there as well.

Seth Mullins: I was just wondering, Chris, how much variation do you think there is between grower to grower as far as cleanout schedule and the way they manage the litter?

Chris Brosch: Far less difference from grower to grower. It's much more tightly controlled by the integrator. There was a period for which one of the five integrators on the shore here was approaching that seven-year schedule. At the same time, another integrator had converted to the third phase and that one-year schedule. At this point, I'm feeling pretty confident that they're as close as they've ever been in their management in the last 18 months.

Seth Mullins: Mark can tell you the dates exactly, but Virginia was three or four years ago, was going to do a broiler characterization study. It didn't come to be, but I did some surveys of growers in one complex's clean out schedule, litter amendment use, all that, and everyone was different it seemed. All one company, all one complex. That was three or four years ago, so maybe things have changed, and I don't realize it. In Virginia, that complex is not in Virginia anymore. But talking to 20 growers, it was hard to pinpoint. "I clean out every year, I clean out when I think it's needed", etc. It was just highly variable.

Chris Brosch: There is some variability stuff. Here on the Delmarva, if a chicken grower's got acres, that's going to influence it because they're following the price of fertilizer which is far more impactful for a bottom line than bales of pine shavings. That's the tradeoff. A lot of the growers here don't have both. So, it's a much simpler calculus where they just follow the direction of the integrator. Paul alluded to the antibiotic issue. I think that has a huge impact on the Delmarva because the density of poultry. We have companies like the manure brokers that are dedicated to just litter conditioning, just that windrowing, which has definitely placed disease pressure on our flock and has inspired some of those integrators to cut the cleanout schedules like I mentioned before, because of the high bad bacteria counts. We've seen outbreaks of all kinds of things other than bird flu, in addition to bird flu, and that's playing into this new phase quite a bit. I'm not surprised that a place like West Virginia may be delayed in those husbandry practices, because they don't have the disease pressure we do with a lower density out there. It's a good observation. I appreciate you sharing it, and we'll be sure to reach out to see what heads or tails we can make of the survey data you've got if you are willing.
Seth Mullins: I don't think it was ever completed. It was started. Mark can probably tell you the details more than I can, but nothing ever came of that that I know of.
Alex Soroka: The feed conversion efficiency, is that by volume, or is there any chance that is by nitrogen content of feed? So how much we convert that nitrogen from feed into chicken product?
Chris Brosch: It's pound to pound, so volume.
Alex Soroka: Is there data on the nutrient content going in versus chicken/poultry coming out?
Chris Brosch: As Paul mentioned, the feed is proprietary. So, on nitrogen and phosphorous, no, but I appreciate where you are coming from because on the phosphorous side, when the phytase enzyme was added to improve the efficacy of the gut in the chickens to convert rock phosphate into bone phosphorous, there was a major decrease of rock phosphate in the feed. So, you're thinking along the right lines, but I don't think that's something we can capture without really raising some eyebrows from the industry.
Dave Montali: What are we doing here? Are we pursuing the new study? When are we going to get the information?
Chris Brosch: I am going to get some help and collect what we can and report back. I suppose I didn't do a good job of mentioning it, but if anybody on this call can help in that collection in their locales. I'm very geographically limited to the Delmarva here. So please do reach out. I'm going to try to get that underway with capturing that volume information because I have production data, and I have concentration data. Paul's going to get the rest of the picture for the production data. But in other places, we're going to need that concentration data and the volume data. So, if you think you can help, I would appreciate you sending a message, and I'll make sure to bring you along.
Kate Bresaw (in chat): Doug is not around, but we can get you what we have.
Dave Montali: I don't think I can help. But I certainly think that there are people at the West Virginia Department of Ag. Would you be reaching out to somebody like Matt Monroe and say here's what I need form you? Or are you going to pursue this for Delaware and then a couple months of now we will still be scratching our head about what to do everywhere else if things are different.
Chris Brosch: That's precisely why Tom put me on the agenda. We're socializing the plan. That's the kind of feedback we need from today's presentation. Obviously, I can reach out to Matt, and I'm happy to because I didn't hear any feedback that what we're endeavoring upon doing makes no sense. I can reach out to him and Seth and colleagues in Pennsylvania. So, I will do that next.

