

Recommendations for the Use of Pencillin in the Treatment of Bovine Mastitis

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STUDIES on the use of penicillin in the treatment of mastitis are not yet complete. The results obtained to date are sufficiently encouraging, however, to warrant a preliminary statement regarding dosage and method of administration, although research still in progress may later result in minor changes in these recommendations.

Penicillin Solutions

Penicillin is marketed as the sodium or the calcium salt of penicillin. Either form is satisfactory for use in the treatment of mastitis. The dosage is measured in Oxford units. The standard package contains 100,000 Oxford units in the form of a dry powder. This dehydrated penicillin will maintain its potency for many months if kept at a temperature of 50 degrees Fahrenheit or below. Before this penicillin can be used for treatment in mastitis, it must be dissolved in a sterile fluid vehicle, such as distilled water, physiological saline solution or a water and mineral oil mixture. Penicillin in solution loses its ability to destroy bacteria in a few days** even when stored in the refrigerator. For this reason it should not be dissolved in the vehicle until immediately before use and any portions of the solution which must be held over for later injection must be stored in the refrigerator until entirely used.

Penicillin-sensitive bacteria are chiefly

found among the Gram-positive organisms. Included in this group are the streptococci and staphylococci, which are the most frequent causes of bovine mastitis. Controlled studies of treatment of the disease caused by either of these bacteria have shown that the streptococcal form readily responds to penicillin injections, while the staphylococcal infections are much more resistant.

In rare instances, mastitis may be caused by bacteria which are not sensitive to penicillin, and thus no benefit will result from its use. Bacteriological tests on the udder secretions to determine the type of organisms infecting that organ are desirable before penicillin injections are made.

Very Satisfactory

Penicillin is the most satisfactory agent thus far studied for the treatment of mastitis. It is almost completely non-irritating for mammary tissue, yet it is highly effective against *Streptococcus agalactiae*, the organism most frequently found as the cause of this disease. Milk does not inhibit the destructive action of penicillin against streptococci other than to reduce its efficiency if too great a dilution occurs in a heavily producing udder. Penicillin, therefore, can be used on the lactating udder without danger of lowering production. If the vehicle in which the penicillin is dissolved is not prepared from a good grade of distilled water, a mild irritation may occur during the course of treatment. This will be manifested by the presence of clots, shreds and flakes in the first streams of milk during treatment and

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†Food and Drug Administration recently announced that penicillin in solution retains its potency as long as one week when properly refrigerated.

for 24 to 48 hours after the injections have been completed.

Penicillin-sensitive bacteria are not destroyed by immediate contact with this agent, but prolonged exposure is required—thus in the treatment of mastitis, an adequate concentration of penicillin must be maintained within the infected quarter for a sufficient period of time to result in

be injected through the teat opening immediately after the regular milking. The end of the teat must be disinfected before the injection is made and the syringe and teat canula must be sterile and free from foreign material.

The following table shows the results obtained with various dosages of penicillin under controlled conditions:

Number of Quarters Treated	Type of Infection	Oxford Units of Penicillin per Injection	Number of Injections Given	Number of Hours Between Injections	Percentage of Cures
33.....	*Streptococci	50,000	4	12 or 24	97.0
32.....	“	20,000	5	12	81.0
9 (dry).....	“	20,000	5	12	89.0
23.....	“	10,000	5	12	69.0
28.....	†Staphylococci	50,000	4	24	32.0
18.....	“	20,000	5	12	27.0
7 (dry).....	“	20,000	5	12	71.0
8.....	“	10,000	5	12	26.0

* *Streptococcus agalactiae*—magnified 900 times in milk sample.

† *Staphylococcus aureus*.

complete destruction of all infecting organisms. The amount of penicillin and the length of time required to completely destroy the infecting organisms appear to vary from one quarter to another. In the present state of our knowledge, it is not possible to predict the minimum dosage or length of time necessary to remove the infection from a given quarter. Therefore, a procedure of treatment must be established which will result in a satisfactory number of cures in any given group of infected quarters.

Volume of Vehicle

In the majority of our trials to date, 50 cc. of sterile distilled water has been used as the vehicle of the penicillin—with a few, however, as little as 10 cc. of the water was employed. With lactating quarters, the volume of vehicle does not seem to be important as the milk produced will carry the penicillin throughout the gland. In the treatment of dry glands, it is probably desirable to employ at least 50 cc. of the vehicle in order to facilitate a thorough distribution of the penicillin in the gland. The penicillin solution is to

The table reveals a marked difference in response to penicillin injections between streptococcal and staphylococcal infections. While extremely limited as to number of quarters treated, the data do indicate an increase in efficiency of the penicillin treatments when given to the dry udder.

