

# AIR EMISSIONS AND OCCUPATIONAL AND PUBLIC HEALTH

The 2010 Poultry and Animal Waste Management Symposium,  
Kelley J. Donham MS, DVM, DACVPM  
Patrick O'Shaughnessy PhD, CIH  
Tara Smith PhD

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## Objectives

### Review:

- 25 years of Research on Occupational and Community health Associations to Air Contamination from Livestock Operations

### New Research:

- Task-based dust exposures in Swine Production
- Methicillin Resistant *Staphylococcus aureus* (MRSA)

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## Worker (Human) Capital

Andrew Savitz – Sustainable businesses  
**Profit –People-Planet**  
The Triple Bottom Line

- <http://getsustainable.net/triple-bottom-line.html>
- **What are the Drivers?? Health a Value added farm product**
- **Reduce:**
  - Health insurance cost
  - Workers' comp cost
  - Disability cost
  - Sick leave
  - OSHA Concerns
  - Liability risks
- **Maintain:**
  - Employee retention
  - Worker moral



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Some recent conferences on Pork Production and Environment

2002 - Iowa Concentrated Animal Feeding Operations Air Quality [www.public.health.iowa.edu/eharc](http://www.public.health.iowa.edu/eharc)

2006 - Environmental Health Impacts of CAFOs: Anticipated Problems, Searching for Solutions <http://www.elporline.org/members/2006/03/1/0831.pdf>

2008 - Pew Commission on Industrial Farm Animal Production 2008 <http://www.ncifap.org/>



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### Community Health Issues

- Depression, anxiety (Shiffman, 1995 - North Carolina)
- Respiratory symptoms similar to workers (Thu, Donham, 1997 - Iowa)
- Respiratory symptoms similar to workers (Wing et al., 1999 - North Carolina)
- Utah Community Health Study (increased respiratory and GI illnesses)
- Antibiotic resistant organisms (Zahn, 01)
- Environmental injustice (Wing 2002)
- Protection against Asthma
- Increase Asthma in children (Merchant et. al. 2005, Sigudarsson et.al. 2006)

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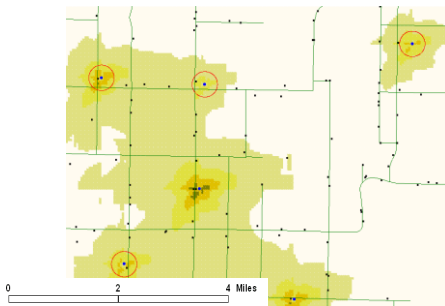
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### GIS and Modeling in Environmental Research in Progress



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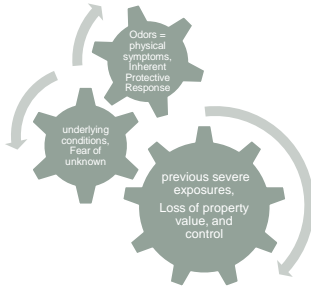
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**Lots of self reported Symptoms, little Objective Findings.  
Possible "Extra Toxic Mechanisms" ??**

Dennis Sottemann, U. California




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**Bottom Line of Community Health & CAFO's?**

- Lots of Symptoms and Subjective findings in rural residents
- Little Objective exposure - response Health findings
- Lower property Values
- "\_\_\_\_\_ inconsistent evidence of a weak association between self-reported disease in people with allergies or familial history of allergies. No consistent dose response relationship between exposure and disease was observable" (O'Conner et. al., PLoS One, 2010)

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**EFFECTIVE CONTROL MEASURES AVAILABLE FOR OCCUPATION AND COMMUNITY**

Little implementation at Present

Make Environment and Worker Health a value added product on the farm

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New Research at U. Iowa  
*Task Based Dust Exposures in Swine  
Production*

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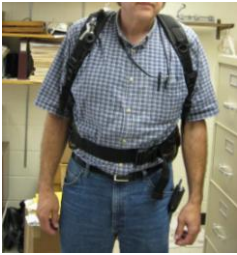
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What Tasks are most hazardous?  
Monitoring Worker Exposures



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Gestation/Breeding/Farrowing/Processing



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## Feeder/Grower/Finishing/Sorting/ Load Out




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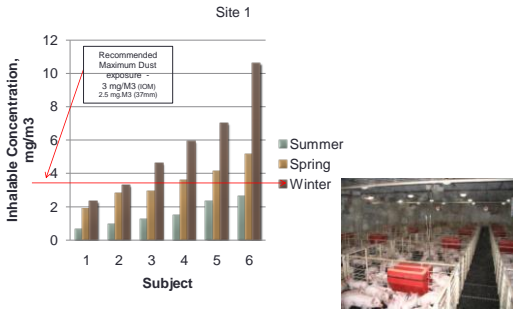
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## Dust Measures by Season




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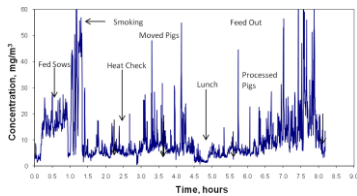
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## Personal Real-time Measurements



Highest Case - Winter

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### Dust Concentrations - Winter

Tasks	Concentration, mg/m <sup>3</sup>	Ranking (most to least dusty)
Sorting and Loading	15.0	1
Finishing Hogs		
Weaning	8.5	2
Drop Feed	7.7	3
Set up and Break Down	5.0	4
Heat check	4.7	5
Treat Pigs	4.0	6
Breeding	3.9	7
Fill out breed sheet/card	3.5	8
Sow/gilt handling	3.5	8

