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### INFECTIOUS ABORTION IN COWS

Infectious abortion is the most disastrous disease among dairy cows in Arizona. Not only is the calf crop lost, but the cows are freshened before their time and do not reach the normal milk flow. Barrenness and difficulty in getting cows to settle in calf seem to be closely associated with this disease. Heifers and young cows seem most susceptible, much loss resulting from their use as breeders, and they often do not develop into good cows. It is also said that milk from infected cows may be unfit for human consumption.

It is probable that dairy cows in every important milk producing district in the State, also many range cattle are suffering from this disease. Dairymen claim that the disease has been worse since 1913, when, due to an unusually dry year, many California cows were shipped into Arizona. As, unfortunately, there are no noticeable indications of the disease except just at the time of **abortion**, one may easily purchase diseased animals and thus spread infection among his own herd of healthy cows.

#### REVIEW OF LITERATURE REGARDING INFECTIOUS ABORTION

The behavior of **females** giving premature birth and the **frequency** with which this occurred, early led persons to suspect that abortion was of an infectious nature. In 1567 Mascall stated that in certain parts of England 50 to 60 percent of the cows aborted. The **researches** of **Brauer** proved that it could be transmitted to other cows. Nocard, working in France in 1886, and, subsequently, **Bang**, proved that the disease was transmissible, and could be produced in sheep, goats, rabbits and mares by introducing the **culture** to the **vagina mucus**, and by **feeding**. **Bang** and **Stribolt** began to investigate the diseases in 1895, and the following year found the germ which has been named "*Bacillus abortus*." **This germ** was isolated from aborting cows, and after development in **pure culture** it produced abortion.

The more **recent** researches of Williams indicate that this disease is of a **very** complex **nature**, being responsible not only for abortion

but premature birth, retained afterbirth, and barrenness. He claims that it may be present in many animals without being noticed. When the animals are weakened in any way the germs become more active and cause much trouble. This investigator claims that the germs are almost universal in distribution and may exist in other organs than the uterus. This is the reason why the disease is found to be very active at certain times and almost dormant on other occasions.

#### NATURE OF THE DISEASE

Investigators agree that the physical act of abortion is not the specific disease, but that the germs of *Bacillus abortus* cause an infectious catarrhal condition of the walls of the uterus which interferes with the food supply of the calf, thus causing death and expulsion from the uterus. It is probable that many cows have slight attacks of this disease, and yet do not abort. Such animals are a menace to the herd as they may be the cause of spreading the disease.

The chief path of affection is probably the genital canal before the entrance to the womb closes. It has also been found that cows may become infected through eating the germs with food or drinking them with water. The disease has been caused experimentally by injecting the germs beneath the skin or into the veins of cows even during advanced stages of conception. Abortion usually takes place from 9 to 320 days after injecting the germs. As a rule, cows abort from the fifth to the seventh month. Those in a newly infected herd have a tendency to abort earlier, while those in a herd that has been long affected have a tendency to carry their calves longer,

#### MOST ABORTIONS INFECTIOUS

Premature birth may be of an infectious or of a non-infectious nature. It is thought that occasionally an animal may abort due to accidental or congenital causes. Thus, injuries received from falls, hooking, crowding, over-exertion, extreme exposure, excessive excitement, or even the eating of moldy foods containing certain poisons may cause abortions. It is also supposed that certain deranged physiological conditions or uterine infection with tuberculosis and the poor condition of pregnant cows may predispose animals to this disease. Manifestly the methods of management are chiefly responsible in such cases, and the cure is to remove the cause. Losses are slight from the non-infectious form of abortion, and the disease disappears readily with better care and management. Whenever a cow loses her calf she should be regarded with suspicion as it is probable that 90 percent of the abortions are infectious.

The presence of the infectious form of abortion may be determined by practical observations and chemical tests. Where, due to no apparent cause, one or two cows abort the first year, and an increased number the second year, it may be concluded that contagious abortion is present in the herd. As a rule, there is an increase in the number of cows that abort on succeeding years if infectious abortion is the cause, while there will be only a maximum of one or two percent of abortions from accidental causes.

## IMMUNITY THROUGH ABORTION

Cows that have had the disease and lost calves may develop an immunity to the disease and lose no more calves. Such cows may have the disease although they do not abort. Other cows may never lose a calf although diseased for several years. Either of these groups are a harbor for the disease and a constant menace to susceptible animals in the herd. The only means of diagnosing the presence of the disease in such cows is the use of chemical tests.