From the results obtained to date, we conclude that 100,000 Oxford units of penicillin is a satisfactory dose for the majority of quarters infected with *Str. agalactiae*. This should be dissolved in 250 cc. of sterile distilled water or other suitable vehicle and administered in five separate injections of 50 cc. each (20,000 units) given immediately after each milking for five milkings. Reducing the dosage or number of injections may lower the number of cures. This treatment can be administered to either lactating or dry cows and in acute, chronic or latent cases of mastitis. Ten to 14 days after treatment, samples from treated quarters should be checked by bacteriological tests for evidence of infection. If the streptococci are still present, a second course of treatment, using 50,000 units per in-

jection given 4 times, either at 12 or 24 hour intervals, is recommended.

With cows producing over 50 pounds of milk a day, it may be desirable to use 50,000 units per injection on the initial treatment.

Plastic Glazing

Glazing material for making long-awaited repairs to brooder and laying houses, livestock and other farm buildings, and cold frames and starting beds is available once again with the release to jobbers and dealers of quantities of wire-reinforced cellulose acetate plastic glazing.

Advantages of cellulose acetate plastic glazing over ordinary non-plastic glazing include the fact that it is hailproof and shatterproof—it has a bursting strength of 200 lbs. per square inch. Far lighter in weight than ordinary glazing material, a correspondingly lighter frame can be used, resulting in a saving of as much as 25 lbs. over ordinary glass sash. Being virtually weatherproof, these products should last for years. Also, this plastic permits the transmission of ultra-violet rays which furnish vitamin D, so important to chick health and the maintenance of high egg production. Moreover, it is easily applied. The material can be tacked directly to the house over the window opening and held in place by laths, or it can be tacked to a frame or sash made to fit the window opening. No special tools are needed and no putty, and the material itself can be cut to the required size with shears or snips from 28 or 36-inch width rolls.

Experimental Work

Tests at the Iowa State Experiment Station, the Manitoba Experiment Station, the Ohio State Experiment Station, and the Wisconsin State Experiment Station, as reported in Everybody's Poultry Magazine's "Poultry House Blue Prints," have proved the superiority of cellulose acetate plastic glazing over the more commonly used glazing material for brooding chicks. At the Iowa Station, for example, 10-

weeks-old chicks raised under cellulose acetate plastic glazing weighed 708.5 grams each, while chicks raised under ordinary glazing weighed only 484 grams each. In two tests of 50 chicks each at the Manitoba Experiment Station, 47 were brought to maturity when brooded under the cellulose acetate plastic glazing while only 34 lived to maturity when brooded under ordinary glazing. Investigators at the Ohio State Experiment Station found that enough of the effective ultra-violet rays were transmitted by the cellulose acetate plastic glazing to offer protection against leg weakness (rickets). The Wisconsin State Experiment Station test resulted in unmistakable symptoms of leg weakness when chicks were brooded behind ordinary glazing, but there were no symptoms of rickets when chicks were brooded under cellulose acetate plastic glazing. Also, increases up to 20 percent in hatchability have been reported when ordinary glazing was replaced with cellulose acetate plastic glazing in hen houses.

Advantages

In addition to admitting a high percentage of ultra-violet rays, they are so constructed as to provide thousands of tiny lenses which spread the entering sunlight and prevent it from burning. This, with the plastic's high heat-holding property, which slows up the overnight loss of sun heat accumulated inside the chicken house during the day, all adds up to at least ten degrees more warmth for the chicks even in the coldest weather. Increased evaporation helps to keep the house dry, and provides more easily maintained sanitary conditions and a healthier situation all the way around for poultry raising when used for glazing.

The same properties of materials which give advantages over ordinary glazing material apply equally well to cold frames and starting beds where they help to bring plants to earlier and sturdier maturity. Where the use of such beds is extensive the saving in material and labor over heavier, shatterable material is considerable. In glazing applications where clear vision is not essential, such as in storm doors, garage and barn doors, basement

and attic windows, skylights and sun porches, winter enclosures for porches and the like, there is likely to be greater economy in their use.

Because of its ability to retain warmth, its unbreakability and light weight for shipping, acetate plastic has found wide use in army hospitals, and prefabricated hutments and barracks, particularly in the Arctic, during the war.

Vitamin D is known as the sunshine vitamin because it is produced in our bodies by ultra violet light absorbed through the skin from sunshine. Research made at the United States Plant Soil and Nutrition Laboratory, Ithaca, N. Y., demonstrated that vitamin C is also a sunshine vitamin. Tomatoes, as well as the citrus fruits, are a rich source of this vitamin. It was known that the vitamin C content of tomatoes varied with the type of the plant, its nutrition on the soil on which it was grown and other factors. When all of these factors were kept uni-

form, it was found that the vitamin C content of the fruit varied directly with the amount of sunshine which the plant received during the two weeks preceding ripening.

About three times as much riboflavin is contained in the colostrum or first milk as in normal milk, but this high level drops approximately 30 per cent within 24 hours after the cow freshens.

Hematoxylin S3 is a new stain for the demonstration of the cytoplasmic inclusions of canine distemper. It is superior to hematoxylin-eosin in the demonstration of small inclusion bodies and gives greater differentiation between the bodies and artifacts.

Dengue vaccine, which protected volunteers against this painful and debilitating disease, was produced by passing the virus through mice.

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