

## **Manure Irrigation Workgroup Meeting – November 22, 2013**

### **DRAFT NOTES**

#### **Original Agenda**

November 22, 2013, 9:00am - 2:30pm  
Dane County Cooperative Extension  
First Floor Meeting Room  
5201 Fen Oak Ct, Madison, WI 53718

#### **Meeting Overview**

This meeting will focus on risk and uncertainty and will include discussion and input on assumptions for the drift study QMRA modeling. The workgroup will revisit a table outlining characteristics associated with manure irrigation and their relationships with identified concerns for drift, health, water quality, etc. The meeting will also include a preliminary discussion regarding potential format and scope of the final product from this group. Assignments are likely to emerge for the Dec. 13 meeting. Background information is available at the workgroup document site and also at the project website ([fyi.uwex.edu/manureirrigation](http://fyi.uwex.edu/manureirrigation)).

#### **Agenda**

8:30am	Room available – coffee
9:00	Welcome, introductions, agenda review and repair
9:10	Review of discussion notes from last meeting – Oct. 22
9:20	Updates and announcements
9:40	Discussion: perceptions of risk – underlying concepts and implications for our work
10:10	Discussion: input on QMRA assumptions for drift study Break as needed
11:45	Lunch – box lunches provided
12:15pm	Discussion/Exercise: Revisit and review connections between identified risk factors and identified concerns – the revised best/worst table from Oct. 22
1:30	Break
1:40	Discussion: visions for final product. How the workgroup might convey its key information and recommendations.
2:00	Assignments for Dec. 13 meeting
2:15	Wrap-up, closing comments, and scheduling for winter 2014 meetings
2:30	Adjourn

#### **Notes from November 22, 2013 Discussion:**

##### **1. Attending:**

Workgroup members: Ken Genskow, Becky Larson, Carrie Laboski, Andrew Craig,

Todd Boehne, Rob Thiboldeaux, Suzanne Gibbons Burgener, Gloria Smedema, Sarah Grosshuesch, Kenn Buelow, Jeff Polenske, Dana Cook, Lynn Utesch, Jeff Sommers, Mark Borchardt

Members not attending: Pat Murphy, Shelly Mayer, Jim VandenBrook

Others Attending: David Nelson (UW), Sarah Koske (CDC/DHS), Drew Nicholas (MEA).

## **2. Review Discussion Notes from Oct 22**

The workgroup reviewed the notes (previously distributed) from the October 22 meeting. Actions identified during the October 22 meeting included refining/revising the “best/worst” table as a discussion tool for practices that affect various risks associated with manure irrigation; a revision was presented later on the agenda. There was to be additional discussion about incorporating nutrient availability and rate information into that table; that was post-poned. We were also going to find additional meeting dates for Winter 2014. Meeting dates for 2014 proved difficult: January 31, 2014 worked for most and was selected as a meeting date. There was no success finding dates for February and March.

## **3. Updates and Announcements.**

*Nov 16 Rural Heath Forum.* Lynn Utesch provided a summary of the Nov 16 Rural Health Forum in Sturgeon Bay that he had announced the forum at the Oct 22 meeting. About 140 people attended the event, which focused on large livestock operations and associated public health concerns. All five speakers addressed issues discussed by this group. Gordon Stevenson, former chief of Runoff Management at DNR, stated concerns about the volume of liquid manure in Wisconsin and lack of resources and political support for effective enforcement; he also expressed support for over-extended agency employees. Dr. Keeve Nachman from Johns Hopkins University (one of the authors of the JAMA Intern Med article on CA-MRSA discussed at our Oct 22 meeting) presented that article along with two other studies. He noted there is not enough data to typify risk associated with dairy manure and that further study is needed in areas with a higher concentration of dairy than used in the PA study summarized in the article. Videos and presentation slides from the forum will be posted soon by the organizers.

As a follow up, it was noted that several major health care providers in NE WI are interested in working with Dr. Nachman on replicating the study here. Several workgroup members expressed an interest in contacting Dr. Nachman to discuss how the study would be applied in WI and to discuss questions related to the JAMA Intern Med study, such as: why it was difficult to correlate dairy manure to MRSA risk; proximity issues regarding livestock operations and communities; if a new study could look at some of the other diseases; etc.

