calf is placed in an individual pen, 5 by 10 by 3 feet, where it remains until it is 4 to 6 months old, depending on the size of the calf.

Moving the calf and its pen, preferably uphill, once each week, takes the calf away from its contamination before too many of the oöcysts sporulate. The calves are not completely freed of infection, but they swallow enough oöcysts to get slight, nonclinical coccidiosis and to develop sufficient immunity to be resistant when they are placed on pasture, unless the pasture is heavily contaminated by older cattle.

Calves raised in portable pens and then placed on pasture are no more susceptible to coccidiosis and other parasitic diseases than are calves raised in individual stalls in a conventional calf barn.

Besides preventing clinical coccidiosis, portable pens reduce the transmission of worm parasites and many other infectious diseases of calves. As compared with barn-raised calves, those raised in portable pens remain remarkably free from respiratory troubles and invariably make better weight gains and have fewer deaths. The portable pens are recommended primarily for use in Southern States, but they have been used successfully in milder weather in some Northern States.

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Diseases of Calves

M. G. Fincher

Calf scours is perhaps the most important of the diseases of calves. It is known also as diarrhea in calves, calf septicemia, and 3-day calf disease.

It takes many different forms and therefore is hard to define. Here, though, I describe the types that are seen a few hours after birth and those that appear later.

The most fatal form of calf scours appears at birth or within 6 to 72 hours after birth. The calf is found soon after birth in a cold, weak, and dying condition.

Sometimes there is little or no evidence of actual passage of watery feces, and several calves on a farm may be "found dead" unless they are closely watched following birth. In other herds a few calves may scour mildly or severely during the first 10 to 30 days of life and recover with little assistance. Oftener, however, calves with severe diarrhea become unthrifty and pot-bellied, show poor growth, and get pneumonia.

The middle ear, joints, and umbilicus in rare instances become seats of localized infection in beef or dairy calves when they are a few days to several weeks old.

We do not know all the factors that favor development of the various forms
of diarrhea in calves. Many causes are known, but others undoubtedly have escaped detection.

Various infections may be to blame. Usually a calf reared from an isolated family cow on a small farm remains free of scours and grows better than do calves in larger herds in expensive but crowded calf barns. Presumably, therefore, infectious agents may be regularly present in most large herds.

The organisms capable of causing scours include the coliform group. The salmonella group is involved infrequently in California and other parts of the world. Possibly viral agents are the cause. The salmonella or paratyphoid organisms seldom have been recognized in calves in the eastern part of the United States.

Calf pens, parturition stalls, barnyards, trucks, and railroad cars may be contaminated by these infectious agents and may be a source of infections that cause mild to fatal scours.

Adult or younger cattle very likely carry the agents on their feet and skins. It is believed that the uterus and digestive tract of adult cattle do not generally harbor the infectious organisms.

An unusually severe type of acute calf septicemia or calf scours, with death of some calves, will occur quite regularly when a large group of very young calves is assembled from different farms, because the virulence and the variety of the causative agents associated with calf diseases are thereby increased.

The removal of pregnant cows from an area where fatal scours is rampant and allowing them to calve in isolated stables or grass paddocks or on pasture often stops an outbreak immediately.

Calves born in a particular set of buildings, stalls, or outside yards may die of severe septicemia with or without scours over a period of a few weeks or several months. If the pregnant cows are moved to one or preferably to several new, clean stables or yards, the losses may suddenly stop. This strongly suggests that some type of infection (virus, bacteria, or both) occurs promptly after the calf is dropped in an infected place on the farm or ranch. Leaving this infected area and moving the remaining pregnant females to one or several uninfected areas avoids the chance for exposure to infection of calves born after the move.

The cow's diet during the several weeks before she drops her calf influences the calf's resistance to scours. The dam's lack of vitamin A (and perhaps other vitamins) may weaken the calf even though she herself is not emaciated.

A low amount of vitamin A in the calf's liver and in the dam's colostrum may result from poor pasturage and too little roughage and concentrates during the last months of pregnancy. When cows have been on poor winter rations or on extremely dry pasture, one can expect severe outbreaks of scours and other diseases of calves.

