



CASE STUDY · STRAY VOLTAGE DETECTION & CONTROL

Reducing Electrical Stress in Dairy Operations

A London Dairy case study on stray current monitoring and herd comfort



AT A GLANCE

Operation: London Dairy, Southwestern Ontario

Solution: PrevTech electrical surveillance and stray voltage control

INTRODUCTION

When electricity becomes a herd management issue

When dairy producers think about herd performance, the usual factors come to mind: genetics, nutrition, ventilation, water quality, and overall herd management.

Electricity rarely makes that list.

Yet inside modern dairy barns, where animals interact continuously with metal equipment, water, concrete, and automated systems, **electrical conditions can quietly influence herd comfort and behavior.**

In some cases, the presence of **stray current within a facility's grounding system** can introduce subtle voltage potentials between surfaces that animals touch every day. These voltages are often too small for people to perceive, but cattle are far more sensitive, often contacting these surfaces with sensitive parts of their bodies.

The difficulty for producers and advisors is that the effects rarely appear dramatically. Instead, they often show up as **small behavioral changes or unexplained variations in herd performance.** Same as when any other stress factor is introduced.

The experience of **London Dairy in Southwestern Ontario**, owned by Tommy and Benji Faulkner and operated by Cris Ghita, illustrates how monitoring technology and proactive electrical management can help farms better understand and manage these hidden electrical dynamics.

A HIGH-PERFORMANCE HERD WITH STRONG MANAGEMENT PRACTICES

London Dairy is a progressive dairy operation recognized for its strong focus on herd quality, genetics, and herd trade across North America.

While milk production remains a key component of the operation, the farm's herd dynamics include a significant amount of animal movement and trade. This creates a higher level of variability in production data compared to closed herds with stable populations.

Because of this turnover, using milk yield alone to identify subtle environmental stressors can be difficult.

What stands out most about London Dairy is the management team's **attention to herd comfort and environmental conditions.** Issues related to equipment performance, ventilation, or electrical anomalies are typically addressed quickly and proactively.

This culture of rapid response and continuous improvement made the farm an ideal partner when exploring whether electrical conditions could be better measured and understood.

ELECTRICAL SYSTEMS AND THE REALITY OF STRAY CURRENT

All electrical systems include a deliberate connection between the **neutral conductor and ground**. This connection is required by electrical code and plays a critical safety role by ensuring that fault current has a safe path to return.

Because of this design, **small amounts of electrical current naturally circulate through grounding systems**.

This phenomenon is completely normal and exists in nearly all electrical networks, from residential homes to commercial buildings and large agricultural facilities.

However, livestock environments are unique. Dairy cows often contact multiple conductive surfaces simultaneously such as water troughs, metal rails, and wet concrete floors. Under certain conditions, circulating grounding currents can create small voltages between these surfaces.

Herds may react to these voltages through subtle behavioral changes such as:

- Reluctance to drink from water troughs
- Hesitation entering milking stalls
- Inconsistent milk let-down
- Agitation during handling
- Changes in feeding behavior

These responses can be difficult to connect to a specific cause because they often appear gradually and alongside many other variables that influence herd performance.

A STEP-BY-STEP APPROACH

Before investigating off-farm electrical influences or stray current dynamics, the first essential step is to establish a stable and compliant electrical environment within the farm itself. This begins with installing electrical network monitoring and conducting a thorough review of the on-farm electrical installation. The objective is to identify and correct internal faults such as deteriorated wiring, equipment leakage currents, moisture-affected or worn-out connections, or improperly configured electrical components that may be bleeding current to ground. These conditions are common in agricultural environments and can create electrical disturbances that mimic or amplify stray current concerns.

Equally important is confirming that the grounding system conforms to electrical code, specifically ensuring that there is only one neutral-to-ground bond located at the main service entrance. Removing any additional or unintended bonds elsewhere in the installation helps eliminate circulating currents and establishes a clear and predictable electrical baseline. Once on-farm faults are corrected and the electrical network is properly normalized, monitoring data becomes far more reliable, allowing any remaining influences, including potential off-farm electrical interactions, to be evaluated with much greater accuracy.

