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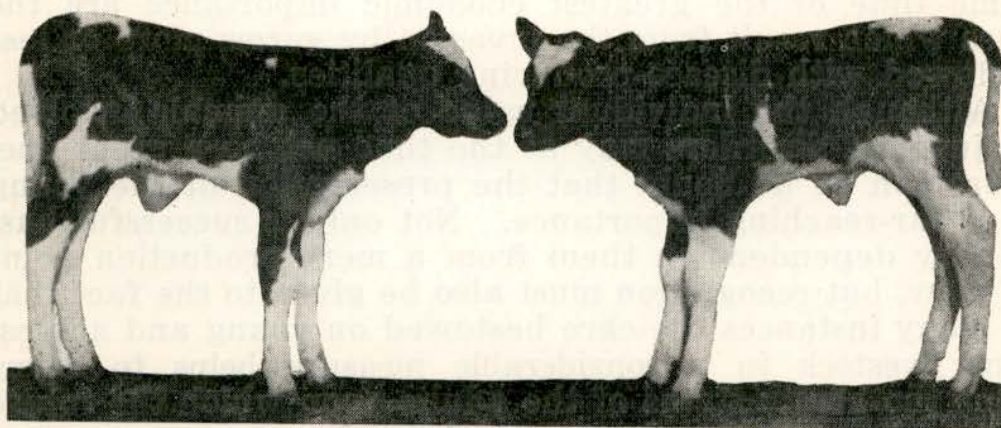
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White Scours of Calves

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NORMAL CALVES, FIVE DAYS OLD

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White Scours of Calves

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Among the many diseases to which animals are liable there are a number which are dominated by the factor of age. Some of these are particularly apt to manifest themselves during the newborn and juvenile stages of life's journey. They may be due to causes greatly varying in their character. Most conspicuous among them and at the same time of the greatest economic importance are the ones which result from the invasion by germs more or less endowed with disease-producing qualities.

Although the individual value of the animals involved in juvenile disorders may at the time not be a great one, there can be no doubt that the preservation of the young is of far-reaching importance. Not only is successful husbandry dependent on them from a mere production point of view, but recognition must also be given to the fact that in many instances the care bestowed on young and adolescent livestock in a considerable measure helps to determine the health status of the adults upon which the future prosperity of the producer may depend.

Before giving consideration to one of the more important and common of the diseases of the newborn, it may not be amiss to examine the actual status of the young animal when the fateful event of birth brings it in contact with the many factors present in the environment in which its life must pursue its course.

The conditions imposed by domestication may not always be favorable to a normal existence and it may be pertinent to inquire into the means of protection which may enable the young to develop into a healthy adult.

Prior to birth the young animal was living like a parasite within the womb of its dam. There it was well protected, although not absolutely so, against the invasion by various disease-producing bacteria. With birth this snug mode of life comes to an end and the newborn must face surroundings containing elements of danger, which to meet, it is not always adequately prepared. Even after this event the young remains, for a more or less extended period, dependent on the maternal body for its sustenance.

During this phase of life, when milk is the young animal's only food, it is not always certain that the latter

is entirely free from bacteria, which are apt to cling to the older animals and which may be disease-producing or may become so under certain conditions.

The young animal at the time of birth is as yet to be provided with the means of defense against microbic invaders, which commonly enough are part and parcel of the surroundings in which it is placed. It may be able to withstand the ones to which the species is naturally resistant, but it is quite doubtful that its protection avails against other disease-producing germs or even against such as are only potentially so.

Notwithstanding certain experimental observations to the contrary, the unborn young does not appear to participate in the protective substances by which the maternal body can successfully defend itself against a considerable assortment of infections which may be hazardous for its newborn offspring.

Therefore the young of our domestic animals are born with a virgin vulnerability, not only to most infections to which their kind is liable but also they are not prepared to resist many germ invaders which are harmless to the older stock.

Such germs may habitually inhabit the more mature animals, without doing damage, but under certain circumstances they may destroy the young ones and more particularly the newborn. If they invade the latter in conspicuous numbers or even if they invade at all without meeting a firm resistance, fatal disease may be the result. In such a case the young animal occupies about the same relation to the microbic invaders as a dead animal does to the bacterial causes of decay.