Colostrum from the dam of the calf or from some other cow, fresh within 12 to 24 hours, contains gamma globulins rich in antibodies. If the calf gets no colostrum in the first several hours of life, scours are likely to ensue. Yet this colostral milk has a high content of fat (and perhaps other products), which produces scours if the calf gets too much. Calves of high-butterfat breeds especially may become extremely sick from too much colostrum even if infection is absent.

Calf diseases, including scours, seem to be more severe and widespread in some years than in others. We do not know why. It may be due to lack of agents that produce immunity—antibodies—in the cows and in their colostrum and, therefore, high susceptibility to viruses or other agents in the newborn calves. Then, as the diseases became widespread, the calves might have acquired some immunity, perhaps from their dams, and the incidence would be lower for several years.

A virus has been isolated from calves
and cows near Ithaca, N. Y., and other parts of the United States. It can cause virus diarrhea. It has not been classed as a true cause of white scours or scours in calves under 3 weeks old, but it deserves attention as a threatening or possible cause. Most 3-month-old calves in the Ithaca section are resistant to artificial inoculation with the virus. Therefore the virus may have entered the young calves and built up resistance in them. It is debatable whether it has caused clinical symptoms, except a mild fever and resistance to that particular virus.

Some research men have suggested that some cases of scours are due to the same cause that is connected with diarrhea in human infants. It is called metabolic acidosis and is accompanied by low blood sugar and a low potassium level in the blood. Great variation in the blood chemistry has been found, however. The presence of a severe to moderate acidosis and the variations in the sodium and calcium levels in the blood of affected calves deserves more study before they can be positively evaluated. No doubt metabolic acidosis is a cause or a result of scours.

Some calves, as the late D. H. Udall pointed out years ago, develop depraved appetites and eat contaminated bedding. Their true stomachs (abomasum) at a week of age may contain shavings, coarse straw or hay, and hair, mixed in an indigestible mass. They remain unthrifty and develop so-called dietetic scours.

Furthermore, many calves are deprived of cows' milk when they are 3 to 15 days old. Veterinarians generally believe that calves should get milk longer than that. Various milk substitutes are widely used. Most of them contain dried skim milk, antibiotics, chemicals, carbohydrate filler, and vitamins. We have seen many calves that died of dietetic or nutritional scours or did not thrive because they got no fresh whole milk. And we have seen calves that were fed such artificial diets and seemed highly susceptible to ordinary infections even though they grew well.

In sum, then, scours seems to be due largely to an overcrowded condition, poor hygiene, poor diet for the calves or for their dams, and to a variety of infectious agents, which may enter by ingestion, inhalation, or through the umbilical stump.

Acute calf septicemia is a striking and costly form of the syndrome—a complex set of symptoms—called calf scours.

Usually the calves with this condition die suddenly. A few calves have a fetid, white, watery diarrhea soon after birth. A series of losses may occur despite drastic steps to cure or prevent the diarrhea. Then for several years the disease may not appear in such a virulent form on the same premises. Or it may recur a few weeks each year on larger farms. Or, again, calves may have a fetid, watery diarrhea, may be clammy and cold, and may have sunken eyes when they are 6 to 24 hours old—a syndrome that is a continuous experience each year throughout the long calving season, especially in winter and spring in the Northeast. Severe outbreaks may occur in hot weather, too.

Calves that survive may respond well to good husbandry and become useful adults. A few will remain unthrifty and stinted, with conformation much poorer than their inherited potential, and develop considerable pneumonia. Chronic solidified areas will be found in their lungs at autopsy.

The absence of a temperature in many of the so-called "3-day scours" or very acute cases often is confusing and surprising. It probably means that the loss of fluids through the bowels has been so rapid that the patient is approaching shock and more complete dehydration and death. Owners may not have noticed that the calves were sick and the veterinarian may have found nothing at autopsy. There is a total absence of gross changes in the tissues. If the examination is performed
immediately after death, hemorrhages may be found on the sclera of the eye or in the stomach, kidneys, or intestines, and the contents of the stomach and intestines have a fetid smell. Feces on the buttocks and tail have an extremely offensive odor.