MONITORING ELECTRICAL CONDITIONS AT LONDON DAIRY

To better understand the electrical environment within the facility, **PrevTech Electrical Surveillance** was installed at London Dairy. This means that each breaker panel of the site has a sensor connected to our controller. Any upcoming or existing faults on-farm will be detected and repaired by the maintenance team as they appear. No more guessing, actions on pure data.

As part of the installation, a **specialized sensor was added to the main bonding jumper at the farm's electrical service**. This sensor detects the presence of electrical current circulating through the grounding path. When all the on-farm issues have been detected and controlled, we can consider that any remaining current on the main bonding jumper originates from off-farm.

Initial measurements revealed a **continuous current flow of approximately 3–4 amperes** returning through the farm's grounding system on each electrical service.



It is important to emphasize that currents of this nature are not abnormal. They are a natural consequence of how electrical systems operate and are present in many large agricultural and commercial facilities.

What the monitoring system provided was something that farms rarely have access to: **visibility into an otherwise invisible electrical phenomenon**.

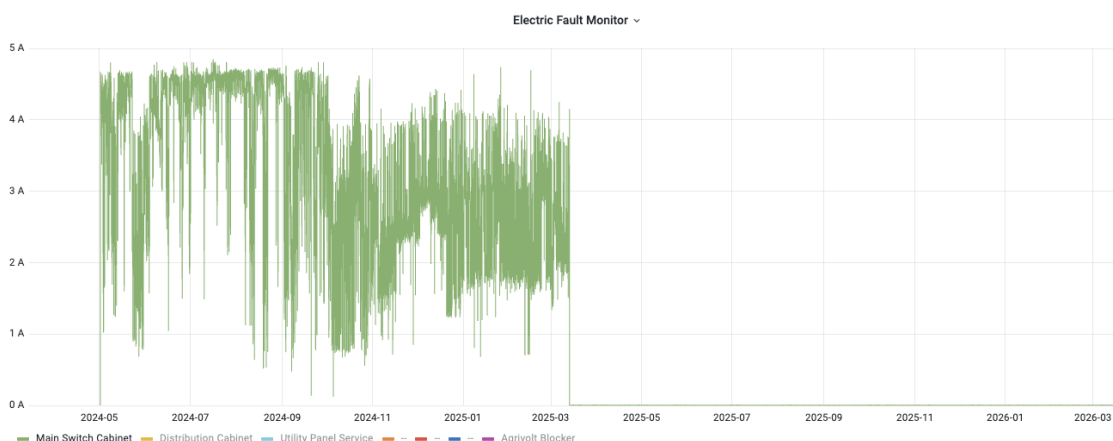


Figure 1a. Measured off-farm stray current returning through the farm grounding system prior to installation of the stray current blocker at the main electrical service #1.

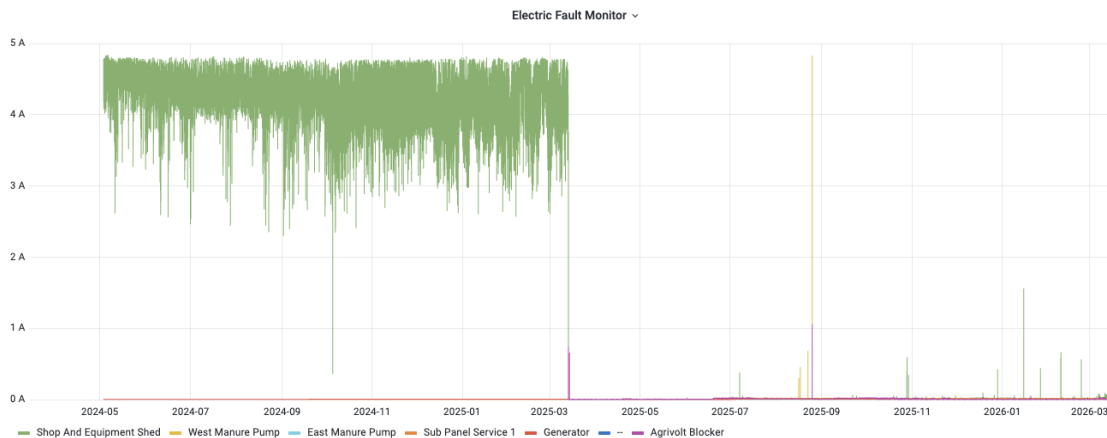


Figure 1b. Measured off-farm stray current returning through the farm grounding system prior to installation of the stray current blocker at the main electrical service #2.

