

CATTLE BRUCELLOSIS

(Bang's Disease)

By B. J. Killham



Brucellosis control means healthier and more profitable herds.

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SUMMARY

There are no cures for cattle brucellosis, but control and eradication are possible and profitable.

The disease is characterized by conditions other than abortions. Infected cows may or may not abort.

Controlling cattle brucellosis means curbing undulant fever in man.

Basically, there are just two methods of control—control of the spreader and immunization (vaccination).

The disease is most commonly acquired through contact, direct or indirect, with infected cows. The germs enter the body most frequently through the mouth.

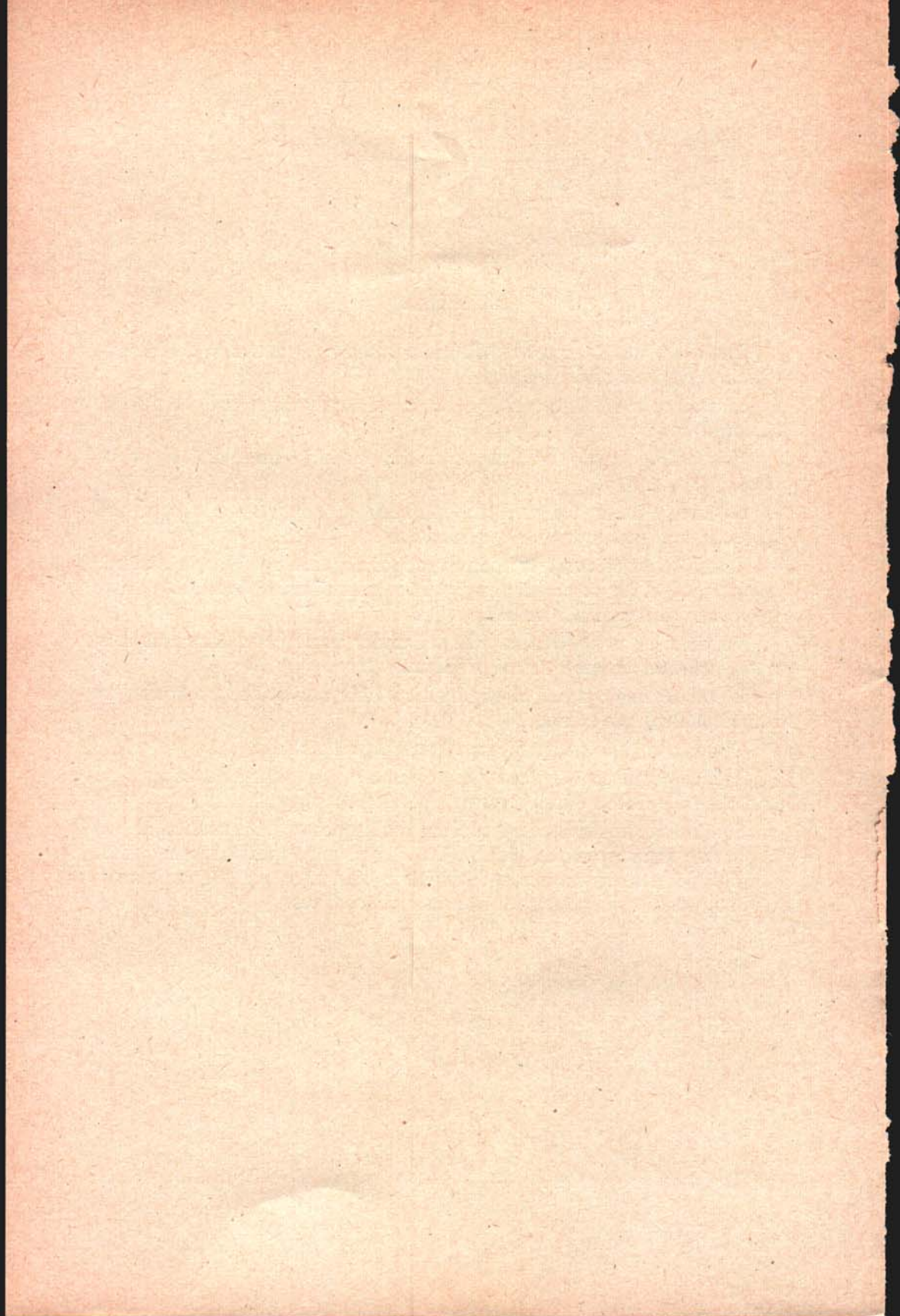
Vaccination is a valuable adjunct under some conditions but it is not a solution of the control problem.