Calves in most herds may die before the onset of the acute type of the disease. They start showing white or greenish-gray, fetid feces at 24 hours (or as late as 10 days) after birth. Usually these calves are not especially depressed and cold and will get up to nurse or suck a nipple pail despite severe diarrhea. Like the more severe form, this common "white scours" may lead to an unthrifty calf. Fetid, purulent discharges may come from the ears or umbilicus. Joint changes and lameness (arthritis or tendovaginitis) may set in. Eventually pneumonia, repeated attacks of constipation, or scours and unthriftiness may occur.

Older calves that have escaped the baby-calf type of septicemia and scours occasionally may develop troublesome and apparently contagious diarrhea. This form of diarrhea affects one or several calves 1 to 6 months old in a herd. The liquid feces often are nearly black. That is due perhaps to a medicine that did not stop the diarrhea but changed the character and color of the feces, or it may be due to blood in the feces. That blood would have come from the true stomach or small intestines; any fresh blood might come from the large bowel or rectum.

These late cases of scours in older calves may be a symptom of an unrecognized chronic pneumonia or be part of other localized infections following sickness in early calfhood. Such chronic scours often represent evidence of a poor diet and poor housing or general environment. Standing or lying in the mud or water-soaked bedding seems to favor the development of this and other forms of scours.

Prevention of scours is not a simple matter. Years ago people concerned with rearing healthy calves learned the value of keeping straw or hay contaminated with feces and other coarse material out of the abomasums of calves less than 2 weeks old. To do that, muzzles were helpful for pail-fed calves.

Some farmers still use muzzles on calves that have unusual appetites. Many calves need such protection. Carefully prepared pellets or other dry-grain calf starters, placed in small amounts in clean containers, are something for the calf to eat after it has hastily consumed the milk. To feed pellets for that purpose, the owner may have to build small stanchions or stalls in which very young calves can be fastened when they drink milk. Their feed and water should be so placed that the calves may then turn to vitamin-enriched calf starter, small amounts of clear water, or fine timothy hay—all of which should be placed off the ground so that the calves will not befoul the food and water with manure.

Many dairymen prefer nipple pails, because from them the calf gets its milk with its head held as when it nurses a cow. This natural position keeps the calf from inhaling milk or gulping it too fast, as it does from an open pail. The nipple and pail must be cleaned thoroughly every day.

To combat scours, farmers have effectively used the open-pen, nurse-cow system for rearing dairy calves to 3 or 4 months of age.

Beef cattle of high quality are quite regularly reared on nurse cows of a dairy breed until the calves are a year old. This plan gives unusually good growth and perhaps vigor. If, however, dairy calves are allowed to remain on nurse cows after they are 2 months old, a degree of fullness in the neck region below the throat sometimes results. This throatiness is undesirable in a dairy calf intended to be used in competition in the show ring, but has no undesirable effect on the health of the calf.

The nurse cow must be free from chronic infectious diseases lest the calf get the infection. Parasitism can spread to the calves from infected
cows, but if the cow and calf are kept in a covered shed (with sides open as needed for the particular climate) and if no soiled ground or water holes are nearby, the danger of spreading parasitism in this way in the northeastern United States is not serious. A tarpaulin is lowered over the one open side of the shed in cold weather. Four nurse cows are tied in the shed and eight or more calves allowed to run with them. A creep is provided where they can eat grain and hay. A suitable dry calf starter, consisting of pellets and a special calf ration, is desirable. Clean, fresh water should be available to calves after they are 5 days old.

These two practices do not solve all disease problems of calves—acute septicemia may kill calves before it is time to shift them from colostrum of the dam to the nurse cow or nipple pail.

Another recommended preventive practice is to use feeds or supplements rich in vitamin A for the cows during the final 3 months of their pregnancy in order to raise the resistance of newborn calves to infections.

The plan of having many places in the farm buildings or many areas on a ranch as calving places may help to keep down scours because chances of exposure to infectious agents are reduced thereby.

As I mentioned before, it often is necessary to move the pregnant cows away from a place where newborn calves are dying within a very few hours after birth or let the cows calve in a pasture. Breeding so that calves are dropped in May or June usually assures that a clean pasture will be available for calving.

The movable, isolated pen system for rearing calves is still popular in much of the United States where calves may always remain outdoors.

