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# Farm Sanitation

G. S. Weaver

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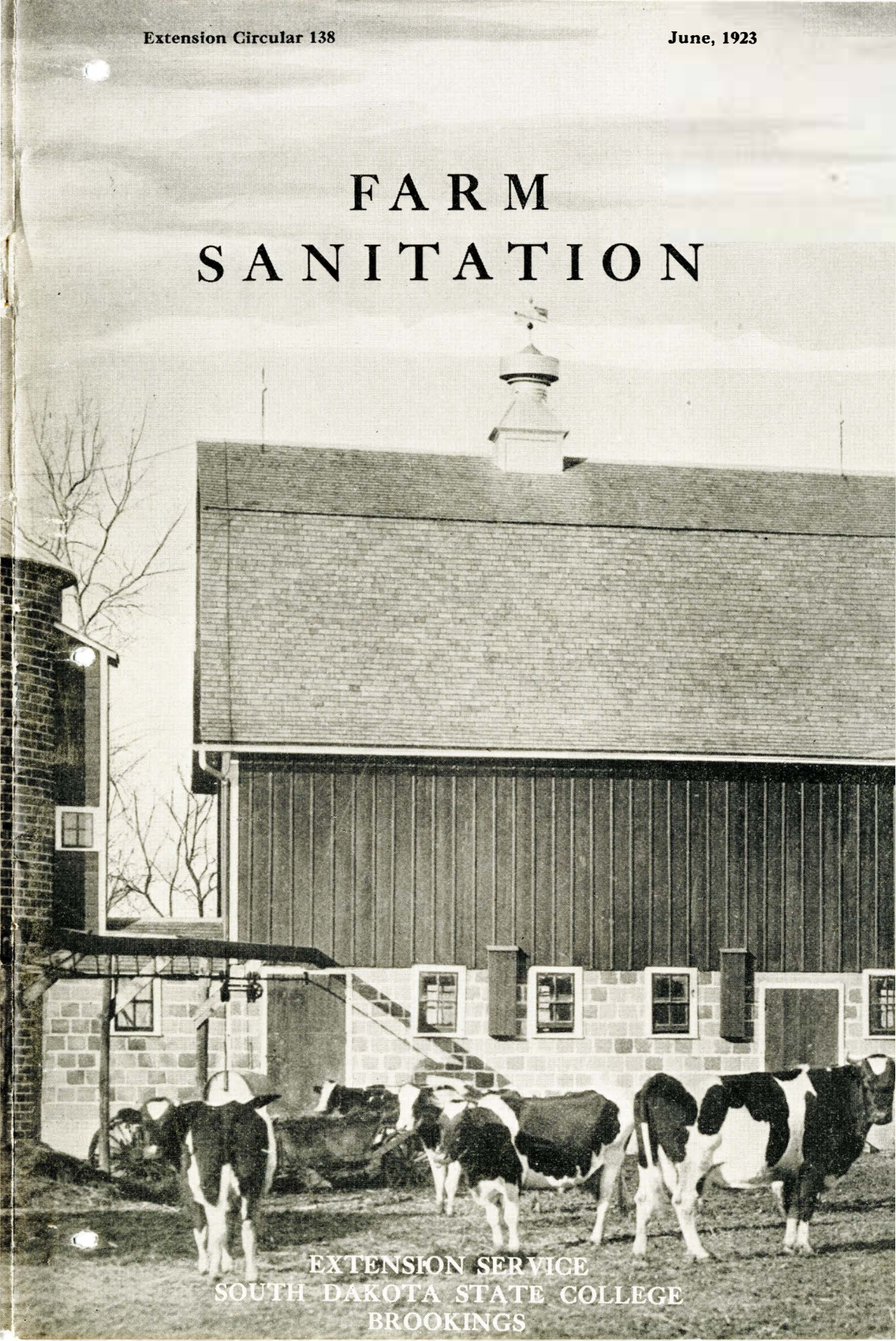


EXTENSION SERVICE
SOUTH DAKOTA STATE COLLEGE
BROOKINGS

STATE PUB. CO., PIERRE, S. D.

# FARM SANITATION

**Dr. G. S. Weaver**
**Extension Specialist in Animal Diseases**

Sanitation means to keep things clean, to be hygienic. Farm sanitation helps to preserve the health of domestic animals and indirectly the health of the people that live on the farm. Cleanliness, sunlight, fresh air and disinfectants are the important factors in sanitation.

## GERMS CAUSE DISEASE

The most important discovery that has been made in connection with sanitation is the fact that contagious diseases are caused by very minute organisms commonly known as "germs." Our knowledge of germs began when Davaine in 1863 discovered that anthrax was transmissible from one animal to another. Two years later tuberculosis was demonstated to be contagious from man to animal. Kock in 1881 originated methods of culturing germs. The work of Pasteur on anthrax and rabies, in developing methods of immunizing animals against these diseases, has laid the foundation for immense accomplishments in preventing contagious diseases. These men that were pioneers in this work have saved thousands of lives both human and animal and the world owes them a great debt which can never be paid.

**The time honored mud wallow. A harboring place for germs and worm eggs. Unsightly and unsanitary; to be looked upon with disgust.**

Note—A brief description of a few common diseases will be found on page 28.

## Characteristics of Germs

Germs are so small that they cannot be seen with the naked eye. As germs cannot be noticed people do not always realize that danger is near nor the damage that germs can do. Every disease has for its cause a different germ and each different germ has its own characteristics.

When an animal is affected with a disease, germs are thrown off through the excretions of that animal. These germs are harbored in refuse of various kinds and many types will live for years in a dark damp place. Mud wallows, old strawstack bottoms, manure piles or any accumulation of filth will harbor germs and keep them alive for long periods ready to take the first advantage of attacking a susceptible animal.

Some germs have the power of forming a spore or enclosing themselves in a shell, which adds greatly to their resistance against weather conditions. The germ that causes anthrax is an example of such a germ. Most of the spore forming germs are easily killed before they have a chance to form a spore. Germs can be killed by burning, by exposure to direct sunlight and by exposure to disinfectants.

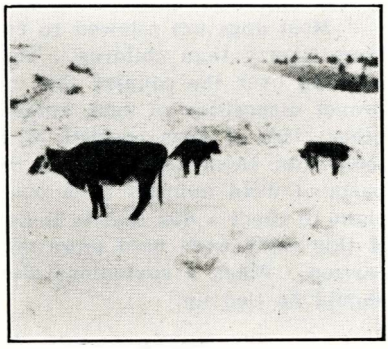
**Clean farmsteads make for better health for the family and livestock.**

## PREDISPOSING CAUSES OF DISEASE

While germs are the direct cause of contagious diseases, other factors may help the disease get started. Any condition that helps to lower the resistance of the animal will make him more susceptible to disease. For example, a hog that is infested with lice has a low resistance due to the constant irritation of the lice, and is therefore, more easily attacked by hog cholera. A cow that is not properly housed and is subjected to exposure of extremes in the weather conditions is more susceptible to hemorrhagic septicemia. Young animals have a lower resistance to disease than full grown animals.

When any particular species of animals are subject to a certain disease, any breed within that species is about equally susceptible to any other breed, viz: a Mule-foot hog is equally susceptible to hog cholera with a Duroc-Jersey.

Improper feeding is probably the biggest factor in lowering the resistance of animals. Contaminated and insufficient water puts animals out of condition. A lack of sunshine, poor ventilation, poor drainage or any other unsanitary condition helps the germs get in their deadly work. If animals were properly cared for a large amount of disease troubles could be eliminated.



**"Turned out!" What for?**

## THE SPREAD OF DISEASE

Disease is usually spread from one farm to another by being carried. When the size of a germ is considered, it being necessary to magnify it 800 to a 1,000 times in order to see it, it is not unreasonable to expect that anything that will carry a particle of manure the size of a dime may carry millions of germs.

Probably the greatest carrier of disease is the new animal that is brought onto the farm for one reason or another. Any new animal that is brought in should be isolated or put in quarantine for fifteen to thirty days or even longer depending upon the circumstances. Hogs may be disinfected by dipping or spraying with a coal-tar dip of some kind. Sheep and cattle may be dipped in a similar manner before being brought onto the farm.

Animals that are exhibited at fairs may bring disease on the farm when they are returned home. The exchange of breeding animals may be the cause for an outbreak of disease. Feeder cattle and feeder hogs very frequently bring in disease. If the herds and flocks of livestock were improved by only bringing in sires that were positively known to be free from disease, a large number of the outbreaks could be prevented.

### Dogs Carry Disease

The dog is a big factor in distributing disease around the country. The most noteworthy disease carried by dogs is rabies which is infectious to both man and animals. Hog cholera may be carried by dogs. Not only is the dog guilty of carrying contagious diseases but he also carries parasites that infest both man and animals. Tapeworms in sheep and man are carried by dogs. Fleas

and ticks that infest dogs may be transferred to other animals and carry disease in that way. The above list is enough to show that the dog proposition should be given consideration.

Most dogs are allowed to run at large and are frequently given more liberty than children. There are thousands of worthless curs running over the country that no one seems to claim and the only proper disposition of such animals is to shoot and bury them. Another class of dogs consists of those owned by people that do not look after them and these go roaming around the country carrying parts of dead animals from one farm to another. Any man has a right to shoot a dog that is endangering his livestock in any way and if this right were used more often less disease would be spread or carried. When a contagious disease is in the neighborhood the dog should be tied up.

## Stockyards a Source of Infection

The ordinary public stockyards situated by the side of the railroad, of which there are thousands, are more or less continually infected with all sorts of contagious diseases. While it is against the law in most states, people are constantly taking animals out of these yards and placing them on their own farms.

