A Field Topic

Current Concepts in Brucellosis

FRANCIS J. DRAZEK

Diagnostic Laboratory, New York State College of Veterinary Medicine
Cornell University, Ithaca, New York 14853

(Received for publication August 16, 1978)

ABSTRACT

Brucellosis continues to be a very devastating disease in the United States and throughout the world. In dairy herds, spread of the disease often results in severe milk losses due to the necessary slaughter of infected animals. Many herds have been depopulated because herd owners have not followed management recommendations to control the spread of infection. Undulant fever is a frequent occurrence in farm families where herds are infected. Increased movement of cattle, including importation of animals, has contributed to its spread. Prevention, control, and eradication have been impeded by present housing and management practices. The general apathy on the part of the owner in not having herd additions blood-tested for brucellosis before entry into the herd is also an important contributing factor.

The incubation period of brucellosis may vary from 1 month (or less) to 9 months (or more). A cow may be exposed to Brucella following calving and not show any evidence of the disease until she is in the last trimester of the next pregnancy. Another cow may become similarly infected and a blood-reactor in a month. A calf born of an infected cow may not show any evidence of the disease until she aborts at approximately 2 years of age.

Uterine fluid provides an excellent medium for growth of Brucella. When an infected cow calves or aborts, this fluid plus the calf or fetus and the afterbirth are saturated with the bacteria. Due to their inquisitive nature, other animals are likely, unless restricted, to come in contact with the tissues or fluid and thus contract the disease. Persons administering to the calvings or abortions can likewise manually carry the disease on their clothing, hands, and footwear. They can infect feed or feed areas or animals they come in contact with.

Brucella abortus, which causes contagious abortion in cattle, was discovered by Bang in Denmark in 1897. The 81 years that have elapsed since his accomplishment have produced much knowledge about the disease, including development of tests for antibodies, bacterial cultures, vaccine, and proper management practices. In spite of this, as much confusion as clarity still exists about control and eradication of the disease in a given herd or geographical area. Allow me to take you on a brucellosis trip, which should provide support for this belief.

Brucellosis is brought into a herd through the purchase of animals of unknown or questionable source. Herd additions should originate from known Brucella-clean herds, blood-tested at the time of purchase, then isolated for at least 30 days, retested and found to be negative.

If abortions have not occurred or have been disregarded, brucellosis is often diagnosed by: (a) traceout of the purchase of animals from a source that has revealed brucellosis in other herds; (b) a suspicious milking test in dairy herds, or (c) market cattle testing; blood from every adult animal is collected at time of slaughter and tested for brucellosis.

In any of these instances (a, b, or c) the entire herd is subsequently blood-tested. There is no effective cure for brucellosis in cattle. The bacteria live within the body cell. Antibiotics and other treatments are effective where organisms exist between cells. Brucella organisms thrive on moisture and contamination. Cold weather (including freezing and thawing) will enable them to survive for weeks or months. The uterus of an infected cow may harbor the organisms for a month or more, discharging some of them almost constantly.

Strong sunlight with a temperature of 80°F or higher and its accompanying drying effect will destroy Brucella in a day or less. Cresylic disinfectants are very effective for use on rubber footwear and to disinfect the premises following proper cleaning.

SPREADING BRUCELLOSIS

There is little or no danger of spreading brucellosis from one farm to another by the dairy inspector or inseminator who is cautious and applies good basic judgment. This person should wear rubber footwear and carry a disinfectant, including a pail and scrub brush. Keep away from cows that have calved or aborted or are otherwise discharging uterine fluid which may also be spattered on walls and partitions. A procedure that I have adopted is to disinfect upon arrival at a farm and disinfect before departure. It leaves a good impression with the owner and is an effective disease control measure against the spread of many diseases.

Undulant fever in man is contracted by drinking raw milk or by ministering to calvings or abortions of Brucella-infected cows. Slaughter
house workers are a high risk group when they handle Brucella reactors. Accidental exposure to Brucella vaccines may result in undulant fever.

