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Some Diseases of Cattle.

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and
F. G. MATTHEWS.

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PART I.

BY C. A. CARY.

COW POX. VARIOLA.

COW POX is a skin disease naturally occurring in cows and rarely appearing in other cattle. It may be transmitted by inoculation to calves and to man. The true nature of the virus has never been discovered: various kinds of bacteria have been reported as the cause, and some investigators claim that it is produced by an animal micro-parasite.

The period of incubation is said to be from two to four days. The eruption occur usually on the teats, the udder and neighboring parts; some observers report eruptions on the inside of the thighs, on the head, and on the scrotum and perineum of the bull.

The teats at first become slightly swollen, sensitive and somewhat hard; in a short time appear a number of pimple-like modules, having hard or tumified bases, on the teats and udder around the base of the teats. On transparent skin these modules are scarlet red or rose red; on white skin they are bluish white, giving a flourescent reflection; on a dark skin the nodules have a lead-gray color; and, if the skin is thick and tough the pimples may be a dirty yellowish gray in color. The pimples or nodules are enlarged popillæ of the skin and vary in size, yet they average about one-fourth of an inch in diameter. In about two days the outer layer of the skin is raised, around the center of the enlarged pimple, by viscid, yellowish lymph, which is in separate saccules (multilocular vesicles); by thus raising the outer borders of the nodule its center appears depressed. But in

some nodules the excess of lymph raises the entire outer layer of skin over the nodule, forming one large unicellular vesicle, filled with thick, yellowish lymph (serum). The vesicles usually become mature in 8 to 10 days, and vary in size from one-fourth to three-fourths of an inch in diameter; they are usually circular on the udder and may be elliptical on the teats. When the vesicles are not broken their contents become purulent (filled with pus), the centre first becomes brown in color which soon extends to the border of the pustule. The pustule dries and a dark brown scab or crust is formed which usually drops off about the fourteenth day, leaving a pale red or white and shining, depressed scar. The vesicles or pustules on the teats are always broken by the milker and the brown scabs come off prematurely and sometimes drop into the milk to be removed from it by the strainer. Complete recovery takes place in the eruptions that appear on the udder in about 21 days; but with those on the teats successive scabs or crusts are removed, ulcers become "cracked" and raw, and healing occurs slowly, requiring in some instances thirty to forty days. During this time re-infection or infection with pus germs may take place and thus successive crops of nodules (possibly vesicles and pustules) and scabs may appear. In one case under my direct observation there were four successive crops of eruptions in four months (winter and spring) on the teats and udder of the same cow. Crusts from the third crop were mixed with dilute glycerine and a calf was inoculated, by vaccination, producing an ulcer with a scab or crust without apparently passing through vesicular and pustular stages. Had I used the crusts from the first crop I am confident true cow pox would have been produced in the calf. Moreover, the calf inoculated had been getting the milk from this cow (not sucking) and may have become immune before being inoculated.

Dr. Van Es, while practicing in Mobile, reported to me a case where a milker became infected on the hand by milking cows with cow pox.

Owing to the fact that man is inoculated (vaccinated) with bovine virus (cow pox virus) to produce a partial immunity to small pox, it is possible that many cows may become inoculated by milkers who scratch their vaccinated arms and fail to disinfect their finger nails before milking the cows. Records (Crookshank and others) seem to indicate that cow pox is usually more prevalent when small pox scares are numerous, and many persons are vaccinated; this relationship appears to be true so far as the imperfect records of cow pox in Alabama can indicate. I have observed that children who drink raw milk sometimes have ulcers not unlike vaccination ulcers, about the mouth or face or on the hands; this might result from scratching pimples, eroded places or sores when the finger nails are covered with infected milk.

The fact that milkers, who become infected with cow pox, were partly or wholly immune to small pox, led the celebrated Jenner to discover and apply the method of vaccinating man with cow pox virus in order to prevent virulent small pox.

The virus of cow pox is fixed and can only be transmitted by direct inoculation. Generally the milker carries it from one cow to another and, if not immune, inoculates himself, or carries it from his vaccinated arm to a susceptible cow. One attack, or series of eruptions, produces immunity in a cow for life. Hence young cows at first period of lactation (with first calf) are the ones most frequently infected; yet older cows may have it if not already immune. It is generally more virulent in winter than in summer.

The chief troubles resulting from cow pox are the annoyance or difficulty in milking and sometimes a decrease

flow of milk; the latter may be due to lack of removing all the milk; also "caked bag" or mammitis may be a sequel to lack of removing all the milk. Moreover, there is some danger to non-immune milkers and possibly to non-vaccinated children.

Treatment consists in isolating the affected cows and allowing the same milker to milk the diseased cows and no others. The milker should keep his finger nails cut close and smooth and thoroughly wash and disinfect his hands after and before milking with a 2 per cent. solution of creolin, or corrosive sublimate 1 part and water 1,000 parts.