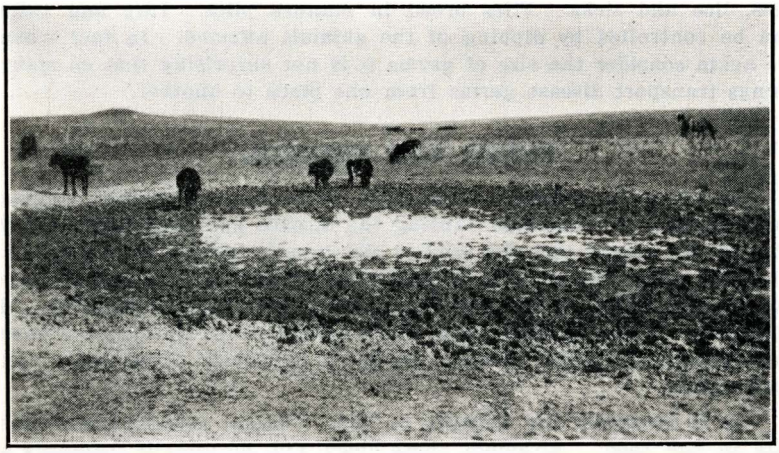
It is a practice in some localities for a stock buyer to sell brood sows out of these yards and wherever this practice is persisted in hog cholera will break out sooner or later, because all of these yards are infected with hog cholera. Many times bred cows are handled in the same way and as a result abortion disease is frequently spread to uninfected herds. Tuberculosis in cattle may be spread in the same manner. Sheep that are shipped long distances and then unloaded through stockyards frequently contract hemorrhagic septicemia.

When feeder stock is unloaded from cars it should be unloaded through a separate chute, apart from the stockyards. If closer supervision could be given the public stockyards, and the livestock that passes through them, less disease would be distributed into the country.

## Harbored Infection

Outbreaks of disease frequently occur as a result of the infection being held over on the same farm year after year. This is very characteristic of anthrax as this disease has been known to occur at intervals for 20 years on the same farm. Whenever an outbreak of anthrax occurs the animals should be confined to a small lot and as soon as an animal dies the carcass should be burned before the germs get a chance to form spores.

Blackleg is another disease which has this trait. The germs that cause these diseases are harbored in the soil, so if it is possible to plow the infected fields after an outbreak of either disease it will help to kill out the infection.



**In parts of the state such holes are the only source of water. A harboring place for germs.**

Probably a large number of outbreaks of hog cholera are started from the infection of a previous year being held over, therefore, the hog houses and hog lots should receive a thorough cleaning and disinfecting after an outbreak of hog cholera has abated.

The germs that cause tuberculosis in cattle, hogs and poultry are held over from year to year in dirty lots. Harbored infection plays an important part in starting outbreaks of disease.

## Miscellaneous Spread of Disease

Other means by which germs are carried are numerous. Birds of different kinds may carry contagious diseases. Crows and buzzards may carry hog cholera and about the only control is to properly dispose of all dead animals by burning so the carrion do not have a chance to work on the carcasses. Running streams may carry diseases like anthrax and hog cholera. Several outbreaks of anthrax have been known to follow streams. The exchange of farm machinery may lead to an outbreak of hog cholera. At some seasons of the year farmers frequently exchange work, for instance at threshing time, and outbreaks of hog cholera have been traced to threshing rings.

Whenever it is necessary to exchange work or machinery in a community that has any contagious disease present a thorough disinfection of shoes, wagon wheels, horses' feet, etc., should take place. Creolin or a compound solution of cresol should be used for this purpose.

Public highways are sometimes contaminated by livestock that is being driven to market. Some diseases may even be carried by

flies, lice and ticks. Flies breed in manure piles. Lice and ticks can be controlled by dipping of the animals affected. In fact when we again consider the size of germs it is not surprising that so many things transport disease germs from one place to another.

## FEEDS AND FEEDING

In about 90 percent of the cases of contagious diseases among farm animals the infection causing the disease has been taken in by way of the mouth and the food is the largest carrier of the germs. The food supply of animals is frequently contaminated and if it were not for the action of the digestive juices, many more animals would take sick. Some animals have more resistance to decomposed feed than others and some animals are more particular about their diet than others.

It is necessary for animals to have protein, carbohydrates and fats in the food. Although these need not necessarily balance, a certain amount of each is necessary to the health of the animal. However, if the ration is balanced, feeding is usually more efficient. If a hog is fed a straight corn diet, which is a high carboyhdrate diet, he would have a lower resistance to disease than if the corn were supplemented with a protein feed such as skimmilk. In order to prevent disease in animals, particular attention should be given to the cleanliness of food and to feeding a variety of foods in order to put the animal's body in the proper condition to ward off disease.

### Animal Foods

Milk is the most common food derived from animals and should receive special care. All cows should be tested for tuberculosis and if found to be affected should be slaughtered or otherwise properly disposed of. A cow that gives tubercular milk may give this disease to her calf or to the pigs or even to children that may drink the infected milk. If milk derived from cows that have not been tested for tuberculosis is used in the household it should be pasteurized or sterilized. Skimmilk is a very fine supplement to corn when fed to hogs and it makes very little difference whether it is fed sour or sweet, but one method should be selected and then followed as frequent changing may cause indigestion. Pail fed calves have less white scours when the milk is kept clean and the feeding utensils sterilized before each feeding. If abortion disease is in the herd the milk should be boiled before given to pregnant sows as this disease may be contagious from cattle to hogs. Milk if properly handled has a very important place in the fool supply of animals.

Tankage is another food derived from animals and is a packing house by-product. It is an excellent feed for hogs and there is no danger of it producing disease unless it is contaminated between the time it leaves the manufacturer and reaches the hog.

## Plant Foods

A majority of the food stuffs for animals are derived from plants. If plant food is properly cared for, very little trouble is caused from this kind of food. On the other hand if plant food becomes spoiled it may set up digestive disturbances. Mouldy or dusty hay is very irritating to the lungs of a horse. Spoiled ensilage may give diarrhea and thereby lower their resistance. Decomposed or rancid slops may give hogs indigestion. It is a mistake to give any food to animals that is spoiled or decomposed.

Corn is probably the most important feed. Corn can be fed to practically all livestock without injury in any way and if it is properly supplemented builds up the animal's body. Oats, wheat, hay of all kinds, grasses, etc., all have a place in the diet of animals and if to a certain extent, an animal is left to choose among these feeds he will pick out the best to build up his body.

Poisonous plants in pastures may cause trouble, but if sufficient food is provided otherwise, animals rarely eat poisonous plants. A disease known as forage poisoning may be derived from pastures and the exact cause is not known, therefore whenever this disease is recognized an immediate change of feed should take place. Actinomycosis or "lumpy jaw" in cattle is caused by the ray-fungus and this fungus grows on plants in the pasture and is taken into the animal's mouth on the plants. If any cattle are affected with actinomycosis they should be separated from the herd and not be allowed to run on pastures used by other cattle. So many feeds are raised that are good it does not seem necessary to feed spoiled food.

## Mineral Foods

Salt is essential to all farm animals. Ordinary barrel salt is the best to feed for the reason that an animal may have all the salt desired. Salt should not be mixed with the feed but should be fed in a separate feed box. If salt is mixed with the feed the animal may get either too much or too little and suffer as a result. It is not necessary to buy expensive condiments such as the ordinary "stock food," as very few animals need such a tonic but in case they do the material can be mixed at home at a much less cost.

The following government formula is as good as any:

| | |
|---|---|
| Wood charcoal | 1 pound |
| Sulphur | 1 pound |
| Sodium chloride | 2 pounds |
| Sodium bicarbonate | 2 pounds |
| Sodium hyposulphite | 2 pounds |
| Sodium sulphate | 1 pound |
| Antimony sulphide (black) | 1 pound |

Give one tablespoonful once a day on the feed.

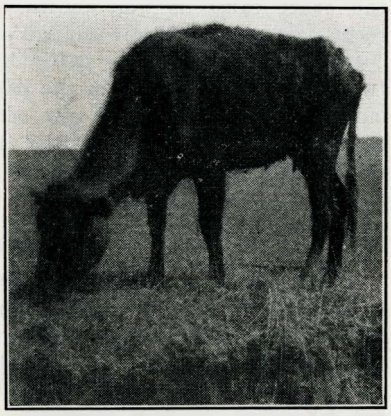
If the livestock have not been in the habit of eating salt it should be fed to them in graduated amounts until they become accustomed

to it as too much at one time may cause them to get sick. Animals that are not fed salt may become affected with rickets, especially hogs, which causes weak bones and paralysis; an animal that is affected with rickets is more subject to contagious diseases than a normal animal. Salt helps to build up the mineral content of the bones.

## Feeding

Feeding is the most important part of animal husbandry. It is far more important than any breed problem. More money is lost every year from improper feeding or the lack of feed than all the diseases put together. Animals that do not have enough to eat have a low resistance to disease. Hundreds of cases of hemorrhagic septicemia in cattle are due indirectly to a lack of feed. The idea prevails in some localities that if a critter barely lives through the winter that is all that is necessary and when the animal is turned on grass in the spring gains will be so rapid that all lost time will be made up. The idea is foolish and a herd in such condition is one of the finest of places for all the ills of cattledom to get started.

Horses that are half starved get lousy and hide-bound and in poor condition to do the spring work. Strangles and influenza work havoc in such a herd of horses. Hogs that do not have enough to eat are unthrifty and highly subject to disease. Sheep are in the same category and if not properly fed are fit subjects for all the parasitic diseases known to sheep. Let this point be emphasized, you cannot expect an animal to build up his body resistance against disease if you do not give him enough to eat.



**An emaciated cow. A fit subject for any infectious disease.**

## SOILS

Many different kinds of germs live in the soil and the most of these are of value in some way but the soil may harbor germs that cause disease. Very few if any, disease producing germs will multiply in the soil but will simply lie dormant until given a chance to get into the body of some animal. The germs that cause malignant edema, anthrax and tetanus are held in the soil for many years.

The pollution of soil takes place in various ways. The greatest danger of polluting soil is with manure taken from a barn or feed lot that has been contaminated with diseased animals. If barnyard

manure is hauled out and spread on the field in the fall of the year and left on top of the ground until spring, very little trouble will be caused by this source.

Necro-bacillosis—a disease mainly in pigs—is spread by the soil being contaminated with the feces of other hogs. If the carcasses of animals are not buried deeply they may contaminate the soil. The eggs of various worms that infest most of the livestock usually lie in the soil for a certain length of time until they are finally picked up by the animal. Sewerage from the house or barn may pollute the soil and make it dangerous to farm animals.

## WATER

From a sanitary standpoint water is either good or bad. In many instances one glance at the water will tell that it is not fit for use. Common sense should be used in judging the fitness of water as well as anything else. Samples of water are sent in to the laboratory for examination that are so badly polluted as to be dark in color and in some instances actually thick, when the evidence is in plain sight that the water is not fit for livestock to drink. On the other hand water may be polluted and show no evidence of it to the naked eye. Only water that is known to be good, that is free from contamination, should be used for the household or given to the farm animals.