The structure of the newborn's intestines is an open one, permeable to bacterial invaders as well as to certain undigested proteins, such as the ones contained in the colostrum or beestings of the cow. These secretions of the udder contain the substances by which the maternal body contributes to the protection of its young against certain germ invaders much in the same manner as certain serums will protect against some of the infectious diseases. It is from this source and from it only that the newborn receives a measure of immunity upon which it may eventually erect its own protective mechanism.

If this protection becomes available before a noxious germ invasion takes place, the development of the young may proceed uninterrupted by disease. But if, on the other hand, a massive microbic assault precedes the develop-

ment of a defense, the surviving chances of the young animal may be materially reduced. Its survival is even in the balance when invasion and protection come about simultaneously.

With the above considerations in mind, it becomes possible to understand some of the reasons for the occurrence of disorders among the newborn of animals kept under the usual conditions imposed by domestication. Among these, the subject of this circular, *White Scours in Calves*, occupies a prominent place.

White scours of calves is a disease of bacterial origin usually manifesting itself within a period of from 4 to 8 days after their birth, with the majority of the cases occurring within 48 hours. The disorder primarily involves the intestines but in a large proportion of the cases the causative germs are apt to soon swarm throughout the body.

White scours may be caused by more than one species of germs although in a preponderating number of the cases the one which produces the mischief is the common colon bacillus, which is widely distributed in nature as a rather harmless inhabitant of the normal intestines of a great number of animal species. Although even in adult animals the germ occasionally figures as a cause of sickness, it is particularly in the newborn that the colon bacillus gives rise to fatal infections.

How a relatively harmless germ may do so is not fully understood, but there are, at least, two factors that are worthy of consideration in this connection. In the first place, thought must be given to the great vulnerability of the newborn already mentioned above and, in the second place, to the interesting fact that once a calf has sickened through infection by the colon bacillus and the germs have further opportunity to pass from calf to calf they are apt to become more virulent with every passage until in a given stable the chances of the recently born calves to escape from the disorder become increasingly less. This phenomenon is further enhanced by the fact that the relatively harmless colon bacilli, once their virulence has become exalted, may retain this quality for long periods. Such germs may be introduced into a stable from without, although it can not be doubted that white scours in a given stable may take its origin from the colon bacilli normally present in the intestines of the older animals. Such germs

finding their way into the intestinal tract of the newborn may there encounter conditions so favorable to their growth and dissemination that disease comes about with great promptness. Once the infection has become established in a stable it is apt to maintain itself there with a high degree of tenacity.

Scours of newborn calves is essentially a disease incidental to domestication and manifests itself particularly in the form of stable outbreaks. On the other hand, the disease is but rarely encountered at pasture or range.

The germs which most commonly cause white scours in calves are present in the environment supplied by the infected stable and there they are associated with objects and materials contaminated by the body wastes of other animals. By the licking and mouthing of the objects and substances mentioned the newborn calf introduces the infection into its body. It is also possible for the calf to become infected when in the course of birth it swallows the contaminated mucus of the vagina of the dam.

Nursing at a filthy udder is a mode of infection of a formidable character. In fact all feeding in an unclean manner must be accepted as a means of transmitting the disease and especially so in stables where the latter is prevalent. That the fresh navel wound may permit the entrance of the germs must be admitted, although at the present time the importance of this manner of infection is not regarded to be as great as it formerly was.

That a calf may become infected before the act of birth removes it from its dam's womb must be accepted as a possibility, although the fact that calves born at pasture from cows of more or less permanently infected stables so rarely contract the disease does not support this opinion.

In its most common form white scours of calves asserts itself during the first four days after the animals are born. Not unusually the disease already manifests itself before the calf is 24 hours old and occasionally cases are observed of calves which die before they are one day old and without even developing the diarrhea so characteristic of the disorder.

As generally observed the disease first shows itself by a certain lassitude on the part of the calf concerned. The young animal's eyes have a dull appearance and the sub-

ject is disinclined to move about and usually prefers to remain lying down. Its appetite is impaired and often it refuses to suck altogether. Diarrhea soon makes its appearance. The evacuated materials are at first of a yellowish or grayish white color. Undigested milk curds are often passed. These bowel discharges are frequently frothy and may have a very offensive odor. Gradually they may become more mucous and watery in character; their color may change to a more brownish tint and may be observed to be streaked with blood.

