many infected herds are not tested at regular intervals. Either of these deficiencies may delay or even prevent the elimination of infection from a herd.

7. **Education.** There is enough knowledge concerning brucellosis to finish the task. It is a matter of educating the people who are affected the most and getting them involved in a program that is sound. We must honestly deal with industry and industry organizations regarding brucellosis and what is required to eradicate this disease. We must tell them all we know about it, the damage it does to their livestock, the conditions under which it spreads, as well as the cost of living with the disease. On the other hand, we must make them fully aware of the tremendous job involved in eradicating brucellosis as well as the cost and inconveniences connected with eradication. I realize this is a very large educational task. However, if everyone of us who have an interest and a responsibility in this endeavor will accept our responsibility, we can do it. This involves attitude changes on the part of regulatory workers, both state and federal, cattle owners, marketing people, those involved in transportation of livestock and most important every segment of the veterinary profession who has any contact at all with cattle and swine producers.

8. **Funding.** We must have adequate funding. By this I mean enough money to judicially carry out the procedures which are sound and must be followed not only for one year but over a continuing period of time so that we can have some assurance of operating at a level of effectiveness that will work and that will continue without interruption until the job is complete. The agricultural appropriation bill before Congress for the current fiscal year has in it a $9 million increase for the brucellosis program. If this increase becomes a reality, we will be able to strengthen the Program on a continuing basis.

The time has come to make a choice whether we intend to eradicate brucellosis or continue to live with it. It is my firm belief that an informed livestock industry is the only group that can make that choice. We need your help to get the correct information to the cattle owners and other segments of the industry.

Thank you for the opportunity to meet with you.

Comparative-Cervical Retest of Tuberculosis Suspects

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The tuberculin test has proven its value as the principal tool for the detection of bovine tuberculosis in cattle throughout the world (1). Since the early 1920's the intradermal tuberculin test, applied in the skin of the caudal fold of cattle, has detected over four million tuberculin reactors in the United States and provided a means of eliminating this disease from all but a few hundred tuberculous cattle herds. In spite of this remarkable record achieved through the use of the caudal test, it is well-known that no skin test procedure is perfect, as evidenced by the high number of no gross lesion (NGL) reactors in recent years. As the prevalence of *Mycobacterium bovis* infected herds decreases (30 in fiscal year 1974), the relative importance of false-positive tuberculin responses increases. It is generally agreed that most false-positive responses in cattle are a result of the animal having been infected by microorganisms that contain some antigenic characteristics similar to *M. bovis* which causes the host to show some degree of heterospecific response (2,5).

Since the early 1940's procedures employing more than one type of tuberculin have been used to help differentiate *M. bovis* infected cattle from cattle showing heterospecific sensitivity due to other microorganisms (6,8). The procedure which has given the most reliable results to date involves the use of avian and mammalian purified protein derivative (PPD) tuberculins injected simultaneously at different sites on the neck. Animals which show a greater response to the mammalian tuberculin are considered possibly infected with *M. bovis* (9,14). Huitema (6) has presented data to suggest that when PPD's of equal biologic potency are used more specific results are achieved.

In 1971 the United States Department of Agriculture conducted a field trial to evaluate the use of the comparative-cervical (C-C) tuberculin test as a supplemental diagnostic test for the clarification of the status of caudal fold tuberculin test "suspects." The results of this field trial were presented at the 77th annual meeting of the United States Animal

Health Association, St. Louis, Missouri, on October 17, 1973 (15). The conclusions reached from this field trial were:

1. The C-C test can be used to reclassify caudal tuberculin test "suspects" either within 10 days of the caudal test injection or after 60 days.
2. The specificity of the C-C test in a group of cattle known to be free of *M. bovis* was 97.3%.
3. The sensitivity of the C-C test in a group of cattle known to be infected with *M. bovis* was 74.36%. On a herd basis this rises to 97% if four or more lesioned animals are present.
4. The C-C test is an efficient diagnostic test for clarification of the status of caudal tuberculin test "suspects."

Figure 1 shows the C-C test results of 225 caudal fold suspects in known negative herds. Each dot represents one animal. You will note that 26.7% fell below the diagonal line, which indicated they had a larger increase to bovine PPD than to avian PPD. From this data a scattergram was developed as a standard form for plotting the results of the C-C test. The zone limits were set at the discretion of the investigators and were established to allow all responses to bovine PPD of less than 2.5 mm to be classified negative. Figure 2 is a scattergram of the above data. The two cows which fell in the reactor zone were NGL at postmortem examination.