Water plays a very important part in the body of the animal. In fact the animal's body is made up largely of water—from seventy to eighty percent. Water acts as a lubricant all through the body. It carries cells from one part of the body to another. It regulates the

**A fine example of what a barnyard ought not to be. The overflow from an artesian well is the cause.**

temperature of the animal. Probably the biggest thing that water does in keeping up the resistance of the body against disease is to eliminate waste products. Waste products are carried off through the skin, kidneys, breath and intestines. An animal should have all the water he wants to drink at all times and let it be clean.

Streams are a common source of water supply for farm animals and their fitness depend entirely on the source. Too many times they are contaminated before they arrive at the point of use. Hog cholera and anthrax have been known to be carried by running streams. When a contagious disease is known to exist in the neighborhood of the stream the livestock should not be allowed to drink out of the stream.

Sloughs and ponds are rarely a desirable source of water. They are usually thick with mud and decayed vegetable matter and are a place for germs to be harbored. Foot-rot in sheep and cattle is frequently caused by such places. Flukes that affect the liver may be in such water. Sloughs should be drained if possible, or fenced off.

Dams are the only source of water supply in some parts of the country and these may become polluted if not properly cared for. The basin above the dam should be kept free of all dead animals, manure or any other thing that might contaminate the water. The dam should be fenced and the stock allowed to drink only at one point or better the water could be pumped out of the dam into a sanitary trough.

Wells that are properly cared for are a very good source of water. Water that comes from an artesian well is not contaminated with germs in any way and can be considered free from disease germs. However, artesian water may contain some minerals that act as a laxative and in some cases a physic to livestock. The overflow from an artesian well should be controlled and not be allowed to develop a mud puddle in the barnyard. Hogs should not be allowed to drink out of such a mudhole as they may contract necro-bacillosis as a result.

A dug well is not as safe as an artesian well for the reason that there is more chance for the well to become polluted. Dug wells that are not properly covered are very easily polluted by surface water. Germs do not enter the soil to any great depth, probably not over four or five feet except in crevices and the most of them are within four or five inches of the top, therefore the popular idea that the water is polluted at the bottom of a dug well is a mistake. Dug wells are polluted from the top of the well. The curbing and covering of the dug well should be absolutely tight so that no surface water can get in or so that small animals may not fall in.

Springs are an excellent source of water supply. They should be curbed in and the overflow piped to the drinking trough, then the overflow should be carried away through a drain tile. The livestock

should not be allowed to drink out of the spring at the ploint where the water comes out of the ground.

If water is suspicioned of containing some mineral or poison, a sample (one gallon in a clean container) can be sent in to the laboratory for chemical examination. If it is suspicioned of containing germs that cause disease, a sample may be sent into the laboratory for miscroscopical examination.

**A hole dug in the ground for the collection of surface water. No other watering place was provided.**

## DISPOSAL OF MANURE, SEWAGE, GARBAGE AND OTHER WASTES

Every case of contagious disease is caused by the transfer of the infection of one animal to another and the main object of sanitation is to break this connection. In many cases of contagious diseases germs are thrown off by the millions in the feces and urine of the animals. The proper disposal of manure is important at any time but if a contagious disease exists on the farm it is of supreme importance. To be ideal, sanitation would require the hauling of the manure to the field every day but this is not usually practical on the average farm. However, after an outbreak of disease the manure should be hauled out and scattered on the field that is not used for livestock, as soon as possible.

Many modern farms have manure pits where the manure is held until a convenient time for hauling. The best manure pits are built of concrete and the size is considered according to the number of livestock; they all have a drain pipe to a cistern that collects the liquid manure.

The ordinary manure pile is dangerous as it is a breeding place for germs and insects. Flies lay their eggs in manure piles to hatch out and pester the livestock. Lice are harbored in manure piles. The eggs of various worms are held over from summer to summer in manure piles.

Many contagious diseases are spread through the feces of animals contaminating the feed of other animals. Tuberculosis affects hogs to the extent of about 20 percent and the most of this infection gets into the hog by his eating of the dung of cattle that are affected with this disease. White scours in calves is a disease that is held over from year to year in manure that collects about the place, and the manure that is gathered from calves that are affected with white scours should be burned. Manure is of great value as fertilizer when properly handled but if it is allowed to become a nuisance it may be the cause of immense loss of livestock.

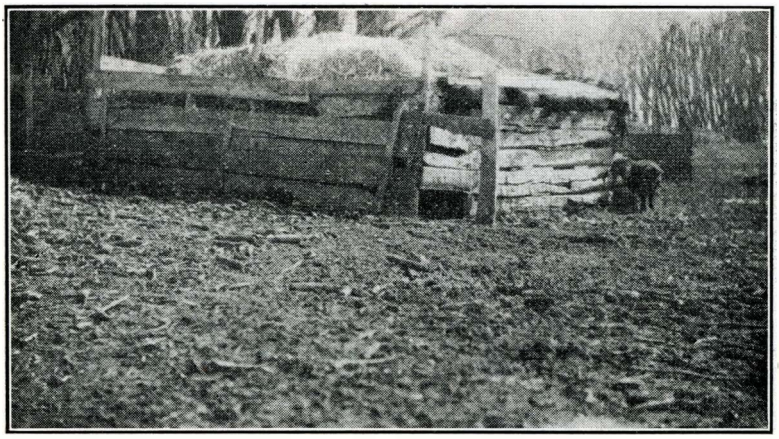
Sewerage collected from barns and barn lots may pollute the water supply and contaminate the soil near the farmstead. An ideal method of disposing of barnyard sewerage is to build a cistern for the collection of this material and when enough is collected let it be hauled out and sprinkled on the land; it is a very good fertilizer when used in this manner. From an economical standpoint a cistern will pay for itself in the improvement of the land. A cistern is usually built of concrete and made water-tight so that no seepage will take place. It is a great mistake to drain a barnlot into a nearby stream for the reason the stream may become contaminated and carry disease to the next farm below. Under no circumstances should the water from barns and barnlots be allowed to accumulate and develop into a filthy mudhole.

Sewerage from the house should be drained into a septic tank. A cesspool is not satisfactory as water that leaches out may pollute the water supply of the family and livestock. The open backed privy is a nuisance and should not be tolerated because the material that comes from this building may contaminate the food of animals and cause all sorts of disorders. Outhouses should be tight in order to keep out rats as these animals may carry disease.

Garbage collected from the house should be burned. This material collected in a swill barrel from day to day and allowed to decompose and afterwards fed to the hogs may cause intestinal disturbances that will lower the hogs' resistance to such an extent that they will be excellent subjects for hog cholera. Many times garbage will contain bits of raw pork and it is an absolute fact that hogs will take cholera from such material if the practice is persisted in. Dish water should not be put in a swill barrel as it contains soap and soap is injurious to the hog's stomach.

## FARM BUILDINGS

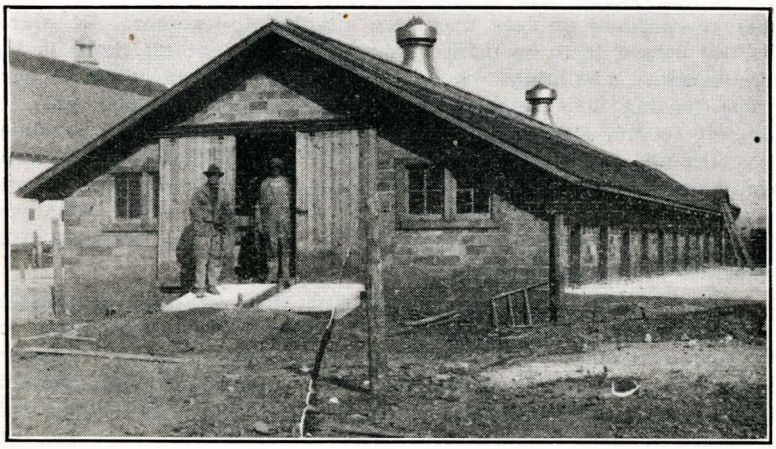
The location of farm buildings is important from a sanitary standpoint for the reason that if the proper drainage is not made



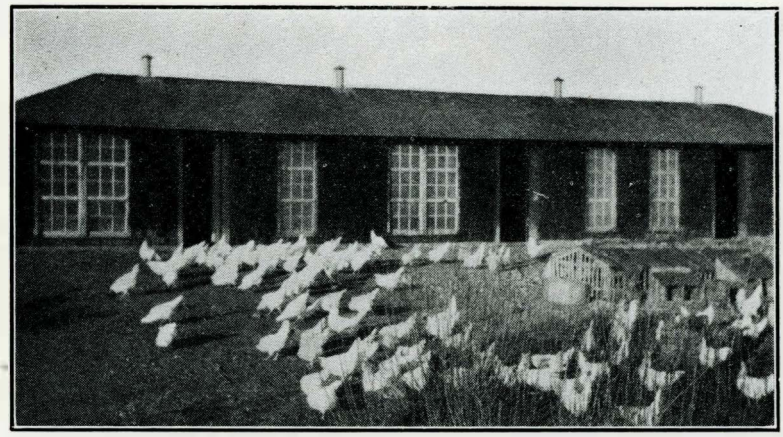
**"Ye old time hoghouse." Unsanitary, and the only possible method of disinfection is by the use of a match.**

possible, feed and water for the family and animals may become contaminated. Buildings should be located on ground with a gentle slope—preferably a southern slope.

The well should be dug or drilled on the highest point in the farmstead in order to prevent surface water from getting into it. The dwelling should be next in order, that is below the level of the well and above the level of other farm buildings. The barn, hog-house or any other building that houses livestock should not be located within 200 feet of the dwelling as many odors emanate from the barns that are offensive to people and sometimes dangerous.



**A sanitary hoghouse and a feeding floor to the side.**



**Contentment in the poultry yard. Clean surroundings and a well lighted, ventilated house.**

Farm buildings should be constructed with some idea of permanancy in the mind of the builder at the time of construction. The materials to be used should be durable and of the best quality. It may be necessary at times to construct temporary shelters for livestock such as a straw shed, but temporary buildings are usually hard to keep clean and in some instances become unsightly and a nuisance by harboring infectious diseases.