Blood testing, practical segregation and sanitation are musts in sound control programs.

The blood test is dependable if intelligently used.

The infected cow is most dangerous as a spreader at calving time and that should be considered in planning for segregation.

Sanitation should be viewed from the aspect of fundamental cleaning rather than from the standpoint of real or so-called disinfectants. Sunlight, fresh air, moisture elimination and even soil bacteria may be employed to advantage in sanitary procedures.



Cattle Brucellosis

By B. J. KILLHAM

The purpose of this bulletin is to discuss basic facts and the more recent developments pertaining to cattle brucellosis.

In the absence of a cure for this disease, prevention and control are naturally of prime importance. There are differences of opinion regarding some preventive and control measures, but ample data are available to indicate that the disease is very costly and that prevention and control pay large dividends.

THE DISEASE

It is the same disease that was formerly called contagious or infectious abortion and Bang's disease. The terms used earlier stressed too greatly the word abortion. It is true that most cattle abortions are caused by brucellosis, but abortions may be due to other causes. Hence, the terms were misleading and the cause of costly errors. The cattle owner who views brucellosis as the sole cause of abortions, or who does not realize that cows infected with the disease may abort just once or not at all, often falls an easy victim to the vender of so-called cures.

The newer term brucellosis is derived from the generic name *Brucella* and therefore is applicable to any of the diseases caused by the closely related organisms—*Brucella abortus* (cattle), *Brucella suis* (hogs) and *Brucella melitensis* (goats).

CONDITIONS PRODUCED

Brucellosis is characterized by conditions other than abortions and it is possible for cows to be affected with the disease and not abort during any period of pregnancy. The conditions which mark the disease may be outlined as follows:

| | |
|-----------------------|-------------|
| Abortions | |
| Retained afterbirths | |
| Breeding difficulties | |
| Udder disease | |
| Pneumonia | } in calves |
| Scours | |

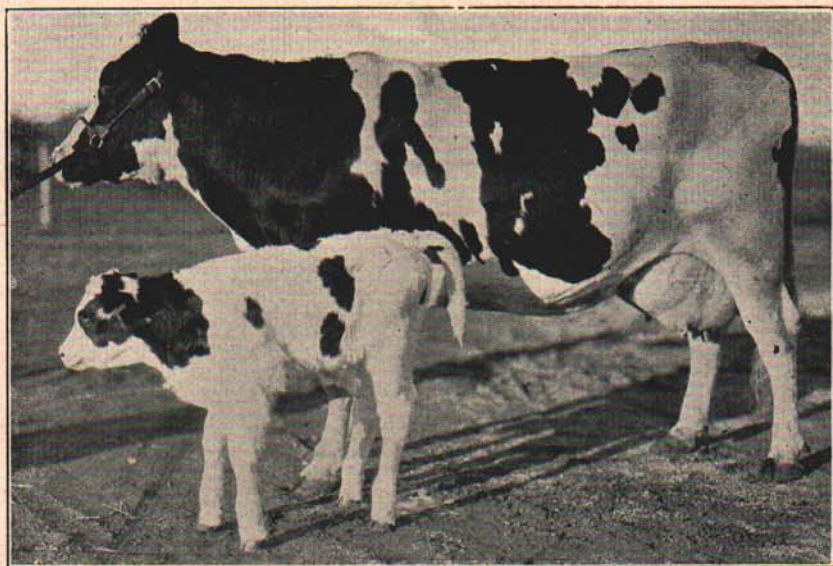


Fig. 1. This kind of situation is not typical when brucellosis is present.

