

Characteristics of Recycled Sand Bedding Over Time

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Introduction:

Environmental mastitis is a major source of economic losses on dairy operations. The rate of intramammary infection (IMI) is correlated with the number of mastitis pathogens on the teat end. Bedding materials have been implicated as primary source of environmental pathogens on the udder during the intermilking periods. Sand is commonly used in free-stall operations as an inorganic material that does not support bacterial growth. Recycled sand collected from flush waste management systems is used to reduce costs but may lead to increased bacterial load in the sand. The goal of this study was to evaluate the impact of recycled sand bedding frequency on free-stall sand dry matter (DM) organic matter (OM) and bacterial numbers.

Materials and Methods:

Recycled sand samples were collected from free-stalls immediately after bedding (0 hour) and 24, 48, 72 and 96 hrs post bedding. Samples were a composite collected from 5 locations at the rear one third of every other free stall in a pen (avg. 90 stalls/pen). Samples were refrigerated until evaluation of bacterial numbers later the same day. The remaining sample was frozen (-20 C) until dry matter (DM) and organic matter (OM) analyses were performed.

DM and OM Determination -Duplicate 2 gm thawed sand samples were heated in a 100°C forced air oven for 18h and reweighed for DM content. Samples were then placed in a 600°C muffled furnace for 5h and reweighed for OM content. Bacterial culture of sand - A 100ml volume of sand was diluted 1:5 with sterile saline in a Ziploc plastic bag, mixed well and allowed to stand for 10 min. Sample liquid was decanted into a 50ml tube and 5 serial 1:10 dilutions were made. Two-tenths of a ml of the 1:1000 dilution were plated on MacConkey and PEA agar and incubated at 37°C for 24h. Counts from both plates were multiplied by the dilution factor (25×10^4) to calculate CFU/ml.

Results and Discussion:

The average DM of recycled sand bedding increased from 0 hrs (95.6%) to 24h (97.2%) and remained constant from 24 to 96h. The average OM increased from 0 hrs (1.72%) to 96 hrs (2.68%). Average bacterial numbers remained constant from 24h (5.23×10^6) to 48h (5.17×10^6), peaked at 72 hours (9.05×10^6) and decreased at by 96 hours (6.58×10^6). The peak in bacterial numbers at 72h did not correlate with increased moisture or OM. Since bedding is primary source of environmental pathogens exposure, controlling the level of organisms in bedding is critical in preventing mastitis. Based on the limited data set of this study, addition of fresh recycled sand at 48 hour intervals may reduce the exposure of teats to bacteria and decrease the incidence of environmental mastitis. Further work is needed to determine the critical level of OM in recycled sand associated with increased risk of clinical mastitis.

