3-1930

Swine Sanitation

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Circular 39 March, 1930

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From the very beginning of Nebraska's agricultural development its farmers have recognized that the production of swine must of necessity accompany the growing of corn. The latter, one of the state's most important staples, cannot be marketed in a more economical manner than after having been transformed into pork, bacon, and lard.

As a result the state has for many years maintained a rather dense swine population mainly divided into large herds kept on relatively small areas of land. This density of population, as well as certain practices in management and selective breeding, has brought about conditions favorable for the propagation of a number of microbic or parasitic diseases which, in a costly manner, force themselves to our attention.

The various factors which affect the incidence of swine diseases are numerous and in a given situation may be so intricately interwoven as to baffle the observer. Among these factors there are two which are particularly dominant.

FACTORS WHICH CAUSE THE MISCHIEF

One of them is the prevalence of hog cholera, which must be reckoned with at all times, regardless of season or locality. The other factor is associated with the type of environment in which young swine especially must manage to exist. Being kept in a yard grossly befouled with the dung of older swine, if not generations of swine, certainly constitutes a challenge to the fitness of young swine to survive. It is not possible in such a place to provide food and water not containing considerable numbers of the parasitic and microbic inhabitants from the intestines of other swine.

To these unfavorable factors must be added the adverse influence of the cold and dampness of early spring, or even winter; inadequate or injudicious feeding; and also a degree of constitutional deterioration engendered by the selective breeding for early maturity and rapid fattening for many generations.

As a further predisposing cause of mischief, mention should be made of the prevailing practice of early farrowing. It cannot be denied that this may result in certain business advantages, but there is reason to believe that these are acquired at a considerable price exacted by disease and unthriftiness. The prevailing low temperature of the early season; the lack of sufficient exposure to outdoor sunshine;

and, above all, the absence of green feed for sow and litter contribute materially to the causes which directly or indirectly make disease possible.

Rickets or allied disturbances of metabolism are of frequent occurrence, and these, as well as other upsetting influences operating in a faulty environment or under an injudicious regime of management, particularly expose swine of pig age to the intercurrent infections which so commonly result in disease.

ALL TROUBLES NOT DUE TO ENVIRONMENT

In hog cholera we have a disease which notoriously defies the direct influence of environment, while on the other hand there is a group of infections which largely come about by unsanitary conditions prevailing in the immediate surroundings in which swine must live. These are materially enhanced by such depressing influences as faulty feeding, cold, moisture, and indoor life.

In addition we must reckon with an ever-increasing amount of mange, with outbreaks of so-called "flu," with a wide distribution of tuberculosis, with the hazard caused by abortion disease, and with a rather heavy infestation of internal parasites.

HOG CHOLERA CAUSES GREATEST LOSS

Hog cholera (see Nebraska Extension Circular 223) is as yet the disease that causes the greatest part of losses among swine, in spite of the fact that practically every farmer knows that this disorder can be successfully controlled by immunization. The smaller the number of cholera-susceptible swine on the farms, the less will this disease play a part in losses by death.

It appears to be quite clear that preventive vaccination, well ahead of the period during which cholera is apt to show its highest incidence, is the only method by means of which cholera losses can be prevented. Neglecting to vaccinate during years when the disease shows a reduced prevalence contributes to make extensive outbreaks possible during the following year. It may be fitting to observe in this connection that with a suspension of general vaccination, there is bound to come about also a reduction in serum manufacture and thus, if a bad cholera year comes along, a serum scarcity is apt to be the result.

TROUBLES DUE TO ENVIRONMENT, MISMANAGEMENT, OR LACK OF CONSTITUTIONAL VIGOR

Among the swine diseases commonly associated with faults of environment, management or inherent constitution, we

observe rickets, bronchitis, pneumonia, parasites, bull nose, pig typhus, joint infections, and a number of others caused by pus-producing germs.

These diseases are more or less confined to pigs and younger swine and probably are accountable for the larger part of the death losses among these age groups. Even before the pigs are born they may be menaced by abortion disease (see Nebraska Experiment Station Circular 21) and there is reason to suspect that the disorder known as rickets frequently originates in faulty care and nutrition of the sows during pregnancy.

RICKETS AND BONE-SOFTENING

Rickets belong to a group of bone diseases largely characterized by deficiency in the mineral constituents which normally enter into the composition of bone. At the same time other body tissues may suffer from a similar deficiency and thus the correct functioning of some of the organs may be seriously interfered with.