The evacuations appear to be accompanied by pain; there may be severe straining, in the course of which the anus may become everted.

Fever is present from the beginning and as the disease advances the rate of respiration increases. There is a marked loss of body weight, the belly is tucked up, the flanks are drawn in and the eyes sink deeply into their sockets. The sick calf soon becomes exhausted and emaciated and death takes place. In most cases the disease runs its course in from one to three days. The general death rate of white scours is a very high one, ranging from 85-100 per cent of the cases.

The after-death appearance of calves which have succumbed to scours may vary to a considerable extent in accordance with the rapidity of the course of the disease and the intensity of the infection. Although the examination of the carcasses generally reveals evidence of a serious disturbance the lesions found cannot always be regarded as highly characteristic.

The inspection of carcasses dead with white scours most commonly discloses a marked degree of waste of the body tissues. The skin covering the parts adjacent to the anus is soiled by malodorous fecal matter and the mucous membrane of the end-gut is apt to protude from the opening. The veins exposed to view by the removal of the skin are distended with dark, clotted blood and this condition may likewise be observed throughout the body.

After opening the great body cavities it becomes at once apparent that of all the internal organs the ones of digestion show the more marked and more constant changes. The blood vessels of the digestive stomach (abomasum) and of the intestines are distended with blood. The mucous lining of the stomach shows intense inflammation and more particularly so near the point where it joins the intestines.

its walls may be found to be infiltrated and thickened by a watery fluid. The affected mucous membrane is often covered by a sticky mucus. Here and there and especially at the protruding parts of its folds superficial erosions and small hemorrhages may be observed. Portions of the mucous lining of this organ may be more or less loosened and can be readily scraped off with the knife.

The intestines are inflamed throughout but usually more severely so in the case of the small intestines than in that of the large ones. The intestinal mucous lining is of a deep red color and frequently its surface is eroded. The wall of the gut is thickened by the presence of infiltrated fluid and hemorrhages of the mucous membrane are often observed. The lymphatic structures of the intestines are commonly swollen and small hemorrhages may be seen immediately beneath the outer covering of the gut.

The intestinal contents commonly consist of a thin, fluid and very fetid substance of a yellowish or grayish color. It often contains flakes of mucus and gas bubbles. In calves which have not taken nourishment, the contents of the intestines are commonly of a darker color (bile).

The lymphnodes which receive the lymph drained from the intestines are enlarged, abnormally rich in fluid and upon section are apt to show small hemorrhages.

In most of the cases the spleen is moderately enlarged but not always so. The liver and kidneys of calves which have succumbed after a more rapid course of the malady are often found to be congested. In cases in which death did not take place until after two or three days of sickness these organs may be lighter color owing to the degenerative processes to which they were subjected in the course of their illness. The lungs frequently show congestion and even pneumonia is not an uncommon sequel to the disorder. In animals which have had to sustain a still more prolonged period of sickness joint complications and sores in the mouth and about the lips may occasionally be observed.

When one contemplates the acute character of the disorder, the marked vulnerability to bacterial invasion on the part of the calves concerned as well as the fact that so early in the disease its causative germs invade all the tissues of the body, it becomes obvious that medicinal and other methods of curative treatment are always bound to fall short of hopeful expectations. In spite of such considerations many remedies have been proposed and actually

administered to cases of scours. Such treatment has had no influence on mortality and attempts of this nature can safely be regarded as entirely futile.

Even preventive measures are not always successful although they always promise far more than attempts at cure. The fact that the causative germs may so thoroughly invade a given stable and there with great tenacity maintain themselves always tends to make prevention difficult of achievement. The marked vulnerability of the calves to the infection also adds to the difficulty.

Notwithstanding these disadvantages the application of certain principles of hygiene has a distinct value when calf scours has to be coped with and in this connection a number of factors are worthy of consideration.

It has already been pointed out that the environment in which calves are born plays an important part in the prevalence of scours. It is a matter of observation that the disease, although also occurring in sanitary stables, is much more apt to become a problem in stables of faulty construction and in which a scrupulous cleanliness can not well be maintained. Hence the hygienic construction of cow stables and a management tending to cleanliness must be accepted as factors always unfavorable to the occurrence and spread of the malady.

