# Neonatal Calf Umbilical Cord Healing and Infection Rates After Treatment with Four Different Antiseptics

## A.S. Leaflet R2970

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**Summary and Implications**

Federal regulations regarding the sale and storage of 7% iodine solutions have increased the interest in exploring the effectiveness of alternative antiseptics for umbilical cord dipping. There are few studies documenting the effectiveness of alternative umbilical antiseptics. Four antiseptic solutions (7% iodine-, 4% chlorhexidine-, citrate-methylene blue-parabens (Zuralac), and 1000 ppm chlorine-based products) were compared to determine their impact on umbilical healing and 24-h infection rates in a field trial with dairy calves. There were no differences between treatments, suggesting all four dips tested were effective in preventing umbilical infections and permitting healing of the umbilical cord when used within 30 minutes of birth under clean, dry conditions.

**Introduction**

The umbilical cord serves as a conduit for the blood supply between the fetus and the placenta throughout pregnancy. The cord ruptures during the birth process in calves, leaving an umbilical stump that becomes a potential route for pathogen entry into the newly born calf increasing the risk of septicemia. Studies indicate that 15-20% of dairy calves in the US develop umbilical infections, and 1.6% of calf deaths are related to umbilical infections. Umbilical infection also reduces total BW gain during the first three months of life. Careful and consistent umbilical cord care substantially decreases calf mortality. Typically, antiseptic compounds are used to help clean, sanitize and speed healing of the umbilical stump. The two most common choices of antiseptic compounds are 7% iodine or 4% chlorhexidine. Federal regulations regarding the sale and storage of 7% iodine solutions have increased the interest in exploring the effectiveness of alternative antiseptics. The objective of this project was to compare four antiseptic solutions (7% iodine-, 4% chlorhexidine-, citrate-methylene blue- parabens (CMP) (ZuraLac, ZurexPharmagra), and 1000 ppm chlorine-(ECALogic, Zurex Pharmagra) based products) to determine their impact on umbilical healing and 24-h infection rates in a field trial with dairy calves.

**Materials and Methods**

The Iowa State University Animal Care and Use Committee approved this project. Jersey and Jersey-cross calves (n=60) were monitored at a commercial farm (Sioux Jersey; Salix, IA). All calves were obtained within 30 min after birth. Thirty calves were purebred Jersey calves; the other thirty calves were Jersey-cross calves. Calves were born in a group calving pen and moved shortly after birth to a group calf holding pen. At some point during the first 24 h of life, they were moved to commercial plastic calf hutches at two separate facilities (one facility for purebred Jersey heifer calves, the second facility for all other calves). Different bedding substrates are used inside the calf hutches at each facility. Purebred Jersey heifer calves were bedded with pine shavings with limestone powder while all other claves were bedded with a combination of pine shavings and straw. All calves were fed pooled maternal colostrum within 3 hours after birth.

Calves were alternately assigned by birth order to 4 treatment groups: 7% iodine, 1000 ppm chlorine, 4% chlorhexidine, and ZuraLac. All umbilical cords were dipped within 30 min of birth. Prior to initial dipping, diameter of the umbilical cords (as an indicator of cord drying and healing) were determined using digital calipers. As an indicator of umbilical infections, surface temperature of the umbilical stump (along with a reference point at the midpoint of the sternum) was determined using infrared technology (Dual Laser 50 Model 42570, Extech Instruments Corporation, Waltham, MA). These measurements were all repeated at 24 ± 1 h of age.

**Results and Discussion**

Mean diameter of umbilical cords for all calves (n=60) was 22.85 mm at birth and decreased to 7.64 mm at 24 h of age. There were no treatment differences noted ($p>0.05$) between dips on healing rate of umbilical cords (Figure 1). No umbilical infections were noted in any of the calves on this trial. The mean surface temperature of the umbilical stump was 33.1 ± 2.2 °C at birth (1.5 ± 1.6 °C higher than the sternal reference temperature). At 24 ± 1 h of age the mean temperature of the umbilical stump was 33.0 ± 4.3 °C (0.5 ± 1.8 °C lower than the sternal reference temperature) (Figure 2).