ADDRESSING STRAY CURRENT AT THE SOURCE

After several months of monitoring, the farm elected to install a **PrevTech Stray Voltage Blocker at the two main electrical services.**

The goal was to reduce the amount of electrical quantities through livestock contact areas while maintaining proper electrical safety paths.

The system was allowed to operate for several months while herd behavior and operational indicators were observed.

Although milk production data did not provide a clear before-and-after comparison due to herd turnover, two operational indicators stood out during the observation period:

- Increased water consumption
- Improved feed intake ratios

Both indicators are closely associated with herd comfort and metabolic performance. Increased water intake in particular is frequently linked with improved milk production and better overall feed efficiency.

While these observations do not constitute a controlled scientific study, they provided **practical confirmation that electrical conditions can influence animal behavior in subtle but meaningful ways.**

THE IMPORTANCE OF PROPER GROUNDING

One important aspect revealed during many electrical monitoring installations is the role of **proper neutral-to-ground bonding.**

Electrical code requires that **only one neutral-to-ground bond exist within a facility**, typically located at the main electrical service.

Over time, additional unintended bonds can appear through equipment installations, wiring changes, or aging infrastructure. These unintended connections can create alternative current pathways that increase the circulation of stray current within livestock areas.

During monitoring installations, identifying and correcting these unintended bonding points often results in immediate improvements.

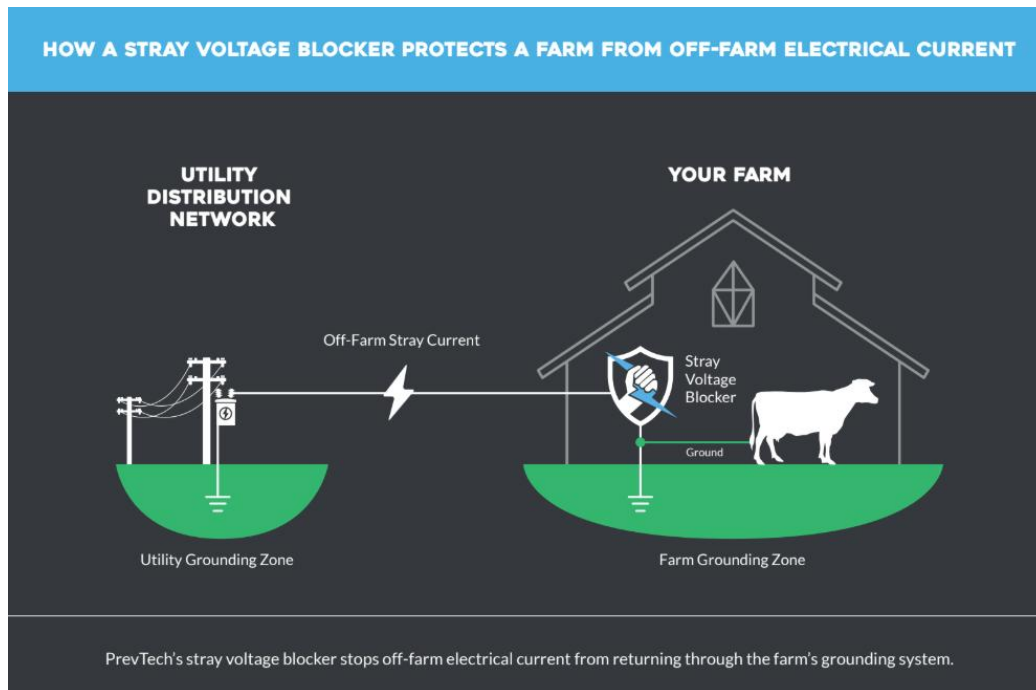


Figure 2. How a stray voltage blocker protects a farm from off-farm electrical current, showing the correct single neutral-to-ground bond configuration.

