



Registered MASTITIS VACCINE

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A mastitis vaccine has been tested in South African dairy herds over the past two years and is now registered. In this article, we recapture some basic factors regarding mastitis vaccinations, discuss the principles on which this vaccine functions and provide findings of the South African study.

This study compared vaccinated and non-vaccinated cows with each other over **seven months** in a ***Staphylococcus aureus* (STA) positive herd**. The **vaccinated and non-vaccinated** groups in the same herd were matched according to lactation number, stage of lactation, milk yield, somatic cell count (SCC), STA udder infection status and the degree of damage in the udder tissue. All cows were lactating and vaccinated on three different occasions on the same day. Quarter milk samples were taken monthly and economically important information such as milk yield and the occurrence, severity and duration of clinical mastitis cases was noted.

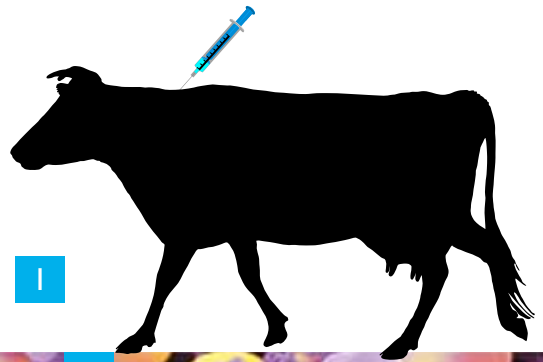
Prevention is better than cure

The preventive approach towards udder health is no longer a luxury; it is becoming increasingly important to keep cows producing optimally for at least six lactations. Despite major improvements in management, STA remains a major challenge in the South African dairy industry. The group **coagulase negative staphylococci (STE)** is an imminent threat for udder health, as the increase in the numbers isolated from milk, the increase in SCC, point to the cause and signs of antibiotic resistance. We also noticed an increase in the occurrence of ***E. coli*** mastitis in herds with intensive housing systems.

Back to basics

When intact, the blood-udder barrier is selective in what it allows to enter the udder. When, for instance, we treat a dairy cow intramuscularly with antibiotics, only a fat-soluble or protein-bound product will penetrate the blood-udder barrier. White blood cells cross this barrier on demand and have a short lifespan once in the udder. When the udder becomes inflamed, as is the case with mastitis, the blood-udder barrier becomes more permeable allowing white blood cells and antibiotics to cross with greater ease. The effect is a high somatic cell count (SCC). When a dairy cow is vaccinated with an effective vaccine, an immune response follows. However, these cells circulate in the body and are not

present in large quantities in the udder. This means that mastitis vaccination is not highly effective but the response time is shortened and the disease is usually less severe.



The principle of vaccination

Immunity is the capacity of an individual to resist disease. It is not so much the organisms that provoke disease but rather the breakdown of the equilibrium in the body. Once immunity is broken down, organisms can multiply rapidly and disease can set in.

The nature of mastitis creates a number of unique challenges for producing successful immunity against the disease. *Staphylococcus aureus* are very successful udder bacteria known for chronic udder infections, poor milk quality, udder damage and sporadic clinical flare-ups. When STA are present, many different strains are also present. The same is true for coagulase negative staphs, *E. coli* and coliform bacteria.

Cross-immunity between strains is not a given, that is why much research is invested into the formulation of vaccines! More than 170 different STA strains have been isolated from mastitis cases and never only one strain in a herd. Currently, we do not type strains routinely.

Isolating one or a few STA or other mastitis-causing bacteria from a herd and formulating a vaccine against these strains is therefore a not a sound investment. When manufacturing a mastitis vaccine, there should be a communal factor that addresses many strains at the same time.

The basis of the vaccine

When STA pass through the teat canal into the udder, they find a suitable spot on udder tissue and start multiplying. The moment they start to multiply, they form an effective protective slime shield (biofilm) to protect them from antibiotics and white blood cells. Once this colony of growing bacteria becomes large enough, it releases free bacteria (without their protective slime shield) into the udder where they find a new spot to attach and the process is duplicated.

