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## Wiring Livestock Barns

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Wiring a livestock barn, as any farm operator knows, is a challenge. Rules in the National Electrical Code are intended to minimize the dangers of fire and shock to humans and animals. The issues of physical abuse, corrosion, condensation, and stray voltage are difficult to prevent. Electrical contractors with little or no farm wiring experience often do not realize that even the best commercial and industrial wiring materials and techniques installed in a livestock confinement building can be damaged and corroded to the point where it is unsafe in less than a year. Farm operators need to know what constitutes satisfactory livestock building wiring, and work with electrical contractors to make sure the wiring installed will give good service for many years. Just following the electrical code will not guarantee satisfactory results. Here is how a farm operator in Mid-Michigan worked with the builder and electrical contractor to address several issues when wiring a new dairy free stall barn.

The waterers are completely nonmetallic, thus at first glance it would seem that stray voltage is not a problem. *Not true.* If heat is needed to prevent freezing in the winter, a 250 watt immersion heater is placed in the water away from the livestock under the protective cover. This immersion heater has a metallic casing that is required to be grounded to prevent shock. Grounding the heater casing creates a link that can energize the water with stray voltage. In this barn an equipotential plane consisting of steel reinforcing mesh was installed in the floor of the area adjacent to the water trough with a copper wire. This copper wire connects the steel mesh in the floor to the equipment grounding wire in the receptacle box installed to supply the immersion heater (Figure 1). If the stray voltage ever gets to a level that can be perceived by the dairy cows, the water in the trough and the concrete floor will be at the same potential to protect the livestock.



*Figure 1 A size 6 copper wire is fastened to the steel mesh and brought out of the concrete so it can be connected to the equipment grounding wire in the circuit supplying power to the immersion heater.*

Dairy cows in this barn have access to all areas. As much of the wiring and boxes as possible must be installed out-of-reach of the livestock. Livestock will chew and lick cables, conduits, and boxes if installed within reach. They can destroy rigid nonmetallic conduit, type UF cable, and nonmetallic boxes if they are exposed. To prevent damage, boxes in this free stall barn were installed a minimum of 7 ft above the livestock floor. A 1¼ in. rigid metal conduit, open at both ends, was used to protect the immersion heater cord from livestock damage (Figure 2). Next month Truman Surbrook will discuss load balancing and wire sizing to prevent stray voltage.



*Figure 2 Nonmetallic boxes with covers that are weatherproof with a cord installed are mounted high enough to be out-of-reach of the cows, with rigid steel conduit providing protection for the heater cord.*