Using recycled manure solids as a bedding material in a freestall dairy barn

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Long used, little studied

Recycled manure solids (RMS) have been used as a bedding material since 70’s in North America.

Today RMS is growing its popularity also in Europe.

However, there is only little research done on animal welfare and helth effects of RMS.

**Advantages:**
- Renewable
- Not abrasive
- Economical

**Risks:**
- SCC
- Animal/human health
- Management

**Management is important!**
- Use fresh! No out of control heat production.
- Keep stalls clean
- Milking hygiene
Experimental design

2 x 24 cows
2 x 3 months
RMS vs. peat

Untreated solid part from separated raw manure.

Udder health
Lameness/hoof health
Skin alterations
Cleanliness
Lying behaviour and activity

Other experiences on use
• Spreading methods
• Dry matter content
Bedding

- Adding fresh bedding three times a week
  - Minimum of 10 l/stall/day, about 500 liters on a single spreading
  - Mechanical spreading (Bobman)
- Screw separator (Bauer Separator S 655), sieve 0.5 mm
- Dry matter analyzed once a week
  - After separation
  - Before spreading

Recommended DM 35%

<table>
<thead>
<tr>
<th></th>
<th>Dry matter %</th>
<th>SD</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>From separator</td>
<td>23.8</td>
<td>1.3</td>
<td>21.9</td>
<td>26.7</td>
</tr>
<tr>
<td>From Bobman</td>
<td>24.6</td>
<td>2.0</td>
<td>20.1</td>
<td>27.7</td>
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</tbody>
</table>
Udder health

Milk samples every two weeks

Somatic cell count
(1000 cells/ml)

BoxCox transformation, $\lambda = -0.3$
Mixed linear model, independent variables:
- Bedding material
- Animal group
- Study period
- Parity
- Milk production

No statistically significant difference in SCC between bedding materials.

Change of period

Animal group $p < 0.05$
Parity $p < 0.0001$
Milk production $p < 0.001$
Bacteriological milk samples

- Most prevalent finding with both beddings was CNS
  - Normal flora on skin, not necessarily connected to environmental factors
  - Often subclinical cases
- "Environmental" mastitis occurred four times
  - Cases only with RMS and on first study period
  - E.coli, Str. Dysgalactiae, 2 x Str. Uberis
  → Two of these cases had high SCC rest of the experiment (CNS/no finding)

<table>
<thead>
<tr>
<th></th>
<th>Whole herd 2016, %</th>
<th>Experiment, %</th>
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<tbody>
<tr>
<td>Str. uberis</td>
<td>5.8</td>
<td>3.6</td>
</tr>
<tr>
<td>Str. dysgalactiae</td>
<td>2.3</td>
<td>1.8</td>
</tr>
<tr>
<td>E. coli</td>
<td>1.8</td>
<td>1.8</td>
</tr>
<tr>
<td>Total</td>
<td><strong>9.9</strong></td>
<td><strong>7.2</strong></td>
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</tbody>
</table>

Connection between environmental mastitis cases and RMS cannot be ruled out. However, these cases were occasional and controllable.
Cleanliness

Scoring based on Welfare Quality® every two weeks:
- Hind legs
- Hind quarter
- Udder
→ Clean vs. dirty

Bedding material affected only cleanliness of udder (p < 0.05):
• With RMS there was 1.5 higher odds to get score clean compared to peat

Generalized estimating equations (GEE)
• Bedding material
• Study period
• Animal group

Note! Lack of physical dirt does not mean that there is no pathogens on the skin surface.
Conclusions

• Cleaner udders with RMS
• No effect on SCC
• Connection between environmental mastitis and RMS cannot be ruled out → However, occasional and controllable cases

Management is important!
• Use fresh! No out of control heat production.
• Moisture and high temperature in barn promote microbial growth.
• Stall hygiene! Remove wet and dirty bedding regularly.
• Overall cleanliness → floors, stalls, milking!