Next we evaluated the C-C test in separate groups of known infected animals and followed them to slaughter. Figure 3 shows a scattergram of the combined C-C test results for 156 cattle with evidence of bovine tuberculosis. One hundred sixteen (74.36%)

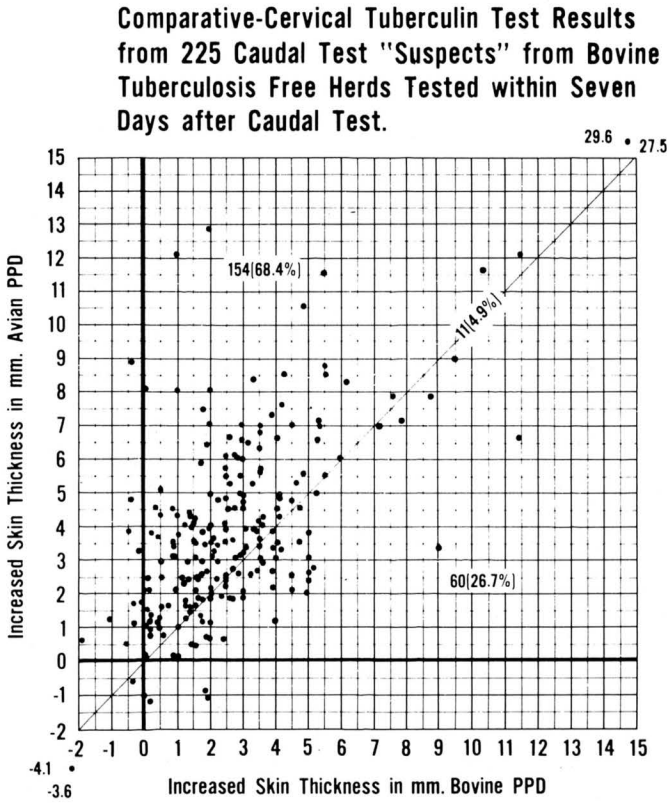

Figure 1.

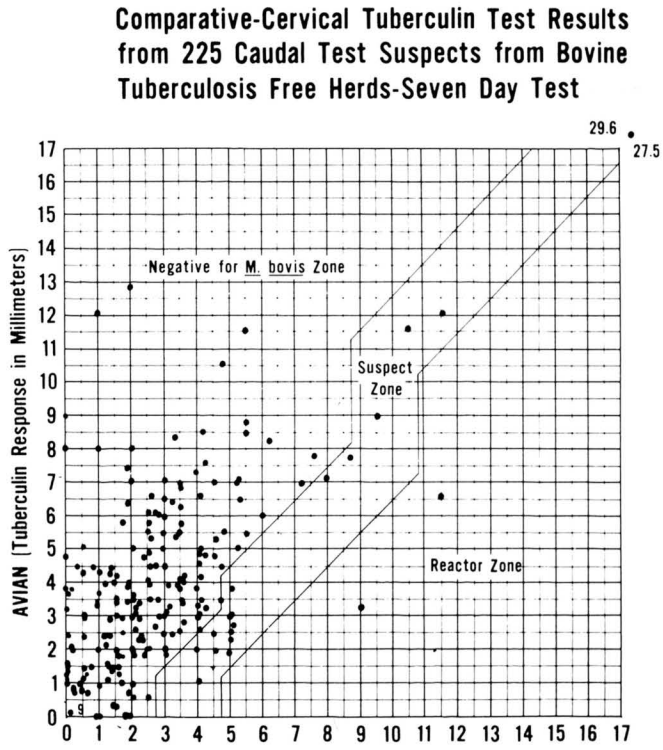

Figure 2.

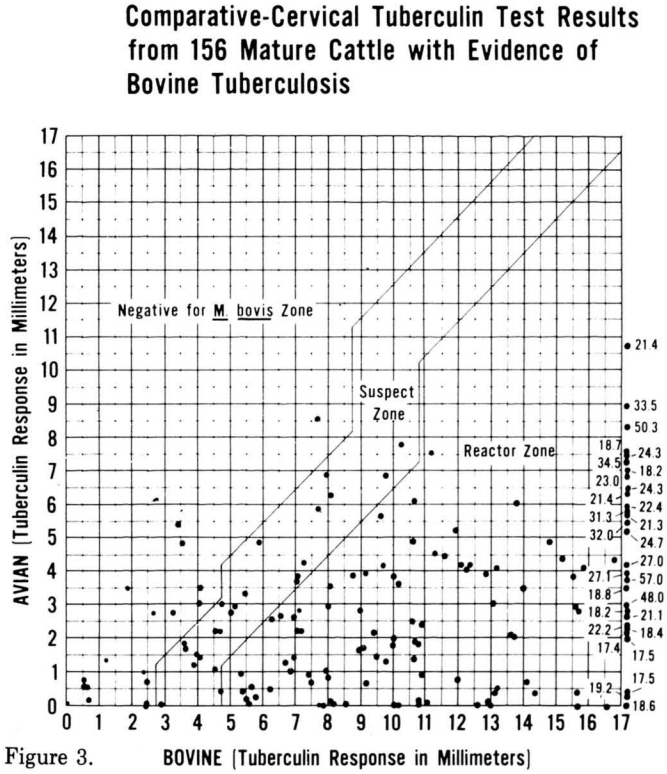

Figure 3.

