

Windrowing Poultry Litter Pros and Cons

or
How to do it Right

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Traditional litter management between flocks

Litter Issues

- Cost of quality bedding material has risen and availability has decreased
- Environmental concerns related to:
 - Excess litter production in areas of high poultry production
 - Increased concerns about pathogens in litter used as fertilizer
 - Storage of poultry litter

Traditional reconditioning between flocks



Potential Problems with Litter Re-use

- Increased energy use to maintain air quality.
 - High ammonia during brooding.
- Pathogen carry over.
 - Breaking with same disease conditions flock after flock

Traditional Control Methods

- Pathogens

- Litter removal followed by sanitation/disinfection
- Aeration
 - Desiccation
- Others
 - Fumigants
 - Organic acids
 - Salts
 - Hydrated lime

- Ammonia

- Ventilate
- Litter treatments
 - Acidifiers
 - Competitive Microbials

In-house Composting / Windrowing





Composting

In-house composting / windrowing

- Is it composting?
- What happens to pathogens?
- What about ammonia?



Windrowing litter

- What it isn't:
 - True composting
 - Litter sterilization
- What it is:
 - Partial heat treatment
 - Pasteurization (partial sterilization)





In-house Windrowing Studies

- University of Delaware
- Auburn University
- Louisiana State University
- University of Georgia

De-VA In-house windrowing study

- Compared a traditional crusted house with one that was windrowed
 - Turned 4 days after construction of windrow
 - Spread out 6 days after construction of windrow
 - 14 days total down time

VA-DE In-house windrowing study

- Achieved +135°F temperatures
- 99.99% reduction in E.coli and Salmonella
- +8,500 lbs more chicken
- ~\$2,000 more to farmer
- Additional costs for windrowing
 - \$700 propane
 - \$300 custom windrowing (\$225 for traditional crusting)
 - \$100 leveling windrow

AU In-house Windrowing Study

- Microbial testing
 - Aerobic and anaerobic bacterial counts lower in windrowed vs. un-windrowed litter.
 - Clostridium perfringens reduction >99%
 - ILTV completely eliminated in litter after 5 days
 - *However...house again positive with subsequent flock*
 - *House dust?*

LSU In-house Windrowing Study

- Evaluated impact of water addition to windrow
- Evaluated pathogen reduction

Moisture Addition

- From LSU study:
 - 31% minimum moisture required.
 - Best results with no addition of water to the litter.
- Issues with supplemental water
 - Time, labor
 - Additional dry time needed
- 60-95% reduction on anaerobic bacteria

Research Summary

- Eliminates coliforms and Salmonella,
- Reduces:
 - clostridium perfringens 50%
 - Total aerobic bacteria 10-30%
 - Total anaerobic bacteria 60-90%
- Inactivate many viruses, including AI and LT

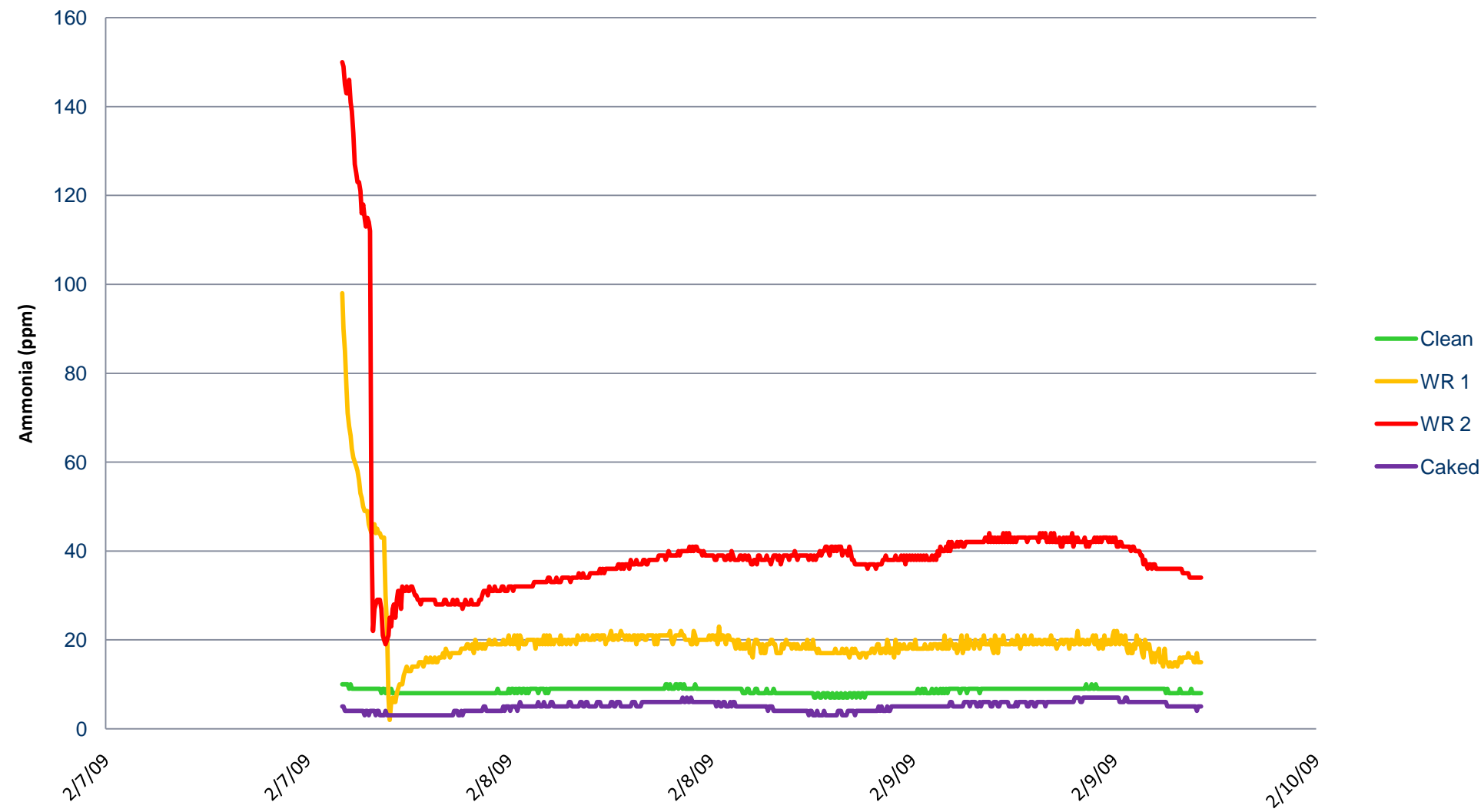
Mode of Pathogen Reduction with Windrowing