*Ebert Enterprises application for manure irrigation.* Andrew Craig reported that the permit decision will be made soon. DNR expects that the permit will be appealed. Appeal hearings usually happen six to nine months after filed, but this might qualify for an expedited scheduling process for the hearing.

*Survey of permit holders regarding interest in manure irrigation.* Andrew Craig announced DNR plans to contact all Wisconsin CAFOs in state to ask if they use manure irrigation, and if they plan to do so in near future, including what type of manure they would use.

*New EPA report.* USEPA released a new publication “Literature Review of Contaminants in Livestock and Poultry and Implications on Water Quality” EPA 820-R-13-002 (July 2013). The document is available through EPA and is uploaded to the workgroup livebinders site. [Noted in later discussion that Table 14 of this report is an especially helpful summary]

### **3. Presentation and discussion: public perceptions of risk**

Sarah Grosshuesch led the workgroup through a presentation (attached) and discussion focused on public perceptions of risk. The presentation began with information about the Precautionary Principle within public health policy—that precautionary measures should be taken to limit health risk even if causation is not fully established—noting that the US does not have the strong legal precedent for this principle although it is seen more in other countries. The Precautionary Principle has been applied when considering subjects including: GMOs, Medical Imaging and EMF. Key elements include using caution in the face of uncertainty and increasing public participation in assessing relative risks.

Key points related to risk:

- Risk management considers the presence of uncertainty, and the perception of risk. It also assesses relative risk between specific activities, conditions and environments. Remedy is often applied through education and regulation.
- Society accepts that certain risks exist such as related to automobiles, work accidents, etc. We are good at mitigating some types of risk. We are less familiar or accepting of others.
- Tolerance for risk increases when; 1) the risk can be quantified 2) the benefits are defined and clear, and 3) the immediacy and severity of the impact. Other factors include: is the risk equitable, or distributed unevenly? How voluntary is taking on the risk? Is the negative result permanent? Risk assessment looks at comparing risk to the possible benefit of tolerating risk.
- Another important issue when considering risk and public perceptions relates to credibility of the sources of information for those potentially affected.

More details are included in the attached slides.

### **4. Quantitative Microbial Risk Assessment (QRMA) Planning and Scoping**

Mark Borchardt led a presentation and discussion of the QMRA process as a way to get input from the workgroup regarding the drift study. As background, DNR has funded a drift study led by Borchardt and Larson. (A recorded presentation about that study is available on the [fyi.uwex.edu/manureirrigation](http://fyi.uwex.edu/manureirrigation) website.) The study cannot examine all issues and all pathogens

– the research team must match priorities with resources available. Throughout the remaining elements of the study, the research team would like this workgroup to provide input on those priorities and other assumptions necessary for the analysis. Starting January 2014, there will be a full-time post-doctoral position focused on this study. A pdf of the Nov 22 meeting presentation is attached.

Major points from the presentation/discussion:

QMRA is a process using risk assessment principles for quantifying at the population-level the adverse health effects that result from exposure to pathogenic microorganisms. This QMRA will use data collected by the research team to meet the overall study objectives: 1) define setback distance at which the risk of illness from airborne pathogens from manure irrigation is acceptable, and 2) perform sensitivity analyses to identify those variables driving the pathogen transmission process from source (irrigation) to receptor (people)

Context regarding setback distance (from discussion). The current Wisconsin requirement for setback is a minimum of 500 ft from a property line with the potential to increase for public or environmental health concerns. This requirement was codified in NR214 in the 1990s based on best professional judgment, observation of manure irrigation practice, and experience with industrial discharge regulations. Concern with pathogens in drift is new – previous industrial discharges have usually included nutrients, salts, and other chemicals, but not pathogens. Historically, there have been some concerns with chemical drift, based on window splatter reported by drivers. In those cases, dischargers have been asked to put drift control measures in place...e.g., use drop nozzles, avoid high wind conditions, etc. It was noted in discussion that the state of Iowa has a pressure-based requirement – closer setbacks require lower pressures; larger setbacks allow for higher pressures (more at Dec 13 meeting). The outside wetted edge of spray path indicates the distance to setback. In addition, producers must always manage for wind. Standardized setbacks, where they exist, tend not to differ by application method.

