

University of Nebraska - Lincoln

DigitalCommons@University of Nebraska - Lincoln

Manure Matters (newsletter)

Biological Systems Engineering

2003

Manure Matters, Volume 9, Number 9

Christopher G. Henry

University of Nebraska - Lincoln, chenry1@unl.edu

Mike Reynolds

University of Nebraska Cooperative Extension

Follow this and additional works at: <http://digitalcommons.unl.edu/manurematters>



Part of the [Agronomy and Crop Sciences Commons](#)

Henry, Christopher G. and Reynolds, Mike, "Manure Matters, Volume 9, Number 9" (2003). *Manure Matters (newsletter)*. 29.
<http://digitalcommons.unl.edu/manurematters/29>

This Article is brought to you for free and open access by the Biological Systems Engineering at DigitalCommons@University of Nebraska - Lincoln. It has been accepted for inclusion in Manure Matters (newsletter) by an authorized administrator of DigitalCommons@University of Nebraska - Lincoln.

UNL's Livestock Environmental Issues Committee Includes representation from UNL, Nebraska Department of Environmental Quality, Natural Resources Conservation Service, Natural Resources Districts, Center for Rural Affairs, Nebraska Cattlemen, USDA Ag Research Services, and Nebraska Pork Producers Association.

Manure Matters

Volume 9, Number 9



Contact:
Chris Henry
217 LW Chase Hall
University of NE
Lincoln, NE 68583
(402) 472-6529
chenry@unl.edu

Low Water Stream Crossings for Cattle (LWSC)

Chris Henry
Extension Engineer
University of Nebraska Cooperative Extension

Mick Reynolds
Project Coordinator

Livestock access to streams, specifically, cattle access to streams in pastures has become of concern in the development of Total Maximum Daily Loads (TMDLs). There is very little information available to planners on the contribution of nitrogen, ammonia, phosphorus, and human health-related microorganisms to stream segments from rangeland cattle. A common modeling solution in the development of TMDLs is to exclude livestock from streams in order to reduce nutrient loads. Although this approach seems simplistic, it is problematic for owners and managers of rangeland livestock.

Many producers are now choosing to supply water to their livestock from man-made drinking water sources supplied by groundwater, surface water or rural water supplies. In addition to providing a higher quality source of water for livestock, these approaches have the added benefit of minimizing the amount of time livestock spend near surface water sources. These practices along with rangeland management techniques such as rotational grazing (cross fencing) have increased the production capacity of pastures.

LWSCs (Figure 1) are permanent crossing locations in streams or other conduits of surface water that a) provide access across the stream; b) minimize erosive effects of unprotected stream banks; and c) is comparable in cost to entire stream exclusion (fencing). LWSCs have been utilized for a wide range of crossing applications including tanks, farm machinery and livestock. LWSCs can be made from a variety of materials, including concrete, rock and riprap, and bricks. They are generally exempt from section 404, Army Corp of Engineer Permit requirements, since they are considered an unregulated access road. As with any construction project, regulatory requirements should be verified with all state and local authorities before construction.



Figure 1. A concrete LWSC for cattle.

Design and Application of LWSCs for Livestock

One of the biggest challenges of a LWSC in a pasture is determining the proper location for its installation. In our experience, several things must be considered:

- The location of mineral supplements, insect deterrents, and salt. This is especially important when rotational grazing is used. Since cattle tend to return often to these items, proper placement can increase crossing use.
- Existing places where cattle access the stream. This may be a large area along the stream bank, so by installing a LWSC, the area impacted by the cattle can be greatly reduced. Cattle tend to use the easiest locations in a stream to cross, so capitalizing on this should increase crossing success and use.
- Location of drinking water sources, (stream, rural water, ponds, and wells). The crossing will have a higher chance of being used if it is convenient for them to access water. The crossing itself may be the water source, or it may be a route to other drinking water source(s).

The approaches of a LWSC should not exceed 5:1 slopes, although some conservation practice standards allow up to 4:1. Care should be taken to ensure that the approach and slope of the LWSC is not too steep, especially concrete structures, as cattle may not have adequate traction to negotiate the crossing. The surface of the crossing should be made to minimize slippage and abrasion to animal hooves. For concrete construction, surfaces should be roughened. For aggregate construction, the LWSC should be surfaced with limestone screenings or similar material to provide a stable and uniform surface for livestock. During construction of a LWSC, the stream should be dammed and the stream flow should be discharged below the construction site. The stream must be returned to its original elevations. Crossings should be placed a minimum of 0.2 feet below the natural elevation of the stream channel. LWSC's should not obstruct stream flow.



Figure 2. Cattle using an LWSC

UNL's Livestock
Environmental
Issues Committee
Includes
representation from
UNL, Nebraska
Department of
Environmental
Quality, Natural
Resources
Conservation Service,
Natural Resources
Districts, Center for
Rural Affairs,
Nebraska Cattlemen,
USDA Ag Research
Services, and
Nebraska Pork
Producers
Association.

Contact:
Chris Henry
217 LW Chase Hall
University of NE
Lincoln, NE 68583
(402) 472-6529
chenry@unl.edu

A hoof contact zone of at least 2 inches should be placed on aggregate crossings. They can be made from sand, limestone screenings, ground limestone, rock screenings, or other similar material (USDA, 1986a). The Wisconsin Conservation Practice Standard (USDA, 1986a) suggests that crossing widths for cattle be 4-10 feet in width. The authors recommend that crossings are at least 10 feet in width since it has been observed that 2-3 animals may attempt to use the crossing at the same time. Immediately after construction, temporary fencing may be required to protect vegetation and to encourage livestock use of the crossing.

Recommended surface material thicknesses are:

Soft Foundations

- A 6 inches of pit run sand-gravel below 5 inches of concrete, with 6 x 6-W2.9 x W2.9 wire fabric or with #3 rebar 12" o.c.e.w.
- A 4 inches of surface gravel over 18 inches or more of crushed rock or angular rock
- A 4 inches of surfacing gravel over 18 inches of field rounded stone over 6 inches of pit run sand-gravel

Recommendations for firm foundations are included in the most NRCS conservation practice standards (USDA-NRCS Wisconsin 1989a, USDA-NRCS Wisconsin 1989b, USDA-NRCS Wisconsin 2002). If a geotextile fabric is used, rock thickness can be reduced substantially. A non-woven fabric is recommended by the authors. Construction costs for these LWSCs in Nebraska averaged about \$5,000 for materials and labor. The Nebraska Environmental Trust provided cost share for these crossings through the Livestock Producer Environmental Assistance Project.

References

USDA-NRCS, Wisconsin, 1989a. Access Road (ft). Conservation Practice 560. Section 4 of Field Office Technical Guide.

USDA-NRCS, Wisconsin 2002. Access Road (ft). Conservation Practice 560. Section 4 of Field Office Technical Guide.

USDA-NRCS, Wisconsin. 1989b. Rock Channel Crossings. Engineering Field Manual Notice 210-WI, Wisconsin.

Issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914, in cooperative with the U.S. Department of Agriculture. Elbert Dickey, Director of Cooperative Extension, University of Nebraska, Institute of Agriculture and Natural Resources. University of Nebraska Cooperative Extension educational programs abide with the non-discrimination policies of the University of Nebraska Lincoln and the United States Department of Agriculture.