TREATMENT OF MASTITIS BASED ON MILK CULTURE VS TIME POST-CALVING

STUDY OUTLINE

As presented at the 2018 National Mastitis Conference in Milan, Italy.

The study was conducted in 4 locations across New Zealand – Waikato, Taranaki, Manawatu and Canterbury. Every case of mastitis in the study was cultured in-clinic from a sample taken that day by the farmer, and treatment was initiated before culture results were available.

The study was separated into two groups - a CBC (case by case) and DIM (days in milk) group.

In the DIM group all cases that had calved 7 days or less were treated with 3 x 12 hourly 1 gram penicillin (Intracillin® 1000 Milking Cow).

Cases after 7 days were treated with 5 x 24 hourly 200 mg cloxacillin (Orbenin® LA, Zoetis). Culture results were recorded but treatment was not changed in this group i.e. treatment was allocated according to how many days in milk the cow was at the time of diagnosis.

In the CBC group the initial treatment was always 1 gram of intramammary penicillin (Intracillin® 1000 Milking Cow, Virbac) at 12 hourly intervals.

At 24 hours the culture result was available, coinciding with the end of the initial treatment period. A decision was then made about treatment for every individual cow based on her culture result i.e. on a case by case basis.

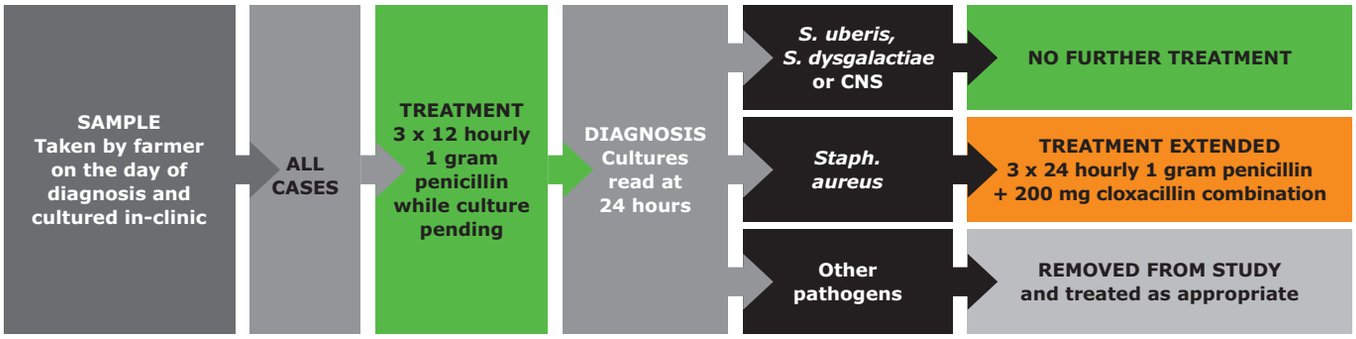
If *Strep. uberis, Strep. dysgalactiae* or CNS were cultured no more treatment was given – it was assumed that 3 tubes of penicillin was enough.

If *Staph. aureus* was cultured the course was extended, but with 3 x 24 hourly treatments of combined 1 gram penicillin and 200 mg cloxacillin (Penclox® 1200) at 24 hour intervals.

This means that the *Staph.* cases in the CBC group ended up with 5 days of penicillin and 3 days of cloxacillin treatment, the latter in theory covering for any penicillin resistant *Staphs*. Any other pathogens were removed from the trial and treated appropriately.

These protocols were designed to compare a system where cows are individually diagnosed and treated according to pathogen, with a more traditional system where penicillin is prescribed as the preferred treatment in early lactation and cloxacillin becomes the treatment of choice later in lactation. In other words, the CBC protocol is about individual diagnosis and treatment of cases, and the DIM protocol reflects decision making at herd level.