The name rickets is particularly applied to such a bone disease when it occurs in young, growing animals. When the disease affects mature animals, it is designated as osteomalacia or bone-softening, altho the character of the latter does not materially differ from the disease in young pigs. Another member of this group of bone diseases is called osteofibrosis, because in this the bone material is largely replaced by fibrous tissue. While rickets and osteomalaia are common in Nebraska swine, osteofibrosis probably is quite rare. This disease is more or less common among horses in certain sections of the country, where it is popularly known as "big head."

SUNSHINE HELPS TO PREVENT RICKETS

Rickets and bone-softening are primarily caused by a lack of the lime-phosphorus compounds in the feed or by an inability on the part of the animals to assimilate or to utilize them. This latter factor is especially associated with a lack of exposure to the direct rays of the sun. In addition, some evidence has been brought forward which indicates that in some strains or families of animals a hereditary predisposition to bone disease of the rickets type may also have to be considered. Rapidly developing animals are more readily involved in rickets than those belonging to the more slowly growing breeds.

The difference between rickets and osteomalacia is largely determined by the factor of age. In the rickets of pigs the bone is not normally built up because of a lack of material,

or because the pigs cannot assimilate it. In the bone softening of the older swine, the same materials are withdrawn from the normally formed bone in order to make use of them in other parts of the body. In the final analysis both conditions are based upon the same causes and lead to identical results.

INDICATIONS OF RICKETS

Pigs affected with rickets often are "crampy" in their movements. They are stiff and show a tendency to remain nested in the bedding. In other animal species the bones may become thickened and deformed, but this is not often seen in swine. The most conspicuous symptom is perhaps a marked tendency on the part of pigs, as well as of older swine, to walk on their knees, while in the case of the latter, especially, bone softening is first shown by a real or apparent paralysis of the hind quarters. Convulsions or "fits" are a frequent accompaniment of rickets.

Rickets in the young, more than bone softening in the adults, seem to have a depressing effect on the general state of health and either constitute a predisposing cause to other diseases or else the latter are favored by the same influences which help to bring about the metabolic bone defects.

NEED LIME-PHOSPHORUS FEEDS AND SUNSHINE

In the prevention of rickets, two factors are of especial importance. One of these is correct and adequate feeding (see Nebraska Experiment Station Circular 40) of all swine, young and old. If the ration which must be used is deficient in lime or phosphorus, or in both, these substances should be provided in the shape of milk, tankage, or steamed bone meal. Alfalfa is also a good source of lime.

Not only is this essential for young swine, but for adults as well. The brood sows should certainly be fed with a ration not defective in lime and phosphorus. There is no evidence that pigs are ever born with rickets, but there is reason to believe that mineral deficiencies of the dam during pregnancy are likely to render rickets in the pigs more probable.

The other factor is sunshine. Sunshine in some way, not yet understood, enables the animal body to utilize the bone forming minerals. The absence of exposure to outdoor sunshine is a rather prominent cause of rickets and probably is also accountable for a good share of the bone softening of adults.

The part of the sunlight peculiarly responsible for this action is the so-called ultra violet rays which cannot pass through window glass. Therefore the exposure must be made outside. With this the health-giving influences exerted on

pigs at pasture is apparently connected. With life at pasture is also associated the vitalizing effect of green forage. All these favorable factors are missed by the early pigs and if we must persist in the unnatural, if not the abnormal practice of having pigs come before the winter is over, it may become increasingly necessary to give them their sunlight exposure in an indirect manner, by feeding some cod liver oil to the sows during pregnancy and while suckling the pigs. As long as the latter are excluded from outdoor influences after they are weaned, they should also be given some of the oil in their feed.

RESPIRATORY TROUBLES

Respiratory troubles, especially bronchitis and pneumonia, are relatively common among small pigs and account for a prominent part of the losses sustained on our farms. Pigs so affected cough, show some fever, and do not show as vigorous an appetite as could be desired. As the disease advances, there develops an increase in the rate of breathing and the latter may even become painful or difficult. At a still later period the animals are unthrifty, acquire a wasted appearance, and may become anemic. Such pigs often have a scurfy skin. Pneumonia is a common complication of other diseases such as rickets, pig typhus, or cholera.

PNEUMONIA

The principal cause of pig pneumonia is associated with environmental faults such as low temperatures, wet, cold floors, and dark, filthy pens. This may or may not be further complicated by inadequate or faulty feeding. To this must be added the action of certain bacteria commonly present in the normal respiratory passages or in the stable filth.