QMRA Process Steps involve:

- Exposure Assessment: Pathogen concentration at air volume inhaled →
- Exposure-Response Assessment/Describe Relationship (non-linear) →
- Risk Characterization

This requires the research team to:

- Define exposure pathways
- Define pathogen hazards
- Define population at risk
- Define health outcome
- Define acceptable level of risk
- Define exposure scenarios

The research team is seeking workgroup input on those decisions.

Workgroup input on study assumptions:

Confirmation: the analysis will focus on threats to human populations, not herds or wildlife (no disagreement).

Confirmation: The analysis will focus on inhalation rather than on what lands on surfaces [fomites], foods, or is introduced through vectors such as water. Irrigation at aerosol and droplet level produces some exposure through inhalation. General agreement that a decision to focus on inhalation is good in terms of risk communication and scariness aspects – it is the least controllable by individuals and likely has the largest impact. Also pathogen exposure is difference from chemical exposure because microbial inactivation (pathogen destruction through uv, desiccation, etc) limits infection. We can use QRMA to account for cumulative exposure as well as momentary level of exposure. QMRA does NOT do a good job handling changes in immunity over time for two reasons: 1) sick people die and 2) people develop immunity over time.

Confirmation: QMRA is the best approach for this project. Borchardt noted three main approaches to this understanding this issue: 1) epidemiological research is the best avenue of study, but also prohibitively expensive, 2) QMRA, and 3) population dynamic modeling, which has very limited application in US at this point. The QMRA approach is very appealing for advantages outlined in presentation and also because it looks at risk in advance – and provides more information, without requiring people to get sick first.

Confirmation: The analysis should concentrate on dairy cattle (% of positive manure samples). Hazard Characterization depends on bacterial and protozoan hazards in the irrigated material. For a good summary of hazards associated with manure, Borchardt suggested reading Table 14 in the recent EPA report (“Literature Review of Contaminants in Livestock and Poultry and Implications on Water Quality” EPA 820-R-13-002, available on LiveBinders site). There are more concerns related to swine than dairy. Discussion raised questions about how the analysis might address swine or poultry at all; rather than QMRA outputs, the study could make qualitative statements, such as there are additional concerns about swine application due to viral transmission that may affect humans.

Confirmation: Focus on several key “dire” pathogens. Analysis is not able to include all pathogens initially, although it is possible to test for other organisms later. There is also some ability to proxy zoonotic pathogens by using surrogate microorganisms with similar physical/transport characteristics. Discussion suggested to look for those organisms which concerns the public most. Discussion with workgroup led to recommendations to include these pathogens in analysis (either directly or through physical surrogate/proxy organisms):

- Leptospira species to analysis – fairly common in herds
- MRSA – for public perception issues, do if possible
- Coxiella burneti – very important to do if possible

Confirmation: Safety factors for exposure risk should start with general population because most data available for dose-response, then adjust for children, based on amount of time outdoors, more rapid breathing, and lung capacity (also make adjustments for immune-compromised and immunosuppressed). The analysis should exclude farm workers as specific group, because they have multiple pathways and higher frequencies of exposure. Safety factors are based on Dose Response Curves for specified populations. Different safety factors would be applied for different population groups.

Confirmation: Dose Response Curve should be based on infection (conservative approach), and if possible, also illness or death. Infection, illness, and death are the three dose-response options. There are tests which establish infection/likely infection. A skin outbreak or other obvious physical response is not necessary to establish likely infection rate, and might be more closely related to an illness measure.

Confirmation: Acceptable Level of Risk (ALR). There are several ways to determine ALR including how well risk is tolerated in specific populations. Research team plans to define ALR using Probabilistic USA standard for waterborne infectious disease approach: 1 infection per 10,000 people per year [i.e. 0.0001 infection/person-year]. Create setback corresponding to that rate (or to an adjusted rate). The research would then be able to approximate risk based on different setbacks. At risk population includes residents, workers, tourists etc. To put this in perspective: what is the public health exposure from similar operations if they are not irrigating? And in comparison to best professional judgment? The research team hopes to eventually provide a probabilistic risk level at variable distances from the wetted perimeter.

