Coincident with progress in the eradication of brucellosis in Minnesota's cattle, the number of human cases have significantly decreased.

Effect of Eradicating Brucellosis in Cattle on Incidence of Human Cases

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BRUCELLOSIS was first reported in humans in Minnesota in 1927, and there was a general trend toward an increasing number of cases until 1946. Since 1946, however, the trend has been downward. Whereas the case rate per 100,000 population was 0.24 in 1927, it was 1.94 in 1956. The maximum case rate of 13.84 occurred in 1946 (table 1). The purpose of this study is to show the effect of the area certification program on this rise and fall in the reported number of human cases of brucellosis.

One can assume that, as with any disease, an awareness of the disease's presence in the State was needed before the majority of cases could be diagnosed properly as brucellosis. In 1927, serologic and bacteriological services were introduced into the laboratories of the Minnesota Department of Health to aid in the diagnosis of brucellosis. These services were accepted by practicing physicians and have been used increasingly since that time.

It should be noted here that the only cases counted by the Minnesota Department of Health are those confirmed by an agglutination test with a titer of at least 1:80, accompanied by clinical symptoms suggestive of brucellosis, or confirmed by isolation of the organism from blood cultures.

Other factors undoubtedly affecting the number of human cases of brucellosis in Minnesota are the number of cattle in the State and the extent of the area certification program pertaining to brucellosis in cattle.

Statewide pasteurization of milk may also have played a role in decreasing the incidence of infection in humans. A law requiring pasteurization was enacted in 1949, and a regulation prescribing minimum standards for grade A milk became effective under that law on March 31, 1952. No attempt will be made in this paper to evaluate the effect of pasteurization in itself, since for our purposes the presence of *Brucella* organisms in milk merely signifies an infected animal.

In 1939 the Minnesota Legislature enacted a law authorizing the State Livestock Sanitary Board to control and eradicate brucellosis in cattle by means of an area plan. Under this plan, all cattle owners in a specified area are required to participate in a testing program. The law also provides for the slaughter or iso-

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Table 1. Brucellosis in humans, Minnesota, 1927–56

Year	Cases [1]	Deaths [1]	Population [2] (in millions)	Case rates per 100,000
1927	6	0	2. 51	0. 24
1928	12	0	2. 53	. 47
1929	42	0	2. 55	1. 64
1930	62	0	2. 56	2. 42
1931	72	2	2. 59	2. 78
1932	62	3	2. 61	2. 38
1933	72	0	2. 63	2. 74
1934	102	1	2. 66	3. 83
1935	114	3	2. 68	4. 25
1936	77	2	2. 70	2. 85
1937	89	5	2. 72	3. 27
1938	85	0	2. 75	3. 09
1939	92	3	2. 77	3. 32
1940	137	3	2. 79	4. 91
1941	177	1	2. 81	6. 29
1942	260	1	2. 83	9. 18
1943	326	1	2. 85	11. 43
1944	395	0	2. 87	13. 76
1945	352	1	2. 89	12. 17
1946	403	1	2. 91	13. 84
1947	378	0	2. 93	12. 90
1948	295	1	2. 94	10. 03
1949	349	0	2. 96	11. 79
1950	281	0	2. 98	9. 42
1951	188	1	3. 02	6. 22
1952	135	0	3. 07	4. 39
1953	131	1	3. 11	4. 21
1954	149	0	3. 15	4. 73
1955	114	0	3. 19	3. 57
1956	63	0	3. 25	1. 94

[1] From records of the Minnesota Department of Health.
[2] Population figures between censuses were interpolated.

lation of all cattle reacting to tests and regulates the importation of any cattle into the area according to whether the animals, or herds from which they originate, are infected or not. By 1956 all the counties in the State were operating under this plan.

The area plan of control, as it is operated in Minnesota, has been successful. There has been a steady increase in the number of counties that have attained a certified status, except during World War II and the immediate postwar period when progress in eradication nearly came to a standstill.

More important, perhaps, is that the testing for recertification at the intervals required by State law and the Uniform Methods and Rules of the U. S. Department of Agriculture continues to show a decrease in the incidence of brucellosis in cattle. This favorable progress is probably attributable to the Minnesota law and regulations that provide for the blood agglutination test of all cattle as the basis of the eradication program. The milk ring test and calfhood vaccination, while used extensively, are considered only as supplements to the systematic blood testing of all cattle.