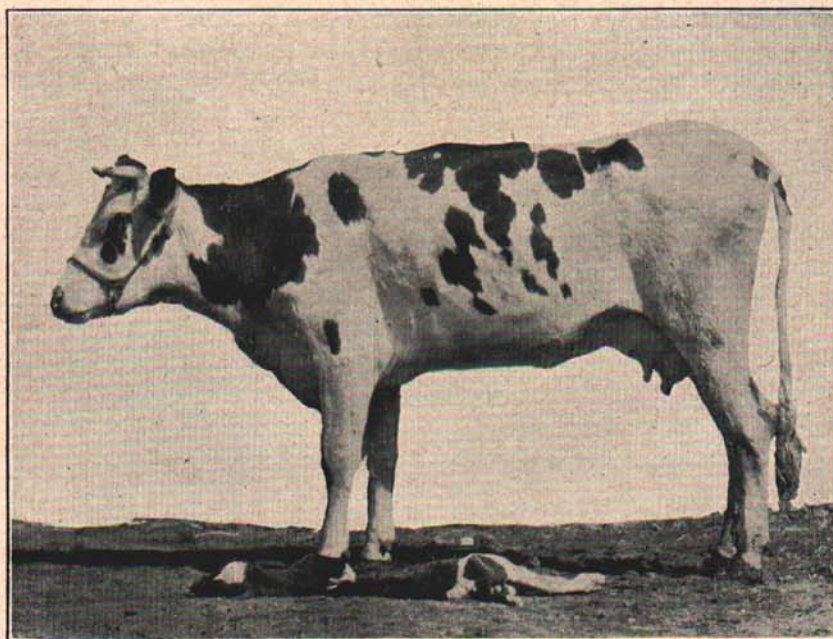


Fig. 2. Tragedies of this nature too frequently accompany brucellosis.

Abortions

It is probably true that a majority of the cows affected by this disease will abort, and it is also probable that most aborters will abort but once. There is no rule, however, regarding the number of abortions, the period of pregnancy that may be involved, or the month of pregnancy during which an abortion may take place, and, as indicated, some cows may more or less consistently produce calves despite the presence of this disease.

Retained Afterbirth

Retained afterbirths are always aggravating and frequently the forerunners of serious trouble, particularly if improperly treated. *Brucella abortus*, the germ which causes the abortion disease, may be directly or indirectly responsible for the retention of afterbirths.

Breeding Difficulties

It is now very apparent that breeding difficulties for which this germ is primarily responsible are the cause of great losses in connection with brucellosis. These difficulties may range in seriousness from the instances when it is necessary to breed the affected cow two or more times to the cases in which the cow is completely and permanently sterile. Undoubtedly, the possibility of loss in this respect has not been sufficiently emphasized. The cow which becomes affected and aborts once and thereafter produces calves more or less consistently is subjecting her owner to a material loss. That loss becomes insignificant, however, when compared to that which occurs when the valuable dairy or breeding cow is entirely disqualified as a breeder or producer because of the disease and becomes a total loss except for the salvage price which the butcher will pay.

Udder Disease

Formerly it was not believed that *B. abortus* injured the udder in any way although the organism was frequently isolated from the udder and milk. It has now been demonstrated, however, that the germ does injure the udder. The condition produced primarily would probably not reach proportions that would cause it to be recognized as garget or mastitis by the cattle owner, but the injury caused may serve as an entrance for other types of organisms which can, and all too frequently do, cause mastitis. Also, any injury to the functional udder tissue no matter how slight may logically be assumed to be responsible for interference with the productive ability of the affected udder.

Calf Diseases

Calves dropped by cows affected with brucellosis, after having been carried through a gestation period approximately normal as to length, may exhibit symptoms of pneumonia or scours shortly after birth. These conditions may be directly due to *B. abortus*.

