Literature Review and Synthesis of Research Findings on the Impact of Stray Voltage on Farm Operations

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1. Scope of this Report

- Literature review
- Pathways whereby stray voltage can affect animals
- Symptoms indicative of stray voltage
- Minimum voltage (or current) level at which impacts can be expected.
- Measures for mitigating stray voltage
- Review of regulatory measures

Ways That Stray, or Tingle, Voltage Can Impact Farm Operations

- Direct effects
  - Mild behavioral reactions = sensation
  - Involuntary muscle contraction = twitching
  - Intense behavioral responses = pain
- Severity depends on
  - amount of electrical current (milliAmps) flowing through the animal's body
  - Body pathway
  - Individual animal Sensitivity

Indirect effects

- Animals avoiding certain exposure locations
  - Reduced water intake if exposure is required for animals to access watering devices,
  - Reduced feed intake if exposure is required for animals to accesses feeding devices or locations.
- Difficulty of moving or handling animals in areas of voltage/current exposure
- Release of stress hormones produced by contact with painful stimuli

Basic concepts of voltage, current, and resistance

- Ohm's law = relationship between
  Voltage, Current and Resistance
  - If voltage (across animal contact points) is increased, the current flowing through the animal will increase
  - If resistance (of contact points) is increased, the current flowing through the animal will decrease
    - 1 milliAmp = 1/1000th of an amp

$$\textbf{Current (Amps)} = \frac{\textbf{Voltage (Volts)}}{\textbf{Resistance (Ohms)}}$$

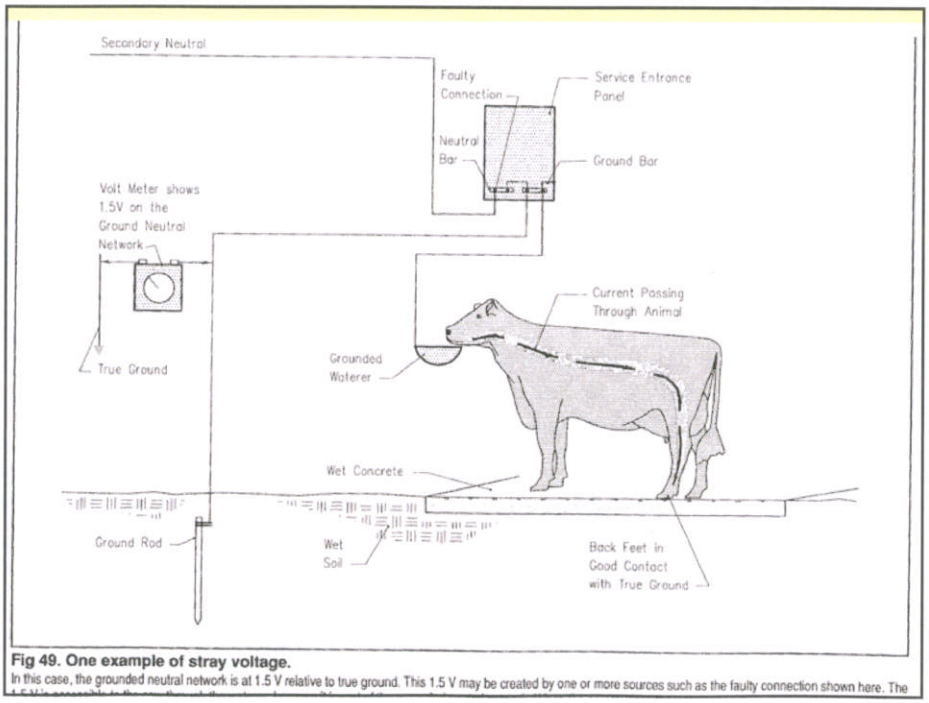
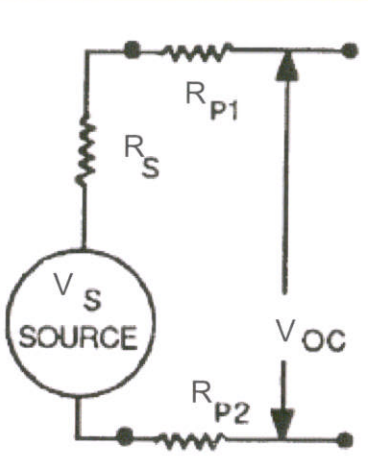
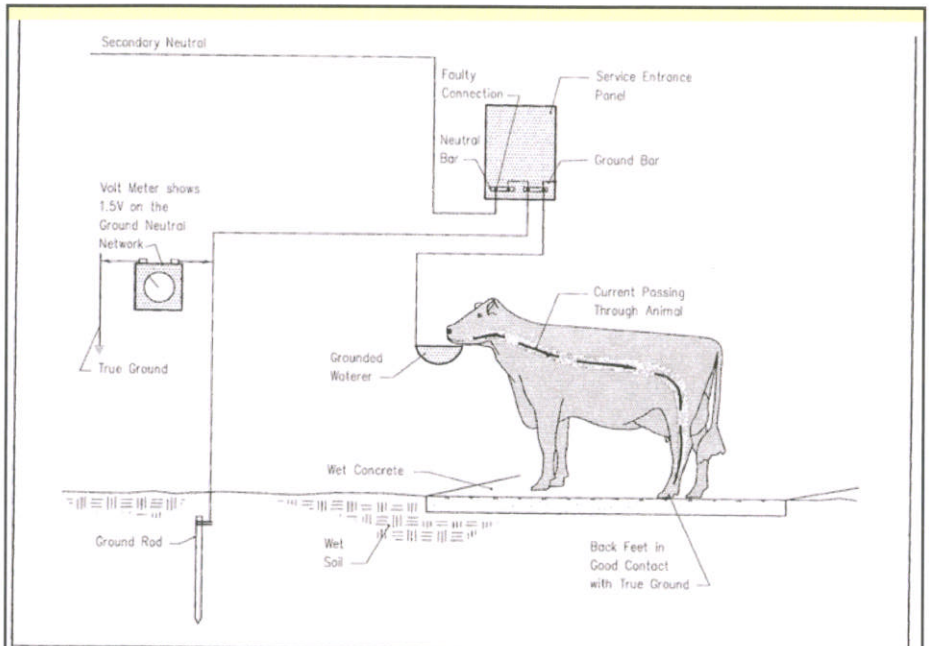


Fig 49. One example of stray voltage.
In this case, the grounded neutral network is at 1.5 V relative to true ground. This 1.5 V may be created by one or more sources such as the faulty connection shown here. The

Elements of the Source Circuit

- Vs = Voltage Source (I*R on neutral wire)
- Rs = Source Resistance
- Rp1 = Path Resistance 1
- Rp2 = Path Resistance 2
- Voc = Open Circuit or Source Voltage





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