Effects of Program

Figures 1–4 compare the number of cattle (taken from the U. S. Department of Agriculture's official estimates of all cattle and calves on farms on January 1 of each year) with the number of human cases of brucellosis, the percentage of counties under the area certification program, and the number of cattle reactors to brucellosis which were slaughtered. From these figures it can be seen that from 1927 to 1948 when numbers of cattle increased or decreased, there was usually a corresponding increase or decrease in the number of human cases of brucellosis. From 1949 to 1956, however, this relationship was no longer evident.

It is apparent from the data in the figures that the area control program was effective in reducing human cases of brucellosis. During 1949–50 the number of counties joining the area test program began to increase sharply. The years 1949–51 were the beginning of a rise to new heights of the cattle population and the number of cattle reactors slaughtered. Concurrent with these upward trends there was a marked downward trend in the number of reported human cases of brucellosis.

Table 2 shows the number of counties certified year by year in Minnesota and the case rates in the certified counties as contrasted with those in the noncertified counties. The life table approach has been used in preparing this table.

The total experience shows that since 1940, when the first counties were certified, the case rate has been 3.12 times greater in noncertified than in certified counties.

Each year since 1942, except 1955 and 1956, the case rates have been significantly higher in noncertified counties. In 1955 and 1956, how-

ever, there was a great shift in the population from a noncertified to a certified status. This fact, coupled with the incubation period of brucellosis and the difficulties that sometimes arise in establishing a diagnosis, probably contributes to creating a lag effect, so that cases that actually occurred under noncertified conditions are being reported after the area has become certified. The difference in case rates in 1956 is not statistically significant, which tends to uphold this hypothesis.

Brucellosis in Humans From Cattle

The question may arise as to whether or not the real problem of brucellosis in humans in Minnesota originates from contact with cattle. In addition to blood samples submitted routinely for *Brucella* culture, the division of medical laboratories of the Minnesota Department of Health attempts to obtain blood specimens for all individuals who show a *Brucella* antibody titer of 1:320 or higher. Of course, by the time arrangements are made to have blood submitted for culture, the patient is not always in that stage of the disease where there is bacteremia.

Figure 1. Number of cattle on farms, Minnesota, 1927–56.

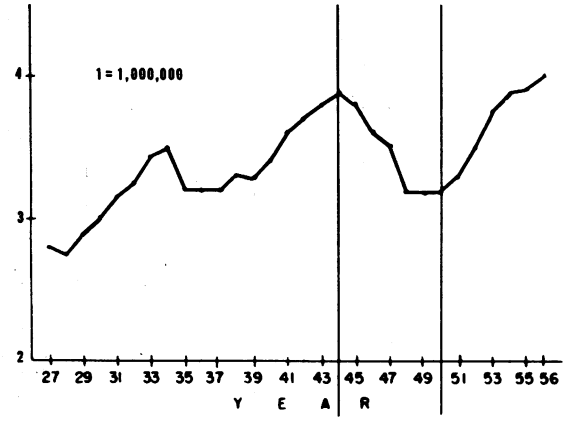

Figure 2. Reported number of human cases of brucellosis, Minnesota, 1927–56.

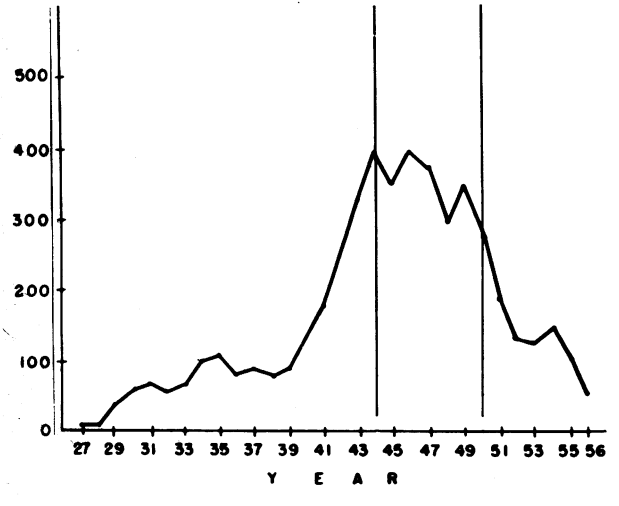

Figure 3. Number of Minnesota cattle reactors to brucellosis slaughtered, 1937–56.

