Non-inferiority clinical trials to evaluate the efficacy of teat disinfectants

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Protocols to evaluate the efficacy of teat disinfectants are based on those approved by Nat'l Mastitis Council. An experimental disinfectant is superior to an established one in studies planned as superiority trials. The aim could be just to show that an experimental product is not superior but equivalent to or not inferior to an established control. Collecting duplicate milk samples from all quarters at evenly spaced intervals is the basis of current protocols, but low SCC quarters are most likely to show negative results when cultured. Single quarter milk samples may be sufficient to define the bacteriological status of a quarter. Thus combining single quarter milk sampling and SCC thresholds to define eligibility for samples to be cultured might be adopted to test teat dips. Our objective was to describe the methodology to compare the efficacy of an experimental teat dip (ED) vs. a control (CD) based on proving non-inferiority. Trials have been designed as one-sided studies to demonstrate the ability to reduce naturally occurring new IMI. Two trials were conducted on commercial dairy herds to demonstrate that the difference in effect (risk of new IMI=ED–CD) should be no less than -Δ. A new IMI rate of 0.03 was assumed for the CD, and a detectable difference between ED and CD -Δ=0.03 (doubling of new IMI). The essence then was to identify whether the conclusion of no difference could be interpreted as a non-inferiority claim, also based on a proper power calculation of the performed trial. Logistic mixed models were used for analyses. Differences in new IMI were negligible, thus the ED were not inferior to CD. We conclude this with a power of 81%. For all practical purposes, this was as close as possible to concluding that the ED were equal in efficacy, providing evidence of a valid and field-tested methodology to evaluate the efficacy of teat dips under the assumption of non-inferiority.