In cattle, Brucella localizes and is generally confined to the uterus, the udder and accompanying lymph nodes. There is no evidence that undulant fever has been contracted by eating meat from infected animals since cooking destroys Brucella.

**VACCINES**

A number of Brucella vaccines are used throughout the world. A 45-20 vaccine requires repeated injections. H-38 vaccine is used extensively in some parts of Europe and elsewhere. Research and evaluation of these products in this country have been disappointing. The only vaccine that is available for general use in the United States is Strain 19. It is a live vaccine that is made from Brucella abortus Biotype I which is one of the field-strain organisms. It is administered to calves, generally under 6 months of age. Some calfhood-vaccinated animals show a vaccine antibody blood reaction for years or for the life of the animal. It is indistinguishable from blood reactions caused by the field-strain of Brucella. This creates a genuine problem in a brucellosis eradication program.

Most people involved in brucellosis programs agree that Strain 19 vaccine protects only two out of three animals that are vaccinated with it. Our experience in New York State has shown that Strain 19-vaccinated animals are just as susceptible as non-vaccinates in a herd outbreak. The following summary illustrates my point.

During a six-month period in 1977, culture attempts were made of tissues from 54 Brucella reactors which were found on blood test. All culture attempts were made at the Diagnostic Laboratory of the New York State College of Veterinary Medicine. Of these, 35 (or 65%) yielded Brucella abortus Biotype I, 18 (or 51%) had been calfhood-vaccinated with Strain 19, 17 (or 49%) did not show proof of Strain 19 calfhood vaccination, 19 (or 35%) reactors did not yield Brucella, 9 (or 47%) of these showed proof of calfhood vaccination with Strain 19, and 10 (or 53%) did not show proof of calfhood vaccination with Strain 19. Three cows aborted in each group of calfhood vaccinates (Strain 19) versus non-vaccinates. Culture attempts were not made on all six of these animals. The owner did not notify us when some of the abortions occurred. All six were Brucella blood reactors, however.

Strain 19 adult vaccination of cattle has been used in some of the Southern states, if requested by the owner and approved by State and Federal disease-control officials. Its main benefit seems to be to help cows produce a live calf at or near full term. In my opinion, it contributes little toward the total eradication of brucellosis in the United States, which is the goal of the U.S.D.A. Its use is not permitted in states where the incidence of brucellosis is low. Some of the states that import most of their milk will not accept milk from states that permit use of Strain 19 in adult cattle.

**CONTROL**

Increased herd size, loose housing and a tremendous increase in the exchange and movement of cattle have all contributed immensely to cattle disease problems. Brucellosis is no exception. Mechanization has enabled farm operations to handle more animals with less help. In a brucellosis outbreak, there can be no short-cuts. The following list of recommendations must be adhered to in the elimination of the disease from infected herds.

1. Pregnant animals should be closely observed for impending abortion or calving morning and night on a daily basis.

   **A. Pregnancy exams should be made on every animal of questionable status.**

   1. Most Brucella-caused abortions occur during the last trimester of pregnancy (6 to 9 months).

   2. Brucella abortions may occur as early as 3 to 6 months of pregnancy.

2. A cow can calve at full term (or beyond), with an apparent normal calf. Expel her placenta, milk well, yet be infected with brucellosis.

3. A cow will generally give a 24-h warning before aborting - sudden bagging and "settling or dropping of cords" followed by discharge and some placenta showing.

4. All animals that show signs of aborting or calving should be segregated immediately by being tied individually or placed in separate pens.

