

Application of Intra Repiderma on navels of newborn calves



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1 Navel infections

The calf's navel is its lifeline prior to birth, but after birth this open connection with the outside world poses a major threat for infection (**Fig. 1**). Navel infections are mainly caused by bacteria like *streptococcus* and *E. coli*, starting with an acute local subcutaneous infection. This can worsen into an open dangerous infection, which can easily enter the blood stream and reach the liver and bladder through blood vessels that end in the navel. Studies have shown that morbidity in the first weeks of life was in 29% of the cases attributed to umbilical disease. And even worse, navel infections in pre-weaned calves consistently resulted in a mortality rate of 2%.

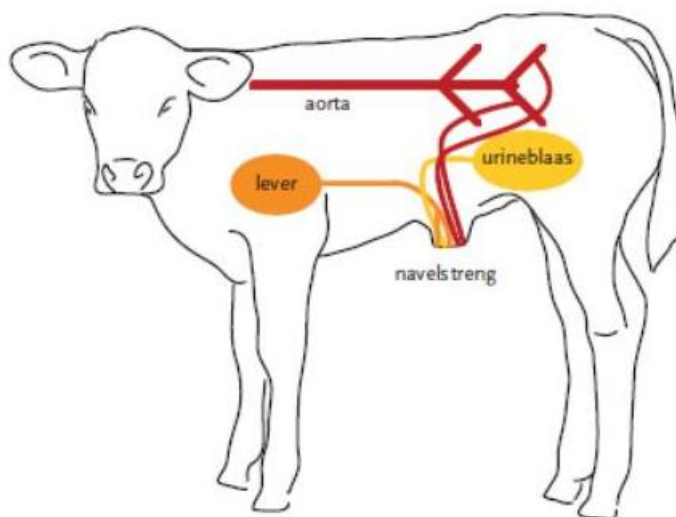


Figure 1. Schematic representation of the blood vessels from the aorta, liver, and bladder, all ending in the navel, providing a potentially dangerous open connection with the outside world.

Prevention starts with the application of proper hygiene measures during and directly after delivery. This also includes the application of a suitable disinfectant on the navel. Often an antibiotic spray is used, but the use of antibiotics has major drawbacks, like the development of resistant pathogens and the inhalation of antibiotics by the user. Intra Repiderma is an aerosol spray that does not contain antibiotics, but it contains other ingredients to kill potentially dangerous pathogens, and a component that is able to stimulate the natural healing of the skin.

2 Intra Repiderma

Intra Repiderma contains two active ingredients in spray form. Both components are required, as these components have a different clinical effect and thus provide a two-way mechanism for an effective skin treatment: Zinc is mainly incorporated for its positive effect on wound repair and copper is mainly incorporated for its anti-microbial properties, while it also has an effect on wound repair but with a different mechanism of action (stimulation of new blood vessel formation). In this way, Intra Repiderma not only inhibits the cause of certain diseases (bacterial infection), but also stimulates healing of skin lesions.

2.1 Antimicrobial properties copper

The bactericidal properties of copper have been known for many years. It has been used as a disinfectant for veterinary purposes and in the food industry. Copper sulphate, for example, has been used for many years as a disinfectant if footbaths for cattle (Epperson and Midla, 2007).

Copper at low concentrations is required for living organisms including bacteria. At higher concentrations however, copper can be bactericidal or bacteriostatic. These effects can be caused by different mechanisms including substitution of essential ions and blocking of functional groups of proteins, inactivation of enzymes, production of hydroperoxide free radicals by membrane bound copper and alterations of membrane integrity (Faúndez, 2004).



2.2 Wound healing properties of copper

Besides the earlier mentioned bactericidal and bacteriostatic effects, copper has also an effect in wound repair (Sen, 2002). An important phase in the wound healing is the angiogenesis (the formation of new blood vessels). This enable more fresh blood flow to the wound and thus the supply of essential wound-recovery stimulating factors. The most prevalent factor to stimulate this process is the vascular endothelial growth factor (VEGF) (Stefanini, 2008). The expression of VEGF is copper sensitive: when Cu^{2+} was topical applied, wound healing was accelerated.

