Stray voltage, one farmer's success story

BY MARTHA J. GEHRINGER

BUFFALO SPRINGS — Stray voltage, what is it and where does it come from? These questions mystify many farmers whose herds suffer from stray voltage. One thing they are certain of is the effect it has on their herd.

J. Calvin Zimmerman, a dairy farmer from Buffalo Springs, Lebanon County, became an expert on stray voltage the hard way, through first hand experience of the problem.

Zimmerman and his wife, Thelma, ventured into farming on their own in 1978. Things began to unravel in 1982, just as they were in the process of expanding the herd.

This was to be the beginning of three years that would push them to the wall with problems resulting from stray voltage, and the frustation of futile attempts to correct it.

The origins can be traced to when the power company replaced a transformer on the farm with a larger one. This was done to solve another problem at the time where they were constantly blowing fuses.

The hook-up required by this transformer was different than the one required by the previous transformer and resulted in a reading of 14 volts of stray voltage. At this level sparks could be generated by touching a cow or the bulk tank. A bulb could also be lighted by touching it to the neutral wire and the ground wire.

There was no question at this point that he had a stray voltage problem. In addition to this obvious sign, Zimmerman was experiencing other symptoms. His somatic cell count had doubled, the cows were refusing to enter the parlor, and they were lapping at the water.

Zimmerman contacted the power company several times in an attempt to work with them to solve the problem, but [illegible] as much as possible on stray voltage, hoping to solve his dilemma. Through earnest reading he learned about a computer which Penn-State had developed that was capable of recording the level of stray voltage on the farm.

This was attached to the water bowls on the farm in May 1983 and recorded the levels of stray voltage the cows were experiencing. Richard Adams, a nutritionist at Penn State, paid a visit to the farm, in conjunction with the computer, to verify that the feeding program was intact and not contributing to the problem.

The resulting graphs gave them their first picture of the intensity of the problem.

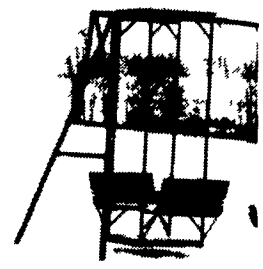
The next step was the purchase of a new product on the market, a voltage filter. This was installed in April 1984 and briefly solved the problem. Initially it dropped the voltage to 0.5 volts, but became ineffective when DC current clogged it. The filter, it turned out, was specifically built to handle only the standard AC current.

The DC current came from the gas company which uses it on their pipeline to retard corrosion of the pipes. After explaining the situation to the gas company, they agreed to reduce the amount of current in use on the pipeline crossing Zimmerman's field. This did not, however, eliminate the DC stray voltage.

Simultaneously with the addition of the voltage filter, the power company doubled the amount of current on the line. The doubling actually served to reduce the voltage to a level of six volts.

The next phase was the addition of a Ronk blocker. This solution resulted in the same fate as the voltage filter due to its inability to block the DC current.

The fifth product to be tried was an AC-DC blocker. This worked effectively to reduce the level to a half volt but only for four months.



This is the path stray voltage takes to the substation. It is amplified via an underground cable that is attached to underground ground pins known as the grid field. So long stray voltage!

After this data was analyzed, the next step was to install a network of reference ground pins around the farm that attract the voltage to a compensating amplifier unit. This unit is also connected to the farm's service entrance neutral bar.

Using these two sources, the amplifier, the brain of the system determines how much voltage must be drawn away from the cow area and sent to the third piece of the system, a remote grounding field.

This field was established at the minimum of 300 feet from the cow area to prevent a possible return of the voltage. Four copper-clad ground rods were placed at regular intervals in line through the field to provide the current with a path to return to the substation.

J. Calvin Zimmerman, right discusses his new system with Steve Hagey, sales, service representative of Madison Silos.

These ground rods were driven down to the bedrock to provide the [illegible]atest conductivity to the [illegible]nd. These rods are connected [illegible]e amplifier with 600 feet of [illegible]e.