Complex Disease

In brief, this is a disease marked not only by abortions but responsible also for at least three other major conditions in mature cattle, if we may consider the breeding difficulties as a single condition, and possibly two important conditions in the calf. It is not the intention to convey the impression that all of the conditions mentioned are always due to brucellosis. Any of these conditions may be produced by other means, even the abortions, but in far too many instances the *B. abortus* is the direct or indirect cause. Cows affected by the disease may or may not abort and abortions may occasionally be due to other causes, but too great emphasis cannot be placed on the probable fact that approximately 90 percent of the cattle abortions occurring in Michigan are due to this disease. If progress in control efforts is to be made, the issue will have to be faced squarely on this basis and action governed accordingly.

DOES BRUCELLOSIS CONTROL PAY?

It certainly does. When practiced, losses in milk and calf production are eliminated, breeding efficiency is increased, terms of milk ordinances can be met, state and interstate regulations can be complied with, sales and fair requirement restrictions do not present obstacles, cattle can be moved with greater freedom and breeding operations are not unduly impeded.

CONTROL

Basically there are just two ways of controlling cattle brucellosis. These may be indicated as:

1. Control of the spreader.
2. Immunization.

Control of the Spreader

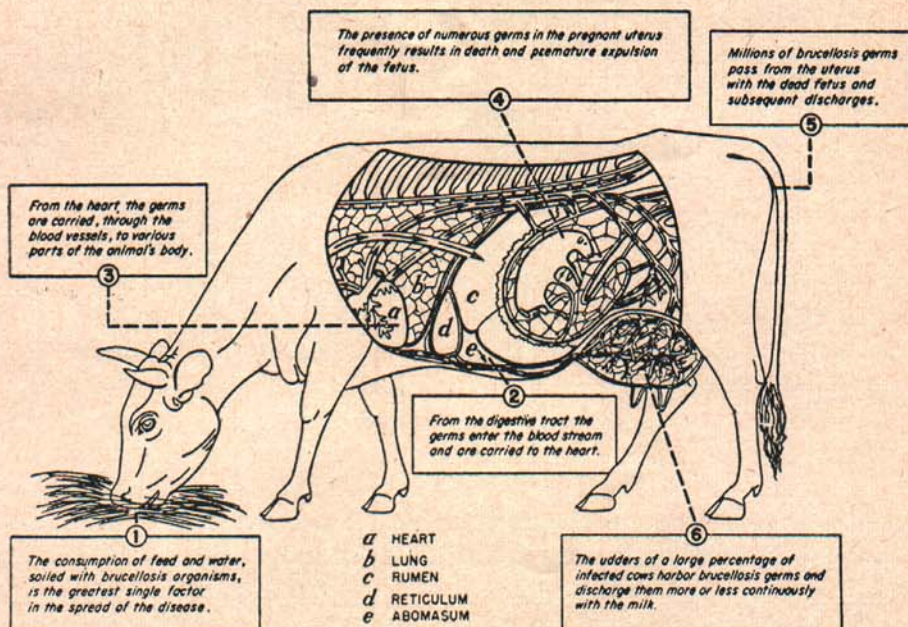
This procedure has been successfully employed in other major animal disease control or eradication campaigns. It was used in fighting southern cattle fever, foot and mouth disease, tuberculosis, and now is being successfully employed in combating brucellosis and mastitis.

The Spreader

The two organs in the body of the cow in which the germ does damage and from which it can be passed to the outside are the udder and the pregnant uterus. The germs may and do lodge in other parts of the body, particularly in the lymph nodes, but unless the place where the germ is located is so situated as to permit the organism to escape to the outside the affected animal is not a spreader of the disease. From a practical standpoint, the spread of the disease may be considered to come chiefly from the pregnant uterus.

