

# Comparison of the antimicrobial efficacy of chlorhexidine gluconate and povidone iodine as preoperative surgical preparation solutions in cattle under field conditions

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## Introduction

Antimicrobial substances are used in the preoperative period to reduce the number of resident skin flora and prevent surgical wound infection. Most standing abdominal surgeries in cattle are classified as clean contaminated and are performed on potentially immune-compromised cattle in a contaminated area. Thus, the antiseptic used must quickly reduce the number of microbes present while at the same time preventing bacterial recolonization following the procedure. This can be particularly difficult in field conditions where many environmental contaminants cannot be controlled by the surgeon. Environmental conditions are a major contributing factor in determining the efficacy and residual effects of antiseptic agents. Therefore, a preparation procedure with a high percentage of bacterial reduction and prolonged residual activity would prove favorable in the surgical management of cattle in a field setting. The few studies that have been completed on surgical site preparation in cattle have either been conducted in a sterile hospital surgical suite or only using 1 product in 2 different manners in a field situation. The purpose of this study was to document the comparative efficacy of a standard iodophor and alcohol preparation and a chlorhexidine and alcohol preparation in cattle under field conditions.

## Materials and Methods

One hundred (n = 100) lactating mature Holstein cattle housed in single maternity pens in an open-air barn were used for the study. A single paralumbar fossae of each cow was randomly assigned to a 5-minute surgical skin preparation using saturated gauze sponges with either 7.5% povidone iodine (PI) alternating with alcohol (n = 50) or 4% chlorhexidine gluconate (CG)

alternating with alcohol (n = 50). Microbial sampling of the skin occurred following hair removal, and again at 10 minutes, 2 hours, and 4 hours after skin preparation. RODAC microbial contact plates were used to sample 3 different sites around a simulated surgical incision within the clipped area. Colony forming units (CFUs) were then quantified after 24 hours of incubation. CFUs were statistically compared between groups at each time point as well as within each group at each time point using repeated measures ANOVA.

## Results

When the groups were compared, both groups achieved a statistically significant reduction in CFUs from their pre-scrub level at 10 minutes post-scrub. At this 10-minute sampling time, the CFU counts of CG and PI were not different. However, at 2 and 4 hours post-scrub, CG has statistically fewer CFUs than PI. When analysis was performed over time for the groups, CG maintained a significant reduction in CFU's from pre-scrub levels at both 2 and 4 hours. In the PI group, there was no statistical difference between pre-scrub levels and CFU's at 2 and 4 hours.

## Significance

Both surgical site preparation solutions achieved an immediate significant reduction in CFUs in a field setting. Based on these results, either CG or PI is an appropriate pre-operative surgical site preparation solution for short surgical procedures. However, when surgical intervention is expected to result in a prolonged procedure in a field setting, preoperative preparation with CG would be indicated based on its superior persistent activity.