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### Risks from Power Washing? High Endotoxin levels



Average Endotoxin levels  
 • Ambient = 1,342 EU  
 • During Pressure Washing = 42,711

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### Conclusions

- When hogs are moved – its dusty
- Targets for Control Measures
  - Load out
  - farrowing- weaning facilities
  - Feeding
  - Power Washing
- Control Measures
  - Oil in feed
  - Oil sprinkling
  - Power Washing
  - Respirator use
- Power Washing a Special Case

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## Methicillin Resistant *Staphylococcus aureus* (MRSA)

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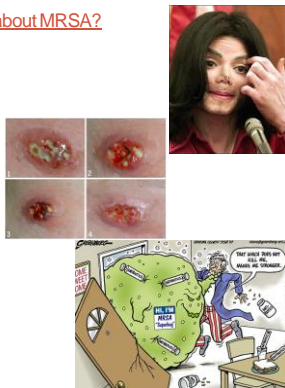
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### Why should we be concerned about MRSA?

- Antibiotic Resistant bacteria
1. Human Disease that is difficult to treat
  2. Hospital Acquired (HA MRSA)
    - a. 94,000 (US)
    - b. 18,000 deaths (US)
  3. Community (CA MRSA)
    - a. 1% of US population colonized
  4. A Window/ reservoir to the larger picture of antibiotic resistance



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## History and Epidemiology

1970's – Mastitis in Dairy Cow (DeVrise, 1975)



1980's – Hospital acquired infections (HA MRSA)

1990's - Community Acquired infections (CA MRSA)

- Athletics and facilities
- Nursing homes
- Child care facilities



2000's – Livestock Associated MRSA (LA MRSA) (Smith 2010)

- Dutch Child and Veterinarian infected (Huizendens 2006)
- Pigs, Cattle, Poultry,



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## MRSA in animal populations (this is an Amphizoonosis)

- Cattle, Pigs, poultry, Dogs, Cats, Horses,
- Livestock = ST 398
- Most ST 398 strains do not have serious toxins
- But, they can become toxic by genetic transfer




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## Significance for Livestock Health

- Animal Health Problem?
  - Mastitis in cattle – 1970's
  - Carriers in pigs (40%), Dairy calves, Poultry, in N America, Europe and Asia
  - Not a large obvious clinical veterinary Problem at present
- An occupational health problem?
  - High 40% of livestock farmers and veterinarians are carriers (Smith, 2009)
- Public Relations Problem – YES!
  - e.g. H1N1, Salmonella, E coli H157, bird flu etc




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## Significance for Producer/Worker Health?

- Occupational and Public infections more common in Europe (LA MRSA = 20% of human cases) VanLoon 2007
- 3% reported but no clinical confirmed human livestock MRSA in US at Present
- Mainly skin infections, but septicemia, pneumonia, head and neck abscesses, also
- Not a huge occupational problem generally at present




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### LA MRSA a Public Health Risk?

- Person to person spread – yes
- Worker to family - yes
- Spread to the general community – Yes
- 20% of MRSA in Netherlands is ST 398



- Sources include Meat and Poultry
- Air from Animal facilities




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### U. IA. Research on MRSA

Tara Smith PhD, Mike Male DVM, Dwight Ferguson,  
Kerry Leedom DVM, MPH, Kelley Donham DVM

- With funding from IPPA and The Great Plains Center for Agricultural Health, U. IA.
- How common is it?
- What is its ecology?
- Is it an important occupational or public health concern?
- Biosecurity Issues?
  - Where does it live in swine buildings?
  - How do we prevent its spread?

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### Research ongoing at Iowa

- Prevalence in livestock populations (smith, 2009)
  - Pigs (40% of pigs sampled) & People in contact
  - Poultry ?
- Prevalence of human cases of LA MRSA
  - Questionnaire data = 3% of workers self-report infections (Leedom-Larson, 2010)
  - Case finding mechanisms from Physicians
- Mechanisms of transmission
  - Air – inside and outside of swine barns
  - Shower facilities (leedom-Larson 2010)
- Prevention of transmission
  - Dust Masks
  - Biofilters




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## Summary and Questions for the future

- Dust exposures in Swine and Poultry = respiratory health hazards.
- Community Health air Exposures are a concern, but objective indicators wanting.
- Winter, load out, feeding, Processing pigs, Power washing
- Enough known to prevent the problem – need broader implementation
- Ecology of MRSA (an emerging issue)
  - Are animals or people long term carriers?
  - Disease burden in Animal and human hosts?
  - Relationship to antibiotic use in Livestock production?
  - Toxic producing genes in LA MRSA?

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## MRSA, MRSA, MRSA!!!

- The nose knows all
- Stay tuned
- Stay informed



Thanks for all you do!

Kelley Donham MS,DVM, DACVPM

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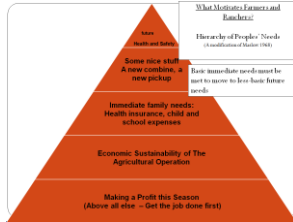
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<http://www.takepart.com/news/tag/anti-factory-farming>

## Intervention Theory and Practice Effective for Agriculture

### Keystones in Successful Interventions

- Making Environmental Health and Safety a value added product of the business




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