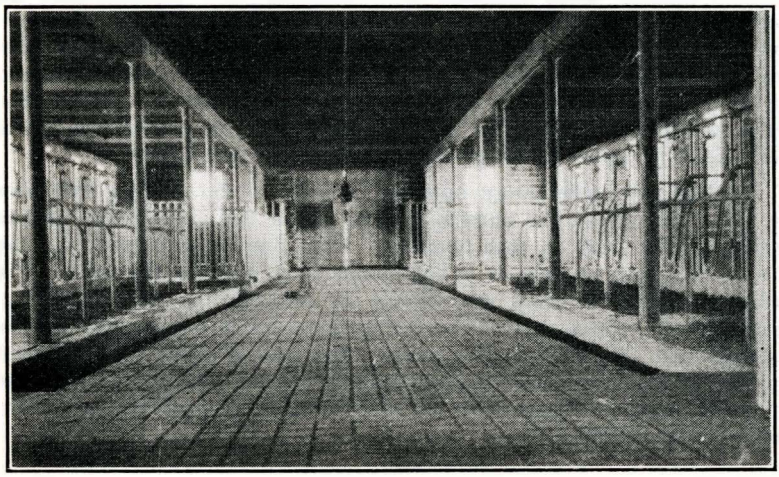
As a general thing it is better to set the farm buildings north and south with the fronts of the buildings lining up horizontally with the dwelling. This arrangement gives more protection to the feed lots in the winter and is convenient if found necessary, to run a high board fence or shed from one building to another. Of course the fire hazard is to be taken into consideration at all times in the arrangement of buildings. It has been found very convenient to have a hog feeding floor between the hog house and the corn crib. A concrete feeding floor is the most durable as well as being sanitary. Eave troughs and concrete gutters should be provided to carry away rain water. A few loads of gravel hauled into the lots adds greatly to the prevention of unsightly and unsanitary mud holes. Whatever the arrangement of the buildings may be, sunlight and drainage must always be given consideration.

Experiments show that a hog feeding floor will pay for itself in two years time in the saving of corn. It provides a clean place for the hogs to eat and when it becomes dirty is easily cleaned. Concrete is the best material for a floor but if this material is not available it does not necessarily mean that the feeding floor is not to be built as planks or brick may be used. Many pamphlets are available that will give instruction in detail concerning the construction of a feeding

floor. The base of the floor should be drained so that the floor will not bulge. The floor should not be laid exactly level but should slope about a quarter of an inch to the running foot. Many feeding floors have a rim around the edge to prevent the hog from pushing off the feed.

From the standpoint of health of both people and livestock, the interior construction and fixtures of farm buildings are very important. Milk that is produced in a dirty dairy barn or chickens that grow up in a dirty hen house do not create much of an appetite. It is not the intention here to advise everybody and anybody to buy the most expensive barn equipment because there is a limit to the overhead that a farm business can stand but from a sanitary standpoint, there is no question but what the modern barn equipment is far superior to the old method of making the mangers and stalls out of wood. Some barns are so constructed that it is impossible to keep them clean.

The fixtures in the dairy barn should be strong and yet take up little space. The lengths of the stalls should vary according to the length of the cows and this can be arranged for at the time the gutter is put in by making the gutter a little farther from the manger at one end of the barn. Concrete or some other material equally impervious to moisture is the only kind of a floor that is sanitary. A wooden floor is undesirable for the reason that cracks hold dirt and will harbor bacteria, insects and vermin. Some dairymen claim that concrete floors are not good for the cows, so they use a board floor in the stalls on top of the concrete and this method is sanitary if the false floors are frequently removed and thoroughly cleaned and



**Interior of sanitary barn. Note the concrete floor, gutters and litter carriers.**

disinfected. Any shelves or ledges should be gotten rid of if possible as these ledges will catch dust and dirt. An ideal dairy barn would have the top sealed and would not have a haymow above it.

The arrangement of the interior of the hog house is important in preventing diseases. The fixtures should be strong yet small enough not to exclude too much light or hold a large amount of dirt. Considering everything, concrete seems to be the most ideal for a hog house floor. It is cheap and it is sanitary. In the ordinary hog house with two rows of pens and a driveway between, the pen floors should drain to a gutter on either side of the driveway and the gutters should drain to the end of the hog house.

## Ventilation

The problem of ventilation arises owing to the necessity of housing animals in order to protect them from bad weather and to provide them with a place to rest and sleep. Whenever animals are housed in tight buildings the air is soon polluted by the breath of the animal and it is necessary to frequently supply fresh air without exposing the animal to drafts. An animal cannot get too much fresh air providing drafts are eliminated, because the air is never too pure. If the air were not changed it would soon become so foul that it would interfere with the health of the animal. The animal's resistance is lowered to all contagious diseases and it is hard for him to recover from some other illness. Furthermore, foul air may act as an incubator or breeding place for germs that cause disease.

One of the chief reasons that air moves is unequal temperature—the warm air moves up and cool air takes the place of the warm air. This is exactly what happens in a building—the animals give off warmth, causing the warm foul air to rise. The principal of ventilation is to make an outlet for the warm foul air and make an inlet for the cool pure air. Of course ventilation does not entirely depend on the warmth of the air inside of the building for the reason that wind pressure is a powerful ventilating force. But outlets and inlets both must be provided or no circulation of air will occur.

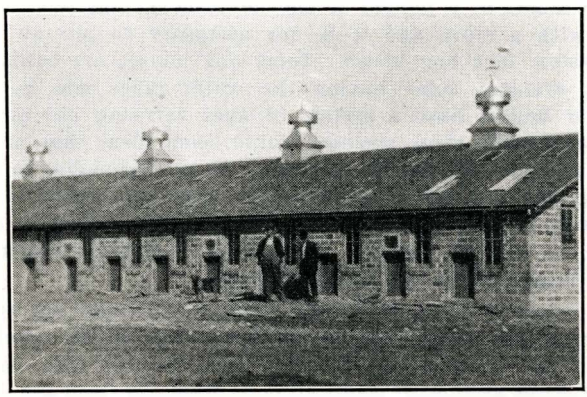
**Inlets and outlets**—An opening is made in the outside wall, two or three feet above the outside ground and a flue is attached on the inside of the wall to this opening. This flue extends well up the inside wall and in case of a hog house part way up the roof. The fresh air comes in from the outside up through the flue and is released in the upper part of the building where it falls gently on the animals and does not cause a draft. The size of these inlets depend on the number and size of the animals. Wind blowing at the rate of three miles an hour will let in 110 cubic feet of air for every square inch of inlet.

Collins' Table of amount of fresh air needed per animal:

| | Per hour Cu. Ft. | Lbs. | Per 24 hours Cu. Ft. |
|---|---|---|---|
| Horse | 141.7 | 272 | 3402 |
| Cow | 116.8 | 224 | 2804 |
| Pig | 46.0 | 89 | 1103 |
| Sheep | 30.2 | 58 | 726 |
| Man | 17.7 | 34 | 425 |
| Hen | 1.2 | 2 | 29 |

From this table can be figured the size of any inlet for any building housing livestock. Of course, it is better to have a number of small inlets than to have one great large inlet.

The outlets should have the same capacity as the inlets or if there is any difference the outlets should be a little larger. The common method of ventilating buildings is to place aerators on the ridge



**Hog house facing south. Notice King ventilating system and windows in the south.**

of the roof. There is no question about aerators taking out the foul air if they are of proper size but they take out considerable of the warmth at the same time. If a barn or hog house is well filled with stock it will make no difference but if only a few head are being housed it will make the building too cold in the winter.

A better method is to provide flues for the foul air to pass out. The flue is built on the same principle as a chimney taking the foul air from near the floor and carrying it out through the roof. This flue can be round or square and should be straight up—if any bends should be necessary the flue must be made larger and even then it will not be as satisfactory—extending from two feet above the floor

Note—This table taken from Extension Circular 31, S. Dak., by Ralph L. Patty.

to two feet above the roof. Foul air flues must be air-tight and non-conductors of heat and cold; if the flue passes through a haymow it must be insulated.

A happy medium in this proposition is to have registers in the flues up next to the roof, then, when the building is well filled with livestock the registers can be opened. These registers should be as large as a cross-section of the flue.

The plan as outlined for the ventilation of farm buildings, is known as the King system and is applicable to all buildings on the farm including poultry house.

## Heating

The heating of any farm building that houses livestock will always be a matter of difficulty owing to the expense. Furthermore, the necessity of heating with a few exceptions, is rather questionable. There are times in the spring of the year when a little heat in the hog house might be a benefit to the newly-born pigs but this can be provided with a stove and it is not necessary to put an elaborate heating system in a hog house. Some hog houses are equipped with hot water systems, some having the water pipes laid in the concrete, other houses have a system of flues carrying hot air through the floor and while these systems would seem ideal they are usually overdone and are not worth the cost. It is reasonable to keep the pigs warm and dry but when they are kept too warm it is worse than no heat at all. If they are pampered too much they lose their resistance to outdoor weather conditions. Artificial heating plants are not a huge success for farm buildings.

Body warmth given off by the animals will heat the house to a certain extent but should not be utilized to the fullest extent as the humidity of the air soon becomes very high and this must be avoided. When the King system of ventilation is used the foul air is pushed down by the fresh air and then passes out the flues. This method conserves a large part of the body warmth in the upper part of the building. Too much humidity caused by the breath of the animals is unquestionably the greatest evil in badly ventilated barns.

## Lighting

Too much importance cannot be placed on the lighting for the reason that light kills germs. Sunlight is the best disinfectant. While it is not the intention to have so many windows in farm buildings that they look like greenhouses, nevertheless it is important to have enough and very few farm buildings have enough. Horses and cattle should have three square feet of glass per animal, and hogs no less than one square foot.

The windows in farm buildings should be so placed that the sunlight can shine on the floor. Most of the disease germs are in the litter on the floor so that sunshine, if allowed to play on the floor,

instead of the walls, can kill these organisms. In horse and cow barns the windows should be placed in the walls while in hog barns the best results are obtained by placing the windows in the roof. In poultry houses the windows are best placed in the south walls. Sunlight provides warmth in farm buildings and helps to dry out the walls and floors of the buildings. By warming up the air it helps the circulation thereby improving ventilation. Sunlight is the best disinfectant and the cheapest.

## DISINFECTANTS AND DISINFECTION

Disinfectants or germicides are agents that kill bacteria or germs, especially those that cause diseases. A deodorant may remove disagreeable odors but not necessarily kill germs. Disinfectants are not cures for diseases but are intended to prevent the spread of disease by killing the germs. A good disinfectant is, therefore, intended to kill many or all of the disease germs and their spores as well. Some disinfectants are rather specific in their action in that they will kill some germs and not others.