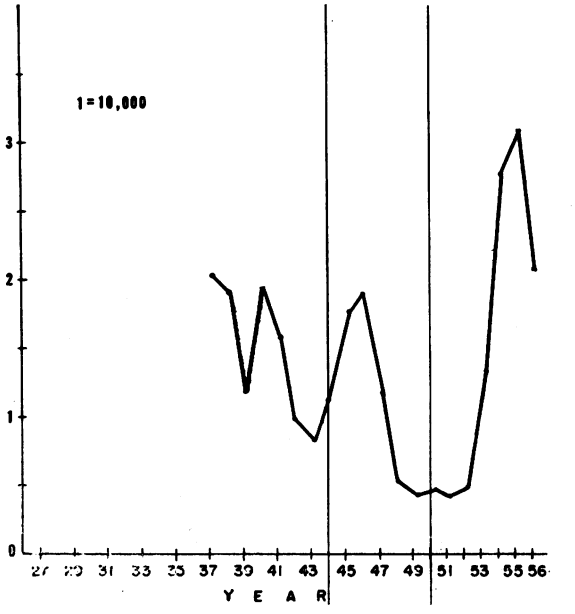

Figure 4. Percentage of counties under the area control program for brucellosis in cattle, Minnesota, 1939–56.

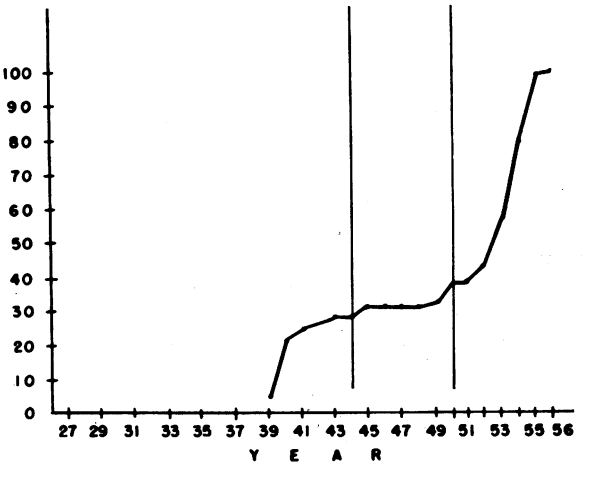

Table 2. Total human case rates of brucellosis in certified and noncertified counties, Minnesota, 1937–56

Year	Number of certified counties by end of year [1]	Number of noncertified counties by end of year [1]	Person-years risk in certified counties (in millions) [2]	Person-years risk in noncertified counties (in millions) [3]	All cases in certified counties [4]	All cases in noncertified counties [4]	Case rates in certified counties [5]	Case rates in noncertified counties [5]	Ratio of certified CR to noncertified CR
1937	0	87	---	2. 7923	---	89	---	3. 19	---
1938	0	87	---	2. 7923	---	85	---	3. 04	---
1939	0	87	---	2. 7923	---	92	---	3. 30	---
1940	7	80	0. 0563	2. 7360	1	136	1. 78	4. 97	1:2. 79
1941	13	74	. 1617	2. 6306	5	172	3. 09	6. 54	1:2. 12
1942	20	67	. 3635	2. 4288	13	247	3. 58	10. 17	1:2. 84
1943	21	66	. 5251	2. 2672	15	311	2. 86	13. 72	1:4. 80
1944	22	65	. 5491	2. 2432	22	373	4. 01	16. 63	1:4. 15
1945	22	65	. 5491	2. 2432	24	328	4. 37	14. 62	1:3. 35
1946	22	65	. 5491	2. 2432	18	385	3. 28	17. 16	1:5. 23
1947	22	65	. 5491	2. 2432	22	356	4. 01	15. 87	1:3. 96
1948	22	65	. 5491	2. 2432	18	277	3. 28	12. 35	1:3. 77
1949	22	65	. 5491	2. 2432	33	316	6. 01	14. 09	1:2. 34
1950	23	64	. 5595	2. 4229	9	272	1. 61	11. 23	1:6. 98
1951	24	63	. 5691	2. 4133	15	173	2. 64	7. 17	1:2. 72
1952	26	61	. 5903	2. 3921	7	128	1. 19	5. 35	1:4. 50
1953	29	58	. 6280	2. 3544	11	120	1. 75	5. 10	1:2. 91
1954	35	52	. 7204	2. 2620	10	139	1. 39	6. 15	1:4. 42
1955	54	33	1. 1775	1. 8049	65	49	5. 52	2. 72	2. 03:1
1956	78	9	1. 8386	1. 1438	45	18	2. 45	1. 57	1. 56:1
Total	---	---	10. 4846	38. 3152	333	3, 800	3. 18	9. 92	1:3. 12