- Temperature
 - Thermal kill
- Microbial
 - Biological kill
- Ammonia
 - Chemical kill

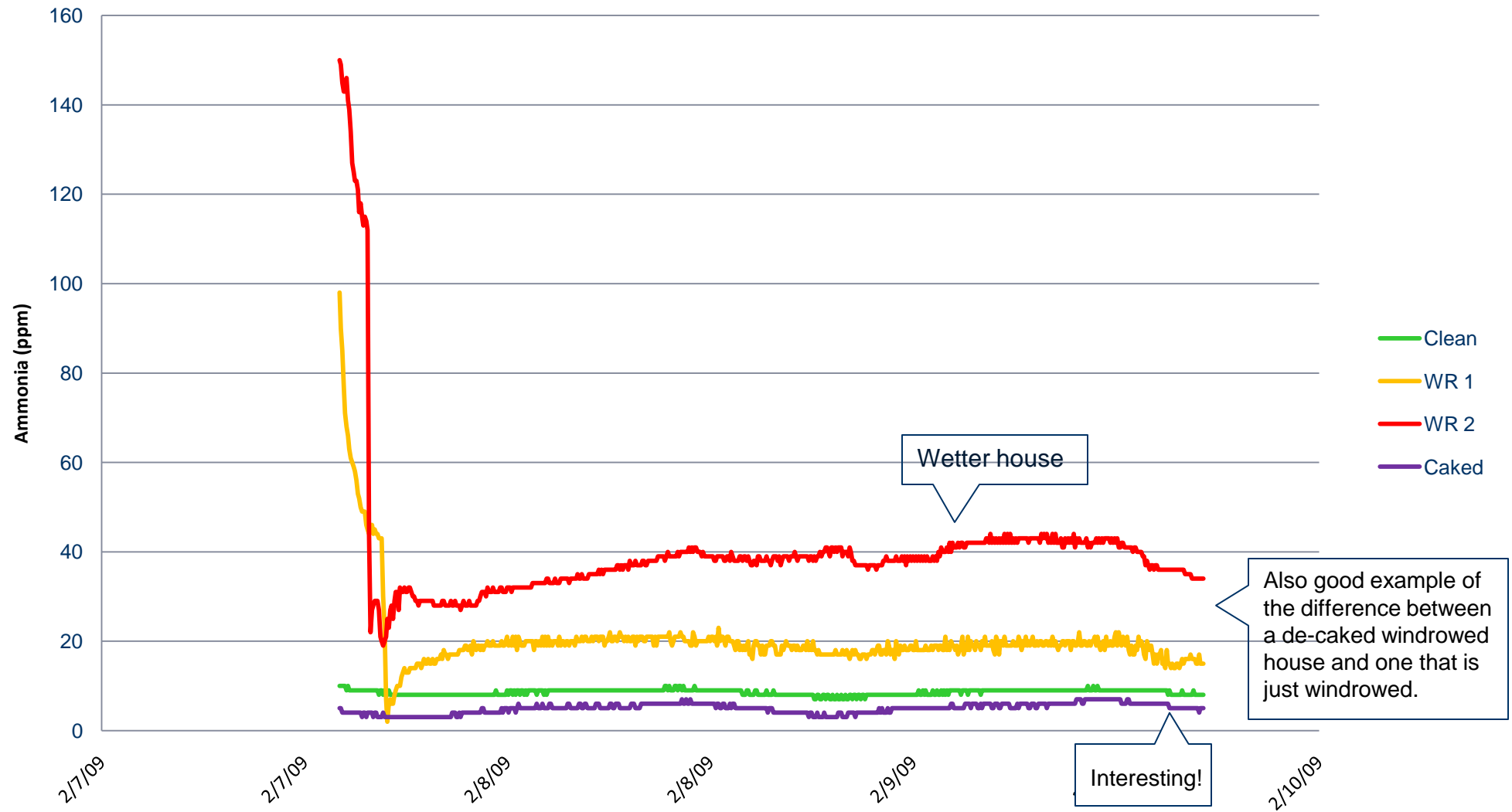
How NOT to Windrow

- Start with a February flock
- Windrows formed on day 10 of layout
- 7-8 inches of litter formed into 2 large windrows
- 5 days in windrow then leveled out 4 days prior to chick placement.
- Litter treatment applied 3 days prior to placement (gone in 2 days)

Farm #2 Ammonia Sampling



Farm #2 Ammonia Sampling



Why do Ammonia Levels Increase?

- Ammonia volatilization hinges on:
 - Temperature, air turbulence, litter pH, litter moisture
- Which is the most important? **MOISTURE**
- Windrowing retains moisture, oxygenates the litter that otherwise will be partially anaerobic.
 - Surface area for NH_3 generation greatly increased
- In essence, we turn on the “oven” when we windrow

Basic Windrowing Protocol

- Getting Started
- Working the Litter
- Completing the Process

Getting Started

- Start windrowing program after a total cleanout, or if on built-up litter, start during moderate or warm weather.
- Minimum 12-14 days down time needed
- Ideal litter depth 3-6 inches
- Form windrows within 2 days after catch
- Ideal windrow height 18-24 inches