The Startvac vaccine stimulates the formation of antibodies against the slime-associated antigenic complex (SAAC) – the slime-forming agents. The benefit of using this SAAC in the vaccine is that antibodies induced by vaccination give cross-protection against several strains of STA. The enzyme responsible for the production of the slime

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THE IDEAL MASTITIS VACCINE SHOULD:

- reduce new udder infections
- eliminate existing infections by improving spontaneous cure rate
- improve treatment success
- decrease bacterial shedding
- shorten the duration of udder infections
- lessen the severity of clinical cases
- cause there to be less severe damage to the udder tissue.



1. Mastitis vaccination is a valuable tool that should always be used with good management and should not be seen as something to replace it.
2. *Staphylococcus aureus* are very successful udder bacteria known for chronic udder infections, poor milk quality, udder damage and sporadic clinical flare-ups.
3. The aim in dairy herds should be that udders remain healthy for at least 6 lactations or more.
4. *E. coli* growing on agar in the laboratory.

was found in 94% to 100% of STA strains isolated from mastitis cases and in approximately 75% of STE strains. Startvac also contains an inactivated *E. coli* J5 strain. All commercially available *E. coli* mastitis vaccines over the years used the same J5 strain. The reason being that it is currently the only known strain that has no outer core but only an inner core similar to coliform bacteria. Although the outer layers of the coliforms and *E. coli* differ from each other, J5 stimulates the development of non-specific immunity directed against the endotoxin that produces disease across strains.

Nothing replaces good management

When using Startvac, good parlour and hygiene management should always form part of this programme. This is especially true for STA-positive herds where there is a risk that when fewer clinical mastitis cases are seen and the bulk SCC is lower, producers may be tempted to relax and neglect parlour management. Producers should regard this mastitis vaccine as a tool for proactive udder health management and not see it as a replacement for good herd and parlour management. Remember, cows may still be infected with STA and will pose a risk to the uninfected cows. Separation of STA-positive cows during milking will remain very beneficial, as STA is mainly transmitted from one cow to the next during milking. If clusters are not disinfected after milking, a STA cow can infect up to seven cows milked with the same milking unit.

Good milking hygiene includes disinfecting hands or gloves of milkers that touch the teats and back-flushing of milking units with an effective, fast-acting disinfectant (at the correct concentration) after every cow milked.

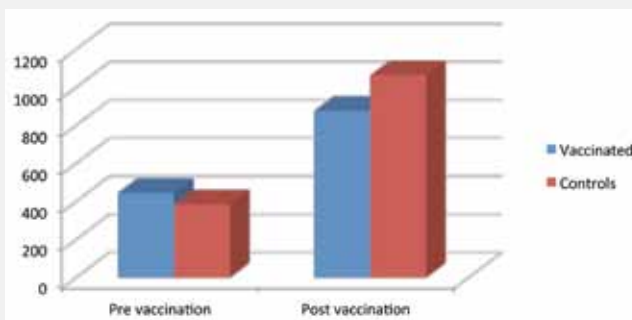
Good milking routine lowers the risk of spread of udder infections significantly but does not eliminate the spread. If calves are fed mastitis milk and kept together in groups allowing cross-suckling of teats in STA-positive herds, there is a risk that heifers may calve down with STA udder infections. Cows dried off with dry cow products are also not guaranteed to be without STA when they calve again.

RESULTS FROM THE SOUTH AFRICAN FIELD STUDY – SUMMARY OF FINDINGS IN THE STA HERD

Both the milk quality and production was better in vaccinated animals:

- They had overall 9,68% lower SCC, regardless of their status of udder infection.
- Daily milk production was 2,15 kg higher during the vaccination period.
- 11,36% fewer new infections with STA occurred.
- 9,74% more vaccinated cows infected with STA were cured.
- Clinical cases caused by STA were 75% less.

Figure 1 Mean quarter milk somatic cell counts summarised for vaccinated and non-vaccinated cows, before vaccination and during the vaccination period.



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