Palo Pinto County Agriculture and Natural Resources Newsletter

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Rotating crops lowers greenhouse emissions

Many farmers grow corn and soybean in rotation to avoid the continuous corn yield penalty, but now there's another reason to rotate. Scientists at the University of Illinois have provided further evidence that rotating crops increases yield and lowers greenhouse gas emissions compared to continuous corn or soybean.

"I think farmers in today's world are looking for reasons to avoid growing in a monoculture. They're looking to diversify and rotate their systems. If they're doing that partially out of a concern for the environment, well, it lowers greenhouse gasses. And it could potentially result in a substantial yield increase," says Gevan Behnke, research specialist and doctoral candidate in Maria Villamil's research group in the Department of Crop Sciences at U of I.

There are other studies out there looking at the link between crop rotation and greenhouse gas emissions, but Behnke's study is unique in a couple of ways. First and most significantly, he sampled greenhouse gas emissions from fields that had been maintained as continuous corn, continuous soybean, rotated corn-soybean, or rotated corn-soybean-wheat, under tillage and no-till management, for 20 years.

"These long-term plots are very stable systems. Sometimes you don't see the impacts of rotation or tillage for years after those practices are imposed. That's one of the highlights of this study," Behnke says.

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Comparing the corn phase of a corn-soybean rotation to continuous corn showed an average yield benefit of more than 20 percent and a cumulative reduction in nitrous oxide emissions of approximately 35 percent.

Nitrous oxide is an extremely potent greenhouse gas, with a global warming potential–how much heat a greenhouse gas traps in the atmosphere–almost 300 times higher than carbon dioxide. It is a byproduct of the process of denitrification, during which bacteria in the soil break nitrate down into inert nitrogen gas. Not surprisingly, nitrous oxide emissions are tied to the rate and timing of nitrogen fertilizer application.

Nitrous oxide levels were high at the beginning of the season and lower at the end. Farmers usually apply fertilizer in the spring and it gets taken up by the crop throughout the season," Behnke says. "A typical farmer would expect these results."

For soybean, which doesn't get fertilized, rotation did not affect nitrous oxide emissions compared to continuous soybean. Rotation did increase soybean yield by about 7 percent, however.

Tillage did not impact greenhouse gas emissions, but the practice gave corn an edge of about 15 bushels per acre over corn in no-till management. Behnke says that effect may not apply to farms outside the study area, however. That's because of the other unique aspect of the research: the location.

The study was conducted at the Northwestern Illinois Agricultural Research and Demonstration Center near Monmouth. With some of the most productive soils in the world, Behnke says corn yields are higher there than almost anywhere else. And greater yields mean more surface residue.

"If you talk to people that work at the Monmouth research center, they'll say it's sometimes difficult to plant into the long-term no-till. It's like planting into thick mulch," Behnke says. "Other places aren't as blessed when it comes to biomass and organic matter return to the soil." He adds that other studies comparing tillage and no-till management in corn don't typically show large differences in terms of yield.

Keep your cattle and margins healthy-Treating BRD in cattle

Treating bovine respiratory disease (BRD) is expensive. Plain and simple. The average cost of a BRD antibiotic treatment is $23.60.1,* However, what can get even more expensive than treating BRD is not treating BRD effectively.

Death Losses

BRD is behind about 50%-70% of cattle deaths on feedlots each year.2 If we only consider the purchase price of the calf, assuming $900 per head, every 1% mortality would add a $9-per-head cost to your breakeven.

But when you lose an animal to BRD, you lose more than just what you paid for that calf. For every increase in mortality, there are additional increases to the breakeven for your operation. On top of the purchase price, you have to consider additional expenses prior to death, includingtreatment and re-treatment medications you purchased to try to help treat BRD, labor costs of pulling and re-treating that animal multiple times, feed costs and opportunity costs.