### Physical Agents

Nature has provided a very powerful disinfectant in sunlight. The direct rays of the sun will kill many germs and allay the actions of others. If sunlight is passed through glass its disinfecting powers are somewhat lessened on account of the glass taking out some of the violet rays and glazed glass is worse than the plain. Sunlight has an oxidizing effect on germs or, in other words, burns them up. Sunlight also has a drying effect and germs do not live well where it is dry. The combination of sunlight and fresh air act as a powerful disinfectant.

Heat is also one of the valuable disinfectants. Heat as a disinfectant is applied either in dry or moist form. Dry heat is usually in the form of a flame and nothing is so successful in absolutely destroying germs as a good hot fire. Here we immediately see the importance of burning all trash, litter, etc., that accumulates about the lots and buildings during an outbreak of disease. An ordinary blow torch will come in handy in flaming some of the corners, especially for mites in the poultry house. There is a possible element of doubt in chemicals as a disinfectant but there can be no doubt if the germs and parasites are subjected to a flame. Shovels and forks, and other utensils, used in connection with an outbreak of anthrax, can be flamed and the germs killed. Curry combs used on mangy horses can be flamed without injury.

Boiling water, if momentarily applied, such as washing, is not disinfection but if anything such as instruments can be held in boiling water most of the germs will be killed in ten minutes. Boiling water becomes useful when combined with certain chemicals such as lye. Steam is an effective disinfectant if used under pressure.

The penetrating power of steam is very great and steam will reach many crevices that boiling water will not. Even haystacks can be disinfected with steam from an engine in extreme cases, such as an outbreak of foot and mouth disease.

Cold as a disinfectant is not a success but is mentioned here to correct a prevailing idea that freezing will kill germs. While freezing may slow the action of germs only a few are actually killed and cold weather can not be depended upon to stop the spread of disease. In fact some germs will live longer if kept on ice than if kept hot and dry.

## Chemical Disinfectants

**Washing Soda**—Washing soda (Sodium carbonate) is mainly used for a cleanser in connection with boiling water. While it has very little disinfecting power it has a place in washing utensils and floors.

**Lime**—Lime is used as a disinfectant in several forms. Fresh lime is used in the hog houses and other buildings by being thrown around or sprinkled on the walls, floors and ground in the lots. It is not detrimental to the manure, in fact it improves it, and has a tendency to make the soil unhealthy for germs. Freshly burned lime should always be used.

The most common form in which lime is used is in the form of whitewash. Whitewash acts as a very good medium for the application of disinfectants. Carbolic acid is very good to add to whitewash as a disinfectant used to the extent of 5 percent. If any of the coal-tar products are used the mixture should contain 3 to 4 percent of disinfectant. Whitewash is used most commonly in hog houses and poultry houses and makes a very good substitute for paint on the inside of a building. All surfaces should be dry when whitewash is applied. The application can be made either with a brush or spray pump. The following is a common formula for whitewash that will stick:

| | |
|---|---|
| Fresh burnt lime ..... | 1 bu. |
| Water ..... | 12 gals. |
| (Slake and strain) | |
| Common salt ..... | 2 lbs. |
| Sulphate of zinc ..... | 1 lb. |

Dissolve these two in two gallons of boiling water. Pour this into the slaked lime. Then add two gallons of skimmilk and mix thoroughly.

In some instances one pound of glue is sometimes dissolved in water and also added.

If a disinfectant, such as Kreso, is to be used add one-half gallon.

Chlorid of lime is made by exposing slaked lime to chlorin gas. This comes in the form of a white powder and must be kept free

from air until used. It is a powerful deodorant and is best used in outhouses. Six ounces of the powder is mixed with a gallon of water for use. It is not as good a disinfectant for barns as the coal-tar products.

**Potassium Permanganate**—Potassium permanganate, when dissolved in water, has very little place among disinfectants but becomes a very valuable aid to liberate formaldehyde gas. For disinfecting 1,000 cubic feet of space, 20 ounces of formaldehyde and 16 2/3 ounces of permanganate crystals are used. The permanganate crystals are placed in a pail on the floor of the room to be fumigated. The liquid formaldehyde is then poured on the crystals and the room is immediately closed and sealed. (Dorset.) Twelve hours should elapse before the gas is allowed to escape. This gas that is formed is poisonous and any person that attempts this procedure should thoroughly familiarize himself with these chemicals or better secure expert assistance.

**Bichloride of Mercury**—This chemical is also known as mercuric chloride or corrosive sublimate. It usually is made in the form of tablets and is usually used in the strength of 1 to 1,000. It is one of the strongest disinfectants known but has its disadvantages in that it corrodes metals and is an exceedingly poisonous substance. Great care should be taken with any of these tablets for the reason that if any tablets are taken internally it means sure death.

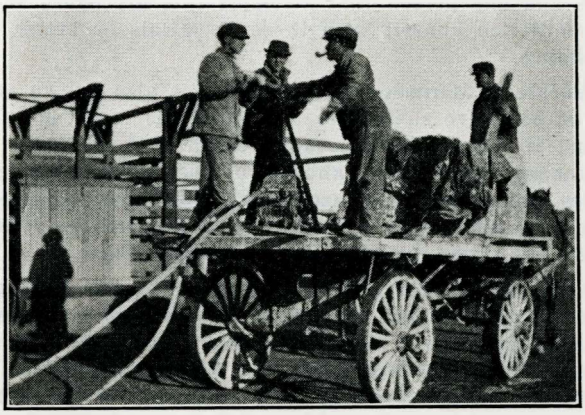
**Carbolic Acid**—This product if pure is in the form of crystals and is not a liquid. When carbolic acid is used as a disinfectant it is usually made up into a 5 percent solution. It can be used on metails or clothing without harming them in a 5 percent solution. However, this product is quite expensive. The so-called "crude carbolic acid" has very little real carbolic acid in it but is very widely used and is a very efficient disinfectant because it contains "Cresylic acid" which is the active principle.

**Cresol**—Probably there is no other disinfectant that can be as useful about the farm as this coal-tar product. While it is not often used in the pure form it is widely used in combination with soaps and oils in a large number of the common dips and disinfectants. It is a much better disinfetcant than carbolic acid. A good grade of cresol should be used as it mixes better with water than the lower grades. For ordinary disinfection around barns a 2 percent solution is very effective. A 2 percent solution of cresol is more effective than a 5 percent solution of carbolic acid.

**Compound Solution of Cresol**—This product is a combination of 50 percent cresol and a soap made of linseed oil and potash. When used a 4 percent solution is the most desirable. The big advantage over cresol is that it mixes better with water. Soft water is best. However, it is necessary to use twice as much of the compound solution as of the straight cresol.

The active principle of lysol and creolin is cresol (cresylic acid).

**Formaldehyde**—While formaldehyde is sold in both powder and liquid the powder is rarely used. The most common form used is the liquid which is supposed to be 40 percent pure and commonly called formalin. This product has an advantage in that it can be either used as a gas or liquid. The common method of using the liquid is make up a 5 percent solution in water using the formalin as the disinfectant. When this solution is sprinkled or sprayed it evaporates rapidly and forms a gas which has considerable disinfecting power. If a quick gas is desired for fumigating it is combined with potassium permanganate crystals. This was discussed under the heading of potassium permanganate. With the exception of bichloride of mercury this product is the most powerful of the common disinfectants.

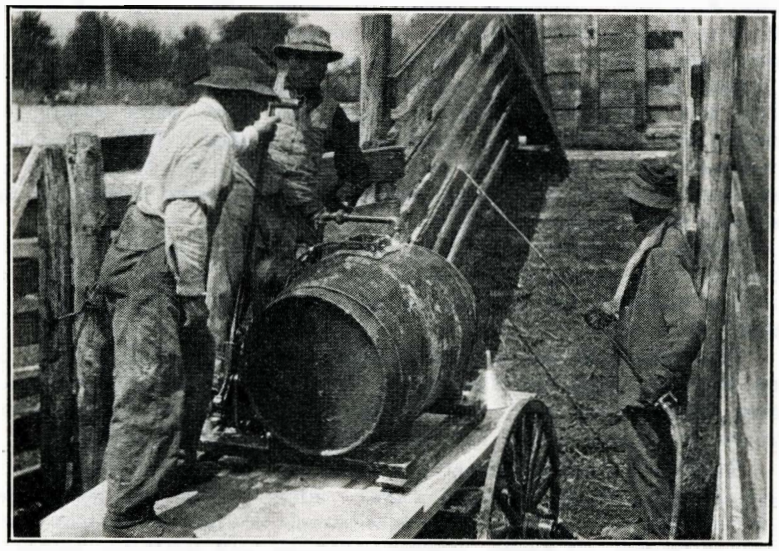


**Disinfecting Apparatus.**

## Disinfection

Even with the best of disinfectants being used and the frequent application of the same, many diseases will spread but these diseases will spread much faster if the precautions are not taken. All waste products thrown off from a sick animal are infected and these waste products must not be allowed to accumulate but must be immediately destroyed or rendered harmless.

Discharges from the nose, mouth and skin may be infective. The dung and urine are also dangerous. For instance the most common mode of transmission of tuberculosis from cattle to hogs is by the way of the dung. Discharges from the vagina, in a case of abortion disease, are infective. In order to prevent the carrying of these discharges to other parts or the buildings or lots, it is necessary for all persons and animals to be kept away from infected pens and stalls.



**A barrel pump disinfecting apparatus in use.**

A thorough cleaning is the first step in disinfection. Dry sweeping or dusting is dangerous on account of the germs in the dust and all surfaces should be wet down before sweeping or scraping. Depending upon the virulency of the disease the manure and bedding is either hauled out on ground that is to be plowed, where no animals can come in contact with these, or burned.

If it is necessary to disinfect manure and bedding this can be done by a free application of fresh burnt lime. Formaldehyde can also be used and is very rapid in action. This is also very effective in the disinfection of urine.

Eating utensils such as feed troughs, parts, etc., must be scalded with boiling water. The addition of lye to the scalding water is an improvement but it will then be necessary to rinse the utensils with water alone.