In healthy, normal pigs such germs may not be capable of doing harm, but in the pig compelled to exist under adverse conditions they are apt to develop a disease-promoting influence. They may even become decidedly virulent after they have passed thru a number of animals. However, they are not usually the primary source of trouble.

Such bacteria are of different kinds altho the disease with which they may be associated or the after-death appearance of the affected pigs may not show fundamental variations. Another factor must be added to the ones mentioned, the migrating larvae of the common roundworm of the intestines (see Nebraska Experiment Station Circular 17) which are apt to carry certain microbic causes of mischief from the latter to the lungs.

PREVENTIVE MEASURES

Among the preventive measures which may have a favorable influence the establishment of a safe environment is the principal one. Consideration should also be given to the sanitary value of relatively late farrowing, by which the pigs are less liable to exposure to cold, dampness, and the disadvantages of the indoor life of winter and early spring. Pig pens must be scrupulously clean, dry, warm, and reasonably well ventilated without causing the chilling of the animals. The latter should have an abundance of bedding of rather short straw to prevent them from nesting on a cold floor. In concrete pens, it may be advisable to provide a false floor made of lumber.

For pigs farrowed during an unreasonably early season, artificial heat should be supplied, altho care should be taken not to overheat. A pen temperature of 55° F. should be warm enough when the feeding is adequate and in the presence of plenty of bedding. The weather permitting, the pigs should be allowed to run outside for at least an hour or two a day and for this purpose, clean ground should be selected. At least, the regular hog yard is not a safe place for young pigs. If the suckling brood sows could receive some succulent or green feed, this would be a fine thing for the pigs as well.

PIG TYPHUS, OR "NECRO"

Pig typhus, or "necro," as it is often called, is a common source of losses among pigs less than four months of age. As a rule this disease is more or less of a chronic nature, altho acute forms are occasionally observed.

The affected pigs show persistent diarrhea with yellow, gray, sometimes bloody bowel evacuations of a fetid odor. These symptoms are apt to make their appearance quite early in life, altho most of the cases develop shortly after weaning. In the beginning the pigs may have some fever, accompanied by dullness. In the more chronic cases the animals fail to thrive or to gain in body weight. They become emaciated and may actually become deformed by a mere loss of flesh.

The mortality of pig typhus runs very high (25 to 65 per cent) and even the ones that do recover frequently fail to develop into profitable swine. The disease is marked by inflammation and a cheesy ulceration of the intestines, the lymphnodes of which are usually swollen, of a pale, grayish white, or grayish red color. Some of the lymphnodes may soften and develop a cheesy mass in their interior. Pneumonia is a common complication of pig typhus and may bring about a caseation of the lung tissue involved.

CAUSES OF PIG TYPHUS

Pig typhus is a germ disease and the germ which produces it belongs to a group which, under ordinary circumstances, is relatively harmless. However, when in a grossly contaminated environment, the germs occur in large numbers and when at the same time the young pigs are adversely influenced by such depressing conditions as cold, dampness, faulty feeding and others, they are apt to become the producers of actual disease.

The germ is eliminated by the droppings of animals sick with the disease or of the older swine which serve as healthy carriers. The soil of hog yards, as well as the bedding of the pens, may thus become more or less permanently contaminated and this pollution can readily be transmitted to the food and water, which serve as the principal means by which the infection is transferred to healthy pigs. Like some other of the germs which cause disorders associated with faulty environmental conditions, the one causing pig typhus is often an inhabitant of the intestines of normal swine in which it may exist as a harmless parasite.

Positive infection is, to a large extent, dependent on the number of germs which pigs take in. Hence the disease is most commonly found where young pigs are concentrated in a limited space and where the body wastes are bound to constitute a conspicuous ingredient of the upper soil layers and where thru the feeding habits of the animals concerned, great numbers of germs are likely to be taken in every day. Under such conditions the unavoidable pollution of food and water are particularly to be feared. As the germs taken in, in the manner described, rapidly pass from pig to pig, their disease-producing qualities are increased and in this manner formidable outbreaks may come about.

TYPHUS AND HOG CHOLERA VACCINATION

Aside from the losses primarily due to pig typhus, consideration must be given to its possible relation to unfavorable results obtained after hog cholera vaccination. At least, it is quite significant that from a rather large proportion of herds in which hog cholera vaccination had not been followed by the most desirable results, pig typhus was also reported. There is good ground to believe that between the germs of the latter disease and the virus of hog cholera, there exists something like a reciprocal relation by which the virulence of each becomes enhanced by the presence of the other. Ordinarily such a relation may be without great practical importance, but it becomes a cause for apprehension when typhus infection in a herd of swine immune to cholera,

or in the process of becoming so causes this immunity either to break down or to fail in realization.