[illegible]is system, installed by the [illegible] dealer, Madison Silos, [illegible]ata, contains a total of 35 [illegible]nd rods that have the ef-[illegible]veness of 35,000 rods in [illegible]her system.

[illegible]mmerman has had the system operational for almost two months and already he is witnessing a rebounding of his rolling herd average, as well as a return of his somatic cell count to more normal levels.

Stray voltage was an extremely costly problem for Zimmerman. In addition to paying for solutions which didn't perform properly, he realized a loss of income from decreased milk production, and his vet bills and cow replacement costs escalated.

Now Zimmerman is looking to rebuild his herd with renewed confidence and optimism. He expressed his confidence in the system by stating, "I've stopped looking for alternatives. It is working 100 percent and has reduced the voltage level to practically zero."

Stray voltage, a brief overview

[illegible]he signs are usually there but [illegible] problem isn't always easily [illegible]ntifiable or pinned down. It [illegible]esn't necessarily occur con-[illegible]nuously. Even if cows are [illegible]owing symptoms, it doesn't [illegible]ean they can be attributed to it. [illegible]r, no symptoms need be present [illegible]r it to exist. What is it?

[illegible]The answer is stray voltage.

[illegible]The classic reported symptoms [illegible]clude: a hesitation to enter [illegible]lking parlors or an uneasiness [illegible]ile being milked; lapping [illegible]ter; breeding problems; high [illegible]matic cell count; reduced milk [illegible]oduction; uneven milk-out; [illegible]reased cases of mastitis, hoof [illegible]oblems and other related health [illegible]oblems.

[illegible]Stray voltage is defined by the [illegible]nerican Society of Agricultural [illegible]gineers as the neutral-to-earth [illegible]tential. In a standard electrical [illegible]stribution system, the current [illegible]ust complete a circuit to function [illegible]nd does this by returning to its [illegible]urce.

[illegible]During this process voltages [illegible]evelop in the neutral wires and [illegible]cross parallel grounding paths to [illegible]arth. This voltage in a normal [illegible]ystem can range from a fraction [illegible] a volt to several volts, with the [illegible]ssibility of increase occurring [illegible]hen motors are started or a [illegible]nction of moisture conditions.

[illegible]Stray voltage is perceived by dairy cows at very low intensities, due to low body resistance and direct contact with the metal structures and the earth or wet concrete. Humans however have a higher tolerance and will not be affected by levels that affects cows.

Individual cows are affected at different levels of stray voltage. Research indicates that amounts less than 0.5 volts will have a minimal or no affect to dairy cows, while amounts in excess of 24 volts for any duration could be fatal.

Stray voltage could result from on- or off-farm sources. Improper wiring, shorting in electrical systems, faulty electrical equipment, faulty grounding, or voltage drops on the farm's neutral wire could all result in stray voltage.

If stray voltage is suspected, a qualified electrician should be call in to inspect the system. Consultation with a veterinarian and the power supplier is also recommended. Action should be taken based on their recommendations.

Milk prices meeting

HONESDALE — A Management Seminar for Dairy Producers will be held Friday, Feb. 21, from 10 a.m. to 3 p.m. at the Grace Episcopal Church Hall, Honesdale. The theme will be "Coping With Lower Milk Prices." In recent years the price of milk has been falling and many dairymen face financial difficulties.

Speakers will be Larry Jenkins, farm management specialist; Jack Kirkland, dairy marketing specialist; and Joe Hlubik, diary management specialist, all from the Pennsylvania State University. Topics will include the following: U.S. and World Situation, Feed and Market Situation, 1985 Farm Bill and All Herd Buyout, What's New in Dairy Technology, and Management Survival Strategies.

A light lunch will be served for $2. Reservations are requested. To sign up or to secure more information call the Wayne County Extension Service, Court House, Honesdale 243-5970. All interested persons are welcome.