Environmental Pathogens Present in Bedding

Russ Bey, Jeff Reneau and Ralph Farnsworth,
College of Veterinary Medicine and Department of Animal Science
University of Minnesota
St. Paul, Mn 55108

Environmental mastitis causing bacteria are frequently present in bedding materials. These bacteria are transferred to the cow's udder when teats come in contact with the potentially infectious bacterial agents. Organism commonly causing infections in the bovine udder are grouped into two large groups; gram-positive (Staphylococcus species and Streptococcus species), gram-negative bacteria (Klebsiella species, Enterobacter species, and E. coli).

Bedding material appears to play an important role in the transfer of environmental pathogenic bacteria to the udder. This is because teats are in close contact with the bedding material for prolonged periods of time (during rest or sleep) resulting in teat end contamination. Large populations of environmental bacteria in bedding materials has been shown to result in increased somatic cell counts and increased udder infections as a result of teat end contamination.

To date little information exists on which bedding materials support the growth of the lowest number of bacteria when urine and feces are not present.

The Effect of Particle Size

Various bedding material samples were collected from dairies at random. The bedding material samples were sifted into three different layers using a No.8 and No. 18 mesh screen. 50 cubic centimeters of each layer and original (unshifted) bedding were each transferred to Whirl-pak bags to which sterile distilled water was added and mixed. This mixture was allowed to stand for 20-30 minutes. Samples were taken from the Whirl-pak bags and spread onto plates for counting. Bedding material were also incubated at 37C for 24, 48, and 72 hours. Counts were made to determine number of colony forming units per cubic centimeter of bedding material.

All organic bedding materials supported growth of environmental pathogens. The degree to which growth occurred varied with the respective bedding material and was related directly to the particle size. Large particulate bedding materials supported the least amount of growth while fine materials supported the greatest amount of bacterial growth. Results indicate that ground sunflower hulls, oat hulls and chopped straw supported the best bacterial growth, while coarse pine wood shavings supported the least amount of growth.

From these studies that certain bedding materials support large populations of environmental pathogens. It also appears as though particle size is a critical determinant in the ability the respective bedding material to support bacterial growth.
The significance of these findings is that bedding materials must be kept as clean and dry as possible to limit bacterial growth. In addition, when selecting bedding material the composition and particle size of the material must be considered. It appears that sunflower hulls, hardwood shavings, straw, oat hulls or other fine organic material are able to grow bacteria to high levels better, forcing the need for more frequent bedding changes.

To reduce the risk of udder infections and increased somatic cell counts bedding should be changed daily and fresh bedding material added to stalls. Simple front to back bedding is not a desirable procedure.

The bedding material which supported the LEAST amount of bacterial growth were: sand and large pine shavings. The worst (supported the most bacterial growth) bedding materials were: crushed sunflower hulls, sawdust, oat hulls, and straw. Examples of bedding materials which supported an intermediate amount of growth were paper dots, aspen, and a mixture of hard (oak) and soft woods (pine).