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Brucellosis Eradication and Control. II. Minnesota

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THE ACTIVITIES of the livestock industry and the veterinary profession in the control and eradication of brucellosis in cattle in the United States presents a most interesting and colorful history. Records show that in Minnesota contagious abortion, as the disease was then commonly known, was of grave concern to the Live Stock Sanitary Board when it was first established in 1903. The first regulations, with the idea in mind to control this malady, were adopted in 1907; although at that time, little was known of the cause, the pathology or the epidemiology of the disease.

As research and experience added knowledge in Minnesota, as in all other states, regulations and procedures were changed from year to year until the present program was put into effect. Space does not permit a detailed report of these early efforts of control, but a few of the highlights must be mentioned in order to present clearly the program as now in operation.

No significant accomplishments in the control of brucellosis were possible until the veterinary profession recognized this disease as primarily of a chronic nature with only occasional acute manifestations, nor until the development of a satisfactory test which disclosed the numerous animals that are carrying the disease in a latent form and are capable of spreading the disease when they associate with clean animals. The development, standardization and general acceptance of the agglutination test for brucellosis as now used was the first step towards eventual control and eradication.

As was practiced with most other widespread diseases in the United States, the first efforts to control brucellosis were individual herd efforts based on the agglutination test. Uniform methods and rules were recommended by the United States Livestock Sanitary Association and approved by the United States Department of Agriculture for the establishment and maintenance of brucellosis (then called Bang's disease)-free herds in the early 1930's. This procedure followed closely the first steps undertaken in the United States for the eradication of tuberculosis. It was demonstrated beyond question that an individual herd could be freed from the disease and maintained free provided procedures outlined in the rules were carefully followed. However, as in the case of tuberculosis, it was also demonstrated that the individual herd maintained in a community where the disease was rampant in neighboring herds must continuously maintain the necessary barriers to prevent reintroduction of the disease.

Because of the tremendous success which followed the adoption of the area plan of disease control for tuberculosis, it was only natural that livestock sanitarians should consider the possibility and
practicability of a similar program for the eradication of brucellosis. Steps toward that end were taken in many states. It was recognized that as in the control of tuberculosis the program must become compulsory if it was to be effective; this, of course, requires legislation.

Area Plan Authorized

The 1939 Session of the Minnesota Legislature enacted a law authorizing the State Live Stock Sanitary Board to initiate the Area Plan of Brucellosis Control in any county where 67 per cent, or more, of the cattle owners petitioned the Board for this service. Under this law, in any county where the area plan was undertaken, all cattle owners are required to submit their cattle for testing upon demand. This law has been amended slightly from time to time as new developments dictated, but the general principles remain in effect and are now the basis of our present eradication program.

Minnesota adopted an individual herd plan in 1929. This plan now known as the “Certified Herd Plan” is still in effect and available to individual cattle owners. Also, after the recognition of vaccination with strain 19 by the United States Livestock Sanitary Association and the United States Department of Agriculture in 1941, provision was made for individual herd owners to adopt the plans now known as “B,” “C,” and “D” if they were located in counties which have not adopted the Area Plan of control or started testing under this plan.

In 1945 the State Legislature enacted a law which prohibits the sale of any cattle over 6 months of age, except steers, for purposes other than immediate slaughter or consignment to a public stockyards unless such cattle have been tested and found free from brucellosis. The law was amended in 1949 to make a further exception for officially vaccinated animals sold within 1 year following date of vaccination and accompanied by an official vaccination certificate. This amendment has helped immeasurably in reducing the overall percentage of infection in so-called “non-area” counties, and in restricting the illegal use of vaccine, particularly in adult animals.

Rules and Regulations

In order to thoroughly understand the program for the eradication of brucellosis now in effect in Minnesota the following laws, rules and regulations should be kept in mind.

(1) Only qualified veterinarians approved by the State Live Stock Sanitary Board are permitted to conduct the agglutination test. Only samples submitted by veterinarians are accepted for testing by the state or federal laboratory.

(2) Only veterinarians approved by the Live Stock Sanitary Board may legally administer brucellosis vaccine to any animals in Minnesota.

