Other methods of vaccination have used the principle of a living but mild vaccine, or what has been called an “avirulent” vaccine. This type of vaccine does not require the use of the protective serum.

There also have been introduced bacterins that do not contain living organisms. One is called the adsorbate and the other is the lyso bacterin. The advantage of such products is that they eliminate any possibility of spreading the disease and accidentally infecting the veterinarian while vaccinating the swine. These bacterins show considerable promise as additional tools for the control of swine erysipelas.

No vaccination procedure offers complete protection in all circumstances, however, and it is a common mistake to think that they do.

An owner can do much to prevent disease by following established principles: Inspect his animals regularly; learn as much as possible about the health of animals and the conditions on the premises where replacement animals are bought; isolate newly purchased animals for at least 30 days before introducing them into the herd; keep pens and pastures clean and sanitary; use disinfectants often and according to directions; and feed a balanced ration.

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Diseases of Baby Pigs

N. R. Ellis and Richard D. Shuman

NEARLY one-third of all pigs born each year die from various disorders and hazards.

Not all of the loss can be said to be due to diseases in the strict sense. The causes, which often are ill-defined and overlapping, include various management factors that involve housing, facilities, and care; various prenatal factors, which involve several variables such as genetics, physiology, disease organisms, and nutrition; and postnatal factors reflected in physiological well-being of dam and pig, nutrition, infections, parasites, numbers of pigs per litter, and others.

The multiple nature of the causes is evident in the cataloging of deaths outwardly apparent as due to mashing or injury. Many of the deaths are entirely physical. They are caused by the sow and often indirectly by inadequate housing and lack of protective guardrails, brooder lamps, and other pen facilities, of which the undersized, weak, and sick pigs are more prone to become victims.

The reasons why they are under-
sized, weak, and sick in turn are multiple. Hereditary, physiological, nutritional, and infectious-disease factors and parasitic infestations are involved. Bacterial and viral infections create a variable that may range from an extremely mild or latent contributing cause of weakness and unthriftiness to extremely virulent diseases of epidemic proportions. Some pigs that do not die from these causes often are permanently stunted or unthrifty in growth and use of feed. Examples of such diseases are the various enteric (intestinal) disorders, ranging from those forms that respond to antibiotics and other medication and to improved care and nutrition to the highly fatal transmissible gastroenteritis (T. G. E.).

Other diseases, such as pneumonia, cholera, erysipelas, atrophic rhinitis, and edema, add to the complexity of the possible causes of death.

Nutrition and management studies—directed at the gestation and lactation periods—at the Agricultural Research Center at Beltsville showed that the losses of young pigs are of various forms. Seasonal losses among farrowings of 350 to 500 baby pigs from 1949 to 1955 ranged from 30 percent to 10 percent of all pigs born. The average was about 20 percent.

Stillbirths averaged 3 percent between 1952 and 1954—a relatively low figure, compared to 5, 10, and 18 percent in some of the earlier studies, in which more severe dietary treatments were included in the tests.

Mashing or injury as the immediate cause of death averaged nearly 5 percent in 6 years, even though pen facilities and care were better than average.

Scours, especially in the first few days of life, claimed nearly 4 percent of the pigs.

Classifications of deaths due to other causes included chilling, 2 percent; starvation, more than 1 percent; uremia, 1 percent; and runtiness and weakness, about 1 percent. These totaled about 17 percent, leaving 3 percent as not further classified.

The studies at Beltsville emphasized the importance of good nutrition and good management. Inadequate care, overcrowding, unfavorable weather, and related factors can nullify benefits of good nutrition, and vice versa. Good nutrition and good management can keep losses to 10 percent or less if there are no epidemics of a virulent nature.

So far we have considered the multiple nature of the causes of losses of baby pigs and the general nature of the more specific nutritional and infectious diseases that are involved. Let us consider now a number of the diseases with the object of bringing them to the attention of the swine raiser. Many are discussed in detail in other sections of this book.

**ENTERIC DISORDERS** are the predominant group of diseases of baby pigs. More than a dozen forms, both infectious and nutritional, have been listed, among them T. G. E., baby pig scours, bloody dysentery, salmonellosis (necro), hog cholera, influenza, pneumonia, swinepox, erysipelas, internal parasites, chemical fungi, molds, plant poisons, and the nutritional deficiencies.

Nutritional deficiencies or imbalances are important among these forms of diarrhea. Enteric disturbance often results from too little niacin, pantothenic acid, riboflavin, and other vitamins in the feed. Necrotic enteritis (necro) for many years was considered an important and baffling disease, which sometimes was helped by adding niacin and tryptophan (a crystalline amino acid) to the feed.