A wire mesh a few inches above the floor of the pens keeps them free of urine and manure. Another plan is to put 6 inches of new soil or cinders, covered with soil, in the floor of each pen before each newborn calf is placed in it. The calf is removed from this clean pen to a larger one with other calves at 3 weeks of age.

Calves must be kept from sucking each other’s navels, ears, and teats. If several calves must be kept in one open pen, they might well be kept tied or stanchioned some distance from each other so they cannot suck each other. If a good dry-grain starter for calves is put near them, the calves will soon learn to eat and not start sucking each other.

Utensils used for milk or water must be washed and sterilized often. The fixed boxes for grain should be cleaned if they are so placed that the calves can soil them. Very little grain should be left in them after a calf has eaten for a short time. What is left becomes unpalatable and attracts rodents and birds, which might spread disease.

A good place to rear a few calves in a cold climate is in the same stable with the cows but separated from them so that their manure does not befoul the calves’ feed or bedding. A theory—which has not been widely accepted—is that this close contact between adult cattle and calves improves the bacteria of the calves’ rumen and other parts of the digestive tract. The bacteria produce vitamins, which help protect the calves from scours.

Another, and more drastic, preventive measure for acute scours in young calves is the use of a blood transfusion from the dam or from some other fresh cow.

Treatment of an outbreak of scours after all preventive measures have failed is a serious problem even to the most competent veterinarian. Much can be accomplished, however, with blood transfusions (or transfer) and with modern antibiotics, protectants, and other chemicals. Prevention so that disasters are infrequent should be the aim of the successful breeder, and a veterinarian should be called early in an outbreak. The rapid progress in the development of newer treatments offers the hope that a more satisfactory treatment or even a good preventive
vaccine may be in the hands of your practicing veterinarian some time in the future.

Calves often have slight coughs and nasal discharges, which may develop into a more severe respiratory condition. The farmer might think of the irritation as only a cold or coryza, but actually it might be a part of calf pneumonia.

In large herds especially it is common to find a few calves with symptoms like those shown by a person with a "cold." In outbreaks of so-called colds, some of the calves cough but have a low temperature and eat well, while their mates may be fatally ill.

These respiratory diseases in calves, which are not related to respiratory conditions in man, cause financial loss to the beef and the dairy industries through death and the production of calves of poor conformation and poor growth rates.

Scientists who have studied the diseases differ as to the cause. One theory, represented by the research of Dr. J. A. Baker and his colleagues at Cornell University, is based on the belief that one or more viruses initiate mild or severe pneumonia.

Two Irish scientists, H. G. Lamont and W. R. Kerr, in 1939 described severe losses from scours and pneumonia. An entire crop of 30 calves on one farm was lost one year from what appeared to be pneumonia. The scientists succeeded in causing pneumonia in healthy calves in 5 to 6 days by placing one calf that had pneumonia in a small pen with several normal calves. The intranasal injection of a filtered saline suspension of pneumonic lung tissue from other sick calves, which were destroyed while sick, caused the usual chain of symptoms that had been observed in regular outbreaks of the disease in calves in Ireland. The scientists could not isolate bacteria. They suggested therefore that an influenzalike virus was perhaps the cause of the pneumonia.

Another view is that many different kinds of bacteria are capable of living in a normal calf without producing symptoms until the calf meets some set of factors that lower its resistance. Many investigators would insist that a virus constitutes the resistance-lowering agent that is needed to touch off such bacteria as the shipping-fever organism (Pasteurella multocida) or Corynebacterium pyogenes or any one of a great variety of pyogenic organisms that a calf ordinarily harbors in its tissues. Rarely has Brucella abortus been involved.

Other environmental causes are numerous and important. Foremost among them is improper housing.

Calves are raised sometimes in temperate or in cold climates in stables where extreme changes in temperature occur. Calves left outdoors suffer from even greater exposure. The air in a calf barn that seems well ventilated may become foul and hot; a few hours later a change in weather and wind direction may cause a sharp drop in temperature in it. Or, a ventilator or window may be left open so that a calf is in a cold draft; a few hours later it might have pneumonia.