When *B. abortus* enters the body of the cow it is probable that in approximately 50 percent of the cases it will lodge in the udder. From there, it can logically be assumed that it may escape in the milk. The contaminated milk might be consumed by calves, but under normal conditions there is not much danger of the infection being conveyed through the milk to the mature cattle of a herd, and the calf fortunately has the ability to resist and overcome the disease during the early months of its life. Consequently, attention should be concentrated upon the pregnant uterus for the real spread of the abortion disease from the cow. The non-pregnant uterus apparently does not furnish a favorable lodging place for *B. abortus* and the germ is not ordinarily eliminated from the uterus for any great length of time after termination of pregnancy by abortion or calving. Any discharge from the pregnant uterus or vagina which occurs prior to abortion or calving should be considered as containing the germ and being, therefore, infective. The discharge which follows the delivery of the calf should likewise be considered dangerous. In this connection, it should be remembered that the infected cow which calves in an apparently normal manner may spread as much infection through her discharges at that time as an aborter. The discharge may occur during a period beginning several days before calving or aborting and continue for three or four weeks thereafter, rarely longer. The discharge will usually stop within a week or two after the termination of pregnancy.

The bull may become infected with the disease and the germ may lodge in the breeding organs and possibly, in rare instances, be eliminated in the breeding discharges, but it has not been shown that the bull is an important factor in the spread of brucellosis. The use of an infected bull upon a cow not infected is not recommended, however, because of the remote possibility of transfer of the disease, and there is always the possibility that the bull may mechanically convey the infection from one cow to another.



Prepared in Bureau of Animal Industry,
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Route of brucellosis germs in their attack on cattle.

HOW DISEASE IS ACQUIRED

Carefully checked experiments have shown that under average conditions most of the infection is acquired through the mouth of the animal that becomes affected. In other words, the disease is usually acquired because the germ gets into the feed or water or is deposited in places where it can be licked up or picked up by susceptible animals. Hence, control work should consist of efforts to prevent the material which enters the cow's mouth from becoming contaminated with the germ. This can best be accomplished by strict control of the spreader to avoid any chance of its spreading the disease at the time it is in a position and condition to do so.

ENTRANCE OF THE DISEASE INTO HERDS

The common ways by which brucellosis is introduced into herds are:

1. Purchase of mature infected animals.
2. Permitting animals of the herd to associate with infected cattle of other herds.

3. Breeding operations by which infected animals are brought to the farm.

The hazards in buying cattle through private and public sales and in the showing of animals at fairs should be considered in this connection.

IMMUNIZATION

An animal becomes immunized against a certain disease when it is placed in a condition which enables it to resist that disease when met. This condition is brought about through the formation of combating, resisting, or neutralizing substances in the animal's body as the result of successful conflict with the germ that causes the disease, provided the disease involved is one for which an immunity is produced. Such substances enable the animal to overcome the attack of the disease and to offer resistance if the germ is again encountered. Immunity may be produced by an attack of the disease in a natural manner or in some instances may be brought about artificially by the use of vaccines. Substances used for inducing artificial immunity contain the germ of the disease or its products.

Artificial immunization or vaccination has been very successful in connection with some diseases for which certain types of products have been used; for example, hog cholera and black leg, but vaccination has not met with unqualified success when used against some germ diseases possibly because of the nature of the diseases or the kinds of products used. Because of the success met with in vaccination in some instances, efforts have been made to produce vaccines for many types of germ diseases. Unfortunately, many of these efforts have been complete or partial failures.

It is probable that immunization against brucellosis has been given more thought and study than any other phase of the brucellosis problem. A complete solution has not been reached.

Voluminous data indicate that the vaccination of calves with Strain 19 vaccine has merit, but it is not shown that this vaccine completely solves the problem. Vaccine at its best leaves behind a trail of persistent reactors (about 5 percent when calves are vaccinated), and not all vaccinated calves are immunized by the treatment. Vaccination of calves, however, is a valuable adjunct in the brucellosis control program and its proper use is advisable under many conditions.

The vaccination of mature cattle is a controversial procedure. The committee on brucellosis for the U. S. Live Stock Sanitary Associa-

tion has summed up the situation in this way: "Your committee is aware that adult vaccination is practiced far more extensively than its proved advantages justify; that it is used extensively as a substitute for effective sanitary measures and more extensively than it would be if its known advantages and disadvantages were carefully explained in advance to breeders contemplating its use."

