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MANAGEMENT OF SAND BEDDING ON DAIRY FARMS: PART I

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Cow comfort on dairy farms is associated with the production, longevity, and welfare of dairy cows. Freestall dairy barns are preferred because they protect cows from extreme weather conditions and predators. Different types of bedding, including sand, mattress, or sawdust, are placed in these stalls to maximize cow comfort. Various studies have provided recommendations on the type of bedding and bedding maintenance to reduce negative consequences. Clean, deep-bedded sand has been associated with the best outcomes for mastitis, cow cleanliness, cow lying times, hock lesions, and cow preference. A study in 2014 by the National Animal Health Monitoring System estimated 26% of the operations in the USA were using sand bedding (USDA, 2018). However, producers need to consider logistical practicalities in recycling and upkeep of the sand system and determine if it is an economically viable option for their herd. Some considerations include handling large quantities of sand (25 kg per cow/day), associated labor costs, slurry management, and erosion of farm equipment. This article will focus on the advantage of deep sand bedding and choice of sand quality.

Advantages of Deep Sand Bedding

Sand is considered an ideal dairy cattle bedding because of its natural properties; inorganic (less bacterial growth), dry (reduces the buildup of moisture), cool (does not insulate and helps reduce heat stress), reduces slipping of cows by providing traction, and makes a comfortable surface for improving cow comfort. The physical qualities of sand like particle size and uniformity provides cushion to the animal as it distributes the weight over the area of the cubicle. This eases the impact on cow's body parts such as reducing hock lesions and hair loss. Another advantage of sand is that it is inorganic and does not support the growth of bacteria. Uniform particle size allows for proper drainage of urine or other moisture build up that allows bacteria growth. Sand is also nonabsorbent, which means that it does not



Picture courtesy of Kay Ledbetter

retain or soak up urine, leaked milk, or other fluids which could cause bacterial growth. Moisture on the surface of sand has a quick evaporation time because moisture binds to single grains of sand. This leads to rapid drying of the top layer and ultimately inhibits bacterial growth and survival (Stowell and Inglis, 2000).

Deep sand bedding is associated with fewer clinical cases of mastitis incidence compared to other bedding materials (Gao et al., 2017). Furthermore, the lowest number of organisms were shown to be in new sand in comparison to used sand or manure (Rowbotham and Ruegg, 2016). Additionally, there were lower occurrences of coagulase negative *Staph Aureus* intramammary infection with sand bedding when compared with straw bedding (Dufour et al., 2012). Researchers have also observed suppressed growth of E Coli O157:H (Westphal et al., 2011) and lower SCCs on sand systems than on bedded pack and mattress (Dufour, 2012; Wenz, 2007; Jayarao et al., 2004).

Sand bedding has also been associated with reduced incidences of lameness and increased lying time. Researchers have identified that cows in deep sand bedding lay down more for a greater amount of time than cows on pasture (Black et al, 2016) or even rubber matting (Bak et al., 2016; Solano et al., 2016; Jensen et al., 2015). Overall hoof health was better for cows on sand vs straw or mats which could be due to increased lying time (Norrington et al., 2008). Studies examining the preference of cows to various beddings have shown that cows prefer sand more than a mattress, waterbed, or concrete barns (Wagner et al., 2003).

Choice of Sand Quality

Sand quality affects the overall efficiency of the bedding. Coarse and thick sand negatively affects cow comfort. Fine and natural sand obtained from beaches and river beds may contain pebbles and other organic materials which reduces the quality of sand. The fine sand stays in the stall longer, and therefore, a small amount is required (Buli et al., 2010), however, fine sand also becomes more compact and is harder to recover from slurry for recycling. Mason and concrete sand have fewer pebbles and stones to cause injury to cows.

References: Available upon request.