The udder and teats should be washed just before milking and covered with one of the above antiseptics. After milking apply some of the following to the bag and teats: Copper sulphate 1 dram and water 1 quart. Some have used the following with fairly good results:

Tannic acid .....1 ounce;
Salicylic acid .....4 drams;
Vaseline .....3 ounces.

Apply just after using the copper sulphate solution.

The milk should be boiled before using, especially for children. Apparently it has no bad effects on calves not alowed to suck.

Varicella or false cow pox is characterized by having single celled vesicles and by its rapid course, passing through the papular, vesicular, pustular and healing stages in six to twelve days. The scab or crust is thinner and not depressed in its centre as in cow pox. The vesicles and pustules have the same outline as those of cow pox, but are smaller in varicella than in cow pox.

Notice that these are variations in degree rather than in kind; this makes it difficult to distinguish true cow pox and false cow pox in some instances—especially in the early stages. In varicella there may be successive

crops of eruptions on the udder and teats extending over several weeks or three or more months. Possibly the later eruptions are due to infection by pus germs or to mixed infection. The true cause of varicella is also unknown. Yet it is infectious and can be transmitted by the milker from one cow to another and possibly from the cow to the milker. A similar disease in men is commonly called chicken pox; so far no direct relation between the disease in cows and in man has been established. No inoculations have been made as in cow pox.

The treatment for this is the same as for cow pox.

Furunculosis is a disease that is also found on the teats and udder of the milch cow. It is an inflammation of a hair follicle and its subaceous gland, and of a certain amount of connective tissue surrounding them. The cause is an infection through the follicle by one or more of the pus germs, usually the *micrococcus pyogenes*, var. *aureus* or *albus*. Generally the central parts undergo necrosis, or degenerative changes, forming a small pus collection, which usually escapes by a break in the skin and rarely by erupting into the milk sinus or reservoir of the udder or ducts of the teat or udder.

Furuncles (small boils) appear usually about the base of the teats, but may occur anywhere on the udder or teats; some report their occurrence on the vulva and perineum.

At first the furuncle is a hard, swollen nodule, about one-half inch in diameter; in the course of a few days it becomes soft in its centre and with slight pressure may erupt. Another or several more may appear near or around the first one, and thus a series of successive furuncles may appear on the teats and udder during the greater part of the period of lactation. Sometimes the nodules are quite deeply situated and remain without erupting; these are usually about the base of the teat,

or in other parts of the udder; they may be, in some cases, tuberculous modules.

No doubt that filthy hands, dirty finger nails, open the way to infection. Pus germs are very often found on dirty finger nails and on the dirty skin of the udder; moreover, long, sharp and rough finger nails are fine instruments for inoculation.

Treatment consists in cleanliness and disinfection. With the finger nails smooth and closely cut, and the udder and hands thoroughly washed, chances for infection are very limited.

After infection, wash the udder with water that has been boiled and cooled; apply a 2 per cent. creolin, lysol or corbolic acid solution; or corrosive sublimate 1 part and water 1,000 parts. Be sure to wash and disinfect the udder well immediately after a furuncle erupts. Remember cleanliness of hands, finger nails and udder will prevent it.

OBSTRUCTIONS TO THE FLOW OF MILK FROM THE TEAT.

Chronic inflammation or irritation of the lining membrane of milk duct or canal in the teat (through which passes the milk from the milk reservoir or sinus in the bag to the bucket or air at time of milking) may lead to a graudual thickening of the lining membrane and consequent narrowing of the duct. The milk will then flow in a very small stream and the calf or milker may be unable to remove all of the milk, and thus "dry up" that quarter or produce clotting of the milk or inflammation of the bag ("garget" or "caked bag.") Chronic inflammation may be a result of the growth of germs in the small amount of milk left in the milk sinus or duct, or the growth of germs in the lining membrane

of the duct. The use of a filthy or rough dilator or milk tube may irritate the membrane. The most common cause of infection, according to my observations, is the employment of filthy finger nails or a dirty knife to remove a clot or a temporary obstruction in the duct. The thickening of the lining membrane is usually near the lower end of the duct, but in one instance I found the duct obstructed in the entire length in all four tests; and, according to the owner, the cow was not carefully or properly "dried up."

The duct in the teat may, also, be obstructed by a growth in the substance of the teat, which presses on the duct and obstructs the flow of milk. The growth may be in or on the lining membrane of duct and anywhere along its course, but most frequently at its lower end. In some cases a false membrane develops across the milk sinus or reservoir preventing the flow of milk into the teat; this can be determined by using the milk tube or probe or small dilator.

