

# Litter Alternatives and Windrowing Programs

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## Outline of Presentation

1. Bedding (litter) issues facing US poultry industry
2. Management options with bedding shortages
3. Alternative materials
4. Windrowing to extend litter life

## NCC Bedding Survey

- ❖ Regional shortages from Mid-Atlantic to Southeast to South
- ❖ Short- and long-term issues influencing shortages
- ❖ Expect situation only to get worse!
  - Decrease availability
  - Higher cost
  - Poor quality

## Periodic Shortages Due To:

- ❖ Seasonal demand by poultry
- ❖ Temporary disruption of supplies
  - Weather
  - Mill repairs
- ❖ Depressed housing market & construction



"Sawdust Shock: A Shortage Looms As Economy Slows". Wall Street Journal, March 3, 2008.

## Long-Term Bedding Issues!

- ❖ Milling technology
- ❖ Trade issues and markets for loblolly pine
- ❖ Competing uses:
  - Export markets (2 pellet plants in VA)
  - Particle board
  - Energy for mills, industry and homes
  - Landscaping/hort uses
  - Horse industry
- ❖ Urbanization/changing land ownership
- ❖ Less forest/timber



## Economic Issues on Delmarva

- ❖ Closure of 4 of 8 mills past 6 years
- ❖ Loss 70% of pine milling capacity



## Managing With Shortages

- ◆ Reduce frequency of cleanouts (ventilation, drinker management, litter amendments and health programs help, BUT
- ◆ Consequences:
  - Caused mills to seek alternative markets
  - Decreased performance and health



## Managing With Shortages

- ◆ Stockpile for peak usage (higher cost, fire risk)
- ◆ Reduce placement depth (need dry bedding: good house/litter/crusting management )
- ◆ Import from other states (cost-effective materials and transportation)
- ◆ On-farm storage to offset scheduling issues and cost issues



## Managing With Shortages

- ◆ Re-process chips and residues into bedding material (quality???)



## Managing With Shortages

- ◆ May need to commit to long-term investment in shavings mill (or re-process wood chips into sawdust-like material) to supplement supply. **Higher cost, must contract (10 yrs) to guarantee future supply.**



## Managing With Shortages

- ◆ Purchase bedding by volume, not the “load” or weight!!!



## Alternative Bedding Materials

## Quality Pine Shavings/Sawdust is the Premier Bedding !!!



## Supplement with Hardwood



Poplar Sawdust

- ❖ Some use dry or treated hardwood (green oak ??)
- ❖ Poplar = health/mold similar to pine and less litter cake/foot pad lesions than poor quality pine

## Other Wood Products - Limited Success

- ❖ Chips
- ❖ Pine straw
- ❖ Bark
- ❖ Leaves
- ❖ Wood pellets
- ❖ Ground pallets
- ❖ Paper mill residues

## Composted Land Clearing/ Poultry/Ag Waste

- ❖ Local supply and cost effective?
- ❖ Preliminary research encouraging.



Wk 5 mortality on dermatitis farm: Control 1.5/k, Compost 0.4/k

## Plant Products

- ❖ Hulls (rice, peanut, coca/coffee bean, cottonseed, sunflower, soybean, oat, wheat)
- ❖ Straw/stalks (wheat, barley, rye, oat, flax, soybean, corn, corn cob, kenaf core, switch grass, Bermuda grass, citrus pulp, sugar cane bagasse)

## Coca Bean/Peanut Hulls



- ❖ Opportunity to use limited to few areas
- ❖ Low moisture (7-8%), can be dusty
- ❖ Coca bean house smells good!!
- ❖ Peanut hulls difficult to spread, higher ammonia and storage issues???

## Earth Products

- ❖ Sand
- ❖ Clay
- ❖ Peat moss

## Recycled Products

- ❖ Newspaper/cardboard (shredded, processed, pelletized)
- ❖ Composted municipal garbage
- ❖ Plastics
- ❖ Foam (polystyrene, urethane)
- ❖ Recycled sheetrock
- ❖ Shredded tires

### Paper-Base Products

- ❖ Some shredded paper being used, cut better than shred, best as topping
- ❖ Some pelleted paper (AL) and cardboard (NC/SC) being used, limited supply, hard pellets works well
- ❖ Ground sheet rock (NC firm); used as base layer, nutrient management benefits??  
(Need local, cheap, consistent quality and compatible material handling)



### Envirobed Bedding Study (Hulet, PSU)



- ❖ Chipped cardboard tubes, dust/fines removed and baled
- ❖ Compared to shavings, broiler performance same, lower moisture and better water absorption.

