





Using Separated Manure Solids for Bedding

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What are separated manure solids?

- Dry Manure solids (DMS)
- Undigested feed fibre (UFF)
- Compost bedding







How is compost bedding produced?

- Separated anaerobic digestate
- Separated and composted manure
- Separated manure







Anaerobic Digestion

- Organic material digested to produce methane
- Co-gen to produce
 electricity
- Kills pathogens
- Reduces odour





Separated Digestate

- AD Treatment
 - Temperatures of 35°C
 - Retention time of 20 days
- Separated
- Spread





Drum Composter

- Separate first
- Treatment
 - 157°F (70°C)
 - Compost for 2 to 3 days
- Spread





Green Compost System

- Separate first
- No treatment
- Spread

Who uses compost bedding?

- Mason Dixon Farms 2000
- Matlinks 2005
- European AD Tour 2006
- Crave Brothers 2009
- Dickland Farms 2012









- OLH Symposium 2007
- Mixed plug-flow digester installed in 2001
- Digested solids used for bedding











Sand vs. Compost

- Deep bedded sand
- Deep bedded compost
- Compost bedding on mattresses

Sand

Advantages	Disadvantages
It is comfortable	Sand-laden manure
 Sand provides excellent traction. 	
 It is inorganic, so it does not aid in bacterial growth. 	
 Sand as bedding does not produce hock abrasions. 	
 It is relatively inexpensive. 	
 Sand is easy to obtain in most areas. 	









Why the interest in compost bedding?

- Deep Bedded Sand
- Deep Bedded Compost
 - Renewable
 - Non-abrasive
 - Less wear and tear

Research – compost bedding

- SCC/Mastitis
- Comfort
- Respiratory







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Use of Dried Manure Solids as Bedding For Dairy Cows and

"How frequently should stalls be refreshed with new bedding" case study

Overview

Good livestock bedding sources have become harder for farms to secure. The price of existing sources has increased and then those sources have started to disappear due to the demand for biofuels. At the same time, there is still plenty of manure on farms that might serve a similar purpose if processed by separation, digestion and or composting. In many cases we produce more manure than our crops need which can overload soils with nutrients. Dairies are looking for alternative bedding sources and some have implemented separated or dried manure solids DMS) as bedding. Will it work in the Northeast?



Bedding stalls with manure solids.

Treatment of DMS Bedding

Treatment of DMS bedding, type of stalls and frequency of re-bedding used at each farm.				
Farm (code)	Bedding strategy (after separation)	Type of Stalls	Bedding Frequency	
A (A Drum)	Drum composted for 24 hours	Concrete	3x/week	
B (B Windrow)	Windrow composted for 10 days	Mattresses	6x/week	
C (C Digested)	Digested before separation - used directly	Mattresses	2x/week	
D (D Separated)	Piled 3 days or used directly	Deep beds	2x/week	
E (E Drum) (E Separated) (E Sand)	Drum composted for 3 days Used directly	Deep beds	2x/week 2x/week 1x/week	
F (F Separated)	Piled 7 days	Deep beds	2x/week	



Schwarz et al. 2010



Schwarz et al. 2010



Schwarz et al. 2010

Farm/Bedding	Mastitis	SCC
B Windrow	<mark>10</mark>	24
C Digested	8	17
D Separated	8	52
E Sand	6	36
E Drum	4	30
E Separated	3	30
F Separated	6	34

Conclusions

- Using manure solids can provide an economic benefit without adversely affecting herd health.
- Bacterial levels in the bedding alone are not what cause high SCC or mastitis. Management of the bedding in the stalls is much more important than analyzing it for pathogens. Keeping stalls free of manure and urine, regardless of bedding type, will go a long way toward keeping SCC and mastitis under control.
- Use a DMS system that fits into your farm's routine and one with which you are most comfortable.



Marcia Endres

University of Minnesota

Study of 34 dairies using DMS

Incident	Deep Bedded	Mattresses
Lameness	14.4%	19.8%
Severe Lameness	3.6%	5.9%
Hock Lesions	49.4%	67.3%
Severe Lesions	6.4%	13.2%





University of Minnesota

Conclusions

- Deep bedded more welfare friendly than DMS on top of mattresses
- Lameness prevalence similar to sand bedding
- Hock lesion higher than sand



Risks of Microbial Contaminants of Bedding Materials: Compost, Cattle Manure Solids, Horse Dung and Bedded Pack Barns

Conclusions

- Compost is a source of bacteria spores
- 100 fold higher in compost than in sawdust bedding

Experience – compost bedding

- AD separated solids
- Composted solids
- "Green" compost



Anaerobic Digester

- Using since September 2010
- Milking 300 cows
- Enough to do cows 4–5x/wk, dry cows and heifers 1x/wk



Anaerobic Digester

- SCC no change from sawdust
- Fine particles stick to teat ends
- Be careful of milking routine







Drum Composter

- Deep bedded stalls
- Importance of raking stalls
- Manure handling challenges







Green Compost System

- 62% MC 6" dia. Bedding keeper
- Bed once/wk
 Build up in layers
- SCC 200 to 225,000



Management of Compost

- Bed often
 - Every 3 to 5 days
- Avoid reheating
- Maintain stalls
 - Important for all forms of bedding
- Mechanically rake and level
 - Deep bedded compost



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