The disinfection of farm buildings is a very difficult task and requires the application of all the resources for disinfecting purposes. The organic matter that collects in the crevices of stables and hog houses is very difficult to get at. Furthermore, some germs, like anthrax, form spores and these spores are difficult to kill. To properly disinfect a building the first step is fumigation. This is carried out by the formaldehyde-potassium permanganate method, as described under "Disinfectants." Then remove all articles in the stable that are to be disinfected. All blankets and robes can be immersed in bichloride solution or steamed. Pails, curry combs, brushes, forks, etc., are to be washed with a cresol solution and, if possible, be

allowed to soak. Harness should be washed with soap and water and dipped in a cresol solution. All manure and bedding to be removed and burned. The stable must now be thoroughly soaked with a strong solution of cresol which can be applied by a spray pump. After this thorough soaking the floors and dirty walls should be scraped and all the debris taken out and burned. Then wash all woodwork with hot lye water. After the building is aired out for a few days a coat of whitewash should be applied—the whitewash to be made from fresh burnt lime.

There is a great tendency on the part of farm owners to try to cover up dirt instead of taking it out. It is of utmost importance to do a thorough job of cleaning after which the whitewash is applied.

The ground in the immediate vicinity of the building, such as a hog pen, may need some attention. Take the coating of cobs and other litter off and burn. Then apply a sprinkling of lime. After the sun is given a chance turn the ground over with a plow.

To disinfect a well, throw in about a half barrel of freshly burnt lime and then scrub down the walls. Pump this out and allow the well to refill. Throw the other half barrel of lime in the well and allow it to stay 24 hours. Pump out again and continue pumping until the water is free of lime and ready to use.

## HYGIENE

Even though precautions are taken in protecting the water supply, disposing of sewage, destroying germs by disinfection, and the many other safeguards, to prevent the spread of disease, the animal's resistance must be kept up by proper care and diet. Absolute cleanliness, a reasonable diet and the proper amount of exercise is hygiene in connection with livestock.

It should hardly be necessary to impress owners of livestock with the need of keeping animals clean. What is more repulsive than to look at cows with their sides covered with manure and then think of drinking the milk from those cows? Can it be possible for young pigs to nurse from a sow that is covered with mud and be able to resist all that infection in their young lives? Dairy cows should be kept as clean as possible. The hair should be clipped from the animal in the region of the udder and if dirty the udder washed and dried before milking, otherwise wipe the udder with a damp cloth. All mud wallows should be eliminated. If it is necessary for a hog to have a bath then a concrete wallow should be furnished—one that is readily cleaned and provided with a drain.

Regulation of diet is important in keeping up the animal's resistance to disease. Feeding hours should be set and then a strict adherence kept to them. No general rules can be laid down on account of different conditions, but suffice to say that regularity in feeding means less susceptibility to disease.

For the repair of the daily wear and tear of work animals a period of rest is indispensible. Horses should be allowed at least one hour during midday and an hour and a half would be better. This extra half hour will be made up in increased amount of work during the day.

Exercise is all important. An animal can not be kept in a stall or pen day after day without exercise and be expected to resist diseases or organic troubles. When an animal receives exercise the heart beats more rapidly and more blood is sent through the body and the lungs have a chance to purify the blood faster. When the circulation is increased the skin is better supplied and throws off waste products in the form of sweat which relieves the kidneys and lungs. The amount of urine is lessened because more of the water and waste passes off through the skin and this relieves the kidneys.

## INFECTION, SUSCEPTIBILITY AND IMMUNITY

The causes of infectious diseases are mostly germs but some may be caused by protozoa. Germs that may not be seen by a high-powered miscroscope are called filterable viruses. While it has been frequently stated that germs cause disease, in a strict sense this is not true as the toxins or poisons thrown off by the germs are the real cause of the trouble but from a sanitary standpoint it is only necessary to know that germs cause disease. When germs are introduced into a favorable host they multiply and increase in number which is very different from a poison.

Most of the germs enter the bodies of animals by way of mouth on contaminated food. Some may enter by way of the nose and even some enter through the skin--for instance the blackleg germ.

All contagious diseases are infectious but not all infectious diseases are contagious. Tuberculosis is both infectious and contagious but tentanus is only infectious. Considerable confusion has arisen over the two terms. It would be better to drop the word contagious entirely. Every infectious disease has its own peculiar way of transmission anyway.

### Susceptibility

Not all animals that are exposed to disease will take sick as a result while they may all be susceptible, that susceptibility is in a varying degree in each animal. A dozen hogs may be exposed to hog cholera at the same time but only one of them take sick at first, but when the first hog takes sick he increases the amount of exposure and finally all of the hogs take sick. Generally the number of germs entering an animal's body has something to do with the exposure, but on the other hand it may take a large number to infect some animal and only a small number to infect another. Susceptibility of an animal is influenced by many conditions such as age, condition, fatigue, weather and hereditary predisposition.

## Immunity

An animal that will not take a disease is immune. A man is immune to hog cholera. Immunity may be either natural or acquired. A man is naturally immune to hog cholera. After a hog recovers from hog cholera he has an acquired immunity to that disease. An acquired immunity may be active or passive. If a man recovers from smallpox he has an active acquired immunity. If a hog is vaccinated with serum alone against hog cholera he has a passive acquired immunity, as the immunity lasts only four to six weeks. The theory of immunity is too complicated to be discussed in this bulletin.

# COMMON INFECTIOUS DISEASES

## Tuberculosis

This disease is common in cattle, hogs and poultry. It is caused by the bacillus of tuberculosis. There are three main types of this organism, namely, human, bovine and avian. The disease is extremely widespread in the United States, affecting cattle to the extent of five percent, hogs 20 percent and poultry 35 percent. This will stand for South Dakota as well, with the exception of hogs which will run about 5 percent more.

The symptoms of tuberculosis are similar in most animals. nearly all cases are of a chronic nature and the disease progresses slowly. In the last stages the animal becomes emaciated, breathes with difficulty, possibly having a slight fever and generally dies a lingering death.

Preventive measures consist of finding the sources of infection and eradicating them. The most important step in the eradication of tuberculosis from animals is the testing of cattle with one of the various forms of tuberculin tests. These tests are carried on by veterinarians, both official and practicing, and when that animal is found to be affected with the disease the animal is destroyed.

Detailed information concerning accredited herd work may be secured from the State Livestock Sanitary Board. Most of the hogs contract the disease from tuberculosis cattle and after the disease is eradicated in cattle a big step is taken in eradicating the disease from hogs. A tuberculin test may also be applied to hogs.

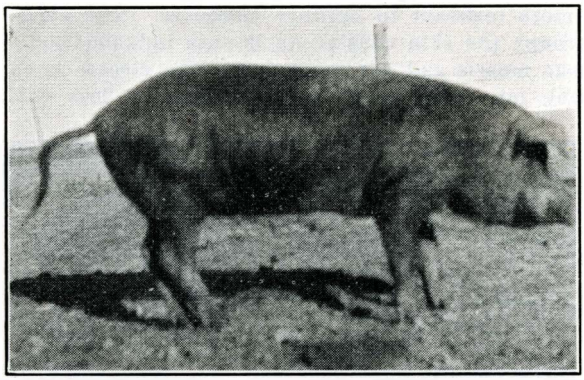
Eradication of the disease in poultry consists of marketing all poultry that is well and destroying those that are sick. The poultry houses are then cleaned and disinfected, according to instructions as laid down in this bulletin, after which a new flock is started by the use of an incubator.

## Hog Cholera

This disease stands next to tuberculosis in the cause of extensive losses of the livestock industry. Every hog raising state in the union

has more or less hog cholera. Losses each year vary from three to seventy-five million dollars. The disease is caused by a filtrable virus and is usually helped along by some predisposing condition, such as improper feeding, care and management.

Hog cholera usually occurs in three main types called severe, acute and chronic. The acute type is the most common and is char-



**The characteristic pose of a hog affected with cholera.**

acterized by a high fever, diarrhea, cough, emaciation, weakness and death in six or eight days. The disease goes through the herd rapidly.

Preventive measures consist of extreme sanitary measures and the immunization with anti hog cholera serum. Hemorrhagic septicemia of hogs, as far as the writer is concerned, is considered a complication of hog cholera and of secondary nature.

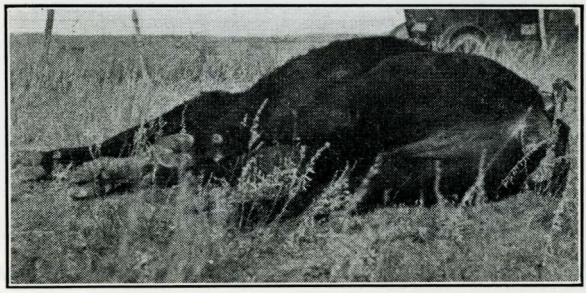
## Infectious Abortion

Infectious abortion is a disease that is causing an extensive loss to both the cattle and hog industry. While not as much research has been done on this disease as should be, however it is now conceded by most authorities that this disease is caused by the bacillus of Bang. The most recent work by the various authorities leads us to believe that the disease is spread by contaminated feed, especially in cattle, and not necessarily through breeding operations.

The symptoms of the disease in cattle and hogs are similar. Premature birth of the young is the most characteristic symptom. While there are several bacterins and vaccines on the market that are still in the experimental stage the control of this disease depends almost entirely upon sanitary measures. The destruction of all dead calves and pigs, by burying, is very important. Care should be taken to not introduce into a clean herd any bred animals that are suspicioned as coming from a herd that is infected with this disease.

## Blackleg

This is a highly infectious disease, mainly of cattle and occurs more frequently in the section between the Mississippi River and the Rocky Mountains than in other parts of the United States. While sheep may be affected it is rather rare. Blackleg is caused by the bacillus of blackleg. It has the power of forming a spore which makes it more resistant to sanitary measures. The germs enter the animal through the skin causing an intense inflammation, destruction of the tissue muscle and gas formation. The disease is characterized by attacking fat, young stuff that is taking on flesh rapidly. It is



**Dead with blackleg. Notice characteristic position of left hind leg.**

more prevalent in the spring of the year than at any other season. The animal becomes lean in the quarter affected, gets down within a few hours and is generally dead within thirty-six hours after taking sick.

Prevention consists of moving the cattle to new territory and vaccinating them with one or other of the various blackleg vaccines on the market. All dead animals must be destroyed in order to prevent the harboring of the germs.

