

tion and therefore should be taken into account when one attempts to evaluate the efficiency of the new vaccines. The incidence of cholera declined from 1952 to 1954, but we cannot attribute the drop to the increased use of modified vaccines until the end of the 10-year cycle.

When the new vaccines were introduced, claims were made that these new forms of virus would be totally incapable of producing cholera. Field usage and experimental evidence have disproved the claims under certain circumstances. Some pigs are highly susceptible to cholera and acquire the disease easily when vaccine is injected into them, although the same vaccine may make other pigs immune.

I know of no way in which to determine which pigs are hypersusceptible. Sows injected with modified-live-virus vaccines during the first 30 days of pregnancy may abort, or many of the fetuses will have abnormalities, such as ascites, edema, asymmetry of the head, lengthening and twisting of the snout, and malformations of the limbs.

Eradication of hog cholera in the United States has been talked about since the first experimental work on it was begun. When the simultaneous method of immunization was discovered, many thought the method would eliminate hog cholera, but the men

who developed the procedure were aware that it would never eradicate the disease. The swine industry could never have grown to a major farm industry without this method of immunization, but the availability of other methods of immunization have made the goal of eradication seem more attainable.

The United States Livestock Sanitary Association in 1951 appointed a committee to study further the possibility of stamping out cholera in the United States. The committee presented its first report in 1951. Its recommendations influenced some States—Alabama, Georgia, and Tennessee—to prohibit the sale of virulent virus. Idaho, Utah, and Wyoming require a special permit for each shipment of virus coming into the State.

The recommendations also led to the establishment of a pilot test area, in which more than 2,500 hog raisers participated, in Florida. The first reports of the project were encouraging.

Alabama undertook an area plan of eradicating cholera in 1952. After 2 years, the death losses from cholera were negligible.

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The Enteritis Complex

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A GROUP of diseases having similar manifestations is called a complex. Several ailments that cause inflammation of the digestive tract of swine make up the enteritis complex—as enteritis means an inflammation of the intestine.

Inflammation of the gut is often accompanied by necrosis, or death, of tissues in the gut wall. The word "necrosis" has been shortened to "necro" and is used widely in referring to disease of the intestine. The term

has little definite value because it does not distinguish between the various intestinal diseases.

Some diseases, such as swine dysentery, affect the intestine without causing much change in other organs. Other diseases, such as hog cholera, seriously affect other organs as well as the intestine. Other specific diseases in the enteritis complex are swine dysentery and transmissible gastroenteritis (TGE). Other diseased conditions of the gut are less well defined.

SWINE DYSENTERY is one of the important diseases of the intestinal tract.

Several common names have been given to it, such as bloody diarrhea, bloody or black scours, and bloody flux.

Dysentery affects swine of all ages. The death rate may vary from less than 10 percent to 90 percent of the herd. Death losses average about 25 percent unless treatment is effective.

The disease is caused by a germ, which is given off in the bowel discharge from infected animals. A small amount of bowel discharge may infect a large number of healthy animals. Brood sows and boars may be carriers of infection even if they appear to be healthy.

The lesions of dysentery are in the large intestine. The small intestine is usually normal. The lining of the stomach frequently is inflamed, but a similar inflammation occurs in several other diseases. Early in dysentery the lining of the large intestine shows small, red spots and diffuse reddening. The intestine content consists of bloody mucus mixed with feces. Later there is sloughing of exudate and of the bowel lining. This sloughed material mixes with the intestinal content, giving a "rice-water" appearance. Usually mucus exists in the intestine in all stages of the disease.

After several days the large gut lining shows necro. The necrosis is superficial instead of being deep, as in hog cholera.

Dysentery is usually brought to a

farm by hogs that have recently been in an infected herd or in an infested sale barn or stockyard. Animals that went through an outbreak several weeks or months previously may bring the disease into a healthy herd.

The first symptoms usually appear 5 to 14 days after contact with infection, although a longer period may pass before symptoms are seen. The symptoms are usually easily recognized. Diarrhea, or scours, probably always occurs. The bowel discharge may not differ at first from what occurs in relatively harmless scours. Soon (usually not later than 2 or 3 days) blood or mucus, or both, appear in the bowel discharge. Blood in the bowel discharge is one of the most reliable signs of dysentery. Occasionally hogs that have other diseases, such as cholera, also bleed from the bowels.

Affected animals may quickly become gaunt and lose considerable weight. Individuals that have the disease can often be detected by sunken sides. In many cases there are surprisingly few symptoms, except scours.

The animals may remain on feed while scouring profusely. Sometimes the disease runs such a rapid course that death occurs before diarrhea is noticed. Return of scours is likely in hogs that recover temporarily.

When dysentery starts in a herd, promptly moving the healthy hogs away from the infection helps reduce losses. If the healthy animals are ready for market, it is usually advisable to market them for immediate slaughter. If the healthy animals are kept for a time, they should be moved to a clean place and divided so as to reduce the spread of infection.

It is doubtful whether any animal that has passed through the disease should be kept for breeding because of the danger from carriers. Affected hogs should be fed lightly on easily digested feed. Milk seems to help recovery.

Yards and houses where dysentery has been should not be used for hogs for a while after all the hogs have been

removed. The houses and yards and all the equipment should be carefully cleaned. The interior of the houses and equipment should be sprayed with a disinfectant.

Direct sunlight soon kills the germs in a clean yard, but the germs may live for a longer time when protected by manure or in some other way.

