Proper Manure Handling Key To Controlling Foodborne Illness

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dary. Manure must be recycled back into the earth for much-needed plant nutrients. To ensure, however, that vegetables and fruit do not become contaminated, according to the Cornell specialist, it's important to follow a "common-sense" approach to managing manure and reducing the risk.

The culprit is E. coli 0157, a bacterium that causes severe illness, especially risky to young children and people with compromised immune systems. Fruit and vegetable consumption has gone up 24 percent from 1970-1997. So as more fruits and vegetables are consumed, there is a disturbing upward trend in the amount of cases of foodborne illness reported, noted the Cornell specialist.

Increases in reported outbreaks can be attributed to the technologies and information distribution capabilities of the agencies charged with tracking foodborne contamination.

And foodborne illnesses are increasing globally — not just in the United States.

A rise in the number of salad bars in U.S. restaurants comprised 35.4 percent of the outbreaks from 1990-1998. Most of the outbreaks are associated with lettuce consumption, Rangarajan said, and sprouts.

To stem the problem of foodborne illness, producers can do their part to more carefully manage manure around the farm. "Learn about where the original risk comes from, develop a plan and think about what to do," she said.

Because scientists still know little about how the foodborne disease organisms survive in the environment, there are few alternatives. The organisms are "ubiquitous," active everywhere in the environment, she said. E.coli 0157 survives the acid conditions of the stomach and can lead to some "awful illnesses."

But the microbes behave much like other organisms in plant diseases.

"Anything you do to manage the manure to protect the environment," said Rangarajan, "will also protect the crop from microbial contamination."

Growers need to keep record of manure rates, time of application, methods of incorporating manure, and watch when they plant.

Also, beware of what's going on with the water. Surface water sources for irrigation can contaminate crops with harmful bacteria. The only source of water should be potable drinking water that is regularly tested for coliform bacteria.

All manure carries pathogens, so it is important to make sure the manure is incorporated into the soil and enough time goes by before planting a vegetable or fruit crop.

As vegetable growers, Rangarajan told those at the meeting to "be diligent about management of manure." No manure should come in direct contact with produce. Flies, she said, can move off cull piles to the clean produce. Cull piles should be eliminated.

Composting manure serves to kill much of the harmful bacteria. The heat from microbial breakdown kills the pathogens.

And it's important, the Cornell specialist noted, to always incorporate the manure. And never, never sidedress with manure.

About 120 days, at least, are required from when the manure is applied until the crop is harvested. That means manure must be applied in the fall, especially to early planted and harvested crops.

"Keep animals out of all (packing and processing) areas as best you can," she said. And choose a crop that is more upright to minimize the risk. Use crops that have no direct contact with the soil, including those with trellises or staking systems and plastic mulch with drip irrigation. Drip irrigation is safer because the E.coli pathogens can be carried in water. Keeping the leaves and fruit dry ensures good control.

If broadcast spraying or irrigating, it is important to use potable water if close to harvest, she noted.

At harvest, according to Rangarajan, growers should pick only dry fruit, leave any fruit with fly droppings on it, use clean totes, cool the product quickly, and train workers in the importance of handwashing on a regular basis.

Totes can be washed in water mixed with bleach at a rate of ½ teaspoon per five gallons or one pint per 100 gallons.

Keeping the produce cool helps stem bacteria growth. At 95 degrees, one bacteria can multiply to 20 million in 6.7 hours. At 40 degrees, the same bacterial growth rate takes 16.7 days.

When hand washing, specialists recommend at least 20 seconds rubbing with soap and water.

By following these procedures, growers can stem possible outbreaks. The product is safe and producers don't have to face the problems endured with recent outbreaks in several states.

Plant Disease

Powdery mildew, early blight, late blight — these kinds of problems can sprout up in cucurbit and other fields. Penn State has found some significant differences in varieties and types of control of these diseases in several trials.

Following management strategies to reduce harvest loss because of disease is crucial, according to Dr. Alan MacNab, Penn State Extension, at the New Holland Vegetable Day.

MacNab demonstrated how critical it is to watch for treatment resistance building up in plant species. And varieties vary in their resistance to fungi.

Many problems can be controlled simply by earlier planting. MacNab noted that on early plantings, 46 days passed before early blight showed up; 30 days in mid-season; and only 14 days to the appearance of early blight late in the season.