Chilling is dangerous for confined calves. Calves that are turned loose with their dams or nurse cows get heat from the cows even in a cold stable, but confined calves cannot escape from a cold pen. The thick concrete partitions formerly used around calf barns shut off the movement of air and were cold and damp, and the calves that rested against them suffered.

Ventilators and thermostatically controlled artificial heat have come into use in many calf barns. The ventilators allow air to enter from a conduit at the ceiling and to escape over the edges of a trough, which may be 4 inches high and 8 to 24 inches wide and is suspended just beneath the ceiling inlet. The air outlet should remove the foul air near the floor.

Dr. E. S. Harrison, formerly of the New York State College of Agriculture, developed a plan whereby individual pens were provided for eight
calves in a small, well-ventilated calf barn. The unit was separated from similar units. Newborn calves thus could be placed in a barn that had been left vacant for a period after it had been disinfected with hot lye solution applied under pressure. This group of normal baby calves would remain in this clean setting in a stall 6 by 6 feet until all were at least 3 months old. Then that barn would be disinfected and left vacant for several days. This avoided the addition of normal calves less than a week old to a group of older calves that were more likely to be harboring some infection capable of causing pneumonia. Having many of these areas widely separated on a large farm further protects the susceptible calf from infection carried by a caretaker who moves from an infected group to a pen of normal calves.

More than one caretaker is needed when several eight-stall units at various locations are filled with calves. Close confinement of many calves in one barn allows one sickly calf to infect normal calves. That has happened even when individual stalls 6 feet square are used—the air becomes fetid in them if they have tight walls higher than the head of the calf; lower walls let the calves nuzzle each other and so spread infection. Calves should not be placed in pens that allow less than 30 square feet of floor space per calf, lest bad air and overcrowding lead to conditions conducive to pneumonia.

Pneumonia occurs rather frequently in unthrifty calves that have survived a mild attack of scours. Sometimes we use the term "pneumoenteritis" to suggest that both diseases have the same cause. Many groups of normal calves, however, suddenly develop pneumonia without another ailment. Pneumonia generally affects calves after they are 3 weeks old. It is common at 6 to 8 weeks, but becomes less frequent as the calves get older. One should not assume, though, that a 4-month-old calf is beyond getting this type of pneumonia. It is more frequent in the cold months, but it may happen in any climate in any month. Spring is the peak period in regions where the calves are kept in stables.

Calves of any age are susceptible to respiratory trouble when they are transported, but in weaned beef calves 6 to 10 months old (so-called feeder calves) the ailment usually is due to shipping fever rather than to the virus of calf pneumonia.

In individual outbreaks, however, the pasteurella organism (which commonly is associated with shipping fever) may be absent in shipped calves that have pneumonia.

There is too great a tendency to assume that all pneumonia of calves is due to the shipping-fever organisms. Dr. John McAuliff, who has practiced intensively with cattle in Cortland, N. Y., has seen no pneumonia in calves due to this disease.

Nevertheless, it is very important to avoid exposure of young calves to cattle of any age that may have shipping fever or pneumonia from any cause.

Various infections and bad atmospheric conditions seem to be responsible for most of the serious outbreaks of calf pneumonia, but the addition of calves from outside herds to other groups of healthy calves may cause a more serious type of pneumonia than is usually encountered from exposure to cold alone.

**Symptoms** of calf pneumonia include dullness, coughing, and rapid breathing in a calf that is 2 weeks to 3 months old. The temperature may reach 103° to 106° F., and a nasal discharge appears. A complete or partial loss of appetite may occur as the pneumonia develops.

Usually the calf loses condition rapidly even if it continues to drink milk. The hair coat becomes rough after a short period; diarrhea develops and may persist if the calf is not treated. Prostration and death in a few hours or days may follow in acute cases.

A few of a group of infected calves
may show no symptoms of pneumonia and yet have small, solid (pneumonic) spots in the lungs. Most calves that cough and have a nasal discharge but still are not considered seriously ill may be found by a clinician to have slight to severe bronchitis and pneumonia.

The solid spots of tissue in the lungs—which, of course, can be seen only on autopsy—may cause relapses later. The slight attacks of pneumonia may cause unthriftiness. Calves that have bilateral pneumonia may recover with or without treatment, but they often are stunted and have a depression behind the shoulders, which spoils their conformation.