[1] From records of the Minnesota Livestock Sanitary Board.
[2] Based on the formula: person-years at risk=population in certified counties previous year plus one-half the added certified population.
[3] Total population minus the person-years at risk in certified counties during the current year.
[4] From records of the Minnesota State Department of Health.
[5] Based on the formula: CR=cases×100,000÷person-years at risk.

Table 3. Blood cultures positive for Brucella in humans, Minnesota, 1932–56 [1]

Year	*B. abortus*	*B. suis*	*B. melitensis*	*B. melitensis or suis* [2]	Year	*B. abortus*	*B. suis*	*B. melitensis*	*B. melitensis or suis* [2]
1932	13	---	---	0	1946	98	6	4	---
1933	6	---	---	0	1947	71	6	7	---
1934	2	---	---	0	1948	62	0	5	---
1935	9	---	---	0	1949	41	4	17	---
1936	4	---	---	1	1950	22	8	4	---
1937	1	---	---	0	1951	23	8	1	---
1938	1	---	---	1	1952	17	10	1	---
1939	1	---	---	3	1953	21	6	0	---
1940	31	---	---	7	1954	25	2	0	---
1941	34	---	---	2	1955	20	0	0	---
1942	22	---	---	9	1956	6	1	2	---
1943	33	---	---	11					
1944	51	---	---	20					
1945	65	8	9	---					

[1] From the records of the Minnesota Department of Health. Cultures were not made prior to 1932.
[2] Prior to 1945 dye test plates were not used, and further identification of these two species was not made.

The isolations that are made, however, represent a random sampling of all reported cases. Table 3 gives the number and type of *Brucella* organisms isolated from blood cultures for the period 1932 to 1956. From this information it can be seen that the majority of patients were infected with *Brucella abortus*. Since it is known that in animals *B. abortus* is mainly found in cattle, it seems safe to assume that the majority of human cases in Minnesota resulted from contact with cattle.

Summary

Coincident with progress in the eradication of brucellosis in cattle, there has been a significant reduction in the number of human cases.

From 1927 to 1948, when the number of cattle increased or decreased, there was a corresponding increase or decrease in the number of human cases of brucellosis in Minnesota. But from 1950 to 1956 the number of human cases declined markedly in spite of a high increase in the cattle population. This change in trend results from the elimination of some sources of human infection by the acceleration of the program for eradicating the disease in cattle.

Since 1940, when the first counties were certified as brucellosis free, the total experience has shown that the human case rate for brucellosis has been 3.12 times greater in noncertified areas than in certified areas.

Infant Care

The booklet Infant Care first published in 1914, soon after the establishment of the Children's Bureau, is now in its 10th edition. In addition to 40 million copies sold in this country, it has been translated and widely distributed abroad.

The 10 editions reflect the history of child care practices in the United States. In 1914, for example, fathers were advised not to play with an infant son or daughter because it might result in "nervous disturbances of the baby and upset his regular habits." Experts now agree that infants need the attention of their fathers as well as their mothers.

In 1914 Infant Care did not advise even strained fruits until a baby was 7 or 8 months old, and solid foods were not recommended until after a baby was 1 year old. Today's Infant Care baby gets fruit juice at 2 weeks and solid foods within the first few months of his life.

The Children's Bureau is planning the 11th revision of Infant Care. As in the past, the Bureau will have the advice of a technical advisory committee, composed of physicians who represent four major medical societies, and the guidance of parents, psychologists, nurses, nutritionists, anthropologists, social workers, parent educators, and others.