## Anthrax

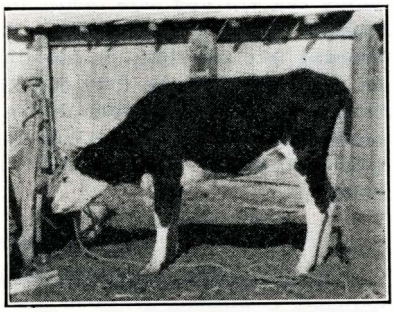
All animals may be affected with the exception of birds and from this standpoint this disease becomes extremely important. While it does not occur so frequently as other diseases the fact that human beings are susceptible makes the disease dangerous to the district in which the outbreak does occur. The disease is caused by the anthrax bacillus and this germ has the power of forming a spore which makes it one of the most resistant germs to disinfectants in existence. The disease will affect an animal at any age or in any condition. It occurs more frequently after floods or washouts in the spring of the year and it is frequently carried by streams. It produces a high fever, some swellings about the body, in some instances a bloody diarrhea, and while some cases may linger along and finally recover most of the cases will die in two or three days. All sanitary precau-

tions possible should be given consideration and carried into action in connection with this disease. Anthrax can be controlled to a certain extent by vaccination but the most important thing in preventing the spread of this disease is the burning of the dead animals, as the spores of this disease may live in the ground for twenty years. The germs are easily killed before getting into the spore stage, but are quite resistant after that. Destruction by fire is the best method of killing anthrax germs.

## Hemorrhagic Septicemia

Hemorrhagic septicemia, as affecting cattle and sheep, is of considerable importance. In the beginning of an outbreak it is generally considered a secondary disease, but with the increase of virulency it may become a primary disease. When sheep or cattle are affected with hemorrhagic septicemia they usually have been exposed to some unusual condition that has lowered their resistance, such as long shipments, bad storms or lack of feed.

The symptoms are a fever, difficult breathing, bloody diarrhea, and about fifty percent will die. Considering the characteristics of the disease, it can readily be seen that most outbreaks can be prevented by proper feed, care and management. After the disease is once started the animals may be given a bacterin with considerable results and also they must be given improved care.



**A cow affected with Hemorrhagic Septicemia. This disease generally occurs after animal's resistance has been lowered by outside conditions**

## Necro-bacillosis of Hogs

Necro-bacillosis is a very common disease in young pigs that is caused by the necrophorus bacillus. This disease causes an extensive loss to the pig industry and in some states it causes a greater loss than does hog cholera. It occurs in several different forms, the main form being sore mouth, bullnose, skin form and necrotic enteritis.

Preventive measures consist of eliminating all hog wallows and putting the small pigs out on clean pastures free from infection and keeping them out entirely away from permanent hog lots. There is no vaccination for this disease that is out of the experimental stage. Constant sanitary precautions are necessary at all times to keep this disease out of a herd of hogs.

## Actinomycosis or Lumpy Jaw

This is a common disease in cattle and in some instances in hogs, but it is not caused by a germ. It is caused by what is known

as the ray fungus and is not an infectious disease. That is it does not spread directly from one animal to another. It is characterized by large abscesses that form in the various organs of the body and contain a very characteristic white pus. These abscess formations occur more frequently on the lower jaw than on any other organ.

The sanitary precautions to be considered are to keep all animals isolated that have a discharging abscess. If an animal is allowed to run on pasture when affected with a discharging abscess a wide outbreak of actinomycosis might be expected the following year. It is necessary for this fungus to pass part of its life history on a plant.

## Poultry Roup

This disease is an infectious catarrh closely resembling a case of influenza in larger animals. It is caused by a germ but this germ has as yet not been isolated. The disease affects the membranes lining the eye and sacs below the eye; the nostrils; the larynx; the trachea. It is attended with a high fever. The disease is generally brought into the flock by new infected birds. The sick birds should be removed from the flock and put into a warm, dry well ventilated room which is free from drafts. Treat the affected mucous membranes by the use of some common antiseptic. If the disease becomes wide-spread kill off the flock and clean and disinfect the poultry house.

## Fowl Cholera

Fowl cholera is an infectious disease and belongs to the hemorrhagic septicemia group of diseases. It is caused by a germ known as bacterium avisepticum. It is carried from flock to flock by sick birds, persons or animals, which have been on infected premises. It is characterized by a very profuse yellowish diarrhea. The bird becomes very weak, drowsy, often sleepy. Finally the disease usually results in death.

The treatment of the affected birds is only futile. The aim should be to prevent as far as possible the spread of infection. All birds affected should be immediately destroyed by burning. Houses and runs should be thoroughly cleaned and disinfected, according to instructions previously given in this bulletin.

# INSECTS

## Flies

Biting and sucking flies worry all animals, horses and cattle especially, even the presence of the flies is a nuisance. Beyond a doubt flies may carry diseases and the common house fly is probably the most important.

Flies are born in filth and then spend their lives flying back and forth from filth to food. Filth contains all kinds of germs and flies

carry these germs to food. Manure and decaying animal or vegetable matter are the hatching places of flies. Horse manure appears to be the outstanding breeding place of flies.

Protection against flies should be directed toward the proper disposal of manure. In order to prevent this breeding place the manure should be covered or hauled out every day, especially in fly season. Adult flies can be trapped and destroyed. Animals should be reasonably protected against flies. Extreme precautions should be taken to protect human food.

## Mites

Mange mites are skin parasites, that is, they live on scales and exudates of the skin. A new generation occurs within four weeks with most forms. While these mites are not all the same, they all belong to the same family. They cause scabies in sheep and cattle and mange in horses and hogs. The animals lose hair or wool and scratch on account of intense itching. Emaciation finally takes place and the animal may weaken and die. There is some difference in the mode of life on each animal so that detailed methods of treatment cannot be discussed here. Suffice to say that lime and sulphur and nicotine dips are used for treatment. Prevent mange by seeing that no infested animals are introduced into your clean herd.

**Dipping cattle for scabies and lice.**

## Ticks

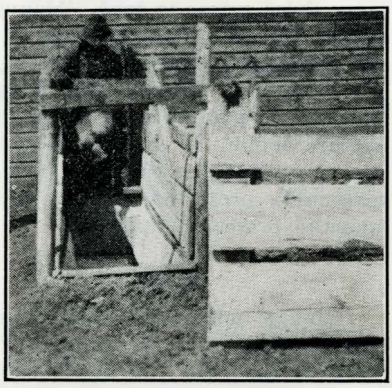
In some parts of the United States the tick proposition is extremely important, especially in the south, but in South Dakota about the only trouble that is caused by ticks occurs in sheep. It is easy to suggest measures for the eradication of ticks but very difficult to put them into effect. These ticks drop on the ground and stay until another host comes along. They will not live over ten months so that if an infested pasture or field is not used for a year the ticks all die. Burning off the land kills a great many of them. Plowing of the land of course kills them also. Ticks can be destroyed on the animals by dipping with arsenical dips. Coal-tar dips are used in some cases for sheep ticks.

## Lice

There are two common types of lice, but since their life cycle is the same it is only necessary to consider them in a group. Lice lay

their eggs on the animal, and these eggs hatch out in about ten days. A common louse only lives about four weeks. All domestic animals are subject to infestation.

Any of the common coal-tar dips will kill lice, and cattle, sheep and hogs, even poultry, may be dipped at intervals of ten days. In order to avoid pneumonia a winter application for lice can be made of equal parts of ground sabadilla seed and sulphur. Clipping and hand application will usually kill all the lice on horses. All infested pens and stalls to be thoroughly cleaned.



**Illustrating a dipping tank for hogs. Effectively used in controlling mange and lice.**

## Mosquitoes

While mosquitoes are of no great consequence to livestock in South Dakota they are pretty much of a nuisance to the human family and may carry diseases. Mosquitoes can be controlled by eliminating the breeding places. They breed in stagnant water, such as sloughs, mudholes, ponds and rain water barrels. Slougs and ponds can be drained or covered with oil. Rain water barrels can be covered with fine screen.

## STATE LIVESTOCK SANITARY BOARD

The South Dakota State Livestock Sanitary Board is composed of three verterinarians and two livestock men. One of the veterinarians acts as superintendent and state veterinarian. This Board is appointed by the governor. The purpose of this Board is to protect the health of the domestic animals of the state. Activities are carried on toward the prevention, control and eradication of infectious diseases of animals wherever possible. The Board is given the power of quarantine of any animal that is affected or exposed to an infectious disease and under certain circumstances these animals may be killed and properly disposed of The Board has the power to exclude from the state any animals which may be affected or exposed to contagious diseases, so that the various diseases may not be brought into the state

The Board has the power of employing veterinarians to assist in this work and employs a staff of field veterinarians for carrying out the provisions of the sanitary laws of the state, such as the investigation of outbreaks of disease, testing cattle for tuberculosis, testing horses for glanders and advising owners of the proper method

of procedure in dealing with these diseases. The Board also has the power of appointing deputy state veterinarians and these are local practitioners throughout the state. These veterinarians are called upon to do state work when the occasion arises. A copy of the complete rules and regulations of the Livestock Sanitary Board can be secured by communicating with them at Pierre, South Dakota.

Space is not available in this bulletin for details concerning the livestock sanitary laws in this state, but it is thought advisable to give the regulations concerning the burial of dead animals, which is as follows:

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## Burial of Dead Animals

### Duty of Superintendent

**Section 7684.** Whenever it shall be brought to the knowledge of the Superintendent of the County Board of Health that the dead, putrid or decaying body of any animal is unburied in his county and is or may become offensive, or endangers or may endanger the health of persons or domestic animals, such Superintendent shall forthwith notify the person who was at the time of its death the owner of such animal, and also the person who was at such time in charge thereof, if known to him and residing in the county, to bury such body, within a reasonable time to be fixed by the Superintendent.

### Owner's Failure

**Section 7685.** If the owner and person in charge shall fail, neglect or refuse to bury such body, within the time required by the Superintendent, or if such persons are unknown to the Superintendent, or do not reside in the county, the Superintendent shall at once cause the same to be buried, and the expenses of such burial shall be paid by the county.

### Owner's Liability

**Section 7686.** The owner of such animal and the person in charge of the same shall at once become liable to the county for the costs and expenses of such burial and notice, and the same may be recovered in an action to be instituted against both or either of such persons.

### States Attorney's Duty

**Section 7687.** Whenever any such dead body shall be buried by order of the Superintendent of the County Board of Health, such Superintendent shall at once inform the States Attorney of the fact of such burial, the cost and expenses of such burial and notice, and the names of the owner and person in charge, if known, and the States Attorney shall at once institute an action in the proper court on behalf of the county against such persons.