Young pigs are highly susceptible to enteritis. They can get sudden and severe diarrheas if the sanitation is neglected, the quality of the feed is low, and the manner of feeding the dam and the nursing pigs are below standard.

Practical treatments that involve improvements in nutrition, feeding, and care do much to clear up the trouble. Outbreaks of diarrheas often can be brought under control or prevented by such remedies as vitamin
and mineral concentrates, sulfonamides, antibiotics, and arsanilates.

ANEMIA was a great hazard until the discovery that lack of iron and copper was responsible for nutritional anemia. Development of methods of providing iron, especially to young pigs, and widespread recognition and adoption of these methods has brought improvement. The recommended dosage is 10 to 15 milligrams of iron daily, preferably in the form of an iron salt. Commercial compounds are available and suggested directions for their use are printed on the containers. Neglect of these precautions can result in the development of weak, unthrifty pigs, and frequently is either the direct cause or at least a contributing cause of deaths.

ANOTHER DISORDER, goiter or hairlessness, is due to a deficiency of iodine. The general use of iodized salt in the mineral mixture or in the mixed diet of the sow in regions—especially in those States bordering on the Great Lakes and westward to Montana—that are deficient in iodine has brought about great improvement. When the disease does occur, it is manifested by enlargement of the thyroid gland, hairlessness, and weakness. A high proportion of pigs may be dead at birth.

UREMIG POISONING often causes runtiness and the death of young pigs. It is also called toxemia-uremia syndrome. A study at the Agricultural Research Center revealed that the disorder is especially fatal among pigs less than a week old. The onset is relatively sudden. Growth is interrupted. The pigs become sluggish and weak. Vomiting and diarrhea frequently occur. The hair becomes rough, and the pigs die or are accidentally crushed by the sow. A postmortem examination discloses emaciation and evidence of uremic poisoning, including precipitates of uric acid salts in the kidneys, an increase in urea and uric acid in the blood, and uric acid in the kidney. The disease seems to have some connection with the amount and quality of the milk that the pigs get by nursing. Studies by W. W. Green and others in Minnesota in 1949 showed that a condition, characterized as a toxemia-uremia syndrome, similar to that seen in suckling pigs, could be induced by feeding young pigs on reconstituted skim milk simply fortified with a mineral mixture along with vitamins A and D. Addition of yeast generally prevented the symptoms. Its sporadic and unpredictable nature has made study and control of the disorder difficult.

HYPOGLYCEMIA affects young pigs 1 to 3 days after birth. The blood sugar in affected pigs is much lower than in healthy pigs. It indicates some derangement of carbohydrate metabolism. The symptoms are sluggishness, weakness, convulsions, and failure to nurse. The amount of sugar in the blood is a measure of the severity of the trouble. The young pig in this condition may be crushed by the sow or it may burrow into the bedding, where it passes into a coma and dies. This condition may affect some or all pigs in a litter. Pigs may be treated successfully in the early stages by injections of sugar, such as glucose, or by feeding them milk by bottle or by medicine dropper.

EDEMA may cause the death of many embryos, even up to time of birth. Some live pigs are abnormal at birth, and many of them die. The edema—an excessive amount of watery fluid in the tissue and in the body cavities—is evident by the potbellied appearance, swollen legs, and other body parts. The trouble has been traced to the vaccination of the sows for hog cholera within 30 days after breeding. Vaccination should be avoided during that critical stage in pregnancy. It is possible that damaged fetuses, stillbirths, and weak and undersized pigs that show a high death rate after birth are
the product of various infections in early gestation.

This form of edema should not be confused with idiopathic toxemic paralysis, or "gut edema," which occurs chiefly in pigs 8 to 14 weeks old.

Brucellosis is important in regard to baby pigs not because of its immediate effect—although arthritis, spondylitis, and paralysis can develop in affected pigs—but because continued herd infection (by retention of affected animals) may cause temporary or permanent sterility of breeding animals, loss of baby pigs by abortion, and the birth of stillborn or weak pigs. (See page 202.)

Leptospirosis was first reported in swine in the United States in 1952. As with brucellosis, the immediate effect on baby pigs may not be of marked significance, although stunting and unthriftiness of young pigs has been observed. Its apparent economic seriousness lies in the loss of sow productivity through abortions and farrowing of weak pigs, which die shortly after birth. (See page 226.)

Swine erysipelas may be a serious threat to growing hogs and to newborn pigs. The infection in baby pigs can result in a high mortality rate; the survivors may remain unthrifty and stunted the rest of their lives. Because the disease can appear a few days after birth, the organisms causing it apparently gain entrance through the umbilicus. Pigs farrowed by immune dams, however, have a relatively high degree of immunity, which persists at least up to 8–10 weeks of age. (See page 373.)