In view of such a possibility one is justified in fearing that in a herd of young swine in which pig typhus is present, hog cholera vaccination may not always be followed by the best results. With hog cholera prevalent as it often is, one must often vaccinate whether typhus is present or not, because, after all, cholera is always the greater hazard. However, the presence of typhus in a herd to be vaccinated should always lead one to be less confident about the results than when the animals are completely free from this infection.

WHAT TO DO ABOUT IT

In herds in which pig typhus makes its appearance, those affected should be promptly segregated and if they fail to show improvement or recovery they should be destroyed. It is needless to say that exposed pigs not yet showing symptoms of the disease should be removed to uncontaminated quarters or yards where the harmful contacts can be avoided.

Pig typhus is a typical filth-borne disease and can best be prevented by sanitary herd management. In such a scheme special pains are taken so that the body wastes of infected pigs, as well as those of germ-carrying, older, healthy hogs, cannot pollute the water and food supply of the normal stock. Yards in which hogs have been kept, sound or sick, should not be used for pigs belonging to the age group of greatest susceptibility.

The prevention of pig typhus is always more dependent on the elimination of adverse contributory influences than on the destruction of the causative germs themselves. Pigs should be maintained in a good state of nutrition and protected against dampness and the inclemencies of the weather. Exposure to outdoor sunshine and access to green feed are very important factors in the maintenance of body vigor and in the promotion of normal growth.

There is good ground for the opinion that along with the other diseases of pig age, pig typhus materially helps to cancel whatever advantage may be associated with the prevailing practice of early farrowing. The marked predisposition to certain juvenile diseases shown by early-farrowed pigs is a plea for later births and among this type of disorders, pig typhus certainly is not the least important.

A decidedly marked advantage associated with a later arrival of the pigs is the opportunity of bringing them to pasture quite early in life. There, green feed and outdoor sunshine are available, and, above all, at pasture, there is less

chance of the pigs coming in close contact with a soil in which a great volume of infective material has been concentrated.

Under all circumstances, old hog lots, more or less continuously occupied by swine, old or young, should not be used for pigs less than four months old. The disorder under consideration is the common penalty for exposing the animals to the fecal ingredients of such enclosures and the disease-producing germs apt to be found there.

OTHER FILTH-BORNE DISEASES

The same principles as those outlined above are applicable to other filth-borne maladies as well as to the control of internal parasites which, after all, depend on a filthy environment for a massive propagation. Bullnose (see Nebraska Extension Circular 225) is one of those and tuberculosis in some of its modes of transmission is another one (see Nebraska Agriculture Experiment Station Circular 25).

ROUND WORMS INDICATE OTHER TROUBLES

The common roundworm (see Nebraska Agriculture Experiment Station Circular 17) should be especially mentioned, because hog lot sanitation was first inaugurated on a comprehensive scale by the U. S. Department of Agriculture in an effort to control this parasite. We have no evidence that the intestinal round worm is anywhere nearly as destructive to young pigs as either pneumonia or typhus, but that a heavy worm invasion may be highly detrimental to the host animal cannot be doubted at all.

At one time, and probably yet, hog worms were, or are, a pet worry for many people. And well they might be, because even if their harmfulness is often overestimated, there can be no doubt that their conspicuous presence in a group of pigs or shotes constitutes the best possible evidence that the environment in which these animals are being maintained is decidedly unsafe from a sanitary point of view. Worms are very trustworthy indicators of other mischief, either present or impending. Wherever intestinal worms can invade pigs in large numbers, all the other filth-borne diseases may come in by the same route.

The propagation of worms should, however, always be prevented, regardless of their importance as prophets of trouble. For this purpose pigs must be farrowed in clean, scalded pens. The sow herself should be thoroly scrubbed before occupying the clean pen. As soon as possible, she and her litter should be taken to pasture, where they are provided with suitable colony houses and where food and water can be supplied in a

manner that would render pollution improbable or impossible altogether.

