

Agricultural Issues

Fracking the Farm

Part 1: *Impacts on Farming and Animal Health*

—Sue Smith-Heavenrich

This is the first of a three-part series concerning the possible impacts of industrialized shale gas drilling on New York's foodshed.

Some farmers look at potential Marcellus shale drilling as a boon: Lease rentals and royalties could make it possible to pass the family farm to the next generation. Others fear that the highly industrialized drilling process will contaminate land, water, and, ultimately, the food we eat.

When Carol French signed a gas lease, she never dreamed that half a dozen years later she'd be warning other farmers to think twice. French, a dairy farmer in Bradford County, Pennsylvania, lives in the midst of the drill zone. The last time she counted, there were nine active wells located within a mile of her farm.

Carolyn Knapp, an organic dairy farmer, lives just a couple miles away. Six years ago she was concerned that signing a lease might affect her organic status. It didn't. Now, with a handful of wells drilled nearby, she worries about other ways that gas drilling and exploration could impact her operation.

The problem: Gas leases do not protect farmland. Once those leases are signed, say Knapp and French, farmers lose control over their land. Gas companies decide where to place access roads, well pads, pipelines, and compressors.

Some small farmers view gas leasing as a way to gain wealth and keep the farm going, says French. Indeed, some strike it rich. She mentions one farmer who leased 500 acres and now has 8 producing wells on his land. "He's getting \$90,000 each month in royalty checks," she says, "but Chesapeake [Energy Corporation] still hasn't paid my neighbors for the well pads on their properties."

Drilling Interferes with Farming

Drilling can interrupt normal farming activities. One of French's neighbors ended up with a well pad sited behind his barn, effectively cutting off easy access to the fields and pasture. The farmer



Infrastructure at the Kerr well in Lathrop Township, Susquehanna County (PA). Photo by Frank Finan

is earning royalties, French says—about \$400/month. But he sold his cows because the drilling operations made it too hard to keep on farming. Knapp, who integrates intensive grazing into her dairy operation, said she planned to dig a 20-acre water impoundment—a pond built to store fresh water and drilling waste fluids—right in the middle of land that's part of her rotational grazing system.

Agricultural land is hit particularly hard, say Penn State extension educators Gary Sheppard and Mark Madden. Over the past four years drilling has affected nearly 7,500 acres of Bradford County farmland. It's a rough calculation, Madden admits, based on an assumption that each well impacts anywhere from half an acre to two acres. But his estimates are backed up by real numbers; Penn State crop and soils professor Patrick Drohan's research shows that farmland makes up about 62 percent of the acreage affected by drilling. Sheppard agrees that drilling activities can change the workability of a farming landscape. "It can be as simple as having to raise and lower implements each time they cross a road," he says. On the other hand, some farmers

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The Kerr natural gas well rig in Lathrop township, Susquehanna County (PA).
Photo by Frank Finan

have benefited by ending up with better access to their fields.

Tim Kelsey, Penn State professor of agricultural economics and rural sociology, recently completed a study of Bradford and Tioga counties (in Pennsylvania). He found that the number of wells in an area has a measurable impact on farming. Areas with 150 or more gas wells lost 19 percent of their dairy herd; areas with no wells experienced only a 1 percent loss.

He doesn't have an exact number, but Kelsey says there is no doubt that dairy farmers are quitting because of drilling. Even if they don't have drilling- or gas-related activities on their own land, farmers face other challenges. Landowners who used to lease fields to farmers are now renting their land for drilling-related uses such as equipment storage and water-withdrawal sites. Large impoundments take land out of production, and crop yields are down in reclaimed pipeline right-of-ways. Add to that the scarcity of sawdust for bedding (it's mixed with drill cuttings before they're trucked to landfills) and the recent addition of an 8-cent-per-hundredweight surcharge for hauling milk (gas companies pay

higher wages for those with commercial driver's licenses) and it's clear that the Marcellus boom is a bust for some farmers.

Herd Health Declines

Cattle, sheep, goats and other livestock are attracted to drilling wastewater because it contains high levels of salts. But wastewater also contains toxic chemicals. As a result, farmers from Colorado to Louisiana, from Oklahoma to Pennsylvania have seen their livestock sickened or killed from exposure to drilling fluids, muds, and additives. Emissions from well sites, processing facilities, and flaring also contribute to health impacts. Animals that don't die outright may lose weight, show decreased fertility, or experience an increased number of stillbirths, abortions, and birth defects.