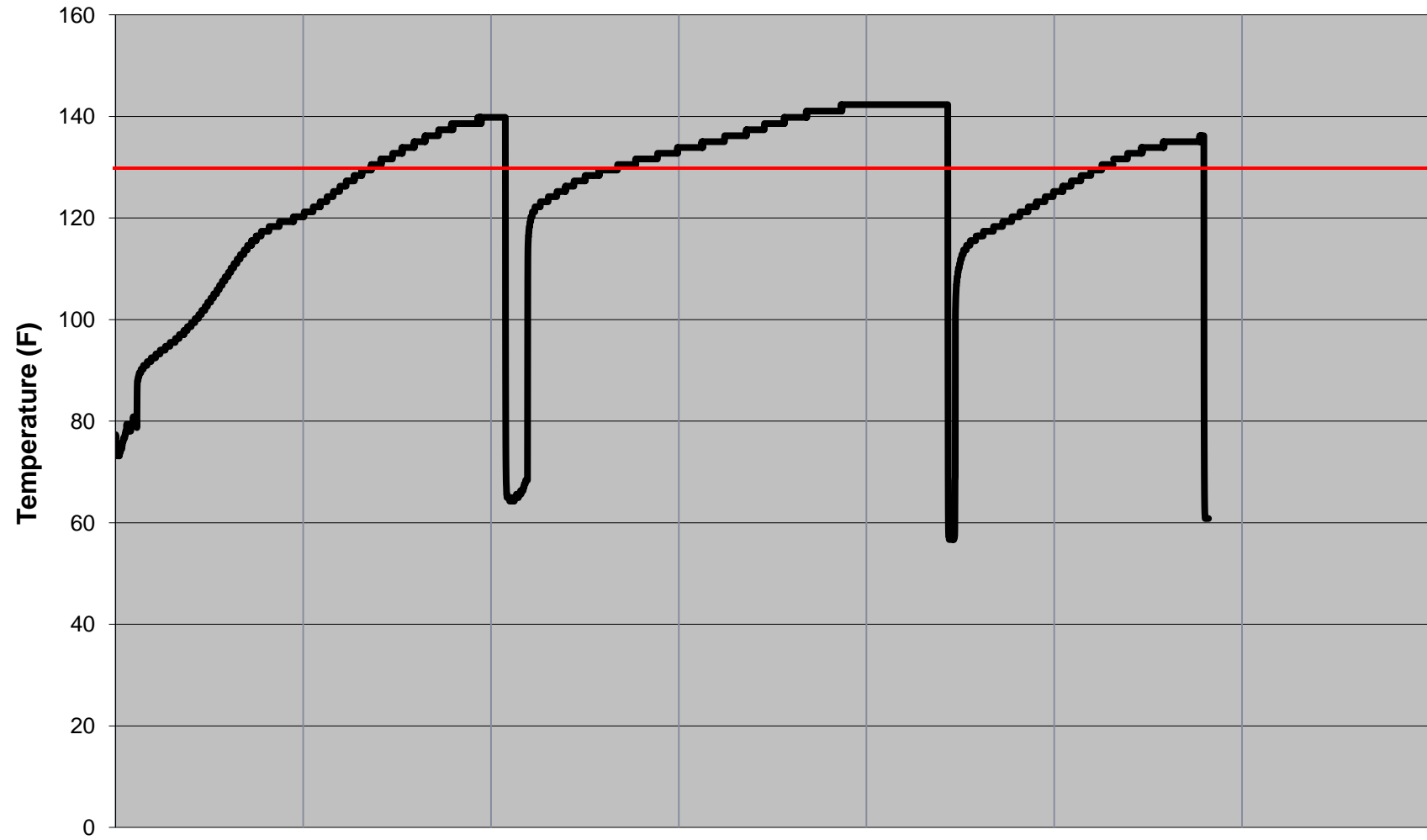
Getting Started

- Excessive cake (>3 feet wide and/or >3 inches thick under the drinker lines) may need to be removed, particularly during cold weather.
- Since one of the benefits of windrowing is exposing the dirt floor to the atmosphere, as much as practical, removing all litter and hard pan from the floor is generally recommended.
 - In cold weather, it would be best to remove this hard pan from the house.
 - In warmer weather and with dry litter, the hard pan may be incorporated into the windrow as an added source of moisture.

Working the Litter

- Three to four days after construction, windrows should be turned.
- Best to turn windrows at least once and several times if possible before leveling.
- The entire windrow should be shifted during the turning process to expose the litter mass to high temperatures and the floor to the drying effects of the atmosphere.

Flock #2



Working the Litter

- From a pathogen reduction standpoint, goal is to reach at least 130 °F and sustain for a minimum 3 to 4 days.
- Exposing all the litter to high temperature is needed to reduce or eliminate pathogens.
- Monitor internal temperatures until confident with the windrowing process.

Working the Litter

- For farms with significant disease challenge, best to remove all litter from the sidewalls and corners and incorporate into the windrow.
- A building wash down prior to windrowing will help incorporate any pathogen-laden dust into the pile.
- May take 2 consecutive windrowing events (flocks) to break some diseases (ie. dermatitis) and reduce the chances of re-occurrence.

Completing the Process

- Ideal time to get maximum beetle kill may be to apply insecticide to windrows within 6 hours after pile formation.
 - Application along sidewalls should be considered if this litter is not incorporated into the windrow.
