

Managing WDGS to Minimize *E. coli*

USMARC scientists evaluate strategies to help reduce *E. coli* O157:H7 prevalence in cattle populations.

by Kindra Gordon

As the price for corn has escalated in the last several years, the use of more cost-efficient feedstuffs — namely ethanol coproducts — has found favor with the cattle-feeding sector.

One such example is wet distillers' grains with solubles (WDGS). While WDGS has proven to be an effective energy source in finishing rations for cattle, recent research indicates it comes with a caveat. Cattle fed finishing diets with WDGS have been shown to harbor increased *E. coli* O157:H7 populations in the feces and on the hides.

Elaine Berry, a scientist with the USDA Agricultural Research Service (ARS) at the U.S. Meat Animal Research Center (USMARC) in Clay Center, Neb., explains why this correlation between WDGS and the higher prevalence of the *E. coli* pathogen may exist.

The ethanol production process removes starch from the corn, she explains. With less starch, the manure produced by the animals fed WDGS has less acidity (and therefore a more neutral pH), so it is more hospitable to the *E. coli* pathogen. Whereas, cattle fed diets high in corn excrete more starch — resulting in lower pH — in their manure, and that acidity helps inactivate *E. coli* pathogens.

Berry says the increased persistence of *E. coli* O157:H7 in the manure in the feedlot environment may be responsible, in part, for the observed increase in *E. coli* O157:H7 in the feces and on the hides of cattle that are fed high levels of WDGS.

As such, Berry reports research that *E. coli* appears to persist longer in the manure of animals fed a high-WDGS (40%) diet.

Initial research

Specifically, in a study of 605 steers, cattle were acclimated to the feedlot and fed a growing phase diet for 77 days. They were then fed a finishing diet with corn plus 0% WDGS or corn plus 40% WDGS on a dry-matter (DM) basis for 140-168 days.

Prevalence and the

percentage of samples with *E. coli* O157:H7 were not significantly different in the pens for either feces or hides at the beginning of the study.

However, Berry reports that significantly different levels of *E. coli* O157:H7 prevalence and the percentage of animals with enumerable high levels in feces and on hides were detected among the cattle fed the 40% WDGS ration at the end of the finishing trial.

Berry says this indicates that feeding WDGS at high levels in the diet appears to increase the persistence of *E. coli* O157:H7 and total *E. coli* in feces and manure over time — but with research and management she believes this risk can be managed.

Berry says, "We don't consider eliminating WDGS a good idea." Instead, she says researchers are asking different questions and refocusing research efforts.

Among the questions being studied:

- ▶ Can WDGS diets be altered to reduce *E. coli* O157:H7?
- ▶ Are effects similar when WDGS is fed at different levels?
- ▶ Can WDGS be removed from the diet before harvest to reduce *E. coli* O157:H7?

Interesting to note

- ▶ A 1,000-pound (lb.) calf eating a standard feedlot ration can excrete as much as 40 lb. of wet feces per day. With 12.1 million cattle on feed x 20 lb. of wet feces per day, that adds up to 121,000 tons of manure daily.
- ▶ The prevalence of shedding of *E. coli* O157:H7 is seasonal, and typically highest in the warmer months of summer and early fall.

▶ U.S. Meat Animal Research Center scientists are continuing their work on *E. coli* O157:H7 management and control measures, including studies on soil solarization, hide-washing techniques and genomic approaches.



Removing WDGS before harvest

Berry's colleague Jim Wells at USMARC conducted a study to address such questions. Specifically, can WDGS be fed at a lower level at the end of the feeding period to reduce *E. coli* O157:H7 prevalence at harvest?

For the two-year study, 608 heifers were sorted into one of five treatments and fed on a DM basis:

- ▶ a corn grain-based diet continuously (positive control);
- ▶ 40% WDGS continuously (negative control);
- ▶ 40% WDGS for the first 56 days and switched to 0% WDGS for the last 56 days;
- ▶ 40% WDGS for the first 56 days and switched to 15% WDGS for the last 56 days;
- ▶ 70% WDGS for the first 56 days and switched to 15% WDGS for the last 56 days.

Wells and Berry report that at the start of the finishing phase, the prevalence for *E. coli* O157:H7 in the cattle's feces was similar for animals fed 40% and 70% WDGS, and both were higher than animals fed 0% WDGS.

After WDGS in the ration was reduced for the later part of the finishing phase, the cumulative prevalence for *E. coli* O157:H7 in fecal samples was:

- ▶ highest for animals maintained on 40% WDGS (about 70% prevalence);
- ▶ lowest for animals maintained on 0% WDGS, (about 10% prevalence); and
- ▶ intermediate for animals shifted to lower WDGS (about 31%-35% prevalence).

Similar relationships between the treatments were observed for hide samples.

Wells, Berry and their USMARC colleagues concluded that reducing the percentage of WDGS fed in the diet to 0% or 15% during the last 56 days of the finishing phase did help reduce the prevalence of *E. coli* O157:H7 in feces and on hides.

However, they emphasize that time is an important component for this management strategy to be effective. She notes that reductions for *E. coli* O157:H7 on hides took 28 days after the shift to the lower amount of WDGS in the diet, whereas the reduction in feces took 56 days after the shift in the diet.

The bottom line, according to the study, is the fact that managing WDGS in finishing diets and feeding no more than 15% WDGS for 56 days prior to harvest may be an effective solution to help combat *E. coli* O157:H7 — without having to eliminate WDGS altogether.



Editor's Note: For more information on feeding options, visit www.feedingandfeedstuffs.info. This API topic site is a one-stop site for optimizing producers' feeding programs.