Action: If you have any state contacts that might have concentration or volume information for poultry litter, please contact Chris Brosch (Chris.Brosch@delaware.gov), Tom Butler (Butler.Thomas01@epa.gov), Zach Easton (zeaston@vt.edu), and Caroline Kleis (Kleis.Caroline@epa.gov) with their contact information.

Inorganic Fertilizer 10:20-10:55 [35 min (15 min presentation 20 min discussion) (Tom Butler, EPA; Alex Soroka, USGS)]

We continued discussing the current processing and application methods for inorganic fertilizer in CAST Phase 6. This will serve as the starting point for changes to scale and application for Phase 7. It also includes potential updates on a modeling approach to simulate inorganic fertilizer applications across the Chesapeake Bay watershed. Informational.

Discussion:

Dave Montali: A couple observations. Conceptually, if we were assuming nutrient management and filling that need based on yield, with a mix of organic and inorganic, and you took the organic away, the nitrogen needs to be replaced to accomplish the yield. But, if you think about areas that are not under nutrient management, maybe that's a way to think about limiting that backfilling somehow. That's one observation for people to think about. The other is that under this scenario, if you were not in a situation where phosphorous was concerned, you would want to be the receiver of transported manure whether you are a different state or a different county. But, by doing so, you then jump to potentially having phosphorous issues. There are rules for when you transport manure to not backfill phosphorous. That was thought out and rationalized, so it might be helpful to say why did we do that and does any of that apply to nitrogen?

Patrick Thompson (in chat): What is the basis for assuming that nutrient use efficiency of manure is greater than that to of commercial fertilizer?

Tom Butler: The nutrient management really impacts the applications. So, it's like a load source input reduction, and that really allows you to reduce your inorganic fertilizer, not the organic part. I just wanted to make that point clear.

Gary Shenk: Building on what Dave was saying, the size of these bars is conceptualized right now as the nutrient management expected application rate of available nutrients, and there were really three different sizes of bars that the AMS was considering. So, this would be the nutrient management application rate and then a higher bar would be the expected application rate when you didn't have nutrient management, which would be like 15% higher. The third is what the calculation ended up being when we applied all of the manure and all of the fertilizer from those county wide manure buckets and watershed wide fertilizer buckets. So those are three different sizes. My memory of the AMS was that they didn't want to assume nutrient management. Like that bar on the right, its nutrient management expected application then higher would be the non-nutrient management, and then perhaps higher is what was actually calculated in the model. So, the AMS didn't want to assume that any county that was transporting a significant amount of manure was, by default, going to nutrient management. So, they weren't just going to give you nutrient management without nutrient management being reported, is my memory of that conversation. If you're thinking about backfilling and not backfilling, thinking about backfilling to the assumed non nutrient management rate rather than the historical rate might be something to think about. I don't know that I'm being completely clear, but what you've got illustrated here is one concept of backfilling and then the second level of complexity is the different sizes of those bars that we're actually trying to match.