Salmonellosis (suistifer or necro) is caused by an organism that generally is considered to be a secondary infective agent, which becomes active in the animal's body after some physiological disturbance has taken place.

The organism, once it becomes active, may spread readily to other animals and produce a definite primary disease condition.

The disease affects pigs of any age, but young pigs appear to be more susceptible than older hogs. Its acute form may kill the animals in a few days.

A chronic form is also recognized; it is marked by diarrhea and failure to gain weight.

Listeriosis is of greater significance in sheep and cattle. It should be suspected when pigs manifest disturbed locomotion, nervousness, and excitability. A positive diagnosis can only be reached by a laboratory examination.

Omphalitis, or inflammation of the navel cord, is the result of exposure to infection by organisms shortly after birth. It is associated with poor management and lack of sanitation.

Bacteria, such as staphylococci, streptococci, coliforms, and the organisms causing swine erysipelas and tetanus, can be related to this condition. Affected pigs that remain untreated may die or become uneconomical to raise.

Swollen, deformed joints, or arthritis, are a common result of infection of the navel cord, but they do not necessarily indicate infection with swine erysipelas organisms.

Pneumonia can be associated with poor management and unsanitary practices, which reduce the ability of young pigs to withstand a variety of infective agents.

Pneumonia can also accompany such primary conditions as hog cholera, salmonellosis, erysipelas, pasteurellosis, atrophic rhinitis, and parasitism.

Necrotic rhinitis and necrotic stomatitis are known also as "bullnose" and "infectious sore mouth."

Mismanagement, lack of sanitation, wounds, and either crude removal of the needle teeth or not removing them at all contribute to these two conditions. Lesions of the face, snout, lips, and mouth can interfere with eating.

The result is that pigs are uneco-
nomical to raise unless treatment is successful. (See page 382.)

**Transmissible Gastroenteritis** (TGE) is of particular importance because it is the cause of high mortality in baby pigs. Litter loss may be greater than 90 percent if the infection cycle cannot be broken. Symptoms may appear several hours after birth; death may occur in 2 to 5 days. The mortality rate declines as the pigs get older.

Sows that have been affected with this disease confer a protective level of immunity to their offspring through the milk. (See page 362.)

**Swine cholera** is capable of destroying an entire herd unless preventive measures are applied. Baby pigs farrowed by immune dams rarely contract cholera because of the passive immunity they receive through the milk. They become susceptible toward the end of the suckling period, however. (See page 354.)

**Vesicular stomatitis** has grown in importance since 1952, because its lesions are like those of foot-and-mouth disease and vesicular exanthema and because a differential diagnosis must be made.

While vesicular stomatitis has been recognized in cattle and horses a long time, its significance in swine, other than in the laboratory, was considered to be of little importance. Its dangers are now recognized but not fully understood.

**Vesicular exanthema** can spread rapidly through a herd and cause a temporary setback to growing market hogs. Sows affected with it early in the gestation period may farrow undersized or runty pigs. Sows affected late in the gestation period may abort.

An eradication program was started in 1952 to control this serious disease. (See page 369.)

**Swinepox** is not considered to be of serious economic importance but is of significance because of the appearance of characteristic lesions on the skin of pigs. (See page 385.)

**Pseudorabies** (Aujesky's disease or "mad itch") is highly contagious. Its symptoms may be mild and therefore unrecognized. In baby pigs the mortality rate can be high.

Restlessness, some incoordination of movement, and convulsions, followed by death, may be experienced. In those that survive, restlessness and irritability of the skin, as evidenced by scratching, may be seen. One of its more important aspects is that it is readily transmitted from swine to cattle.

In cattle the disease is more disastrous and more dramatic; the symptoms may resemble the furious stage of rabies, from which pseudorabies gets its name.

**Swine influenza** may suddenly attack a large proportion of hogs of all ages in the herd. The clinical symptoms are alarming, but all the animals may recover quickly.

If the management and sanitary conditions are poor, however, secondary complications can cause substantial economic loss through death or unthriftness. (See page 366.)

**Atrophic rhinitis** may afflict baby pigs a few weeks after birth. It may retard growth in varying degrees. Losses in litters farrowed by affected dams tend to be heavier than in litters farrowed by those not affected.

**Parasitism** may be overlooked by a farmer who is confronted with diseases that may strike with considerable suddenness and alarm. The economic inroads of parasitism, although less startling, can be very severe, however.

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