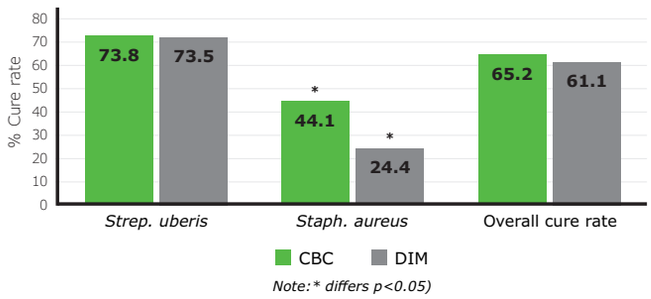
CASE BY CASE PROTOCOL (CBC)



DAYS IN MILK PROTOCOL (DIM)

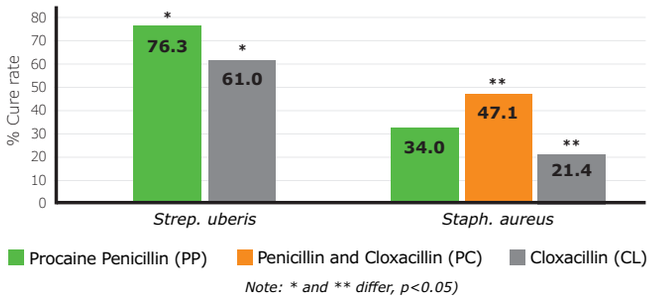
RESULTS

GRAPH 1: Cure rate (%) by protocol, CBC vs DIM, for *Strep. uberis* and *Staph. aureus*



Note: differs p<0.05)*

GRAPH 2: Cure rate (%) by treatment applied, PP, PC or CL for *Strep. uberis* and *Staph. aureus*



*Note: * and ** differ, p<0.05)*

***Strep. uberis* was cultured in 43.0% of the 767 clinical cases. *Staph. aureus,* CNS and *E. coli* were cultured in 15.3%, 10.5% and 7.5% of cases respectively.**

GRAPH 1 compares cure rates between the CBC and DIM protocols. Both protocols result in similar overall cure rates (65.2% for CBC vs 61.1% for DIM) and *Strep. uberis* cure rates (73.8% vs 73.5%). There is a significant difference between cure rates for *Staph. aureus,* however (44.1% for CBC, 24.4% for DIM, p<0.05). This outcome was achieved with less total daily antibiotic dose days and more use of "green" antibiotics, as defined by the NZVA Antimicrobial Judicious Use Guidelines.

GRAPH 2 compares the treatment outcomes for *Strep. uberis* and *Staph. aureus* based on which antibiotic or combination of antibiotics was used. This differs from the comparison of protocols in Graph 1, as many cows in both the CBC and DIM protocols received the same treatment of 3 x 12 hourly 1 gram penicillin.

Procaine penicillin produced significantly higher cure rates than cloxacillin for *Strep. uberis* (76.3% vs 61%, p<0.05).

Note that the course lengths were different as well, with 3 x 12 hourly penicillin compared against 5 x 24 hourly cloxacillin – so the antibiotic with the longest contact time actually has lower cure rates.

There was also a significant difference between cure rates for cows with *Staph. aureus* mastitis. Treatment with 3 x 12 hourly penicillin followed by 3 x 24 hourly penicillin plus cloxacillin resulted in higher cure rates than 5 x 24 hourly cloxacillin (47.1% vs 21.4%, p<0.05). In this case both groups have similar total antibiotic contact times.

In the DIM group there were a small number of *Staph. aureus* cultured within the first 7 days after calving, which were all treated with 3 x 12 hourly penicillin.

While not significant, the cure rates compared to 5 x 24 hourly cloxacillin (34.0% vs 21.4%) warrant further investigation, particularly given the large difference in antibiotic contact time between the groups.

CONCLUSIONS

This study shows that culture based individual cow decision making can result in better clinical outcomes, while also increasing the use of "green" rather than "orange" antibiotics and reducing the total days of antibiotic treatment. It also provides in vivo data which supports in vitro published and on-farm data (e.g. antibiograms) suggesting penicillin is the drug of choice for *Strep. uberis.* The significantly higher cure rates for both *Strep. uberis* and *Staph. aureus* when penicillin is used either alone or in combination with cloxacillin, suggest that the use of cloxacillin as a single active for treatment of New Zealand mastitis is difficult to justify.

REFERENCES

Treatment outcomes of clinical mastitis treated with penicillin or cloxacillin on either a case by case basis after milk culture or by prescription based on numbers of days post partum. M.Clews, A. Kenyon, K. Johnston, S. Oehley, H. Pike, K. Taylor, K. Wyatt, L. Durel. Proceedings of the 2018 International Bovine Mastitis Conference.