Contrary to popular opinion one can overcome infectious abortion more rapidly if the aborting cows are not sold. Diseased animals should never be sold in the open market as they may contaminate clean herds. If they are good cows it is better to keep them in the herd than to sell them and replace them with clean cows. It has been found that an attack of the disease greatly increases an animal's resistance to future attacks, and many cows only abort once until they are rendered immune to further abortion. This immune stock is more valuable in an infested herd than fresh cows that never had the disease, for it is almost certain that clean cows introduced in such a herd will abort. Cows, therefore, that have lost one or more calves should be better than clean cows for milk production, for raising calves and for helping to eradicate the disease although they may have living germs which are transmissible to other animals.

## METHODS OF SPREADING DISEASE

The disease may be spread in several ways. (1) One of the most frequent sources is that of the sheath of the bull becoming infected while breeding diseased cows. Although the males do not contract the disease, it has been found that germs may be harbored in the sheath where they are easily disseminated to cows when serving them. (2) Grains, water and fodder may become contaminated by the germs from a cow that aborts, and infection is easily made through the mouth and alimentary tract. Cows licking other animals, walls, floors, fences, or bedding may gather the germs and become infected. (3) Not infrequently the germs reach the vagina from rubbing other cows, switching the tail, lying on soiled litter, grass or ground\*. It is probable that the disease is contracted entirely through contact, such as introducing diseased animals into a clean herd, on the clothes of attendants, by birds, dogs, feed, litter or utensils secured from infected herds.

## SYMPTOMS

The normal symptom of the disease is the loss of calves by premature birth or abortion. The infection gradually increases each year until it reaches its maximum intensity at about four years, when fully half of the cows may abort. Thereafter the number of abortions usually decreases due to the immunity established in the cows. Heifers are most susceptible to abortion in herds where the disease has existed for several years.

Local symptoms vary considerably in different animals. The first indication is usually the swelling of the udder and the enlarged

and relaxed condition of the vulva. Mucus of a viscid yellowish color is usually discharged. Later the animal becomes restless and finally expels the calf. When the foetus is very immature the membranes usually remain around the calf and are expelled with it. After the foetus becomes seven months or more old the membranes are frequently retained. One should always examine the expelled membranes to note their appearance, because yellowish, odorless exudates will usually be found among some of the cotyledons where the abortion is caused by germs. After abortion there is also a chocolate-colored discharge from cows which often adheres to the tail. One should observe carefully the tails of all cows for this dark adhesive discharge which is significant of abortion.

#### SPECIAL FEEDS AND ABORTION

Scientists do not agree regarding the extent of abortions arising from accidental causes, such as the feed consumed by cows. Many stockmen attribute most of the abortions to this source. On the other hand not a few of those who have made a most careful study claim that one can hardly cause abortion except where the germs *Bacillus abortus* are present. Feeding exclusively on alfalfa hay, silage or velvet beans may reduce the vitality and fecundity of cows, thereby inducing conditions suitable for the rapid spread of the disease. It is a fact that abortion and failure to breed seem especially prevalent among dairy cows in alfalfa districts. This leads one to believe that cows should be given a mixture of wholesome feed so that they may remain strong and vigorous, as such animals are no doubt less affected by abortion and other disease germs.

#### NO CURE FOR INFECTIOUS ABORTION

There is no specific cure for this disease. Treatment requires persistent effort for several months or possibly years to control the disease. There are many so-called remedies, such as carbolic acid, methylene blue and the use of vaccines, but it is doubtful whether these have any value, and certainly they cannot be regarded as cures. Investigators are becoming convinced that prevention and sexual hygiene must be resorted to in order to control the disease.

#### TREATING DISEASED FEMALES

Each cow in the herd should receive special attention whether she aborts or not. First, remove cows that abort from the herd and place them in separate quarters where they may be properly treated. Second, all parts of the foetus, foetal membranes and discharges should be carefully burned or deeply buried and all soiled places well disinfected. Third, the litter, walls, floor and ground that have come in contact with the foetus or discharges during parturition should be carefully sprayed with a three percent solution of carbolic acid or corrosive sublimate diluted 1 to 1000 parts of water. If the calf is alive and shows signs of premature birth it should be killed and burned.

The cow should be doused daily with a good antiseptic solution for at least one week, and once a week thereafter. It is also wise

to sponge off the external genitals, thighs, tail and rump with a strong antiseptic. Often the cow fails to clean, and when this occurs the exposed membranes should be weighted or removed by a qualified person.