Not only should calves be born in clean stalls but they are best kept in clean and disinfected enclosures with a minimum of opportunity to come in contact with objects soiled by manure and other filth. Such measures have their value in establishments in which white scours is not a problem, but in those where the disease has to be actually faced, they should never be neglected.

Mere sanitary measures are not always sufficient when scours has once been introduced in a stable; and even after the first case has once presented itself a special care of the calves will be warranted in order to keep the infection from establishing itself in a more or less permanent manner and all the more so if this should already have come about.

In the latter case it is always well to assume that every calf born must be especially protected. This protection should begin with the cow herself shortly before the calf is born. Immediately prior to delivery the parts of the cow with which the calf must come in contact, as well as those

adjacent to them, should be thoroughly cleaned with water and soap and then disinfected by means of some mild disinfectant solution. Some authorities go so far as to include antiseptic vaginal douches in their method of procedure.

The cow should then be placed in a clean, disinfected stall, preferably removed from the common stable. When the calf is born it should be dropped on a clean or recently disinfected cloth or sheet and at once removed to a clean place prepared for it in advance. There the usual care such as drying, etc., should be given to it and although the danger arising from an infected navel wound is no longer regarded as a very potent one, it can never be amiss to disinfect the stump of the cord by applying to it a mixture composed of one part of the tincture of iodine to three parts of glycerine. Care must particularly be taken to keep the calf from licking or mouthing any object in the stable.

Clean muzzles have been used for this purpose although a device proposed and used by a German veterinary practitioner may be preferred because it also makes possible a more complete isolation of the calf.

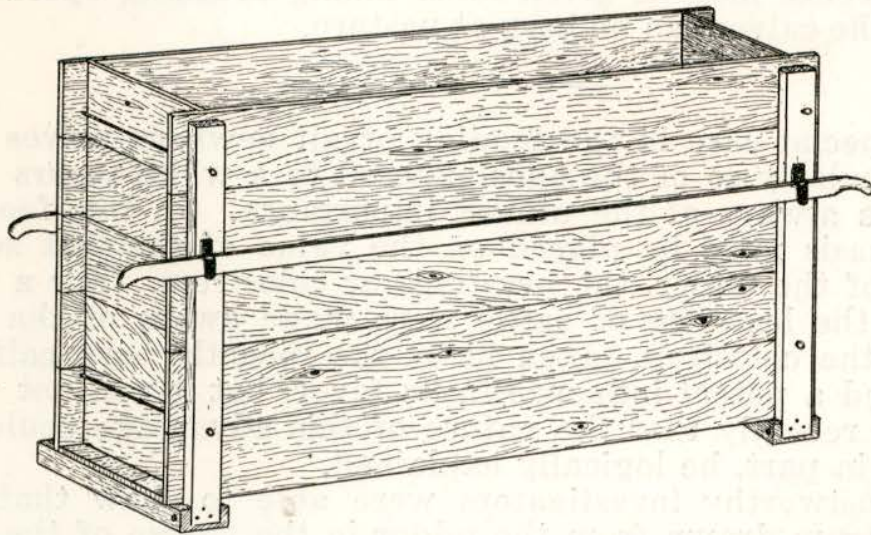


FIG. 1.—Ever's calf box. By this device it becomes possible to completely isolate the calf against infective contacts, to prevent it from licking and mouthing objects in the stable and to remove it to safer quarters.

This device consists of a box made of smooth lumber; five feet in length, sixteen inches in width, and three feet, three inches in height. This so-called calf box is so constructed that it can be readily taken apart for the purpose of cleaning and disinfection. It is painted inside and outside, open at the top and must be so placed that the body wastes drain

away from the front of the calf during the period of occupancy. When in use the box is provided with a bedding of clean straw, sawdust, peat-moss or similar substances.

In an emergency a dry-goods box of suitable dimensions and thoroughly disinfected may answer the purpose but if it should have been occupied by a diseased calf, such a makeshift calf box had better be burnt because, unlike the regular model, it would be difficult to so disinfect it as to make it safe for the next occupant. In the establishments where calf scours can be expected to occur, one or more boxes should be held in readiness and used for each newborn calf.

The calf to be protected must be placed in the box as soon as possible after its birth and kept there during the period of its greatest vulnerability (4-6 days). The calf thus confined should, if at all possible, be removed away from the presumably infected stable to any other suitable place where the infection cannot be expected to be present.