(3) All tests and vaccination must be immediately reported to the Live Stock Sanitary Board. Violation of this regulation is considered a serious offense by the Board; any flagrant violation results in disqualification of the veterinarian.

(4) Veterinarians who have taken special instructions and submitted “check samples” to the federal-state laboratory are authorized to conduct the rapid plate test in their own laboratories. Such tests are recognized in the official disease eradication program.

(5) All practicing veterinarians are considered agents of the Live Stock Sanitary Board when conducting any phase of brucellosis eradication or control. If they fail to comply with Minnesota regulations, or to support the program, they are subject to disqualification, in which case they can no longer legally carry on any of the testing or vaccination procedures.

(6) All vaccination is conducted by practicing veterinarians at the owner’s expense. Regularly employed veterinarians of the state or federal government are not permitted to participate in any vaccination program.

(7) All testing in counties which have not adopted the area plan of brucel-
Brucellosis control must be conducted by practicing veterinarians at owner's expense. Also, all testing for importation, movement or sale of cattle within the "area counties" or other testing which an owner may desire in addition to the regular testing programs in the "area counties" must be done at owner's expense.

(8) Practically all of the testing under the area plan is conducted by practicing veterinarians at state expense. The State Live Stock Sanitary Board maintains a small force of field veterinarians who are available to assist the practitioner in problem herds, and to make scattered retests which are not desirable for testing on a per head basis.

(10) The regularly employed veterinarians of the Live Stock Sanitary Board supervise and coordinate the activities of the practicing veterinarian.

The basis of the Minnesota program is now the area plan and has been since 1939. As of this date petitions have been received and approved from 83 of the 87 counties of the State. All of the cattle have been tested one or more times in 65 counties; 28 of these counties are now certified as brucellosis-free.

When a petition is filed with the Live Stock Sanitary Board requesting that the Area Plan of control be initiated, a certified statement is obtained from the county auditor showing the number of cattle owners in the county. If the number of names of bona-fide cattle owners on the petition equals 67 per cent of that number, a hearing is held in the county on the sufficiency of the petition. At that time evidence and arguments for and against the plan are heard by the Board or its representative. If after this hearing the petition is deemed sufficient by the Board, the county is declared under the Area Plan, but the rules and regulations governing such plan do not become effective until the testing starts.

When it is considered that personnel and funds are available to start the testing in the county, an official notice is published in a newspaper circulating in the county stating the date on which the testing will begin. This notice is published at least 30 days prior to the start of the test. On the date set for the testing to start, the rules and regulations and the provisions of the state law applicable to the area plan become effective. These provisions are briefly as follows:

(1) All cattle owners in the county are required to submit their cattle to the test when required to do so by agents of the Board. The owner is required to furnish such assistance as may be necessary to restrain the cattle so that the test may be applied.

(2) No cattle may be legally introduced into the county until they have been tested for brucellosis unless they originate from a negative herd in another county under the plan or in a certified herd in a county not under the plan.

(3) All cattle introduced into the county, other than from a Certified Brucellosis-Free Herd, are quarantined upon arrival for a retest to be conducted between 30 and 60 days following date of importation. This also applies to all cattle which have passed through community sales or any point where they may have been exposed to infected cattle or cattle of which the brucellosis status is not known.

(4) All herds in which reacting cattle are found are placed under quarantine. These herds, and those in which suspects only are found, are retested at intervals of 30 to 90 days until infected herds have passed three consecutive negative tests and suspect herds have passed one clean negative test.

(5) Owners of reacting cattle have three alternatives: (a) They may sell their cattle under permit for immediate slaughter (within 15 days) in which case indemnity is paid. (b) They may segregate the reacting cattle from all negative cattle, and retain them on the farm. This provision permits
owners, particularly of beef cattle, to place reactors in a feed lot until they are shipped for slaughter. In many instances, the owner will obtain more under this procedure than he would have obtained had he sold the cattle and received indemnity. No indemnity is paid if the owner elects to follow this provision. (c) In problem herds, owners are permitted to retain the reactors with the remainder of the herd provided they will make proper provision to protect neighboring herds by double fencing, if necessary, fencing away from water courses which may drain onto neighboring pastures, and adopting a calfhood vaccination program. The vaccination, of course, must be conducted by a practitioner at owner’s expense.