### Windrowing Litter as a Means of Extending Litter Life and Reducing Pathogens



### Issues Besides Bedding Shortage

- ❖ Breaking disease cycle on farms
- ❖ Pressure to reduce anti-microbial usage
- ❖ Increase regulatory oversight of on-farm litter spillage/storage
- ❖ Sequence cleanout with land application (minimize storage)



**Windrowing/In-House Composting/ Pasteurization/BHT is Not New!**

**Cooper Hatchery Litter Sanitation – Poultry Sci. 1987**

- ❖ Cake removed, stockpile (4' high) for 3 days, and added lime for additional pathogen kill
- ❖ Spread and let dry
- ❖ Reduce litter bacteria, ammonia and odor

**U of D Stacking Study -1990**

- ❖ Used litter stacked 3 days and compared to fresh pine sawdust, used litter and with/without litter amendment
- ❖ Chicks grown in chambers 14 days on litters, reared together afterwards
- ❖ Results: stacked had best weights with least bacteria
- ❖ Industry not interested at that time

**Windrowing Overview**

- ❖ Been tried in many southern states using blades, skid-steer and aerators (MS, LA, AL).
- ❖ Used to extend litter life, disease control (ie. LT) and alternative to litter amendments.
- ❖ Research at LSU, UA, Auburn and UD found it **eliminates** coliforms, Salmonella and respiratory virus; **reduces** clostridium perfringes.

**Methods of In-House Composting: Blade**



- Equipment may be available on some farms
- Requires removing or pulverizing cake
- Small piles and turning a challenge

**Methods of In-House Composting: Skid-steer**



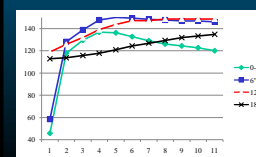
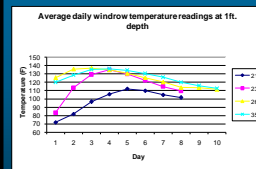
- Places all litter and hardpan in windrows
- Piles larger and slower to reach temperature
- Unless turned, must crust afterwards and potential high ammonia

**Methods of In-House Composting: Aerator**



- Appears to be most common method being used
- Faster heating and reduces/eliminates (?) cake
- Systems commercially available, cost varies
- Requires additional equipment and time to get all litter from sidewalls and corners

**In-House Litter Windrowing**



- Pathogen reduction via thermal, chemical and biological.
- Goal is *minimum* of 130 F for 3-5 days; but lower temps also kill pathogens
- Litter moisture key to heat (35% ideal, but less still works).
- Piles heat from outside inward, core at floor lowest temps (additional reason for turning piles).
- Form windrows immediately after movement, incorporate cake if minimum amount.

## All Natural Broiler Operation

- ❖ Brown Bear equipment used on 80 houses past year
- ❖ Washdown, form 2-4 rows in 50' wide house
- ❖ Turn 2-3 times (3 day intervals) with temperatures up to 150 F. Spread and aerate on day10, place chicks day 12.
- ❖ Advantages:
  - No crusting or bedding replacement, 60% improvement in bird health (2 flocks for necrotic enteritis), less beetles (40%) and ammonia.
  - 12 month pay back (bedding cost)



## IL Turkey Grower

- ❖ Brown Bear equipment used by 3 farms
- ❖ Form 3-4 rows in 40' wide house (deep litter)
- ❖ Set 48 hrs (140-150F), best turn 3 times
- ❖ Advantages:
  - No crusting, reconditions and better quality litter
  - Less ammonia (~50%), fuel and beetles (80%)
  - 24 month pay back (bedding cost)



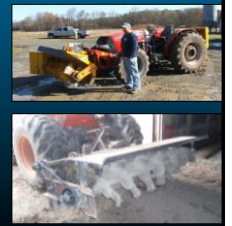
## Georgia Broiler Complex

- ❖ Had high incidence of Runt/Stunting.
- ❖ Over past year growers started windrowing using blades, skid-steer and aerator.
- ❖ Turn windrows at 3-5 days, provide minimum ventilation during process.
- ❖ 75% grower adoption today.
- ❖ Bedding savings but 4% better livability and more pounds to plant!