Calves that suffer from neglect and severe pneumonia tend to have acute symptoms of pneumonia for 3 years or more. A few develop necrotic (dead) areas in the lungs, a chronic dilation of the bronchi, or abscesses in the lungs. Such diseased tissue may spread, and the abscesses may rupture months later and cause death.

The symptoms and course sometimes are changed promptly by early diagnosis and treatment. Prompt and complete recovery, though, may indicate that the ailment was not pneumonia but an uncomplicated cold.

Such a variable course makes calf pneumonia one of the most costly and unpredictable diseases of calves.

**Diagnosis** is not always easy because examination of the living calf often fails to disclose rales or other symptoms of pneumonia.

The possibility of a toxemia (blood poisoning) or uremia (absorption of ura) from other causes—such as overdosing with sulfa drugs—or pneumonia from inhalation of milk or medicines given as a drench must be considered when one makes a diagnosis.

Calves that are suffering from coccidiosis, lungworm disease, calf diphtheria (foot-rot organism infecting mouth or throat), or leptospirosis may breathe rapidly at certain stages of those diseases and require an antemortem and possibly a postmortem and laboratory examination to determine the correct procedure. Lead poisoning in calves often gives rise to a high temperature and may occur in calves that are of the age group in which calf pneumonia is common. The presence of pneumonia should always be suspected in calves with a high temperature and rapid breathing, but one should bear in mind that an allergic reaction to a great variety of agents and many other conditions can cause similar symptoms.

**Prevention** is based largely on an elimination of the known causes and is the most satisfactory method of dealing with calf pneumonia.

In the early stages, that means removal of normal calves to small units and leaving the sick calves in the infected area where they were found.

The early use of antibiotics to control bacteria that act as secondary invaders may check many outbreaks—but no drug has an entirely satisfactory effect on all the bacteria and viruses that may be involved in calf pneumonia.

Calves and older cattle that have been trucked or shipped should not be placed immediately with healthy calves, but should be isolated for several weeks before they are added to the herd.

Good hygiene is essential. Quarters should be dry and free of drafts. Steel mesh or woven wire floors placed several inches above the base of a pen keep calves off concrete floors and, if the drainage is good, keep the pens dry and clean.

Visitors should be kept away from calf barns, because the virus of calf pneumonia and other infective organisms can be carried on shoes and clothing. Cats, dogs, rodents, and swine also might have a part in spreading infections. Care is needed always to keep calves from being exposed to all infections from outside sources.

Many dairymen have found that the open-pen, nurse-cow system of raising
calves is an easy and successful way to prevent calf pneumonia.

The same system might well be used for high-class beef cattle, because beef calves, reared on their dams indoors or maintained in confinement between nursing periods on a nurse cow, also may get pneumonia. The nurse cows could be kept in the cooler months in a shed or pen, one side of which is open and has near it a small yard so the calves can go outdoors at will. A tarpaulin, fastened over the open end of the nurse-cow unit to allow ventilation, gives needed protection. Vitamin-enriched calf starter, early-cut timothy or some other fine green hay, and clean water should be made available to the calves in a creep.

The nurse-cow units should be small. Only six or eight calves of the same age should be put in one.

Autogenous bacterin has been used in attempts to prevent pneumonia in calves. It is a special killed culture in saline suspension of organisms derived from the spleen or lungs of calves that have died of pneumonia on the farm or ranch where the calves are to be vaccinated. Other shipping-fever bacterins, mixed or stock, have given disappointing results, and the autogenous bacterin seldom does all that is expected of it.

Until a vaccine, based on the viruses that may be involved in calf pneumonia, is produced, little can be expected or guaranteed from the use of immunizing agents.

Treatment has changed from the use of cow serums or whole blood from cows or from recovered calves to reliance on wide-spectrum antibiotics or chemotherapeutic drugs. As there is constant improvement from year to year in the methods of treating calves with such agents, it is safest to consult a veterinarian for specific directions.

Calves less than 2 weeks old may die suddenly from a hemorrhagic enteritis caused by *Clostridium perfringens* or *welchii*, type C. The toxins it produces, like the toxins of all the organisms of this group, are extremely dangerous. The beta toxin is thought to cause necrosis (death) of the mucous membrane of the intestine so that there is free hemorrhage into the bowel.