Conducting the Test

When the date has been fixed for the start of the test, veterinarians are circularized offering them employment by the State in conducting the initial test. Efforts are made to secure enough veterinarians to complete the testing in a county in some 3 to 4 weeks. Each veterinarian is usually assigned a township, or in the case of heavily populated areas, perhaps half a township. Most assignments are in the neighborhood of 2,000 cattle to test for each veterinarian.

Tests are usually scheduled to start on a Monday. A meeting of the veterinarians employed is held on the Sunday prior to the start of the test. At this meeting the veterinarian receives his assignments. He is also assigned a lay assistant who is usually a farmer located in the area. An effort is always made to obtain men who are able bodied, familiar with handling cattle, known and respected in the area, and acquainted with the roads and the location of the farmers in the area. This assistant rides with the veterinarian, assists him in controlling the cattle, and carrying out such other duties as the veterinarian may assign him. The assistant is also paid by the State.

During the second World War, and for several years thereafter, it was difficult to interest enough veterinarians in this procedure to complete a full organization in most counties. At the present time, however, we are able to assemble full organizations in several counties at a time. During the present fiscal year, we have been conducting the testing in three counties simultaneously. We still have a waiting list of veterinarians who would take employment if an opening were available.

Much of the testing during the last 2 years has been conducted simultaneously with the tuberculin tests. In such case, the veterinarian tests the cattle submitted to him for both brucellosis and tuberculosis by drawing the blood sample and injecting the tuberculin. He identifies the animals by ear tag on his first visit, which is usually the first 3 days of the week, Monday, Tuesday and Wednesday; he makes his observations for the tuberculin test on Thursday, Friday, and Saturday. Reactors to the brucellosis test are branded, tagged and appraised at the time the tuberculin observation is conducted.

Retesting

After completion of the first test in heavily infected areas, a similar organization is made to conduct the first retest of infected herds. After the first retest has been conducted, or in lightly infected areas after the complete test, the further retesting of infected and suspect herds, and herds which from time to time give a positive reaction to the ring test, is delegated to the local practitioners located in the area where possible. Where the local veterinarians are not plentiful enough to keep this retesting up to date, or if they are not sufficiently interested, it then becomes necessary from time to time to employ other veterinarians to conduct these retests.

The State is divided into 22 districts. A field veterinarian, employed either by the state or federal government, is assigned as a resident district supervisor to each of these districts. It is his duty to supervise the testing conducted by the practitioners in that district, and to coordinate their work and see that all of
the retesting is kept up to date or as nearly there to as possible.

The results of this procedure have been highly satisfactory. The percentage of infection in counties under the area plan is steadily being reduced, and with the tremendous increase in funds made available by both the State legislature and the United States Department of Agriculture, the final completion of this tremendous undertaking appears to be in sight. It will be noted that the area plan as undertaken in Minnesota is not synonymous with a so-called "test and slaughter" plan, nor is there anything incompatible in the Minnesota plan with calfhood vaccination.

Reactors

In problem herds, owners are permitted and encouraged to retain reactors under proper restrictions, and full credit is given to all official vaccinates. Officially vaccinated animals are not condemned as reactors until at least 18 months have elapsed following the date of vaccination. Animals may be moved without restriction for 12 months following date of vaccination regardless of the titer shown. It is not necessary to test these animals during this 12-month period. Vaccinated animals must not have a titer greater than incomplete agglutination in a 1:100 dilution at 12-18 months of age, or a titer to exceed complete agglutination in a 1:50 dilution at 18-24 months of age to be moved as vaccinates. Vaccinated animals showing higher titers from 12 to 24 months following date of vaccination are considered suspects if they do not show a completely positive reaction. Such suspects may be retained in the owner’s herd indefinitely; some of them, of course, become negative. They cannot, however, be sold for any purpose except slaughter.