fell in the reactor zone, 22 (14.1%) in the suspect zone, and 18 (11.54%) in the negative zone. On the basis of this data the Tuberculosis Committee of the United States Animal Health Association recommended the use of the C-C test for retest of all caudal fold suspects at the 1973 meeting.

During fiscal year 1974 a total of 2,512 C-C retests of caudal fold suspects were reported to us. Figure 4

shows the scattergram results of those retested within 10 days of the caudal fold injection. Ninety-four percent were classified negative, 4.5% suspects and 1.5% (21 animals) reactors. Of these 21 reactors 19 were NGL (many of which had skin lesions) and two animals in one herd had gross lesions. Figure 5 shows

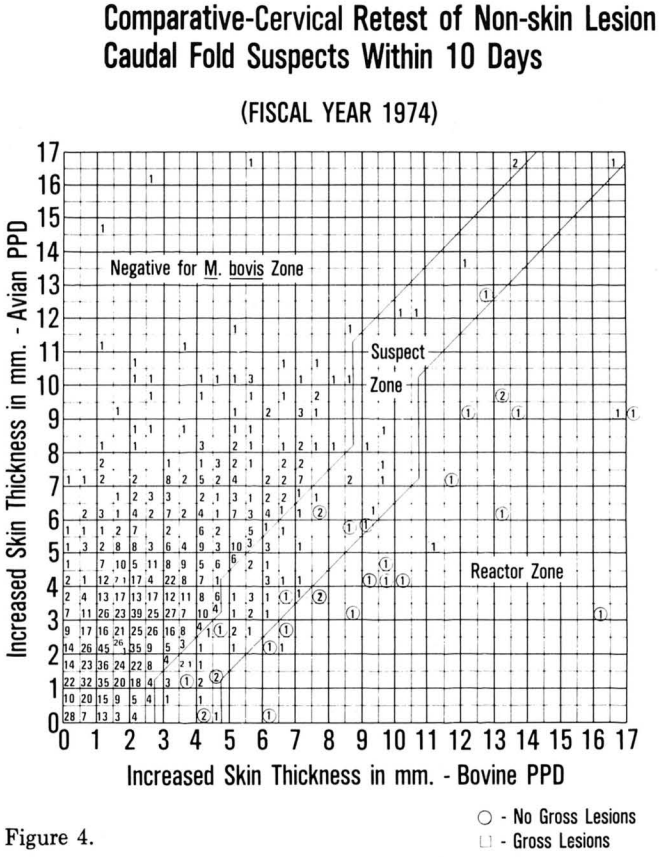

Figure 4.

the scattergram results of those retested after 60 days. Ninety-three percent were classified negative, 5.0% suspects, and 1.7% (16 animals) reactors. Of these 16 reactors 12 were NGL (many skin lesions) and four animals in two herds had gross lesions. Of the 129 C-C suspects 108 were classified negative on a second C-C retest, therefore, 97.5% of the caudal fold suspects were classified negative by the C-C test. This concurs with the data from the field trial. A significant aspect of the preceding data to you as accredited veterinarians is the fact that two of the three infected herds detected by the C-C retests were tuberculosis accredited herds. In fact, three of the 30 *M. bovis* infected herds found during fiscal year 1974 were accredited herds. Table 1 shows that the infection rate for accredited herds was 32 times greater than for non-accredited herds.

The purpose of the C-C test is to establish whether or not a herd is likely to contain animals infected with *M. bovis*. It is not required that the test give positive results on every *M. bovis* infected animal. It is sufficient that the test minimize false-positive results so that the slaughter of cattle in herds not affected with bovine tuberculosis can be held to an acceptable level and at the same time

