

Efficacy of an Autogenous Vaccine for Mastitis

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Mastitis is the inflammation of one or more mammary glands located along the ventral surface of the doe from the chest through the abdomen. This can result from a pathogenic bacteria infection, the most common being *Staphylococcus aureus* although *Pasteurella multocida* can also be the culprit. Typically, mastitis presents itself as a firm swelling on the ventral surface that is warm to the touch. Does with mastitis go off feed and can appear lethargic. In severe cases, the infected area can appear “blue” from the necrosis (death) of the tissues from toxins the bacteria produce. Infected does can develop a septicemia (infection in the bloodstream) and die.

Mastitis effects lactating does and seems to develop more commonly between 14 and 21 days of lactation. Rarely do dry does develop mastitis, it is more likely that when a dry doe is discovered with a ventral swelling indicative of mastitis, this is a case of a low grade infection that went undetected during a previous lactation rather than a new infection. Treatment involves administering an antibiotic, while not wanting to dispense medical advise, penicillin has been one of the most used to treat mastitis. Tetracyclines have also been used, it is best to get the advise of a veterinarian before treating any sick rabbit as the following case study will explain.



Figure 1. Doe with mastitis, notice lump protruding from abdomen.

Prior to the summer of 1997, the herd incidence of mastitis was increasing at an alarming rate. Out of 1200 does in production, it was common to see a case or two of mastitis each week. However, the

incidence never reached or exceeded 5 % of the lactating does being infected at any given time. Treatment was also effective with a series of penicillin shots generally controlling the infection. Those does not responding, most likely because they were detected too late and the infection was advanced, were culled, but the overall incidence remained low.

Mastitis was detected when does were found off feed as indicated by a lactating doe having more than half her previous days ration still in the feeder. At that point, the feeders are checked to make sure they aren't plugged, the same with the water valves and the does were palpated for signs of ventral swellings. Does found to have mastitis were given 1 cc of a long acting form of penicillin and marked for tracking. Rarely would further treatment be required unless the doe was detected late and in that case the doe would not recover. Does with non-responding cases would result in the infected gland not recovering so the does milk producing ability would be diminished. These does were culled.

About mid summer, the incidence of mastitis increased in the herd, well above 10% and in many cases, the does were not responding to the penicillin treatments. Does were also developing "blue bag", a bluing of the skin over the infected mammary gland. This blue tissue would eventually slough off the rabbit. In fact, the blue tissue was the result of toxins being released by the infective bacteria resulting in necrosis (death) of the tissue. The next stage of this outbreak brought does dying with no apparent symptoms. Does would appear normal at their morning feeding one day and be dead the next.

At this point, animals were collected for necropsy and sent to the California Veterinary Diagnostic Laboratory (now the California Animal Health and Food Safety Laboratory) in Turlock, California. Rabbits that died with no apparent symptoms were diagnosed with an acute septicemia caused by *Staphylococcus aureus*. Live animals with the bluing of tissue on the ventral surface were also taken for necropsy and *Staphylococcus aureus* was also isolated from the infected tissues. Antibiotic sensitivities showed the strain of Staph. we had was resistant to penicillin, hence the lack of response to our treatments. The staph. Was susceptible to tetracycline so the attending veterinarian recommended we use LA-200, a long acting form of a tetracycline antibiotic, in any new cases we detect.

Initial treatment showed little promise to slow the progression of mastitis in the herd. With the acute nature of this particular strain of staph, many animals were already beyond treatment when discovered. A new approach was needed in treating this outbreak, the most logical would be to prevent the infection from starting. This is where the idea of vaccinating the does against *Staphylococcus aureus* became a possible solution. Exploring the option, it was discovered that Anchor was producing a staph vaccine for use in the dairy industry. With no vaccine available for rabbits, this was the next best option and under direction of our consulting veterinarian, we began vaccinating all does.