Industrialized gas drilling has turned rural communities into "de facto laboratories for the study of environmental toxicology," say veterinarians Michelle Bamberger and Robert Oswald. Farmers—and their animals—are exposed not only to drilling substances; they're also exposed to the naturally occurring metals, volatile organics, and radioactive compounds that are brought back to the surface during the drilling process.

Livestock, confined to pastures and fields, are exposed on a continual basis to environmental threats. That makes them useful as sentinels for human health impacts, say Bamberger and Oswald. Studies can more quickly assess the reproductive impacts of exposure on a herd of cattle than on a human population because the cattle have a higher rate of reproduction.

Last year the two veterinarians documented 24 cases of animal and human health problems with potential links to gas drilling. They visited farms; interviewed farmers and veterinarians; and obtained water, soil, and air testing results and results from human and animal lab tests.

Only two cases resulted from direct exposure to hydraulic fracturing fluid; most of the exposures were due to consumption of contaminated water from wells, springs, ponds, or creeks. While some cases were due to accidents or negligence, for the most part exposures were a consequence of "normal" drilling operations.

The most common symptoms Bamberger and Oswald found were associated with reproduction: Cows had trouble breeding and experienced a higher incidence of stillbirths. Of the 7 cattle farms studied closely, 50 percent of the herd, on average, either died or failed to breed.

Bamberger and Oswald collected information

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from two beef farms that provided natural “controls”—an opportunity to compare exposed cattle with their cohorts who were not exposed. In one case, 140 cattle were exposed to wastewater that leaked from an impoundment; of those, 70 died and the survivors suffered a high incidence of stillborn and stunted calves. The remainder of the herd—60 head pastured

with no access to the wastewater—experienced no health problems.

In addition to livestock, Bamberger and Oswald documented health impacts for farm dogs, cats, horses, poultry, and llamas. In some cases, dogs and cats drank from puddles left when drilling waste fluid was sprayed to reduce dust on roads. Those companion animals experienced reproductive problems. They also suffered from seizures and other neurological problems, gastrointestinal symptoms, and developed skin rashes or lost feathers and hair.

Farmers Pay the Price

Carol and Don Johnson raise beef cattle on their Tioga County (PA) farm. They signed a lease and have a well drilled on their property. Two years ago, flowback fluid leaked from an impoundment pit onto a pasture where the Johnson grazed their cattle.

To protect the public from eating “potentially contaminated beef,” the Pennsylvania Department of Agriculture quarantined 28 head of the Johnsons’ cattle, including sixteen cows, four heifers, and eight calves. Adult animals were held from the food chain for 6 months and calves exposed in utero were held from the food chain for 8 months. But the exposed calves were quarantined for two years.

The Johnsons not only lost the opportunity to market their animals, but last spring they suffered additional losses: Eight of eleven calves born to cows once quarantined died at birth. At \$500 to \$600 a head this represents a significant financial loss, and the Johnsons have yet to collect any royalties from the well.

What’s the Problem?

Both state environmental regulators and gas industry representatives are calling for drilling policy to be based on “sound science.” Bamberger and Oswald agree. “Science should drive decisions on whether or not to use a practice such as shale drilling,” they write.

Ironically, the biggest obstacle to getting that science done is industry-required nondisclosure agreements. These agreements keep the data—the basis of the science that industry is calling for—secret.

That leaves regulators waiting for the science ... and farmers left holding the bag.

Sue Smith-Heavenrich writes about environmental issues and agriculture—when she’s not pulling weeds or picking stones in her own gardens in Candor, Tioga County (NY).

View from a farm in the Barnett shale region of Texas. Photo by Frank Finan



FOR FURTHER READING

- ◆ Michelle Bamberger and Robert Oswald’s study, “Impacts of Gas Drilling on Human and Animal Health,” was published in the science journal *New Solutions* in January 2012. This study is available online at baywood.metapress.com/app/home/main.asp?referrer=default. Registration (free) is required to access the article.
- ◆ The Natural Resources Defense Council documented agricultural impacts in “Drilling Down: Protecting western communities from the health and environmental effects of oil and gas production.” Available online at nrdc.org/land/use/down/down.pdf.
- ◆ In November 2011, Penn State extension hosted a webinar, “Natural Gas Development and Impacts on Agriculture.” Archived at extension.psu.edu/naturalgas/webinars/recorded/natural-gas-development-and-impacts-on-agriculture.