Ring Test

Since the so-called “ABR” or “ring test” has become perfected and standardized, this procedure has been followed in all area counties at approximately 6 month intervals. In Minnesota we use this test simply as a screening test. The rules and regulations of the Live Stock Sanitary Board specifically state that no official determination of the status of a herd shall be made on the ring test alone. We believe this is entirely sound, although in some states, we understand herds which are negative to successive ring tests are given a negative status. Our records do not indicate this can be safely done. While few herds where reactors are milking give a negative ring test, our records show that a significant percentage of herds in which there are non-milking reactors will be missed if this procedure is followed. The ring test is a very valuable adjunct to the agglutination blood test, and through its use we are able to more rapidly reduce the percentage of infection and find recent infection at an early date. This should be the limit to which the ring test is depended upon as a control measure!

Summary

(1) The brucellosis eradication program in Minnesota is based primarily on the Area Plan.
(2) The Area Plan in Minnesota is not synonymous with the “test and slaughter” plan.
(3) There is nothing incompatible between the Area Plan as conducted in Minnesota and calfhood vaccination. Recognition of vaccinates is given, and vaccinated animals are permitted free movement within certain limits.
(4) The actual testing of cattle under the Area Plan is conducted almost entirely by practicing veterinarians at state expense.
(5) Where possible, the complete blood tests of all cattle are coordinated with the tuberculin tests for reaccreditation in each county. Thus permitting a reduction in expense and less inconvenience to the cattle owner.
(6) The ring test is recognized as a supplement to the blood test, but no official determination of the herd status is made on the ring test alone.
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DES MOINES, IOWA
III. IOWA

H. U. Garrett, D.V.M.

THE CONTROL and eradication of brucellosis in cattle in any state presents many problems, especially is this true in a state such as Iowa, which has not only a goodly number of dairy and beef cattle, but is the largest importer of feeder cattle in the nation. In order not to disrupt our livestock economy it is necessary to have a program with sufficient flexibility to not only meet the various herd problems, but to control and eradicate the disease.

The Forty-eighth General Assembly in session in 1939 gave the cattleman the first law and appropriated $100,000 for the control of brucellosis in cattle. This program was strictly voluntary. From time to time the Legislature has added new sections to the Code Chapter on eradication of Bang’s disease.

From the start of the State-Federal Cooperative program, calfhood vaccination, agglutination blood testing of adult animals and the control and elimination of the reacting animals has been the recommended procedure.

Plans A, B and C are on the present program and were taken from the amendment to the Market Milk Law as passed by the last Session of the Legislature and becomes effective Jan. 1, 1955. This applies to all herds selling Grade A milk to be consumed raw or Grade A milk to be pasteurized.

The plans as passed by the Legislature are as follows:

PLAN A—Test annually all cattle more than eight (8) months of age except steers and official calfhood vaccinates until thirty-six (36) months following date of vaccination. Slaughter all reactors, with indemnity payments as provided by State and Federal regulations. Official calfhood vaccination to be optional with the herd owner.

PLAN B—Test annually all cattle more than eight (8) months of age except steers and official calfhood vaccinates until thirty-six (36) months following date of vaccination. All reactors are to be identified and quarantined on farm provided that the owner may at his option retain such cattle for breeding purposes in accordance with the rules and regulations of the Department. If a calfhood official vaccinate reacts, the animal may be quarantined on the farm and retested within sixty (60) days at the owner’s expense. Official vaccination of all female calves between the ages of four (4) and eight (8) months.

PLAN C—Official vaccination of all female calves between the ages of four (4) and eight (8) months. The herd must be composed entirely of official vaccinates.

Neither of the above plans meet the requirements of many of the states for the interstate shipment of fluid milk. This is also true of many of the cities and towns in Iowa; however, in the amendment passed by the Legislature, it qualified the law with Section II which is as follows:

Nothing contained herein relating to said plans of control shall invalidate ordinances or regulations of any municipal corporation, providing for control of brucellosis by procedures other than the foregoing three plans of control so long as said ordinance or regulation shall embody plans and procedures approved by the United States Bureau of Animal Industry and the Iowa Department of Agriculture.

It is needless to say that the procedure must follow a program or plan required by the area in which the milk is to be distributed, even though the requirements are greater than those required by the State of Iowa.

Many of the cities and towns in Iowa have adopted United States Public Health Plan A which in the main requires that all official vaccinates be negative to the agglutination blood test at 30 months of age instead of 36 months following date of vaccination as used in Plan A of the state program. The state law defines an official vaccinate as any calf between the ages of...
4 and 8 months that has been vaccinated with *Brucella abortus* strain 19 vaccine by a licensed or accredited veterinarian, properly identified with tattoo and tag and reported on proper forms to the State office within 30 days of such vaccination.