### Manner of Burial

**Section 7688.** The burial provided for above shall be done effectively and thoroughly so that the body shall not emit any stench or be offensive, or in any way endanger the health of persons or domestic animals.

### Chairman Township Board May Act

**Section 7689.** Whenever the Superintendent of the County Board of Health is not present in any organized civil township, the Chairman of the Board of Supervisors of such township may act in his place and may perform in such township all of the acts directed to be performed by the Superintendent; provided, that nothing herein contained shall divest the Superintendent of his authority to act in any of the cases arising under the provisions of this article.

### Violation—Penalty

**Section 7690.** Whenever the owner or person in charge of any unburied dead animal shall fail to bury or cause the same to be buried, when required as provided in this article, he shall be deemed guilty of a misdemeanor and upon conviction thereof shall be punished by a fine of ten dollars for each dead body so left unburied.

## Livestock Shipping Requirements
**(Condensed)**

### Horses, Mules and Asses

Health Certificate. Stallions and jacks, special certificate of soundness and health on forms furnished by South Dakota board.

### Cattle

Bulls and female cattle over six months old, health certificate, including tuberculin test or state or federal accredited herd certificate. Range bulls and female cattle for range purposes, if from either of the states of Arizona, New Mexico, Texas, Utah, Colorado, Idaho, Montana, Wyoming or Nevada, or from Kansas or Nebraska west of the one hundredth meridian, or from other territory practically free from tuberculosis, may be brought in without tuberculin test if accompanied by permit from Livestock Sanitary Board of South Dakota. All others, except for immediate slaughter, health certificate.

### Swine

Except for immediate slaughter, health certificate and must be transported in crates or cleaned and disinfected cars and must not be permitted in, or loaded through any stockyards, unless immunized and disinfected under state or federal supervision, and shipped into quarantine at destination for a period of three weeks after immunizing. Swine for Belle Fourche Irrigation Project area must be shipped into quarantine for three weeks.

### Sheep

Health certificate. All pure bred sheep for breeding purposes must be accompanied by certificate showing that they have been dipped twice at intervals of ten days within thirty days of date of shipment in an approved dip.

### Who May Inspect

Veterinarians authorized by the state of origin and approved by the United States Bureau of Animal Industry to apply the tuberculin test or by a veterinary inspector of the bureau at public stock yards or other regular bureau station.

Official. State Livestock Sanitary Board, Pierre, South Dakota.

## Quarantine

This means the isolation of a sick herd. It is one of the most important and necessary methods of controlling the spread of animal diseases. Since the isolation of sick and exposed animals is so extremely important, it therefore, should be complete and thorough. Laxity in quarantine is dangerous as it leads to an assurance which is dangerous. Not only the sick animals should be isolated but all other work animals, attendants, wagons, etc., should not be allowed to travel between herds.

If possible the caretaker of the sick animals should not go near the well animals. When necessary for the same person to look after both sick and well he should change clothes and clean and disinfect the shoes between herds. Disease is spread in many instances by people thoughtlessly traveling from infected herds to well herds. A herd may be quarantined and yet the dog allowed to run anywhere and everywhere. The dogs should be tied up on farms that have diseased animals. All the neighbors should be notified of the existence of the disease and a notification sign placed on the front gate. The laws concerning quarantine should be followed in spirit as well as letter.

The following is a part of the quarantine law in South Dakota:

**General Powers—Quarantine**

**Section 8065.** Such Board shall have power to take all such measures as it may deem necessary to control, suppress and eradicate all contagious, infectious, epidemic and communicable diseases among the domestic animals of this state; to regulate or prohibit the arrival or departure from or removal from one to any other portion of the state of any such infected or exposed animals and at the cost of the owner thereof to detain any such animal found in violation of the provisions of this chapter or any order, rule or regulation of such board; to quarantine any city, town, civil township or county in the state, and any stall, enclosure, barn, stable or buildings of any domestic animals therein, which may be infected with any contagious, infectious, epidemic or communicable disease, or which has been exposed to infection therefrom or which is infected with insects or any other means by which any such disease is communicated; to make such orders as it may deem necessary for the proper control, suppression and eradication of any such disease; and to kill any animal so affected when any such disease is determined to be incurable; provided that written notice shall be given to the owner or keeper of any livestock of the establishment of any quarantine as to such livestock.

## DISPOSAL OF CARCASSES

Probably no other thing is of as great importance as the proper disposal of dead animals. In some parts of this state this proposition receives but little attention. It is a common sight on the western prairies to see dead animals lying in the open with no attempt whatever being made to properly dispose of them. They are left to be eaten by coyotes, dried up and blown away or washed into the creeks and rivers and may act as a great source of infection. There are extreme dangers in cases of anthrax and blackleg. When this material is washed into the watering places it is a very common means of spreading disease to other livestock. A dead animal is the biggest source of infection that exists and it will never be possible to eradicate diseases until more attention is given this problem.

The burial of dead animals is quite satisfactory if properly carried out but it is an extremely difficult matter to induce people to bury animals deep enough. Too many times these animals are covered only with a thin layer of dirt and the legs are allowed to stick out. This is not the proper method of burial as it allows various animals to dig up these carcasses and carry parts of them from one farm to another. If an animal has died of a contagious disease, such as anthrax, the grave in which he is buried should be deep enough that six feet of dirt is on top of the animal. Before filling in the grave a half barrel of fresh lime should be put on top of the carcass. Then the dirt thrown in. It may not be so important to get these carcasses so far into the ground in some other conditions but it is extremely important when the disease is infectious. However burial is not the most satisfactory method of disposing of dead animals.

### Rendering Plants

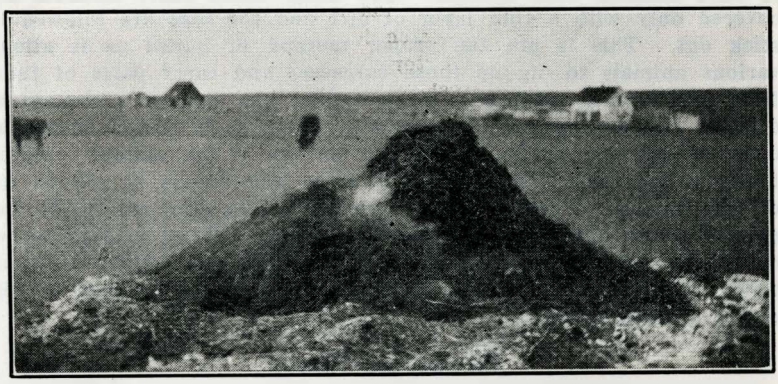
Various rendering plants have been springing up over the country for the purpose of collecting carcasses and producing tankage.

There seems to be a prevailing idea that considerable money can be made from this proposition. However it has been noticed that most of these plants last only a season or two. They are to be discouraged for the reason that they are not the safest way to dispose of dead animals. While it is presumed that with extreme precautions it can be done, the practice teaches us to look upon it with suspicion. In these rendering plants the carcasses are generally skinned and the hides are saved for tanning. In the cases of contagious diseases this is a dangerous procedure, especially so in cases of anthrax. Some sort of a system of inspection should be worked out so that these rendering plants may be given supervision and not be given a chance to act as a source of infection for contagious diseases.

If the transportation of carcasses is permitted over public highways special equipment is necessary. Special tank wagons should be used that are absolutely water-tight. They should be thoroughly cleaned out after every load and then washed with a strong disinfectant solution. Not only the inside of the wagon but the wheels as well should be disinfected. It is positively known that cases of hog cholera have been carried from one farm to another on wagon wheels.

## Burning

Burning or cremating of a dead animal is the best possible disposition. When an animal dies of an infectiou disease its body is literally alive with the germ that caused the disease. When this body is burned to ashes every germ is killed and this is the best method known to kill every germ in that body before the germ has a chance to get into the soil. Cattle and horses may be cremated as well as smaller animals if a little time, work and patience is given to this procedure. Cattle can be burned by using several different methods. Some people claim that it is not possible to burn such large animals, others claim there is no fuel available, while others claim



**What seems to be only a burning manure pile is really a crematory. A carcass is being burned by the manure method.**

**A fine example of unsuccessful burning by piling straw on top of carcasses.**

that the fire is dangerous to the prairies and farm buildings. All these conditions may be overcome if the owner really feels the necessity of burning the dead animal.

Cattle and horses may be burned by the use of kerosene alone. Kerosene can be applied with a spray pump and for the ordinary range steer it will take about 20 gallons. For horses it will usually take about 40 gallons. This may seem expensive and probably is, but no expense should be spared in such cases as anthrax. However, this is not the cheapest method to burn up an animal but can be used when no other fuel is available. In burning large animals the first thing that should be done is to provide a firebreak by plowing around the animal. A trench is then dug a little longer than the animal and about 18 inches wide and 18 inches deep. Fill this trench with hay or straw. Pour about one-half gallon of kerosene into the trench. Roll the animal over the trench and then cover the animal with a thin layer of hay or straw. A load of wet manure is then piled on top of the animal, completely covering it. Dry manure will not do. The manure must be absolutely wet in order to produce a slow fire. Some farmers apply a gallon of kerosene over the animal before putting on the hay and manure. The next day it will probably be necessary to haul another load of wet manure and pile on the animal. With a little attention for a few days it will be found a simple and easy matter to burn a carcass in this way. The same method can be used for smaller animals if so desired.

The common method of burning up dead hogs is to provide some sort of a grate by putting an old steel rake wheel or some iron bars on a few stones, six or eight inches from the ground. A fire of corn cobs or other cheap fuel is then built under the carcass and a slow fire is kept going. In order to get the grease to running good in the beginning of the fire it might be advisable to make a few slices in the animal's hide.

Any small fire will consume dead poultry and this is the best method of disposing of the dead hen.

There is a prevailing idea that dead animals may be given to the hogs. This procedure is dangerous and it does not necessarily mean that it is safe even if the animal did not die of a contagious disease, and the system should be stopped. Our state law specifically requires all dead animals to be properly disposed of within 24 hours and the throwing of these animals to the hogs is not proper disposal. The proper disposal of dead animals is again emphasized as being the most important point in preventing the spread of infection and whenever dead animals are disposed of within 24 hours after death, according to the state law, then and not before will we begin to eradicate the contagious diseases of South Dakota.