CATTLE BRUCELLOSIS CONTROL PROJECTS

Sound brucellosis control programs are based on logical related measures. Vaccination should be considered an adjunct to be employed under some conditions, but the following are always essential:

1. Blood testing,
2. Practical segregation, and
3. Sanitation.

BLOOD TESTING

The blood tests for brucellosis are accurate and can be depended upon to point out the infected animals if intelligently used. It should not be expected that the application of a single test is going to solve any given problem. Cattle may have been exposed shortly before a test and not be in a condition to react at the time of the test, but might react to a subsequent test in 60 to 120 days; the test may be applied to pregnant cows which are the exceptions that will not react while in that condition; or blood samples may be obtained from infected cows that have recently calved or aborted. If due allowance is made for the exceptional animals and if the tests are properly timed, a reliable record of the condition of each animal can be obtained in a relatively short time.

The blood testing is simply an initial and incidental procedure. The real difficulties will develop in connection with problems of segregation and sanitation and the conditions which accompany or follow brucellosis.

SEGREGATION

Segregation may be classed as complete or partial. Complete segregation may be accomplished by slaughtering the diseased cattle, by placing the affected cattle on one farm and the non-infected cattle on another, or by definitely separating the two classes of cattle on one farm.

Partial segregation provides for the separation of the infected animal from the herd when it is most dangerous as a spreader, which is at the time of calving or aborting.

The aim in any plan of segregation is the ultimate elimination of all diseased animals from the herd. This should be kept in view at all times.

Many of the infected cows may early develop conditions which will cause their sale to the butcher, but others may produce calves more or less consistently, and there will be a temptation to retain such animals. The infected animal is always a potential disease spreader and should be eliminated as soon as permissible under existing conditions.

The object should be to replace infected animals with cattle free from brucellosis. The sheet anchor here is the young animal. Even though the mature cattle may all be infected, clean calves can be raised. The closed herd (one to which no mature cattle are added) presents one of the best means of controlling brucellosis.

SANITATION

There is too much inclination to view sanitation from the viewpoint of disinfectants, real or so-called. Such agents have their place but are incapable of destroying disease germs unless they come in actual contact with such germs. Opportunity for such actual contact is frequently not given yet it is often confidently believed that the spraying or spreading of a disinfectant has accomplished the task of destroying all harmful germs in the vicinity.

Sanitation refers to environmental hygiene. Hence, it has to do with the employment of means and measures designed to eliminate disease producing agents from the surroundings or to prevent the intrusion of such agents into the environment.

Nature has provided certain agencies which are very efficient in destroying most harmful germs and these can usually be used to advantage. Fire is the most efficient of germ destroyers but unfortunately cannot be used frequently. However, sunlight, fresh air, dryness, and cleanliness can be used cheaply, easily, and regularly and will accomplish results. In contrast to the foregoing enemies of the disease-producing germ, darkness, foul air, moisture, and filth should be considered as the germ's allies or friends. Fundamental sanitation would include the replacing of the agencies which favor the germ by those factors which slow it up or bring about its destruction. An investigation showed that the brucellosis germ, *B. abortus*, in thinly spread manure exposed to the sunlight was killed in one or two days