In extremely rare instances lime-like deposits may take place in the milk ducts and sinuses, and appear in the duct of the teat as sand-like grains or particles obstructing the flow of milk.

The most common causes of obstruction of the flow of milk in the teat are clots of milk (casein) resulting from infection of the milk by germs getting into the udder through the duct in the teat; retention of milk in the udder for a long time; and catarrhal and other forms of inflammation in the udder. Milk is a good food for germs, and various kind of bacteria will grow in it, many of which will precipitate the casein, thus forming clots in the sinus of the udder.

TREATMENT of obstructions will vary with the conditions presented. Narrowing of the duct may sometimes be relieved by using dilators (figs. 1, 2); it may be neces-

sary to leave the dilator in the canal or duct for an hour or more just before milking. Be careful to cleanse and sterilize the dilator just before using, with boiling water or a good disinfectant. When dilators will not accomplish the desired result, use a small knife blade, lance (fig. 4), or the teat slitter (fig. 5), and enlarge the duct at the place of narrowing; then use the dilator or probe to prevent the narrowing of the duct as the wound heals.

Sometimes growths or small enlargements on the inner surface of the duct may be clipped off with very small sharp pointed scissors or twisted off with small forceps.

Lime or sand-like deposits in the sinus may require considerable dilatation of the duct with the ordinary or spring dilator (fig. 3); or the small forceps may be used to remove the sand-like particles. A false membrane across the milk sinus or reservoir may be pierced and slit open with a small knife (fig. 8). Clots of casein may be removed by using a milk tube (figs. 9, 10), or by using dilators (fig. 3), and complete and frequent milking. If the udder is inflamed use antiseptic injections and applications as directed under head of garget or inflammation of the udder.

PAPILLOMAS or WARTS on the bag or teats may be clipped off with knife or scissors when the cow is dry; cut about as deep or a little deeper than the thickness of the skin. Care should be taken not to cut around or into the opening of the duct of the teat; it might leave a permanent opening or the contraction of the scar might close the duct. After clipping apply once or twice per day, castor oil, 3 ounces; salicylic acid, 4 drams.

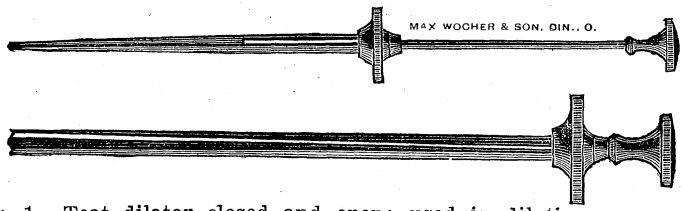


Fig. 1.—Teat dilator closed and open; used in dilating a narrow or contracted milk duct.

Fig. 2.—Grooved dilator for opening obstructed teats.

Fig. 3.—Spring dilator for removing membranes, clots, and sand-like particles.

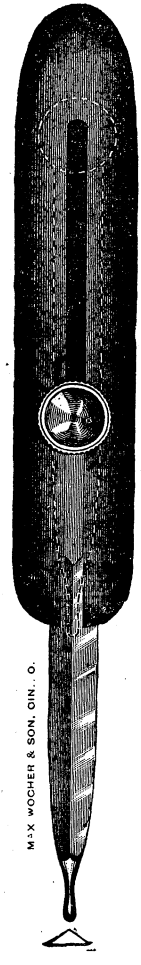
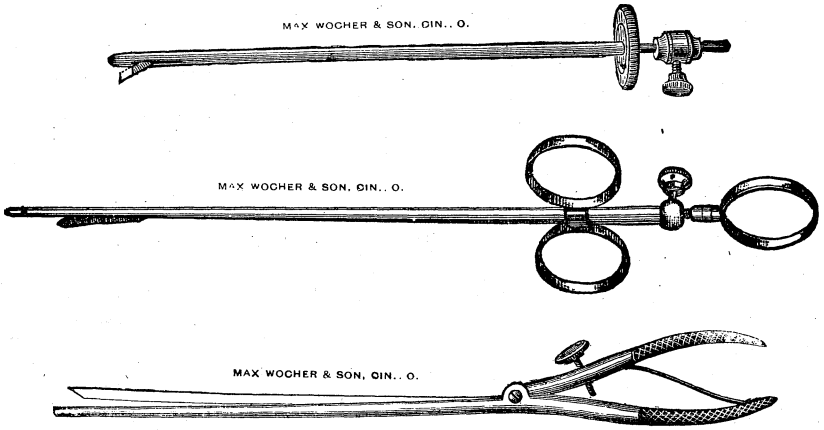
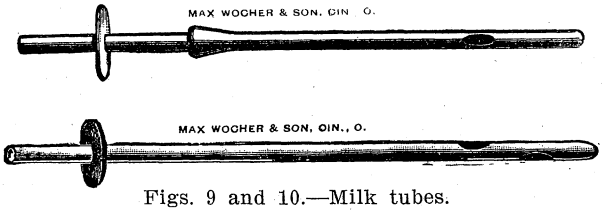


Fig. 4.—Teat lance for enlarging contracted teat ducts.