- **Ventilate during the entire process.** Closing up houses following windrowing to retain heat will have little impact on windrow temperatures. Depending on ambient weather conditions, the end doors should be open, minimum vent fan(s) set on timer or run a tunnel fan(s) set on temperature. Circulation fans should be kept on to help move the air and dry down the litter.

Completing the Process

- Leveling the piles at least 4 days prior to chick placement is recommended.
- It is *critical* that adequate time be devoted to “cooling down” and drying out the litter.

Leveling can be a challenge and time consuming



Completing the Process

- Increased application of a litter amendment (25% +) may be required to suppress ammonia, particularly in cool weather. Higher ventilation rates may also be needed during brooding to control ammonia. Ammonia control tends to be more manageable after a few flocks once a windrowing program is initiated.



Completing the Process

- To minimize the potential for high ammonia levels in the subsequent flock following windrowing, it is ***essential*** to follow the steps previously mentioned.

Time Commitment

● Forming the windrow	60 min.
● Each turn	45 min.
● Leveling	60 min.
● Washing equipment	30-60 min.
	<hr/>
	3-4 hours per house

Alternative Strategies to Save Time and/or Money

- Windrow every other flock
- Clean out brood end, windrow back end
- Custom/contract windrowing (\$300-500 per house)

What windrowing doesn't do

- Decrease litter volume – not enough time spent composting
 - Will need to remove some litter eventually before proceeding with a subsequent flock.
- Will not significantly change total Nitrogen content of litter at time of cleanout.

Windrowing is not for Everyone!

- Average or below average growers
 - ~80% will show improvement (\$50-120/1000 birds)
- Top growers see no real improvement
 - May smooth out a few “bumps” in the road
 - May see boost at sale if one of first in complex to windrow

Windrowing Summary

- Challenges
 - Time consuming
 - Grower ability
 - Equipment
 - “Dirty” work
- Outcomes
 - Pathogen reduction
 - Improved bird performance

Questions?

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