In the face of constantly recurring cases of calf scours in a given stable it may become advisable to abandon the latter as a place for calves to be born in. In such cases preference may be given to so timing breeding operations that the calves can be born at pasture.

Especial care in the feeding of all newborn calves and particularly so of the ones exposed to a white scours hazard is always of the utmost importance. In this feeding emphasis must be placed on the value of the first secretion of the udder, the beestings or colostrum. For a long time the breeders of cattle were made aware of the fact that the colostrum taken in by the recently born calf exercised a potent influence in its favor, but it was not until more recently that the nature of this advantage could, at least in part, be logically explained.

Trustworthy investigators were able to show that the colostrum drawn from the udder in the course of the first two days after the birth of the calf contains certain substances capable of conferring a marked degree of protection against the germs more commonly responsible for white scours. It was also possible to demonstrate that such protective substances are readily absorbed by the calf's intestines during the period mentioned. After that time they tend to gradually disappear from the udder secretions.

The practice of feeding the colostrum to the calf quite soon after its birth thus is based upon sound principles.

In stables where the disease has gained a foothold it is, in addition to the sanitary measures already recommended, advisable to prefer hand feeding to the more natural manner of nursing. Before the colostrum is withdrawn from the udder the latter should be thoroughly cleansed and disinfected and the hands of the milker should be subjected to a similar treatment.

The first strippings of the colostrum should be discarded and then the beestings collected in a sterilized vessel and given to the calf by means of a nursing bottle, also clean and properly scalded. One half pint of the colostrum, warm from the udder, may be given at once and a like quantity given in a similar manner within one or two hours after the first feeding. For some twenty hours additional feeding is not absolutely necessary but very large calves may require another feeding some four or six hours after the second one. However, overfeeding must always be avoided and considerable caution in this respect is recommended.

When the calf is about twenty-four hours old a regular feeding schedule may be inaugurated, dividing the day into four or five feeding periods, allowing from three to five pints in the course of one day. If the feeding is well tolerated the ration can be gradually increased with relative safety. Pasteurized or sterilized milk should not be used until at least two days after the first feeding with colostrum. All milk must be fed warm from the udder and there must be no relaxation as to cleanliness and certainly not during the first week of the calf's life.

Milk from abnormal udders must always be rejected as unsuitable for calf feeding. If for any reason the dam's colostrum is not supplied in adequate quantity or cannot be trusted on account of udder infection, the milk of some other healthy cow may be substituted. In such a case a measure of safety may be supplied by adding to the milk some of the blood serum of the dam.

Precautions in feeding, as mentioned above, are particularly to be given consideration because they tend to prevent certain digestive disturbances by which the vulnerability of the calves to white scours might be immeasurably increased.

Ever since the nature of calf scours and its bacterial causes were more or less definitely ascertained attempts have been made to protect the exposed calves by means of immunizing procedures. On the whole the results of

such efforts were not conspicuously satisfactory and the reports regarding them were frequently quite contradictory.

The value of methods to establish an active immunity by the use of vaccines or similar agents always remains questionable. This is especially true because an active immunity is not engendered at once and a full protection cannot be brought about within the period of greatest vulnerability of the young animals confronted by a scours hazard.

The use of immune serum, when injected into the calves immediately after they are born, on theoretic grounds at least, promises better results because the use of a potent immune serum, properly selected, can be expected to confer a degree of immunity at once. Some good results have been obtained after serum injections but unfortunately they are by no means constant.

This failure to obtain desired results with a reasonable measure of regularity can be attributed to the fact that the germs which are apt to figure as the causes of calf scours may belong to more than one species or variety and hence there is always a likelihood that a given serum injected may not protect against the particular germ prevalent in a given stable.

Hence the routine use of the stock white scours serums available on the market always remains somewhat uncertain in its final results. It is quite probable that the subcutaneous injection of substantial doses (200 c.c.) of the blood of the exposed calf's dam may be fully as effective, even if there is not a sufficient volume of evidence to warrant any specific recommendations with regard to such a procedure.

In as much as the injections of so-called white scours serum can do no harm to the calves, there is, of course, no great objection to their being tried, although one should not be too sanguine in one's expectations.

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