Ensuring that the electrical system maintains a single bonding point not only reduces the risk of circulating stray current but also helps bring the electrical installation **back into compliance with electrical code requirements**, improving overall system safety.

COLLABORATION AS A RISK MANAGEMENT STRATEGY

One of the most important outcomes of the London Dairy project has been the ongoing collaboration between the farm and PrevTech.

Rather than treating electrical inspections as one-time events, the operation now benefits from continuous monitoring and proactive intervention when anomalies are detected.

This proactive approach helps ensure that electrical issues are identified early, often before they develop into larger operational risks such as:

- Equipment failures

- Production interruptions
- Livestock stress
- Electrical fire hazards

>50%

OF FARM FIRES ARE ELECTRICAL*

For modern dairy farms operating complex electrical infrastructure, early detection of anomalies provides both **productivity and risk-management benefits**. With data demonstrating that more than 50% of farm fires are caused by electrical faults and anomalies*, proactive electrical monitoring can significantly reduce risk and increase overall business resilience.

** Ontario Fire Marshal and Emergency Management*

LESSONS FOR THE DAIRY INDUSTRY

The London Dairy experience highlights several important lessons for dairy producers and industry advisors.

- Electrical conditions within livestock facilities can be measured and monitored.
- Animal responses to electrical influences are often subtle but meaningful. Same for exposure to any stress factor.
- Proper grounding and bonding practices remain critical for both safety and herd comfort.
- Proactive monitoring and collaboration between producers and technical specialists can significantly reduce electrical risks.

LOOKING AHEAD

As dairy farms continue to modernize and electrification increases, understanding the interaction between electrical systems and livestock environments will become even more important.

The experience at London Dairy demonstrates that combining **monitoring technology, proper electrical design, and proactive collaboration** can help producers create safer and more comfortable environments for their animals.

Ultimately, improved electrical management contributes not only to animal welfare but also to the **long-term resilience and productivity of modern dairy operations**.

IN THEIR WORDS

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Electrical conditions in a dairy barn are easy to overlook because they're invisible. But when you operate at scale, small factors can influence herd comfort. Our focus has always been on operational discipline; electrical infrastructure is now part of that equation.

Over the years we've made electrical safety part of our management approach. Working with PrevTech helped us monitor what was happening in the background and build better practices around maintenance and response when electrical anomalies appear. This collaboration has become an important part of how we manage risk on the farm.

— Tommy Faulkner, London Dairy

TECHNICAL INSIGHT

HOW STRAY CURRENT ENTERS A LIVESTOCK FACILITY

Stray current can originate from several sources within or outside the farm.

Common contributors include:

- Electrical loads within the farm that create return currents through grounding systems
- Current flowing from the utility distribution network, load related to the farm site and neighboring usage of electricity. This will likely be an increasing issue in time.
- Improper neutral-to-ground bonding within the facility
- Aging wiring or equipment connections
- Long electrical distribution distances on large farms

Because grounding systems are intentionally connected to earth and structural components, these currents can circulate through metal structures, concrete floors (presence of high minerals), and water systems.

Monitoring allows producers and technicians to **quantify these currents, identify the source, and determine whether corrective work is required or if other mitigation measures are necessary.**

TECHNICAL INSIGHT

FIVE SIGNS YOUR BARN MAY BE EXPERIENCING ELECTRICAL STRESS

Although stray current conditions can be subtle, certain herd behaviors may signal a potential issue. Again, think about stress related impact.

Producers and advisors sometimes observe:

- Cows hesitant to drink from water troughs
- Animals avoiding specific stalls or milking units
- Agitation during milking
- Inconsistent milk let-down
- Unexplained variations in feed intake or herd movement patterns
- Abnormally high somatic cell count
- Frequent cases of mastitis

These signs do not necessarily confirm an electrical issue, but they may warrant further investigation.

TAKE THE NEXT STEP

Electrical monitoring can help determine whether stray current conditions are present and whether corrective measures are needed. To assess your facility, contact the PrevTech team.



PrevTech monitors electrical networks in real-time to detect and prevent fire and breakdown risks, and to control the presence of stray voltages before they become critical. Each client benefits from the proactive support of a team of electrical safety experts.

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