In a herd where contagious abortion is known to exist the vagina of heifers should be douched at least once a week; this should be done both before and after breeding until conception is certain. It is also wise to have a special place where heifers may be kept by themselves and bred to a clean bull, so that they will not come in contact with the disease.

#### TREATING THE MALES

The herd bull standing for a public fee offers a special menace. Where one must use public sires it is important that the attendant carry an antiseptic solution with him and carefully syringe the sheath before and after each service. Even where the herd bulls are used exclusively for serving home cows it is wise to follow this practice and to clip as short as possible the long hair at the end of the sheath. An ordinary two-quart fountain syringe with a long straight rubber nozzle may be used, but a common tin funnel with a piece of rubber tubing attached to a hard rubber nozzle makes a good apparatus. A pinch cock should be attached to the tubing to regulate the flow. In performing this operation it is important that the hard rubber nozzle be slipped well up into the sheath. The attendant should hold the nozzle with one hand, and with the other close the end of the sheath so as to keep the fluid from running away too rapidly. Another assistant should hold the funnel and pour the solution into it as desired. After sufficient of the antiseptic solution reaches the sheath, the syringe or tube may be removed and the sheath carefully massaged to make certain that the liquid touches all parts. The solution should remain in the sheath about five minutes before releasing the hand. A sponge should be used to catch the escaping fluid so that the hair, abdomen, and inner sides of the thighs may be wet with the antiseptic. This treatment should be given half an hour before and immediately after service.

#### ANTISEPTICS

Stockmen should make a study of the various kinds of antiseptics available for treating cows and bulls for infectious abortion. Any good standard disinfectant will be satisfactory if used in the proper amount, and if not too strong so as to cause irritation. Generally, antiseptics for internal use are one-half the strength required for external use. Shortly after parturition the genital organs are tender and often torn so that a dilute solution should be used. A stronger solution should be used with cows treated some time after calving and with those that seem sterile. This solution should never be as strong as that used for external application.

*For internal use:* For cows that have freshly calved or aborted, corrosive sublimate made up 1 to 5000 parts of water, one percent solution of carbolic acid, Or three-quarters of one percent solution of creosol, lysol or creolin, are recommended. The latter can easily

be prepared by using one and one-half teaspoonsful of the preparation to one quart of water. When the douche is used only once a week with cows that have calved as long as one month, these preparations may be half again as strong. Potassium permanganate also makes a good solution for internal use, but great care must be taken that the crystals are entirely dissolved. A suitable solution may be made by placing two to four ounces of crystals in a quart fruit jar filled with water. This should be shaken vigorously and allowed to stand for two hours until the crystals settle. To prepare for use take three teaspoonsful of this saturated solution and add one quart of water. The supply may be easily kept up by adding water and crystals.

*For external use:* For external use there is probably nothing more efficient than corrosive sublimate diluted 1 to 1000 parts. As this substance is very poisonous, great care must be exercised that it is not left where cows may drink, lick or eat it. The corrosive sublimate may be purchased at any drug store. Other good external disinfectants are five percent carbolic acid solution, three percent creosol, lysol, creolin, zenoleum or any other suitable coal tar preparation. The liquid antiseptics may be easily prepared by taking six tablespoonsful to a gallon of water.

#### PREVENTION

As there is no specific cure for infectious abortion prevention is of first importance. Great care should be taken to prevent the introduction of germs into the herd. One should never purchase from a herd unless it has been tested and proved free from the disease. One may select cows with a reasonable degree of certainty that they are clean if assured that they have been dropping live calves, and if there has been no abortion in the herd. The agglutination and complement tests should also be made, and if there are no suspicious animals the herd may be assumed to be free from living germs. One should never purchase cows that have been sold several times or retained in herds where animals are being constantly bought and sold.

Good sanitary conditions should always be provided for stock. Yards and stables should be cleaned frequently and barns carefully whitewashed at regular intervals. Scattering freshly slaked lime over the floors daily is a good preventive. Some sponge the rear parts of each cow daily with a three percent solution of coal tar dip. Cows should be given a balanced ration and sufficient variety of food. Exclusive feeding on alfalfa hay, silage, or any other single diet tends to impair the vitality of the animals, rendering them more susceptible to the disease.