In May 1952, the ABR or ring test was used in Iowa. In dairy areas the ring test has proven very valuable as a herd screening test. The mobile unit for the ring test is handled by full time state and federal employees after the education program has been carried out in each county by the State Extension Service through the county extension directors. Too much credit cannot be given Dr. John Herrick for his untiring efforts in conducting a well planned educational program with the extension directors, the dairymen and the veterinarians. Through Dr. Herrick's efforts the ring test has been carried on in approximately one-half of the counties in the State of Iowa and a full schedule is dated for the next 6 months. After the ABR test is completed in a county, the local veterinarians carry on an agglutination blood test on the reacting herds.

An indemnity program is in effect in Iowa permitting the owner to be eligible to receive up to $12.50 for a grade reactor and $25.00 for a purebred reactor from each the state and federal government. In order to receive this indemnity the owner must sign a cooperative agreement to comply with Plan A and send the reacting animals to slaughter within 30 days.

Provisions are provided for the State to pay the veterinarian for drawing the blood samples and tagging and branding the reactors of all enlisted on and following Plan A of the cooperative program.

A regulation which went into effect July 4, 1954, requires that all cattle 6 months of age or over that have given a positive reaction to the agglutination blood test for brucellosis be permanently branded with a hot iron on the left jaw with a letter “B” not less than 2 inches or more than 3 inches high. The permanent identification of all reactor animals will do much to control the disease.

No retests are granted on the cooperative program unless the owner waives indemnity.

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**IV. ILLINOIS**

*A. K. Merriman, D.V.M.*

The first bovine brucellosis control program was put into effect July 1, 1938. Since that time, amendments to the original Act have been made to establish a brucellosis eradication program. This procedure has enabled the Department of Agriculture to promulgate regulations restricting inter- and intra-state movement of brucellosis infected animals and restrain the movement of all cattle within the state other than for slaughter purposes.

Dr. Merriman is Chief Livestock Sanitary Official for the State of Illinois.

Three Plans of Bovine Brucellosis Control are offered. They are designated as plan A, B, and C. All herds are eligible for initial tests at state expense. After the initial test, the herd owner chooses the plan which he feels is best suited for his herd. If plan A is selected and the owner complies with the requirements of this plan, his herd is eligible for an annual test at state expense. Calfhood vaccination is obtainable in conjunction with all plans. Tests and vaccinations at Federal-State expense are contingent upon the availability of funds.
Disposition of Reactors

Grade Brucellosis reactors are tagged and branded with the letter B upon the left jaw and quarantined upon the premises where found and cannot be removed other than to go direct to slaughter. Grade suspects are held at the premises where found under restriction notice and cannot be disposed of other than to go direct to slaughter.

Pure bred cattle revealed as reactors are handled in the same manner as grades except that the brand is withheld, the animals are quarantined, identified by their registration number, and cannot be disposed of other than to go to slaughter unless a permit is granted by the Division of Livestock Industry for such animals to be transferred to herds in which brucellosis infection is known to exist. Pure bred suspects are handled in the same manner except that a restriction notice is issued in lieu of a quarantine.

Movement of Illinois Cattle Other Than Direct to Slaughter

Dairy or breeding cattle over 6 months of age shall be accompanied by a negative brucellosis health certificate. The test must have been conducted within 60 days prior to date of sale or an official certificate showing the animals were vaccinated against brucellosis when between the age of 4 and 8 months and are under 36 months of age at time of sale.

Female cattle of the beef breeds, over 6 months and under 18 months of age, for feeding or grazing shall be accompanied by a negative interstate health certificate showing the animals to have been negative to the blood agglutination test—the test to have been conducted within 30 days prior to date of sale or are accompanied by an official calfhood vaccination certificate showing that they were vaccinated between the age of 4 and 8 months and are not over 30 months of age at date of entry.

Illinois Entry Requirements

Dairy or breeding cattle entering Illinois must be accompanied by an official interstate health certificate showing the animals to have been negative to the blood agglutination test—the test to have been conducted within 30 days prior to date of sale or are accompanied by an official calfhood vaccination certificate showing that they were vaccinated between the age of 4 and 8 months and are not over 30 months of age at date of entry.