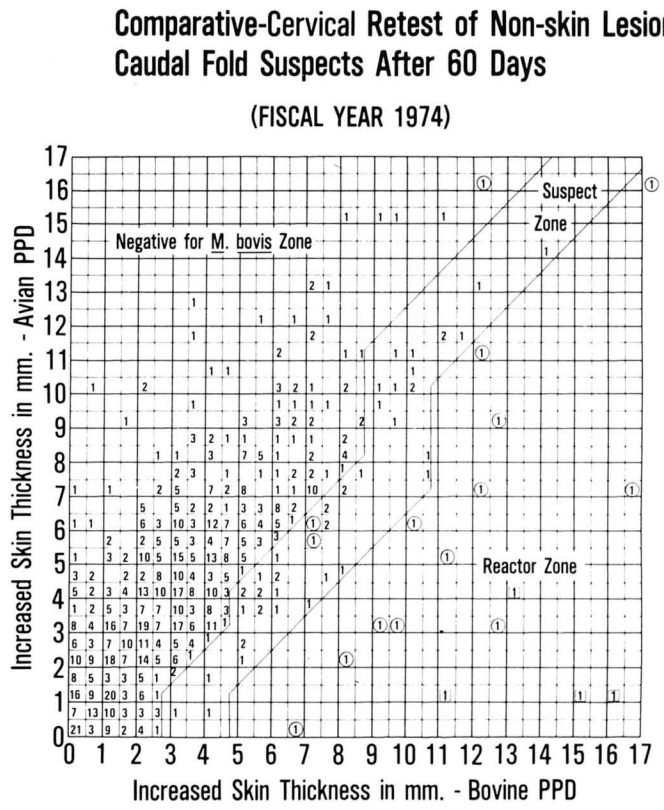

Figure 5.

Table 1

Tuberculosis Eradication

M. BOVIS INFECTION RATES

(Fiscal Year 1974)

Herd Status	Number Herds	Number of M. bovis Herds	Rate Per 100,000 Herds
Non-accredited	1,950,852	27	1.39
Accredited	6,738	3	44.52

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detect bovine tuberculosis at an earlier stage when it is present, and thus accelerate our bovine tuberculosis eradication program.

The logical question you may wish to ask is, how does all this effect me and what am I supposed to do to get this test conducted? We have restricted the use of the C-C test to regulatory (state or federal) veterinarians who have received special training in the application and interpretation of the test. Figure 6 shows the location of all those approved as of August 1, 1974. We have since trained an additional 23 veterinarians, so now have a total of 362 approved to conduct the test. We would like to see every caudal

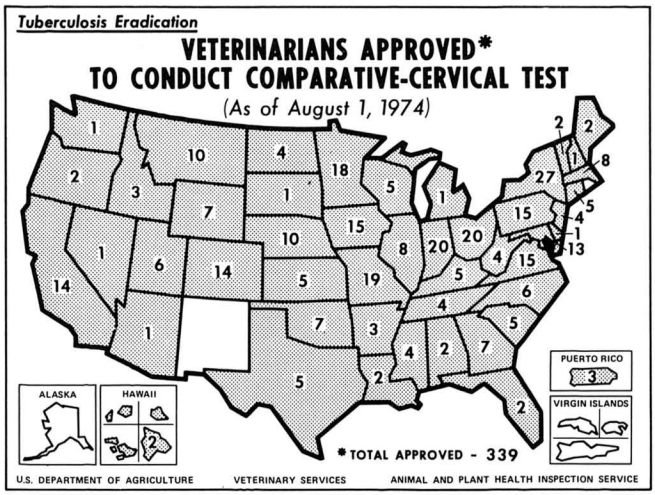

Figure 6.

fold responding animal retested by this procedure. By being able to conduct the test immediately you will not cause any undue hardship to the accredited herd owner or the owner who has his herd listed for sale. We would encourage you to check with your local regulatory veterinarian and work out an arrangement for him to provide you with the service of this retest procedure.

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Epidemiology and Regulatory Medicine

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Man's ageless struggle against disease becomes more complex and more urgent as the intensity of population and interchange of commerce increase. This is in the effect whether we are speaking of animal diseases, plant diseases, insect pests, or diseases of the human family. This enlargement of the problem as the years go by is illustrated by a statement that is often made, and which I believe accurately portrays the situation. It is this–that as the animal population of an area doubles, the disease and pest problems increase four-fold.

We in this country have enjoyed a long development period of expanding into fresh new lands with relatively low concentration of human population, livestock and crops. But the advantages of our natural hritage in this respect are fast diminishing as the leveling effects of our national growth within a fixed land area bring us ever closer to the more urgent disease problems long faced by older countries.

Many older countries keep abreast of the problems as reflected rather accurately in their political, economic and social well-being. Others failed to meet the challenge and gave way to the ravages of devastating plagues and pests, reducing them to a constant struggle for bare survival. It is but stating the obvious that the United States dare not fall among the second grouping.

Veterinary epidemiology or epizootiology are terms that have gained greatly in popularity over the past decade. Older practitioners of regulatory medicine utilized the principals of epidemiology long before the term became common usage.

The cardinal principals of regulatory medicine is possessing knowledge of where disease occurs, when disease occurs, how much occurs, and how it spreads through space and time.

In January 1953, Ohio instituted a new nimal morbidity reporting program. This program was put into