

SOIL, WATER, AND CLIMATE

-MS THESIS DEFENSE-

EVALUATION OF DIFFERENT BIOFILTER MEDIA TO REDUCE NITROGEN, PHOSPHORUS AND E.COLI FROM FEEDLOT RUNOFF

BY

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Abstract:

Water quality is a major environmental concern in Minnesota with its geological and historical abundant water resources. Agriculture is known to be a major provider of nitrogen (N), phosphorus (P) and pathogenic organisms such as *E.coli* to surface and ground water. Open feedlots pose a special risk of polluting the waterways due to the runoff and are therefore regulated by law. New regulations regarding feedlot in Minnesota took effect in 2000. Producers have until 2010 to comply with these new regulations. Currently, feedlot runoff that is not stored and land applied is primarily treated using a vegetative filter system (VFS). This system has limitations and it is unclear whether the new regulations can be met using VFS alone. Therefore, the Legislative-Citizen Commission on Minnesota Resources (LCCMR) founded this study of a minimalist technology very low cost biofilter can be used in conjunction with VFS to meet the new standards. This study focused primary on the following two points:

- (I) Characterize media suitable for the use in biofilters
- (II) Evaluate criteria on how to select media for biofilter

The media spruce (woodchips and sawdust), elm (woodchips and sawdust), storm damaged woodchips, corn cobs, corn stover, flax straw, mature compost and soil were chemically and physically evaluated. The results showed that those measurements can be used to help find a good media for biofilters. Furthermore, the results indicated that several media reduced mineral N, P, total coliform and *E.coli* from feedlot runoff. However, no single media showed peak performance in removing all four parameters. Therefore, mixtures of different media need to be considered. Also the study clearly showed that a "very low management" option of the biofilter resulted in inactivity of the microorganisms and a poorly functioning biofilter.