Growers should know that late blight can be "very, very devastating, it can move very, very fast, and can wipe out the whole crop," MacNab noted, sometimes within a two-week period.

To counter the blights, purchase disease-free tomato plants. "Destroy the potato cull pile," he said. Blight can overwinter and spread to local fields, and you can "get in trouble early."

And continue to rotate crops to stem disease.

Vegetable Growers Association

Bill Troxell, executive secretary of the Pennsylvania Vegetable Growers Association (PVGA), spoke about the work of the association in helping to fund research, its work on promoting the industry, and about the Mid-Atlantic Fruit and Vegetable Convention.

The PVGA helped fund 14 different projects. It also helped fund many promotional efforts statewide, along with money from the Pennsylvania Department of Agriculture.

Through the PDA, PVGA helped erect 23 billboards. The PDA erected 70 more billboards with the "Pennsylvania Produce: Simply Delicious" logo.

Press releases, detailing the work of the PVGA, reached 2.4 million readers.

Speakers at the New Holland Vegetable Day included, front from left, Dave Miller, grower; Bill Troxell, PVGA executive secretary; and Larry Yager, Penn State marketing agent. In back, Ed Herrmann, grower and Solanco Young Farmers Association adviser; Paul Hauser, grower from Oxford; Anusuya Rangarajan, Cornell University vegetable specialist; Bob Rouse, Maryland University Wye Research and Extension Center; and Alan MacNab, Penn State Extension.

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AN EGG A DAY . . .

Carol V. Gay
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Why does it take 24 hours, or so, for a chicken to form an egg?

A short answer to this question is the complexity involved. Egg formation is a sequential, multi-step process.

The process begins when the ovary releases an egg yolk complete with a cluster of embryonic cells floating on its surface; technically this is called the ovum. In 15-30 minutes the funnel-shaped open end of the oviduct engulfs the yolk.

I saw a movie of this engulfment when I was a graduate student and still remember how amazing this was. How did the funnel know where the ovum was?

Once engulfed, the yolk begins its journey down the oviduct, a tube that is 16-18 inches long. Much of the oviduct is comprised of a region, called the magnum that manufactures and secretes proteins to form the egg white, mainly albumen and several other proteins. The oviduct wall is muscular and so can move the ovum along by a gentle squeezing, pulsating action that rolls the yolk in a slow progressive spiral. The result is that by the time the yolk passes through the magnum it has become coated with egg white and has taken on the characteristic egg shape. Transit time through the magnum, which is about 13 inches long, is 2-3 hours.

The next segment of the oviduct is called the isthmus; it is quite short, about 1 inch in length, but transit time is 1-2 hours. The isthmus also secretes proteins, but these proteins form a tough highly cross-linked membrane, known as the shell membrane, on the egg white surface. This membrane will serve as the foundation for eggshell formation.

Finally, the now well-defined egg enters the last region of the oviduct, the shell gland. The egg spends 20-26 hours in this final chamber. In the first few minutes, a dilute salt solution diffuses into the egg white, a process called plumping, causing the egg to swell to its full size. Then, the eggshell is formed as calcium carbonate crystals precipitate onto the shell membrane.

The finishing touches of egg formation include secretion of pigment and the water impervious cuticle. The egg is laid about a day after the yolk began its journey in the early morning hours of the previous day.

As mentioned, there are two time-consuming steps in the egg forming process: laying down the egg white and forming the calcified shell. Could these processes be forced to occur more rapidly to increase egg production? This is doubtful, because the structures that form both egg white and eggshell have to be replenished. Forming egg white protein requires delivery of the protein building blocks, the amino acids, to the tissue that then builds new protein by adding amino acids one by one to the growing ends of the protein molecules. Amassing a large volume of protein requires time.

Likewise, replenishing the source of eggshell calcium in the medullary bone is also time consuming. The laying hen wastes no time in replenishing these stores. While the shell is being formed, new albumen is synthesized and conversely, while albumen is formed, calcium stores are replenished.

Egg formation is a complex process and is tightly orchestrated by many kinds of neuro-endocrine controls.

Disturbances to the control mechanisms result in cessation of laying which can take many days to recover.