Ultimately, need to consider what potential level of infection is acceptable (risk) and compare that against the cost/impacts of not using manure irrigation technologies. As a workgroup, we are examining that cost/benefit balance; our end product will reflect those efforts.

Additional issues and questions raised:

- Even some apparently obvious practices can be complex and complicated, (e.g., high pressure spray for manure irrigation seems an obvious negative, but high pressure might actually help destroy bacteria... the sudden pressure change from pressurized system through nozzle may kill pathogens).
- More work needs to be done to model air dispersion of pathogen transport thus replacing the need to perform a very large number of measures.
- What is the difference in live pathogen between manure source and output?
- Since the QMRA study will not consider animal health, can other research on transfers between operations inform us about transfer to humans? Discussion noted that the State of Iowa is having problems with disease transfer between swine operations. What is known about airborne drift between farm operations? Does available research suggest a good model for potential drift and exposure to humans? What about the potential for viral transfer? Information from BLS4 research?
- So far, research has not established that dairy manure contributes to MRSA.

Next steps for QRMA Planning:

- Organized literature review
- Inventory of available data
- Revisit QRMA scope

## **6. Manure Irrigation Risk Tables**

Becky Larson presented updates of the risk tables outlined during the October 22 discussion (see Oct 22 notes for initial table elements). For each characteristic and risk type, the tables provide information related to “Best Practices,” “Acceptable Depending,” or “Not Recommended.”

Issues:

- Spray Drift (area of wetted ground from spray). Drift is primarily affected by wind and droplet size. Droplet size relates to pressure, nozzle angle, liquid type. Do we need to include all factors that contribute to droplet size, or just droplet size?
- We have not yet made a clear distinction between droplet vs. aerosol. Do we need to? (Dec 13 meeting will include a DNR Air Engineer to help address some of these questions).
- Should “Field Proximity” (under Pathogen Transport Health Risk) be simplified to setbacks and BMPs? Comment that it may make a difference what the practice is proximate to...e.g, forest, roadway, school, etc.
- How best to compare the risk elements with alternatives? A suggestion to add relative risks of other practices to the Drift table to emphasize manure irrigation in comparison to other practices.
- Next steps: continue to refine for next meeting and add references and resources.

## **7. Discussion of potential workgroup products**

The group began a discussion of what end products might be useful and realistic to produce. There was general agreement that we will develop a document that reflects the issues we have been and will be discussing.

Likely components include:

- a description of the context for our workgroup discussions and a summary of our timeline and process
- Completed risk tables with best available information and references
- A written description of any recommendations we make. There is some desire for a clear line once things are defined which describe when producers are in compliance with recommendation and when not.
- A BMP checklist tool – something straightforward for agronomists related to standards and regulations that DNR could use as a basis for initial review for consistency. Configure for ease of public use.

- Realistic scenarios that illustrate how, where, when manure irrigation would be used and how those would compare to other practices available to the producer.

## **8. Discussion of Workgroup timeline and future meeting agendas**

The next two meeting dates are set:

December 13, 2013 at Dane County Extension Office

- discussing organic standards and potential impact
- revisiting regulatory framework, including potential air emission issues and information from other states
- discussion the advantages and benefits of manure irrigation
- revisiting the risk tables and QMRA discussions

January 31, 2014 –Location and potential discussion items TBD.

- Agricultural air quality and public health issues:
  - o possibly Rob T presentation
  - o Cheryl Skjolaas from UW BSE (also regarding agricultural road use/weight issues)
- QMRA, Risk tables, scenarios,
- Other to be determined

## **8. Actions before next meeting.**

- Kenn B and others will begin a draft scenario of manure irrigation practices compared to other approaches
- Lynn U will develop a presentation on organic standards and related issues
- Andrew will contact a DNR air engineer and prepare a presentation on regulatory issues including other states
- Becky and others will continue revising the risk tables