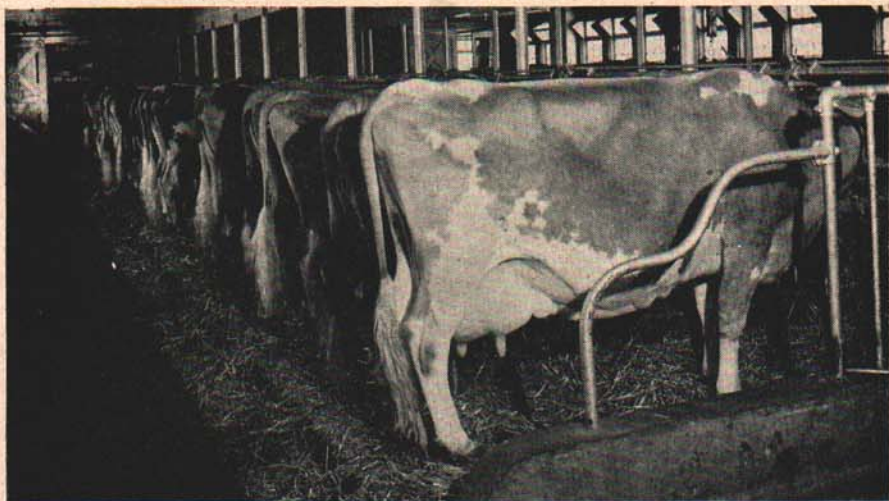


Fig. 3. Clean premises favor the control and elimination of diseases.

although this germ in moist manure located in a dark place lived for 75 days or longer. These findings exemplify the effects of the contracting agencies which are mentioned.

If a real job of eliminating brucellosis germs is to be performed, any thing or condition which will favor or protect the germs should be removed or corrected. A good mechanical cleaning is most important. Germs protected by sticks, cobs, straw, manure or other litter must be exposed to destroying agents. Forks, shovels, brooms,

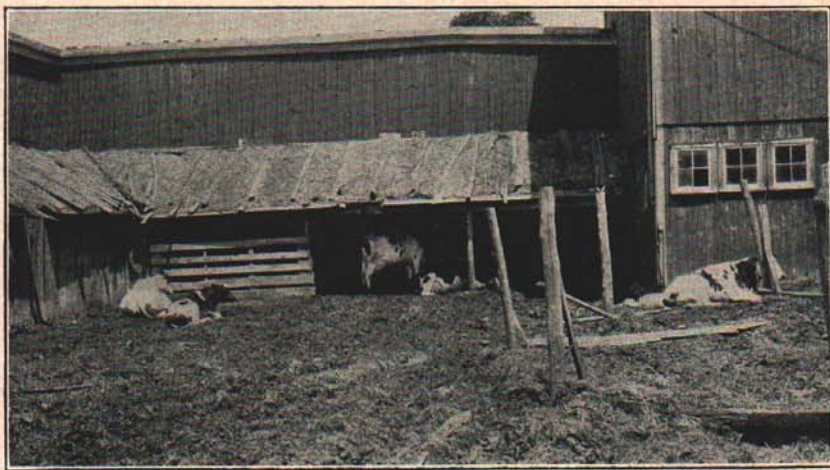


Fig. 4. Insanitary surroundings encourage germ diseases.

and brushes should be employed as far as possible and then, if permanent surfaces are to be cleaned, hot solutions of lye can be used to remove the remaining material which protects the germs.

A suitable lye solution can be made by dissolving the contents of one can of commercial lye (13 ounces) in 10 gallons of hot water. The hotter the water the better for both cleaning and disinfecting purposes. After the application of the lye solution, disinfectants may be used, but it should be remembered that strong smelling disinfectants are not desirable in a barn where milk is produced. Common dirt is often the reason for the survival of the germs and if the dirt is removed the germs go with it or are exposed to destroying agents. In the clean-up, particular attention should be paid to places away from the light.

Outside, the task is not so difficult for there sunlight and other agencies play an all important part in germ destruction. The barnyard should be cleaned up and water and mud holes eliminated. There is no practical way to disinfect a straw stack if it is located near buildings. If it has been contaminated and cannot be burned, it should be fenced off or the straw should be spread on a field or used for purposes which do not involve cattle. The danger of brucellosis germs lurking in a pasture is almost nil if there are no wet or shaded places included.

Soil bacteria which are antagonistic to disease-producing germs may be utilized in sanitary procedures at times, when feasible, through cultivation and shallow plowing.

Trucks are a potent force in spread of livestock diseases. Trucks used for transporting any livestock may become contaminated. Hence, immediately after being unloaded they should be subjected to the treatment recommended for contaminated farm premises.

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