Female cattle of the beef breeds under 18 months of age for feeding or grazing may enter on an interstate health certificate showing the animals to have been negative to the test within 30 days prior to shipment or showing them to have been calfhood vaccinated if not over 30 months of age at date of entry or subject to quarantine for a feeding period not to exceed 12 months. If under 6 months of age, the test is not required.

Female cattle of the beef breed over 18 months of age may enter on a negative interstate health certificate—the test to have been conducted within 30 days prior to date of entry, or an official calfhood vaccination certificate if they are under 30 months of age at date of entry, or they may enter upon permit from the Division of Livestock Industry subject to the brucellosis test within 10 days after arrival.

There is no provision in the Illinois Brucellosis Law for the acceptance or movement of adult vaccinates or animals showing a positive reaction in any dilution.

Ring Test

The ABR Ring Test has been inaugurated in Illinois. Milk samples are collected from all milk receiving plants for the purpose of detecting brucellosis infected herds. The results of the test are given herd owners in order that they may be advised of the brucellosis status of their herd. This program also enables the Department to concentrate its efforts on the eradication of infection in those ILLINOIS

(Continued on page 24)
to simulate the cornea. Tantalum gauze is fixed around the neck of the prosthesis to provide attachment for the ocular muscles.

The one-piece construction was designed to eliminate the necessity of removal for cleansing and to prevent dislodgment by the animal. The muscles, being sutured to the gauze around the neck of the prosthesis, aid in prevention of expulsion of the prosthesis, and also provide motility, which enhances the cosmetic effect.

The tissue reaction to the plastic, so far, is insignificant clinically. The conjunctival secretions appear somewhat more mucoid in nature, but drain readily in a normal manner, and except for a slightly increased susceptibility to conjunctivitis, the tissues involved show very little apparent change.

As these experiments are still in the early stages, no definite conclusions can be drawn. However, results have been encouraging in four cases, and it is hoped that continued research will provide a practical prosthesis to replace the canine eye when enucleation becomes necessary.

ILLINOIS

(Continued from page 17)

herds showing positive reaction to the ring test. Illinois herds are not given a Plan A status on results of the ring test. However, the ring test will be given recognition in conjunction with the blood agglutination test when the Grade A milk law becomes effective July 1, 1955.

Swine Brucellosis Law

Illinois has enacted a Swine Brucellosis Law which became effective in 1953. No female swine, 4 months of age and over, nor any male swine can be sold for breeding purposes unless they are found to be negative to the brucellosis test. This test must be conducted by an approved veterinarian within 60 days of sale. This test is good for one change of ownership or change of premises only.

All swine 4 months of age or over entering Illinois for showing or breeding must be tested within 30 days prior to date of entry by an official laboratory in the state of origin. Illinois swine for exhibition must be negative to a test conducted within 90 days prior to date of showing.

Any swine reacting in a dilution of 1:25, or higher, is considered a reactor. These must be tagged in the left ear. They cannot be sold for breeding purposes.

We have given a rather lengthy detailed explanation in regard to our Bovine Brucellosis Program wishing to emphasize the importance attached to the restriction of the movement of cattle and swine for breeding purposes of unknown brucellosis status. We have a problem of large importation of cattle for grazing and feeding purposes which dairy states such as Wisconsin are not confronted with.

Since the inauguration of our brucellosis program, the incidence of brucellosis in Illinois cattle has been reduced from approximately 7 percent to 3 percent, or less. We feel we now have a very good program which we hope to improve from time to time.

X-RAY

(Continued from page 21)

cessive exposure has been received. In utilizing dental films in this manner, the film should be worn at a point which you suspect is receiving the greatest exposure.

(10) The foregoing remarks have applied primarily to diagnostic uses of x-rays. However, most of the protection principles involved also apply to therapeutic equipment and the necessity for adhering to protection principles when one is using therapeutic equipment is extremely important. No veterinarian should ever utilize therapeutic equipment unless he is thoroughly familiar with its operation, and the associated hazards, and means of protecting against these hazards.

References

Iowa State College Veterinarian