Chronic Losses

BRD also is behind about 75% of cattle illnesses on feedlots each year.2 If any of those cattle don't respond to treatment, these chronic animals can add up to be at least half of your mortality costs, but likely more. Chronic cattle experience permanent health damage and add costly long-term performance losses. Some research shows chronics can be costlier than deads when you consider cost of feed, yardage interest and opportunity cost.3,**

For example, one study published in 2013 found net return to be up to $30.37 per head for cattle never treated for BRD compared with -$45.52 per head for cattle receiving more than three treatments, or a difference of $75.89 per head.

There isn't a way to predict whether or not a load of cattle will be a wreck, but thanks to several recent studies, we know which antibiotics can help treat BRD more successfully. In fact, some antibiotics can result in almost doubling repeat BRD treatments4 as well as doubling mortalities and chronics5 on your operation due to poorer efficacy. As I shared above, if we only look at the purchase price of a calf, assuming $900 per head, this means that at a 1% mortality rate you would be doubling the $9-per-head cost to your breakeven. You would be adding at least an $18-per-head death loss expense using an antibiotic treatment that's 50% less effective.

With your BRD treatment, you're not only protecting your profits but also the life of your cattle. Starting with a more effective treatment can help you make fewer antibiotic treatment courses and decrease the significant impact deads and chronics have on your operation before it's too late.

More advice, articles, videos and study summaries from veterinarians and producers are available at BRD-Solutions.com. There, you also can estimate your operation's BRD treatment costs using the new BRD Cost Calculator.

Fruit flies pose food safety risk

Fruit flies have long been a source of annoyance for restaurant, foodservice and food processing operators. But now, new research shows that these tiny pests can play a more sinister role: spreading illness-inducing bacterial pathogens to food and food preparation surfaces.

Fruit Flies

The study, conducted by scientists at Ecolab, the leading provider of pest elimination solutions to the foodservice, food processing and food retail industries, was recently published in the Journal of Food Protection *. The study found evidence of fruit flies' ability to transfer harmful bacteria from a contaminated source to surfaces or ready-to-eat food. Fruit flies are present in more than half of foodservice facilities, according to data collected by Ecolab's field team, which provides both comprehensive and localized treatment options for small flies.

"Our research confirms that the risk of fruit flies to food safety is as threatening as that of other pests, such as cockroaches, rodents and house flies," said Dr. John Barcay, Ecolab senior staff scientist and an author of the article, " Fruit Flies as Potential Vectors of Foodborne Illness."

In laboratory experiments, the researchers used specially made fly enclosures to assess fruit flies' ability to transferE. coli, Salmonella and Listeria bacteria from a contaminated food source to surfaces of the enclosures. They also examined fruit flies' ability to transfer E. colifrom a contaminated food source to non-contaminated foods. Finally, the researchers investigated fruit flies' capacity to carry bacteria – and the location on their bodies where they are most likely to carry the microorganisms.

Results showed that fruit flies are capable of transferring E.coli, Salmonella and Listeria to surfaces and relocating E.coli from a contaminated source to fresh, ready-to-eat food. The data showed that, on average, a fruit fly had the capacity to carry 1,000 (range 150 – 10,000) 'foreign' bacteria – microorganisms that are not part of their natural flora. Soil, biofilm and bacteria were found on fruit fly tarsal and leg areas.

"The presence of even a small number of pathogenic foodborne bacteria transferred by fruit flies to food preparation surfaces or ready-to-eat foods can lead to a high probability of infection," said Barcay. "This, along with potentially rapid bacterial growth in many ready-to-eat foods, indicates that a fruit fly infestation can pose a public health risk in restaurants and other food service facilities."

Study co-investigators E. P. Black, G.J. Hinrichs, D.B. Gardner and Barcay conclude that food operators can reduce the risk by being "prudent in eliminating fruit flies through proper cleaning and sanitizing of potential breeding sites." Those sites – generally anywhere food debris and aqueous fluids can collect and stagnate – include floor drains, drain lines from drink dispensing equipment and floors with stagnating water. Further, the authors conclude that "it is very important for food handling facilities to partner with reputable pest management partners that are knowledgeable about how to inspect for fruit fly breeding sites, perform chemical and non-chemical approaches to eliminating fruit fries, and maintain good communication with facility management and staff about maintaining structural integrity."