



Supplying Profitable Solutions For Dairy Farmers Into The 21st Century

STRAY VOLTAGE: WHAT CAUSES IT, AND WHAT TO LOOK FOR

Electricity in the Milking Parlour

The effect of small voltages on milking cows (called stray voltage by some people) is a significant and widespread problem. It is electrical current caused by voltage differentials that upsets the cows.

Resistance and Sensitivity to Electricity

Cows are 5-10 times more sensitive than humans, and some are more affected by the current than others due to different levels of resistance. The electrical resistance of a cow determines the current flow resulting from a given voltage differential (explained by the formula $V = I \times R$). Resistance of cows (measured in ohms) to stray voltage can vary from 250-400 ohm to 1000 ohm maximum, ie a low resistance cow would be exposed to twice the current of a high-resistance cow at the same voltage, or half the resistance to double the current.

Causes

The cause of the voltage can be from several factors:

- Unbalanced three phase loads. An imbalance on the three-phase system can result in higher resistance on the neutral line causing a voltage drop.
- High single-phase loads, e.g. water heaters. Having the single-phase water heater on during milking is often a source of imbalance
- Poor earth spikes including one at the transformer
- Improper wiring
- Faulty equipment, e.g. water heater elements
- Corroded connections e.g. aluminium neutral wires.
- Rotary platforms can also generate static electricity. Bonding can dissipate the charge.
- Teat sprayers and drenching guns can also give cows an electric shock.



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Electric fence systems with a return earth through the farm dairy are also known to cause problems. Electric fences on backing gates can be regarded as one way to get cows into the shed quickly and milked; but at what cost to milk in the vat and profitability?

What to look for:-

Electrical shocks are associated with adverse animal behaviour – difficult to get into the bail, dunging and erratic milk let down responses. The symptoms of small voltage and electric shocks include:

- Nervousness and surplus cow dung in the yard and bails.
- Reluctance to use metal feeders and touch the pipe work, e.g. front gate in herringbone.
- Incomplete milk let down.
- 2-3 minutes delay until letdown.
- Increased mastitis as a result of incomplete milking.
- Elevated cell counts in infected cows caused by the stress.
- Faulty liners and pulsators or when teat sprayers and drench guns are used or touch the cows can cause some of the symptoms.

Cows will show a response (flinching and behavioural changes) at a current of 3mA or a voltage of 0.7 volts. However some cows flinch at 0.2 volts. A kicking response is likely at voltages greater than 1.4 volts and currents of 4mA. Transient voltage pulses of 10-volt amplitude for 1 millisecond are sufficient to cause a reaction, 40 volts for 100 milliseconds cause violent reactions.

The most important voltages to look for in the milking area are those between the bail pipe work and the floor, and those due to voltage gradients over a wet floor, or moving on to a rotary platform. Two volts over 1.5 meters are sufficient to cause a problem.

A stray voltage problem is often only detected during milking time because of power loadings. Testing needs to be done at the end of milking when the shed is still wet with urine, dung and leftover chemicals from milking. The resistance of the floor that will control the current will affect the readings.

Conclusion

Identifying and rectifying a stray voltage problem will result in more relaxed, at ease cows in the parlour, less mess and increased milk yields.