**Bedding and udder health in dairy cows**

**What do we know?**

* ***Generally, organic bedding materials (straw, hay, wood products, manure solids) support bacterial growth of potential mastitis pathogens more than inorganic bedding materials (sand)***
  + Organic materials have been shown to support growth of higher numbers gram-negative organisms and streptococci
  + Wood products in particular have been show to support growth of coliform organisms and Klebsiella species
  + Treatment with certain bedding conditioners (alkaline or acidic commercial bedding conditioners, hydrated lime) can inhibit bacterial growth in organic bedding material (streptococci, coliforms, and *Klebsiella* species)
  + Although it supports less growth of pathogenic bacteria overall, Streptococci can be found in higher numbers in sand bedding when compared to kiln-dried sawdust
* ***There is a clear relationship between finding an increased number of potentially pathogenic bacteria in bedding and on the teat skin***
  + In general, the relative number of bacteria on teat skin corresponded to exposure from bedding
  + Manure solids support the most bacterial growth, and new sand supports the least amount of bacterial growth
* ***The relationship between mastitis incidence/milk quality, teat-end bacterial count, and bedding is less clear***
  + Teats of dairy cattle may be in direct contact with bedding materials for 40 to 60% of the day, making bedding materials an important potential source of exposure to mastitis pathogens
  + Linear relationship between rate of clinical mastitis and bacterial count for gram negative organisms and for *Klebsiella* species
  + Some evidence that incidence of clinical mastitis has been shown to be associated with higher bacterial populations on teat ends
  + In a large study, bulk milk somatic cell score was lowest for farms using a type of inorganic bedding, varied seasonally, and was highest in the summer
  + When considering subclinical mastitis, cases of mastitis due to coagulase-negative Staphylococci were highest for cows bedded on manure solids and recycled sand
  + Cows bedded with new sand were less likely to get clinical mastitis than cows bedded with recycled sand or manure solids
  + On modern dairies, most cases of clinical mastitis are caused by environmental organisms

**What do we know about bedded packs, specifically?**

* ***Limited work has been done on bedding bacterial count, teat-end bacterial count, and milk quality/mastitis risk on bedded packs***
  + Sand bedded free stalls and composted bedded packs in Kentucky were not significantly cow hygiene, high somatic cell count prevalence, clinical mastitis incidence, herd somatic cell count, and bulk tank somatic cell count
  + Cows on bedded packs in the Southeast had better hygiene scores with increasing barn temperature, and worse hygiene scores as moisture content increased
  + As compost internal temperature increases, staphylococci, streptococci, and bacilli species growth in the pack decreased, while coliform species increased.
  + Low moisture and high temperature in a pack reduces overall bacteria levels in the bedding
  + Bulk tank somatic cell count and high somatic cell prevalence both increased with increasing ambient temperature

**What are some areas of opportunity for research in bedding, bacterial communities, and milk quality/mastitis risk?**

* + There is a long history of work looking at how bedding material may relate to a cow’s risk of getting mastitis, but this has been limited to the most commonly used bedding materials and housing systems in the dairy industry
  + The relationship between mastitis risk and bedding bacterial load has not been clearly demonstrated as of yet *(however, I had written this before coming across the group of papers listed below from a group lead by one of our scientific advisors that came out more recently- I haven’t had a chance yet to delve into them as of yet, but I’m guessing that their recent work may have shed some light on this relationship!)*

[**Cross-sectional study of the relationships among bedding materials, bedding bacteria counts, and intramammary infection in late-lactation dairy cows.**](https://pubmed.ncbi.nlm.nih.gov/31606215/)

Rowe SM, Godden SM, Royster E, Timmerman J, Crooker BA, Boyle M.

[**Cross-sectional study of the relationship between cloth udder towel management, towel bacteria counts, and intramammary infection in late-lactation dairy cows.**](https://pubmed.ncbi.nlm.nih.gov/31606221/)

Rowe SM, Godden SM, Royster E, Timmerman J, Boyle M.

**Relationships among bedding materials, bedding bacteria counts, udder hygiene, milk quality, and udder health in US dairy herds**

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