Another effect of topical Cu^{2+} was the accelerated secondary healing and contraction of dermal wounds in humans (Sen, 2002). The authors concluded that copper-based therapeutics are a feasible approach for wound healing.

2.3 Wound healing properties of zinc

Zinc is an essential element in both animal and humans. It serves as a co-factor in numerous transcription factors and enzyme systems including zinc-dependent matrix metalloproteinase's that augment auto debridement and keratinocyte migration during wound repair (Lansdown, 2007). Zinc confers resistance to epithelial apoptosis through cytoprotection against reactive oxygen species and bacterial toxins possibly through antioxidant activity of the cystein-rich metallothioneins.

Zinc deficiency of hereditary or dietary cause can lead to pathological changes and delayed wound healing. Topical administration of zinc appears to be superior to oral therapy due to its action in reducing super-infections and necrotic material via enhanced local defense systems and collagenolytic activity, and the sustained release of zinc ions which stimulates epithelialisation of wound (Lansdown, 2007).

2.4 Chelated forms of copper and zinc

Often copper and zinc are used as inorganic form (e.g. copper sulphate, zinc chloride, etc). In Repiderma the copper and zinc organic chelated complexes. This allows a deeper penetration into cells / skin layer which gives rise to a better efficacy of the product as the infectious diseases are often also present in deeper skin layers (**Fig 2**). This improved efficacy has been demonstrated in different practical field trials.

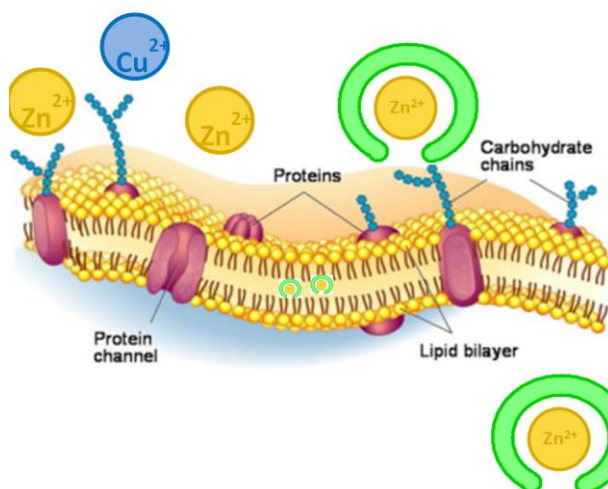


Figure 2. Simulation of the penetration of chelated zinc and copper in comparison with ionized zinc and copper

3 Pilot study at dairy farm Lammers

To study the potential and user-friendliness of Intra Repiderma, the navels of newborn calves were sprayed directly after birth for 3 seconds from a distance of 15 cm at dairy farm Lammers (Fig. 3).



Figure 3. Application of Intra Repiderma on the navel of a newborn calf, directly after delivery (day 0) and its nicely drying (days 3 and 6).

The spray was very easy to apply and resulted in all cases in nicely dried navels without signs of infection (Figs. 3 and 4).

24 hour old animal



36 hour old animal



96 hour old animal



Figure 4. Typical examples of nicely dried navels of different animals that were treated with Intra Repiderma directly after birth.

Because of these nice results, the farmer was very enthusiastic about Intra Repiderma and would definitely recommend it to his colleague farmers.



Dairy farmer Gert Lammers:

“I would definitely recommend Intra Repiderma, because it is easy to apply and results in nicely dry navels without infection!”

4 Conclusions and recommendations

Application of the antibiotic-free Intra Repiderma directly after birth on the navel of newborn calves results in nicely dried navels without signs of infections. Intra Repiderma contains components that act as an antimicrobial (copper) as well as a stimulator of skin healing (zinc). It is important to shake well before use and spray from a distance of 15 cm until the entire navel and especially the end of the umbilical cord are well covered.

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