The vaccination regime called for three injections of 1 cc subcutaneously at 4 week intervals. This would be followed by a booster shot of 1 cc every 6 months. We administered the vaccine in the loose skin over the shoulders. All does in production were vaccinated, regardless of their stage of production, following this schedule. Juniors were first vaccinated at 14 weeks, again at 18 when they are first bred and then at 22 weeks, approximately the time they would first kindle.

To test if the vaccine had any benefit, we randomly vaccinated 250 out of the 1200 does. Junior were randomly allotted to the vaccination and unvaccinated control group in equal numbers.

These does were followed for the incidence of mastitis, the severity of the mastitis (morbidity) and mortality for the six months following the last of the three injections. The morbidity of mastitis in each group was assessed and assigned a number using the following scale:

- does with no mastitis in a lactation received a score of 0
- does with sub clinical mastitis that was only detected after the does had dried up received a score of 1
- does with mastitis and that responded to treatment received a score of 2
- does that either developed mastitis and died or had to be culled received a score of 3.

By the time all the does received their second injection, there was a marked reduction in the incidence of mastitis, as measured by both mortality and morbidity. The results at six months comparing the vaccinated group to the unvaccinated control group are summarized in table 1. By the time the juniors that had received all three vaccinations lactated, there was almost no mastitis among the juniors. Due to these results, the entire herd was vaccinated after 6 months of the trial.

Table 1. Incidence and severity of mastitis in vaccinated vs. unvaccinated does.

| | Unvaccinated | Vaccinated |
|-----------|--------------|------------|
| Mastitis | >35% | <4% |
| Morbidity | 2.3 ± 0.5 | 1.2 ± 0.2 |
| Mortality | 37% | 0% |

During the 6 month trial period there were no complications directly related to the vaccination. There were occasional lumps at the injection site from the formation of abscesses or seromas, but there was no major problems associated with the use of the vaccine. While this vaccine appears to have all but halted the outbreak that began in the summer of 1997, the product we were using came in short supply and eventually we were unable to acquire any. At this point, my consulting veterinarian suggested we contact a lab that specializes in preparing autogenous vaccines (these are tailor-made vaccines specific to a particular farm).

We contacted Hygeia Biological Laboratory located in California to produce an autogenous vaccine using isolates of *Staphylococcus aureus* taken from our farm. Two isolates collected at the CAHFS laboratory were sent to Hygeia and a vaccine prepared (Figure 2). This vaccine was specific for strains of staph located on our farm and was administered in the same fashion as the Anchor product. We routinely isolate staph yearly from our farm and provide it to Hygeia to be added to the vaccine in protocol similar to human flu vaccines. In either case, the newest strains are included to ensure that the vaccine is effective. As we have already seen with the staph becoming penicillin resistant, there is the possibility of changes in the staph strains infecting a herd. It seems like a good policy to routinely check the strains and update the vaccine. With this protocol, we have never experienced an outbreak like was seen in the summer of 1997.



Figure 2. The autogenous vaccine prepared by Hygeia Biological Laboratory for use in our herd.

From this incident, there are several conclusions that can be drawn. First, it appears that vaccinating is an effective way to combat mastitis, at least that caused by *Staphylococcus aureus*. While I did not mention the price, the autogenous vaccine costs about \$1.00 a dose or \$4.00 a year per doe not counting the time and syringe. During the outbreak we had in 1997, we had over 80 does die outright from staph infections and culled almost 400 that had moderate to severe cases of mastitis. That is almost $\frac{1}{2}$ of the herd lost in less than 9 months of production. This is a far greater number than we would have expected to replace. In this case, \$4.00 a doe per year seems cheap.

Another interesting development was the sudden shift to a virulent strain of staph in our herd. We are still not sure if this is a strain that may have been carried in (it would have had to come in on people since we have a closed Pasteurella free herd) or if this strain is the result of a mutation in a less virulent strain that existed in the herd. Either way it shows that there is the likelihood of a virulent strain popping up in any herd so that precautions should be taken to minimize the impact of such an outbreak.