Some antibiotics, given in large doses, reduce the severity of symptoms temporarily and lower the death losses. The antibiotics do not definitely cure the disease and prevent it from recurring. Arsenic, properly used, reduces losses but fails to effect a final cure. These drugs should be used by a veterinarian or under his supervision. Arsenic is always potentially dangerous.

The experience with treatments and so-called cures has emphasized the importance of depending upon fundamental control measures—quarantine to prevent introducing the disease into a herd, sanitation for preventing its spread, and disposing of the infected herd and restocking with hogs from a healthy herd in order to eradicate it.

THE TRANSMISSIBLE GASTROENTERITIS (TGE) is a destructive disease among young pigs. It is highly contagious and affects swine of all ages, but the death losses are limited mostly to pigs less than 3 or 4 weeks old. Shoats and breeding animals usually recover from an attack in about 7 or 10 days. Younger pigs that survive may be stunted for some time.

The cause is a virus.

Symptoms may be seen within 18 hours after pigs are exposed to infection. Practically all the animals may become sick within 2 or 3 days. Scours always occurs, and some of the sick animals vomit. The scouring is watery and profuse in older swine. Scouring and some loss of weight may be the only symptoms in older hogs. Vomiting may occur. Some of the older animals may die.

Young pigs scour, and some vomit. The scours is usually light-colored or white. The pigs lose weight rapidly,

and death usually occurs within 4 or 5 days after symptoms appear. The pigs usually continue to nurse; some stand at the water fountain or trough as if they were thirsty. The mortality may be as high as 90 to 100 percent in pigs less than a week old.

The significant lesions of TGE are an inflammation of the stomach and intestine and an abnormal fullness of the intestine with liquid. The stomach and intestine are fiery red in some cases. The abnormal filling of the intestine often is the only symptom, except dehydration and emaciation.

No sure way to prevent outbreaks of TGE is known. Precautions to be taken to lessen the danger of an outbreak are to keep away from infected farms and to keep visitors away from the farrowing houses and pens, particularly while the pigs are young.

When an outbreak starts, moving and scattering the sows that have not farrowed helps reduce the spread of the disease. It is difficult or impossible to prevent the spread of infection in a central farrowing house or under conditions where litters of young pigs are close together.

Sows that have passed through an outbreak and have lost some or all of their pigs can be kept for breeding. Such sows are often able to transmit resistance to the next litter of pigs. This resistance, or immunity, probably does not last for more than a year. Early breeding of the sow after the loss of pigs is advisable. Continuous farrowing should be avoided, because it tends to perpetuate the disease.

ENTERITIS ATTRIBUTED TO paratyphoid or *Salmonella* bacteria has been given a good deal of attention. Cultures of *Salmonella cholerae suis* can cause enteritis.

Still a question remains as to how important these bacteria alone are in causing disease in swine. The question arises from the fact that *Salmonella cholerae suis* plays only a secondary part in some diseases that affect the intestine, such as hog cholera and dys-

entry. When disease is produced experimentally by cultures of *S. cholerae suis*, there is little tendency for the trouble to spread to contact animals. Moreover, the feeding of tissues or organs containing *Salmonella* bacteria usually fails to cause disease in healthy hogs that are immune to cholera.

THE DISEASES that we have discussed do not account for all of the enteritis that occurs. Other kinds of enteritis are not all clearly understood as to causes.

Coccidiosis causes serious disease of the intestine, particularly in young poultry, calves, and lambs. Comparatively few important outbreaks of enteritis in swine can be attributed to coccidia, however. Other protozoa, such as balantidia, spirochetes, trichomonads, and ameba are found in diseased intestine, but their primary importance is questionable. Some bacteria, such as *Actinomyces necrophorus*, multiply in damaged or dead tissue in the intestinal wall and elsewhere.

It is doubtful if such bacteria alone cause serious disease in healthy animals. The "cork lined" intestine is a familiar form of necrotic enteritis, in which necrophilous bacteria are found. An effort should be made to locate and remove the primary cause of obscure forms of enteritis.

An enteritis commonly occurs in pigs about weaning age or older. It is characterized by scouring, loss of weight, and unthriftiness. It is sometimes called "pig typhoid." Some veterinarians believe it is caused by paratyphoid or *Salmonella* bacteria. A good many cases occur in which these bacteria cannot be found. A filterable agent or virus is found sometimes in this type of disease.

Good care and careful feeding usually bring affected pigs through without many deaths. Swine affected by this disease, as well as by other forms of enteritis, should be fed easily digested, nutritious feed. Milk and molasses are good for cases of inflamed intestine.

Scours in baby pigs is common.

Overloading of the digestive tract with milk or other food may cause scours. Scours sometimes indicates a destructive infectious disease, such as TGE. At other times it may not be important.

Debilitating conditions or an unfavorable environment may cause scours. Baby pigs that are allowed to become anemic are likely to scour.

The effects of nutritional deficiencies in enteritis have not been fully determined. A lack of certain nutritional factors may cause enteritis. A deficiency of nicotinic acid and perhaps other members of the vitamin B group are regarded as the most likely nutritional factors concerned. Many errors have been made in attributing enteritis to nutritional deficiency when the cause was infection.

Chemical poisons and irritants, such as arsenic and mercury, may result in enteritis when eaten or even when applied to the body surface. The general and careless use of poisons may be of increasing importance in causing enteritis.

A prompt and accurate diagnosis is of the greatest importance in successfully handling enteritis in swine. It is no longer sufficient to recognize a condition as necrotic enteritis. The diagnosis should be specific and indicate definitely the nature of the disease affecting the intestine. Successful treatment and control depend upon a correct diagnosis.

Determining the cause of enteritis frequently requires considerable time and skill.

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