THE PRACTICAL SANITATION PROGRAM

In view of some of the diseases which are the subject of this discussion, ground occupied by swine should be periodically abandoned. A systematic rotation of lots and pastures has certainly a definite place in any scheme of swine sanitation. While in a practical way soil cannot well be disinfected, it will effectively rid itself of most of the germs of disease by a process which is commonly designated as biologic purification. Under its operations most of the disease-producing germs will be got rid of, provided animals do not add a fresh supply to the soil. This necessitates that the soil be given a measure of time in which to dispose of its pollution and that a major part of this period must fall within the warm season. At low temperatures the biologic purification of the soil ceases to operate. Hence, wherever hog lots are to be maintained, it is proposed to establish what may be called a three-year pig lot rotation.

In accordance with this plan, provision must be made for a space sufficiently large for three distinct yards, one to be in use for a year and the other two to remain uninhabited by livestock and to be devoted to cropping or garden purposes. Each year a fresh lot is used for the occupancy of swine, so that two years elapse between successive occupations. A similar arrangement is proposed for pasture, even if in that case the degree of infection concentration would be much less.

In all hog lots and pastures there should be adequate provision for drainage. Surface water accumulations are always a menace to animal health and in this connection we are forced to remark that hog-wallows, even the concrete ones, are as much of a clearing house for various infections as any pool or puddle. Subsoil drainage is particularly valuable because it promotes a perpendicular flow of water and hence also the ready subsidence of undesirable organisms and substances. It promotes the aeration of the soil and it helps to eliminate the end products of putrefaction and decomposition, the accumulation of which is apt to inhibit the process of soil purification.

In connection with hog lot sanitation attention must be given to the manner in which food and water are offered to the animals. Drinking water should always be provided in special containers, which can be readily cleaned and from which the water can be periodically removed. Feeding from the ground should be avoided for obvious reasons. From a sanitary point of view the self-feeder is probably the most

suitable means of supplying concentrated feed to swine. Concrete feeding floors may also obviate some of the dangers connected with feeding from the ground, provided they are kept clean and free from filth accumulations. The concreting of entire hog lots would help to solve some of the problems in livestock hygiene, but unfortunately its cost would limit this sort of construction to exceptional cases only.

"FLU" NOT DUE TO ENVIRONMENT

Not all of the swine diseases with which Nebraska hog growers may be confronted can be attributed to environmental factors. The latter, as has already been pointed out, have but little influence on the prevalence of hog cholera. In the case of so-called "flu" the nature of the surroundings also exercises little or no influence.

"Flu" is a highly contagious disease which is apt to show its highest incidence in swine less than a year old. It is marked by high fever, profound depression, and by catarrhal or inflammatory processes in the organs of respiration. In the fatal cases the causes of death are apt to be associated with pneumonia, which may be the culmination of the infection process. In the period which followed the severe outbreaks of "flu" a few years ago, ordinary pig pneumonia has often been mistaken for it.

Occasionally outbreaks are still seen in the state, but they are not so common now as they were a few years ago. The disease appears to be principally transmitted thru contact with infected animals and hence the formidable outbreaks of the past often came about after the return of young swine from shows, fairs, or sales. "Flu," while having some very alarming features, has, after all, a relatively low death rate. In swine affected with this disorder, which are not being disturbed or unduly meddled with, the mortality ordinarily does not go beyond five per cent.

There is no specific treatment or method of vaccination against this malady that can be depended upon. After the sick animals have been placed in a dry, comfortable, protected place, it is best to leave them entirely to themselves. The only means of prevention is to avoid contact with infected swine. Hence, newly purchased animals, or those returning from fairs, should be kept in isolation for two or three weeks before they are turned into a lot or stable occupied by healthy young swine.

MANGE, OR "ITCH"

Another common disease among Nebraska swine that comes about by direct contact and not thru unsanitary surroundings

is mange or itch (see U. S. D. A. Farmers' Bulletin 1085). This disease is caused by a microscopically small mite which burrows into the outer layers of the skin. As a result the skin becomes irritated and scabs or a scurf forms on the surface. In case of long standing the skin becomes thickened and, thru a tendency to form folds, it assumes some of the aspects of an elephant's hide.

In the case of hog mange we actually have an important swine disease which can really be cured, provided that it is not permitted to advance too far. The dips such as are used against scabies or mange of other livestock should be used in accordance with the directions published in the Farmers' Bulletin mentioned above.

When dipping is not feasible a brushing with crude petroleum, repeated from time to time, will often prove to be effective. In prevention, attention must be given to the avoiding of contact with mangey hogs, and to cure the latter as well as the exposed animals with the least possible delay.

[20 M]