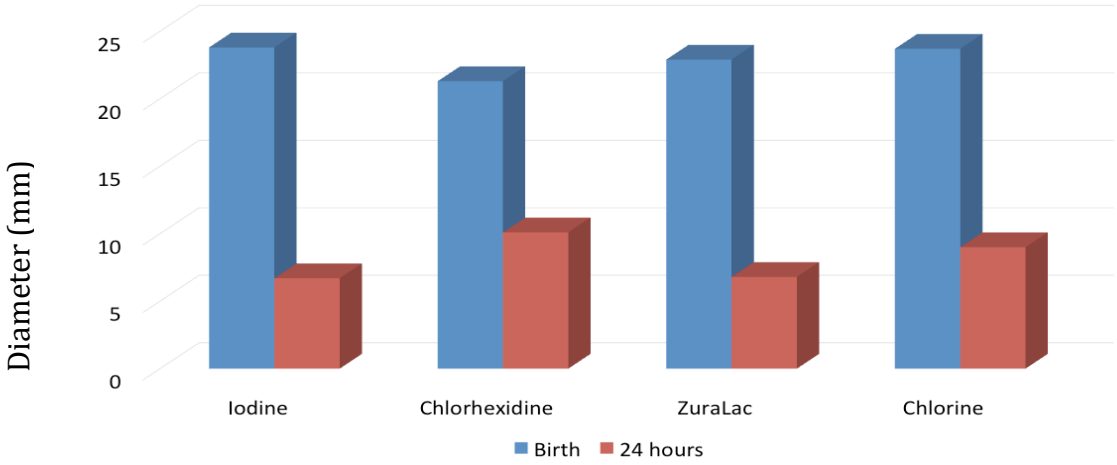


**Figure 1. Mean umbilical cord diameter for calves across treatment groups**

Umbilical cord diameter decreased during the first 24 h of life as healing progressed, but the rate of healing was not affected by treatment (P>0.05).

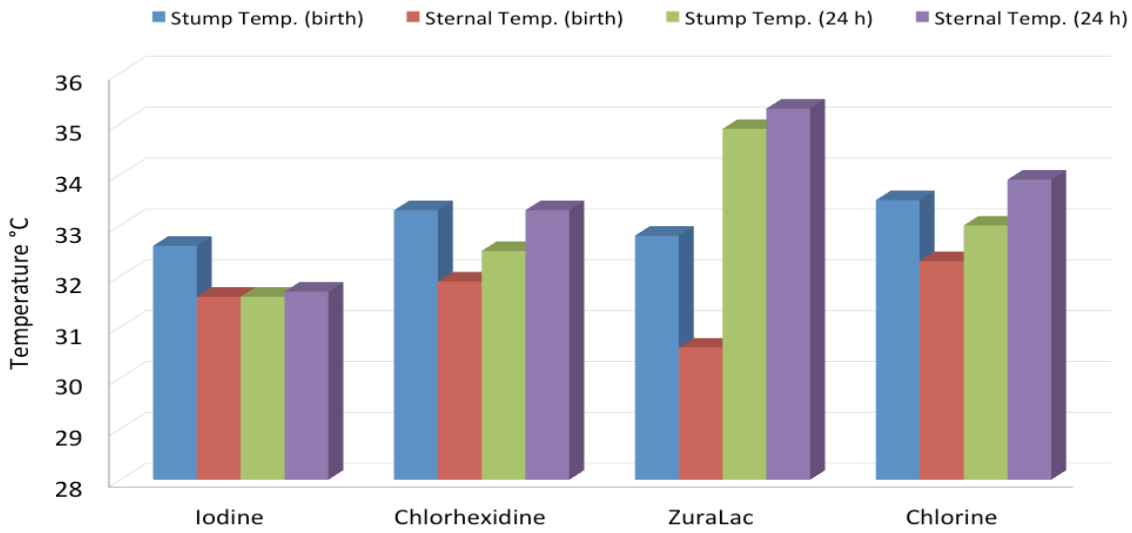


**Figure 2. Sternal and umbilical stump temperatures at birth and 24 h after birth**

Sternal temperature was used as a reference point for normal body temperature. Umbilical stump temperatures were higher at birth due to increased blood flow to that area, but decreased as healing progressed through the first 24 h of life.

Currently, iodine is the most commonly utilized antiseptic compound in the dairy industry; however, there are safety concerns with the 7% concentration. If caution is not used during application, iodine can burn tissues on both calves and workers. Chlorhexidine, chlorine and ZuraLac are all effective alternatives to iodine without the risk of damage to sensitive tissues. In summary, all four dips tested were effective in preventing umbilical infections and permitting healing of the umbilical cord when used within 30 min of birth under clean, dry conditions.