James Martin (in chat): @Elizabeth the two decisions are connected in that the Managed Hay would be a subset of the Other Hay acres, currently 2.14M acres. If we remove either/both of the other managed hay (1.5M acres) and other haylage; grass silage and greenchop (393K acres) crops from the Other Hay Land Use, there will be only 247K acres of Other Hay bay wide to draw from for the Managed Other Hay Land use
Elizabeth Hoffman (in chat): Thanks. I was concerned I missed how far back we were unraveling to but appreciate the clarification on the connection.
Dave Montali: Where is the big heartburn? Is it the backfilling of N to replace organic N that's moved out, or is it the third box that says when we do all that we do, we still aren't using up our watershed-wide stock and, therefore, we put more on?
Jess Rigelman: The complaints I've heard is the whole backfill for nutrients that have been transported out. I think that there is a middle ground there and that, yes, you're not going to transport all your manure nutrients out and have your crops die. There should be replacement of fertilizer, but maybe there's a cap on that because in a high manure county where you're getting like 300 times your application rate manure, it makes sense to transport it out. But it also doesn't make sense that you'd put 100% of fertilizer down to replace it. So, if you were to transport let's say 150% of your manure out and your application was still 150, then maybe you wouldn't backfill with fertilizer. Right now, it's 100% replacement, but maybe it should be set at a level like you'd replace it up to 150% of crop need so that you get a benefit for transporting the extra 150 out. So, I think both arguments are true, but that's the argument that I've heard. You transport manure out, it's supposed to help you, but it doesn't because we just backfill it with fertilizer.
Gary Shenk (in chat): Patrick, there is no NUE assumption. The literature shows that an extra pound of manure N exports less than an extra pound of commercial fertilizer N
James Martin: I think Jess is on the right track here. I think putting some kind of cap on the backfill, in part, we should do that by establishing state stocks of fertilizer rather than Bay wide. I also think it can be informed because those states that are providing fertilizer data actually have it, I believe, at the county scale. So, if county fertilizer sales data support the argument that it is not being backfilled, why would we draw it from other counties within a state or Bay wide to backfill? Let's find a way to cap it so that there's still a benefit of the transport.
Mark Dubin: Historically, with the old AMS, there was a recommendation to have a cap on the backfill, either looking at the nutrient management or crop requirements, but something that never did materialize in Phase 6. So, I think this is a good idea to take a look at this and see what can be done for Phase 7.

Recap/Closing 10:55-11:00 [5 min (Zach Easton, VT)]

Action Items:

- Discuss: Ag Land Use Crops in other hay, Poultry data, and inorganic fertilizer data.

Adjourn – 11:00

Up Next:

Office Hours: Friday, April 11th, 2024, from 8:00 - 9:00 am.

AMT Meeting: Friday, April 11th, 2024, from 09:00 - 11:00 am.

Participants:

Zach Easton, VT
Tom Butler, EPA
Caroline Kleis, CRC
Cassie Davis, NYSDEC
Olivia Devereux, Devereux Consulting/CBPO Contractor
Tyler Trostle, PA DEP
Kate Bresaw, PA DEP
Scott Heidel, PA DEP
Chris Brosch, DDA
Mark Dubin, UME/CBPO
Jessica Rigelman, J7 Consulting/CBPO Contractor
Arianna Johns, VA DEQ
Hunter Landis, VA DCR
Joseph Delesantro, ORISE Fellow/ EPA CBPO
Helen Golimowski, Devereux Consulting/CBPO
Candiss Williams, NRCS
Karl Blankenship, Bay Journal
Dave Montali, Tetra Tech/MWG
Alex Soroka, USGS
Elizabeth Hoffman, MDA
Patrick Thompson, EnergyWorks
James Martin, VA DCR
Gary Shenk, USGS
Paul Bredwell, US Poultry and Egg Association
Seth Mullins, VA DCR

**Common Acronyms

AgWG- Agriculture Workgroup
AMT- Agricultural Modeling Team (Phase 7)
BMP- Best Management Practice
CAST- Chesapeake Assessment Scenario Tool (user interface for the CBP Watershed Model)
CBP- Chesapeake Bay Program
CBPO- Chesapeake Bay Program Office (houses EPA, federal partners, and various contractors and grantees working towards CBP goals)
CBW-Chesapeake Bay Watershed
CRC- Chesapeake Research Consortium
EPA- [United States] Environmental Protection Agency PSC – Principals' Advisory Committee (CBP)
STAC- Scientific & Technical Advisory Committee
TMDL- Total Maximum Daily Load
WQGIT- Water Quality Goal Implementation Team