## Delmarva Windrowing Status

- ❖ Being adopted or tested by all companies (performance and bedding concerns).
- ❖ Appears to break disease cycle (i.e. dermatitis) on problem farms.
- ❖ Have 3 commercial contractors with Brown Bear units, 3 growers with aerators, others use skid-steer.
- ❖ "Learning-curve" on procedures
- ❖ UD studies on pathogen reduction and validate procedures and cost:benefit for possible cost-share.



## Performance Improvement Using In-House Composting of Litter on a Problem Farm

Parameter	Change from Previous Flock	Change from Previous 4 Flocks
Total mortality (%)	-5.3	-3.1
Body Wt (lbs) (Age, d)	+.87 (-1)	+1.28 (+2)
Feed Conversion	-.24	---
Grower pay/lb (\$)	+.0099	+.0066

## Mortality Improvement with In-House Composting on Dermatitis Problem Farm

Flock Movement	Mortality (%)	Number Dead
May 07	11.74	8200
July 07	8.23	5750
Sept 07	2.65	5000
Avg prior to composting	9.87	6317
Nov 07 (composted)	4.48	3132
<b>Difference</b>	<b>-5.39 (55% less)</b>	<b>3185 (6 lbs @ \$0.425 = \$812)</b>

**Performance Improvement Using In-House Composting  
on a Necrotic Enteritis Problem Farm.**

Parameter	Change from Control House
Body weight (lbs)	+0.17
Feed conversion	-0.07
Mortality (%)	-2.44
Condemned (%)	-0.07
Cost per pound	-\$0.0099

Comment: Comparison based on the first flock following composting.

**Windrowing Concerns**

- ❖ Requires adequate layout time (>10 days)!
- ❖ Grower’s ability, equipment and desire?
- ❖ Industry education on procedures and expectations (+/- 2 flocks)
- ❖ Composted litter has different “odor”

**Windrowing Questions**

- ❖ Problem farms or all farms?
- ❖ Every flock or several times a year?
- ❖ How many times can it be done?
- ❖ Does composting change the composition of litter?

**Requires Proper Leveling of Litter**



**Windrowing  
Challenges in Our Area  
That Must Be  
Addressed!!!**

**Higher Cost and More Labor Intensive**

- ❖ Up to twice cost of crusting (partially offset by bedding saving, better performance, environmental benefits).  
Cost:benefit to growers vs. company
- ❖ May require contractors or additional equipment.
- ❖ Requires more labor (and experience) to build, turn and level-out litter.

# Higher Ammonia!!!

## Strategies to Address Ammonia

- ❖ Ideal to start in warm weather following total or partial cleanout or implementing first time on used litter.
- ❖ Use higher rates of litter amendment in winter flocks!
- ❖ May need to remove cake if excessive.
- ❖ Might need to skip winter flock.

*Benefits offset if grower can not manage ammonia!*

## Must Manage Litter Depth



- Cut centers to manage depth
- 3-6 inches appears ideal while reducing ammonia.
- Also provides more uniform distribution of litter for nutrient management plan

## Turning Windrows

- ❖ Turn 1-3 times!
- ❖ Releases ammonia and moisture
- ❖ Mixes and aerates
- ❖ Helps reduce “cookies”

*Operator needs PPE for ammonia and dust!!!*



## Ventilation During Windrowing

- ❖ Use minimum vent fans on timer or tunnel fans on thermostat to remove ammonia and moisture
- ❖ Use tunnel fans when turning or leveling
- ❖ Provide ventilation during entire windrowing procedure (up to chick placement).



## Outlook for Bedding, Alternatives & Windrowing

1. Availability and cost of quality bedding will not improve in the region.
2. Industry must make long-term commitments to secure future supplies.
3. May be limited amounts of local alternative materials.
4. To partially offset bedding demand and reduce cleanouts, need to develop management techniques to reduce pathogen and environmental concerns. Windrowing may be one option.