

BY DESIGN

Slow spread of weed seeds with manure management

by Erin Cortus and Chryseis Modderman, University of Minnesota



The old adage is “what goes in must come out.” When cattle are grazing a pasture, weed seeds are

consumed at the same time as other forage crops. While the cattle digestive system will break down most materials, research shows some weed seeds can survive. Manure management may need to be part of weed management to control the spread of noxious weeds in some parts of the country.

For example, Palmer amaranth is an invasive weed spreading across the Midwest. Manure is one of the ways that Palmer amaranth or other noxious weed seeds can spread among fields or regions. One study showed 27% of amaranth seed ingested remained viable in cattle manure¹.

In a grazed system, the nutrient and weed seeds are returned to

where they originated, often in a different form or quantity. In the case where forage is harvested, moved off the field, and fed to cattle whose manure is then land-applied, weed seeds can affect a greater area (see Fig. 1).

Forage storage and treatment (e.g., ensiling) can reduce weed seed viability within this cycle. Once the weed seeds are part of the manure, there are further treatment and management opportunities to consider.

Compost benefits

Composting solid cattle manure can create the sustained, hot conditions necessary to kill Palmer amaranth and other weed seeds. Maintaining an internal compost pile temperature of 160° F for four days or more reduces the amount of viable amaranth seeds to between 2% and 10% of what was originally in the manure^{2,3}.

Note that composting is not the same as stockpiling. Composting requires active management to create an appropriate mixture of manure and bedding (or other carbon source) that is well-mixed, porous and around 50% moisture to maintain microbe growth. The microbes produce heat while breaking down the mixture, including the weed seeds. Temperature monitoring is a key practice for a well-managed compost system.

Some manure breakdown occurs in liquid-manure storage systems like deep pits, holding ponds or lagoons. However, even carefully controlled conditions in anaerobic digesters rarely create sufficiently hot conditions to break down amaranth seeds.

Summary

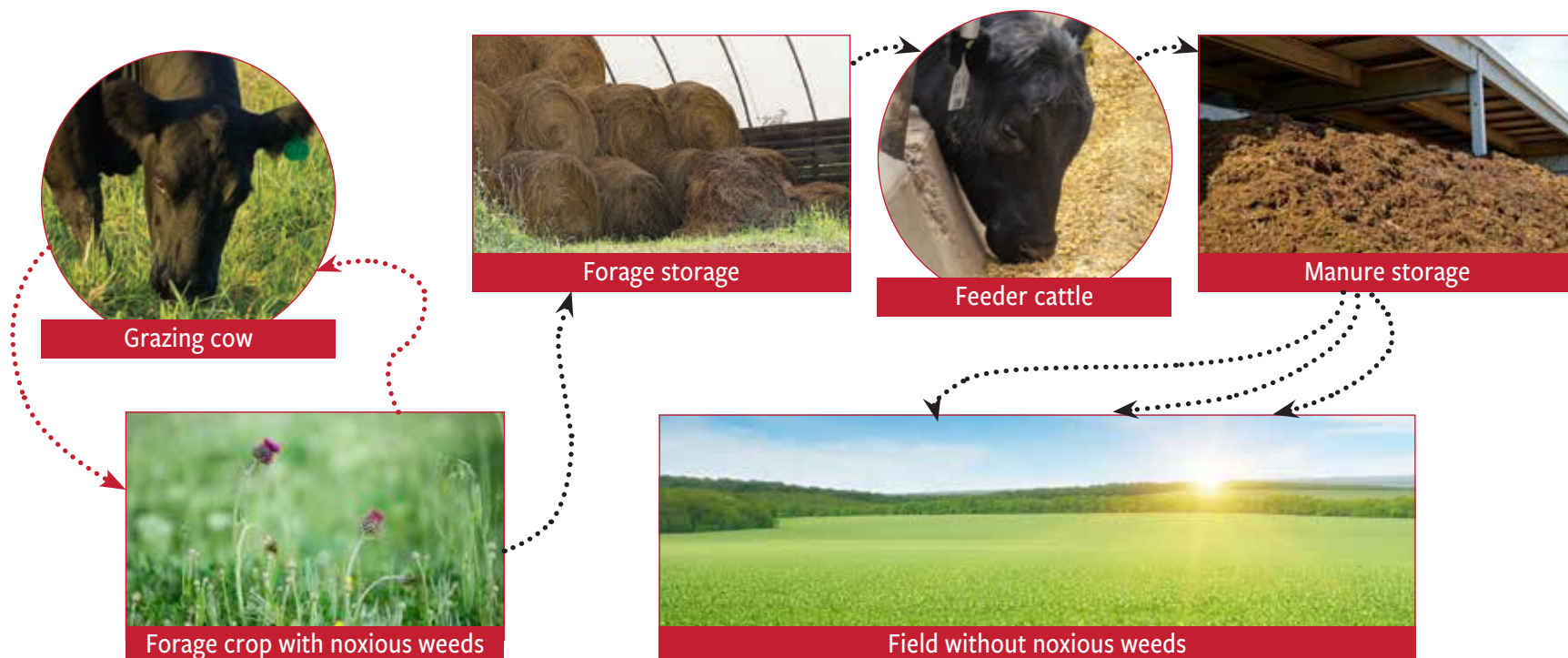
Whether the manure is solid, liquid or composted, managing the

manure during and after land application helps reduce the risk for weed seed introduction, particularly in risk areas for noxious weeds. Weed scouting and recordkeeping that links the source of the manure with the manure application site helps track movements if a noxious weed is found.

Manure management requires additional time and sometimes cost. In the case of noxious weeds, the risk may well be worth it. |

Editor's note: “By Design” is a regular column of the *Angus Beef Bulletin* featuring facility and homestead design for cattlemen. Erin Cortus is an assistant professor and Extension specialist in the Bioproducts and Biosystems Engineering department of the University of Minnesota. Chryseis Modderman is an Extension educator on manure nutrient management. The studies referenced in this column are ¹Blackshaw and Rode. 1991. *Weed Science*. 39(1):104-108; ²Larney and Blackshaw. 2003. *J. Environ. Qual.* 32:1105-1113; and ³Wiese et al. 1998. *TransASAE*. 14(4):377-380.

Fig. 1: The effect of weed seeds when fed to cattle then distributed through them



Weed seeds from a forage crop can cycle through cattle feeding from the pasture. If the forage crop is harvested, weed seeds can potentially move through storage, cattle feeding and manure storage, affecting a crop system elsewhere in time and space.