The true causes of hemorrhagic enteritis with fatal toxemia are unknown.

It has occurred oftenest in Hereford calves in Western and Southwestern States, but at times it affects calves of all beef or dairy breeds.

It is believed to be associated with overeating. It has killed calves that were large and growing well—possibly because they got more milk from their dams than they could digest or because they consumed more grain, grass, and feeds other than milk than their immature digestive tracts could handle. It has been suggested that climate might influence the activity of the clostridial organism.

A closely related organism, *Clostridium welchii* (not typed), which causes a slightly less hemorrhagic condition, has been found in Canada.

In calves in Canada and in the West, the disease caused by clostridial organisms resembles acute calf septicemia in that calves—usually 2 weeks old—often are found dead without warning.

Calves with hemorrhagic enterotoxemia may have colic, develop weakness and listlessness, quit nursing, and pass bloody feces. Afterwards the head is often pulled back by spasms of the neck muscles, general spasms occur, and death ensues in 2 to 24 hours. A tendency toward rigidity (instead of paralysis) is an important sign.

Strangely, in this acute condition, temperature seldom rises.

At autopsy the abomasum (stomach) is often filled with milk, and the small intestines contain blood in the lumen and wall. The inflammation is acute enough to be accompanied by a severe peritonitis.

A laboratory diagnosis is desirable.
unless the disease has occurred regularly for several seasons in the area in which the affected calves are located.

Vaccination of the cows with a specific toxoid, an alum-precipitated killed culture of bacteria, before the birth of their calves is useful. A specific serum for the calves may be tried if the toxoid has not been used on the dams.

Infections with Salmonella organisms are so rare in cattle in the United States that little is known about the nature of the problem in calves. Actual cases have not been identified in the eastern part of the country. In 1954 an outbreak occurred in California. Perhaps the condition has existed in other areas but has been classified incorrectly as calf scours or has been overlooked entirely.

Many types of Salmonella organisms are believed to exist in places where calves are kept, but infection does not occur unless the calves are exhausted or starved or deprived of colostrum.

In the outbreak in California, 37 young calves had been deprived of colostrum and then shipped a long distance by truck—their exhaustion and starvation favored the development of the Salmonella infection. The specific germ was found in the spleen of eight of the calves. Veterinarians in California, on the basis of the animals' medical history and symptoms, have since diagnosed the sickness of many calves as salmonellosis.

Sick calves, 2 to 15 days old, usually have a brief period of fever. It may pass unnoticed and may be followed by sudden death. Other calves scour and sometimes pass bloody or watery feces. They may linger for weeks without any response to the usual treatments for diarrhea.

The intestines and sometimes the stomach are necrotic, but there may be no gross changes in the tissues of the dead calves at autopsy. Some hemorrhage may occur in the stomach and intestines, where many ulcers may be present. The condition may be mistaken for coccidiosis, acute scours, and (rarely) hemorrhagic enterotoxemia. A laboratory diagnosis would be desirable in most outbreaks.

The way to prevent the disease is to avoid improper handling of calves under 2 weeks old. Calves at this age should receive a small feeding of milk at least two or three times daily. Calves should get the proper amount of colostrum. They should be kept away from other scouring calves. They should not be moved long distances unless absolutely necessary.

All places where calves are kept should be completely disinfected. Feeding utensils should be sterilized after use.

No vaccine is available. No treatment is entirely satisfactory.

A condition called tetany may occur in calves 3 months old or older. It supposedly is due to a lack of magnesium in the blood, perhaps because the calf's diet was low in magnesium. Calves that eat only milk are especially susceptible. The symptoms are stiffness and convulsions.

Efforts to prevent tetany should include adding magnesium to the diet.

The use of sedatives to relieve the tetanic spasms of muscle groups has been tried. While there is not ordinarily a simple calcium deficiency in these calves, it may be the only deficiency in some individuals. This is corrected by the use of calcium injections. As in "milk disease," vitamin E may be deficient. Some scientists have suggested the possibility of other vitamin deficiencies in tetany.

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