When the cow is about to calve she should be removed to a separate place and treated as if she were actually diseased. This treatment will put her in good condition after calving and will greatly reduce the danger of infecting the calf. Calves should be dropped on as nearly an antiseptic place as possible. Just after birth the navel cord should be severed about six inches from the

body and disinfected with a warm solution of corrosive sublimate. This may best be done by holding the calf in a standing position and immersing the stub of the navel cord for ten minutes in a dish containing the fluid. It should be disinfected at least every hour until dry. The body openings of the young calf should also be disinfected as well as the udder and adjacent parts of the cow. Calves should be kept away from the old herd and maintained in a healthy condition. About three weeks before breeding, heifers should be doused on alternate days with a mild antiseptic solution such as .25 percent Lugol's solution. After treating one this way for at least three weeks she may be bred, and the treatment continued until it is certain that she is with calf.

All cows that abort should be maintained in separate quarters and carefully treated until the discharge has ceased. Where one is uncertain of the presence of abortion it is best to treat every cow in the herd as if they were diseased. This may be done by washing out the uterus with a healing antiseptic solution which will cleanse the organs, heal torn tissue and stop unhealthy discharges. After the discharge has ceased, the cow may be turned out with the regular herd but should not be bred before three months from aborting.

#### DISINFECTING THE PREMISES

There is no special experience required to make a thorough application of antiseptics. All that is necessary is to use a good solution and make certain that all contaminated parts are brought in contact with the antiseptics. As cobwebs, dust, dark corners, and poorly ventilated places offer special harbors for germs, the ceilings, side walls, and stall partitions should be treated to remove solid material before using the solution. Old wood-work and decayed or porous material should not be allowed to remain in the stables. Where possible, cement walls and floors are recommended as they have smooth surfaces and do not hold the germs. Bedding and manure should be removed frequently and spread on a field that is not pastured by cows. Advantage should be taken of sunlight and fresh air by providing an ample number of windows and good ventilation. Muddy yards, accumulations of manure or litter, and dirty barns are unsanitary and supply an inferior environment for the cows as well as make it difficult to produce good milk. To clean yards, the litter should first be removed, good drainage supplied, and the ground sprinkled liberally with a solution of copper sulphate, five ounces to a gallon of water, or covered with freshly slaked lime. It is almost impossible to control the disease in filthy, unsanitary surroundings, where the foetus are fed to pigs or dogs, and where attendants, utensils, and milkers pass from infected to clean cows.

#### SUMMARY

##### *Nature of disease:*

1. Infectious abortion is widely spread among dairy cows in Arizona.
2. This disease is caused by a special germ known as *Bacillus abortus*.

3. Cows may have the disease and yet never abort. The presence of the disease may be determined in such cows by means of the serum tests,

4. Infection is least dangerous after the cows have been bred and the entrance to the womb closes, which takes place about thirty days from conception.

5. Milk from diseased cows may be dangerous for human consumption.

*Prevention*

1. Do not allow germs of this disease to be taken into clean herds. This can be accomplished by taking special precautions when purchasing cows, refusing to use herd bulls from other farms, avoiding stray cows, and taking special precautions to avoid carrying them on clothing, utensils, implements, or feeds.

2. Treat all cows after calving with a mild, healing and cleaning douche, and isolate these from the rest of the herd or cows that abort. The douche should be repeated daily until all discharges cease, after which once a week until bred.

3. Thoroughly syringe the sheath of the bull two hours before and immediately after every service. Clip the long hair from the end of the sheath and keep a special bull for clean cows and heifers.

4. Keep the buildings, feed lots, yards and pastures in a clean sanitary condition. Have a clean-up day once a month when the manure and litter should be removed, the barns thoroughly cleaned and everything carefully disinfected.

5. Keep your cows in vigorous condition by giving them sanitary surroundings and well balanced rations.

*Where disease is present:*

1. Isolate all cows that abort and do not allow them to come in contact with healthy cows, or use the same pastures, yards, barns, and water trough until they are properly treated and all discharges cease.

2. Carefully burn or bury deeply the foetus, afterbirth and all discharges from cows that abort.

3. Do not breed cows that abort until after all discharges cease and at least three months from the time they lose their calves.

4. Cows that are difficult to settle with calf after abortion should have the vagina irrigated an hour before serving with a solution made of two heaping tablespoonsful of ordinary baking soda to one gallon of lukewarm water,

5. Cows are rendered immune by abortion. Good cows that abort should not be sold from the herd as these have greater immunity than clean animals.

6. All cows containing germs do not abort, and on this account each animal in the herd should receive thorough treatment.

7. Be careful to use efficient antiseptics, but avoid those that are too strong as they have injurious effects upon the genital organs.

8. A qualified veterinarian can be of great assistance in giving advice to farmers regarding sanitary measures and eradication of this disease.

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