

BAE study evaluates impact of cattle grazing on stream bank erosion

The state of Kentucky is the #1 beef producer east of the Mississippi River with over one million head of beef cattle on approximately 40,000 farms, a fact that attests to the importance of beef production to the State's agricultural economic base. As a result of the Tobacco Settlement, Kentucky farmers are supplementing their income through increased levels of cattle production to counteract decreases in tobacco production. With such a large portion of Kentucky's agricultural economic base committed to the production of beef cattle, the environmental impacts of these grazing animals are potentially significant, especially in light of the state's hilly topography underlain with karst. The importance of this statement is magnified by the fact that Kentucky has over 89,000 miles of rivers and streams, many of which are accessible by cattle.

The goal of this project is to provide the agricultural community with a better understanding of the impacts of cattle grazing on stream bank erosion, and to improve current cattle production practices on small farms in Kentucky. Common with SARE's goal, this project seeks to strengthen the agricultural competitiveness of Kentucky's cattle producers while conserving soil, water and stream habitats. It is important to note that this project is a subset of a larger research endeavor into grazing impacts of cattle and best management practices (BMPs) on the water quality of a Kentucky stream. Information regarding the overall research effort can be obtained at the following website: www.bae.uky.edu/WQ406.



The SARE project is evaluating three different treatments:

- (1) Unlimited access to the stream with no alternate water source (control),
- (2) Unlimited access to the stream with an alternate water source, and
- (3) Limited access to the stream via a constructed crossing with an alternate water source.



To date, several components of the SARE project are either on going or have been completed. Within each pasture, permanent cross sections were installed at several locations that exhibited high potential for impact from cattle use. A total of nine monthly surveys on 50 stream cross sections have been conducted using conventional leveling techniques. By comparing these surveys conducted at different times, changes in the shapes of the stream banks, and thus an estimate of the amount of erosion that has occurred between sampling dates, can be determined.

Changes to the stream banks are also being monitored using RTK-GPS (Real Time Kinematic Global Positioning System). This system has the capability of measuring horizontal distances within two centimeters. Surveys using RTK-GPS were performed in May 2002 prior to the introduction of cattle and in November 2002, approximately six months following the introduction of cattle. Efforts are underway to use this information to identify any



Limited access, alternate water source



Unlimited access, alternate water source



Unlimited access, no alternate water source

significant morphological changes associated with cattle activity.

A total of 30 permanent photo stations were installed in May 2002. The photo stations allow for the photographic documentation of changes in the research site. Each photo station was established such that a maximum amount of the pasture plots, and especially the streams could be monitored. Digital images are taken at each photo station once a month, and all digital photographs are taken using the same camera for purposes of uniformity. Collection of the images coincides with the monthly surveying of the cross sections.

Data analysis techniques are still being evaluated, but preliminary results suggest that the treatment marked by limited access has gained soil while both unlimited access treatments have experienced erosion. Photographic documentation also suggests that greater erosion rates are being seen in the unlimited access treatments. Statistical models are being developed to determine the effects of different grazing practices and BMPs on stream bank erosion.

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For updated information on the project as well as an interactive project map, please visit the website at <http://www.bae.uky.edu/WQ406>