   **B.** One or two designated (reliable) people should handle all calvings and abortions. They should wear rubber footwear and (if possible) rubber or plastic apron or overalls and disinfect them. Otherwise, they should change their clothes and have same laundered before re-use.

   a. Aborted fetuses should be placed in a plastic bag and buried immediately.

   b. Newborn calves should be removed to an isolated area. They should be carried but not through stable areas. Preferable not to raise any calves until several months of clean tests.

   c. Calving and aborting areas should be thoroughly cleaned and disinfected regularly.

   d. Dogs and cats should be excluded from all barns.

   e. Fresh cows should remain in isolation until they have passed a negative blood test 2 weeks following calving.

   f. Aborted animals that do not show evidence of brucellosis at time of abortion should remain in isolation until after they have been retested at least 2 weeks later, and if still negative,
remain in isolation another 2 weeks and again be tested.

- Animals that retain their placenta and/or have a discharge following calving should be handled in the same manner as aborted animals (above) until their status is determined.

11. Disinfectants should be placed in areas of entry to mangers and segregation areas. Fresh disinfectant solutions should be made frequently.

Herds owners tell us that these recommendations are too stringent and cannot be implemented. Exposure and spread may continue for months. Eventually they realize that “everything else has failed” and they do enact our recommendations. By then, it is often too late to save much of the herd.

ACKNOWLEDGMENT

News and Events

Journal of Food Protection now Registered Trademark

IAMFES has received word that the trademark, Journal of Food Protection, is registered as of Feb. 6, 1979 with the U.S. Patent and Trademark Office. The mark is registered under the Trademark Act of 1946 and remains in force for 20 years.

Journal of Food Protection was first used March 15, 1976 and it became the name of the official publication of IAMFES with Volume 40, January, 1977. The Journal was formerly called the Journal of Milk and Food Technology.

HEW Report on State Programs Available

The HEW report, “State Government Activities in Food and Drug Control and Related Programs,” is available, free, in single copies to interested persons.

The report is published to provide information on individual states’ efforts to develop and maintain comprehensive programs of eliminating unnecessary threats and hazards to consumer health. The report provides a national profile of such aspects of the programs as resources, personnel, legislation, and analytical and inspection services.

To obtain a copy, write:

HEW/PHS/Food and Drug Administration
Division of Federal-State Relations/EDRO
State Services Branch (HFO-310)
Room 15-A-19 Parklawn Building
5600 Fishers Lane
Rockville, MD 20857

New "DRINC® Briefs" Features Quick Test For Penicillin

Dairy Research, Inc. (DRINC) has announced the availability of its latest DRINC® Briefs, Bulletin No. 179. The bulletin describes research and development projects funded by DRINC during the past year.

Articles in the current issue include: The new quick test for penicillin residues in milk which is both accurate and low cost; on-site whey concentrating system for cheese makers producing less than 200,000 lbs. raw whey per day; new milk-based shake dispenser; boosting cheese yield by ultra filtration; the third DRINC technical booklet on properties of dairy ingredients used in confections and other food formulas.

Other current DRINC projects are listed as is information on conditions necessary for project aid.

DRINC is the product and process R&D arm of United Dairy Industry Association, an organization dedicated to increasing the sale of U.S.-produced dairy products through its total promotion program. For a copy of Drinc Briefs, No. 179, write: Dairy Research, Inc., 6300 North River Road, Rosemont, IL 60018.

Alberta Association Honors Charles

Walter D. Charles, recently retired as the Supervisor, Edmonton District Office of the Health Protection Branch, was named winner of the 1978 "Sanitarian of the Year" award of the Alberta Association of Milk, Food and Environmental Sanitarians. The award was presented at that group’s Annual Meeting.

Charles has served as an active member in numerous committees concerned with use and control of pesticides, dairy and food processing and sanitation, and in committees involved with chemical and microbiological quality of food products.

In addition to his many professional activities, Charles found time to be active in church activities, the Boy Scout organization and committees concerned with combatting drug abuse.

Please Note...

Additional news items appear elsewhere in this issue, at the ends of research articles. Please check the table of contents for the location of the calendar, the new Editorial Board members, and excerpts from recent CDC Morbidity and Mortality Weekly Reports.