Figs. 5, 6 and 7.—Three kinds of teat slitters, any one of which may be used for enlarging narrow or contracted milk ducts.

Fig. 8.—Small tenotome knife (showing only part of handle), which may be used in enlarging a contracted milk duct or cutting an opening in a false membrane across the milk sinus.



Figs. 9 and 10.—Milk tubes.

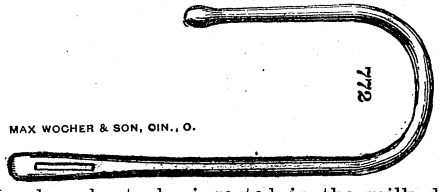


Fig. 11.—Lead probe to be inserted in the milk duct after teat slitting, and retained until healing and danger from excessive contraction of the wound is passed.

POISONOUS PLANTS.

TESTS OR EXPERIMENTS WITH KALMIA LATIFOLIA.

We used a 5 per cent. infusion of the leaves, which was prepared under the direction of E. R. Miller, professor of pharmacy.

I. A scrub cow, about 5 years old, weighing 600 pounds, was used.

Her temperature was 103.2 Fah., respirations 10 and pulse 34 just before the drug was given. At 3 p. m. she was given 3 quarts of the 5 per cent. infusion.

At 4 p. m.—

Temparature ..... 103.2 Fah.
Respirations ..... 10.
Pulse ..... 37.

At 5 p. m.—

Temperature 103.4
Respirations ..... 10.
Pulse ..... 36.

Pulse slightly irregular; cow showed distinct muscular weakness; wabbled about as if drunk; pupils slightly dilated; some muscles showed quivering or twitching movements.

At 8 p. m.—

Temperature 102.4
Respirations ..... 11.
Pulse ..... 24.

In attempting to move, cow fell and was unable to rise. Pulse somewhat irregular and weak; muzzle dry and mucous membrane pale and dry; pupils greatly dilated (amaurotic); some muscular twitchings.

At 9:30 p. m.—

Temperature ..... 102.
Respirations ..... 12.
Pulse ..... 36.

Pulse weak, but more regular; cow could rise, but in trying to walk fell; pupils still greatly dilated; muzzle dry, and mucous membranes pale. Air was cool, and cow was shivering.

Next morning cow was up, but weak and wabbling; pulse stronger and pupils normal in size.

Temperature 100.4
Respirations ..... 12.
Pulse ..... 36.

II. A bull calf, about 10 months old, was given at 10:15 a. m. one-half pint of a 5 per cent. infusion of leaves of Kalmia latifolia.

At 9:30 a. m.—

Temperature ..... 99.2 Fah.
Respiration ..... 8.
Pulse .....32.

At 11:15 a. m.—

Temperature 100.8
Respirations ..... 12.
Pulse ..... 54.

At this time calf was given one-half pint of linseed oil and 2 drams of tannic acid.

At 1 p. m.—

Temperature 101.2
Respirations ..... 10.
Pulse ..... 48.

Calf was down, unable to rise; pupils dilated; spasmodic twitching of muscles; pulse weak and irregular.

The next morning calf was up ready for its breakfast. The tannic acid may have temporarily prevented the absorption of the poisonous principle, but prevented the oil from producing purgation.

III. A sorrel mare, about 9 years old, weighing about 800 pounds.

Just before giving the drug her

Temperature was .....99.
Respirations ..... 12.
Pulse .....30.

At 10 a. m. she was given 1 quart of a 5 per cent. infusion of the leaves of the laurel ivy (Kalmia latifolia). She coughed considerable during the drenching, which indicated that some of the infusion went into the larnyx and wind pipe; possibly this made the drug act quicker than usual. At once the mare began to retch, froth at the mouth and breathe rapidly; pupils became dilated; co-ordination of muscular action lost; animal excited and struggling.

At 11 a. m.—

Temperature	96.
Respirations	56.
Pulse	46.

Breathing rapid and irregular; pulse weak; mucous membrane of nose pale and of the eye slightly congested; frequent convulsive movements of the limbs.

At noon—

Temperature	95.
Respirations	60.
Pulse	46.

Breathing still very rapid; pulse weak; animal becomes more quiet; pupils still greatly dilated. Muscular twitchings appear first in the face and extended to all the surface muscles of the body; occasionally there were convulsive movements of the limbs; surface of body cool.

At 1 p. m.—

Temperature	94.4
Respirations	52.
Pulse	46.

Animal very quiet; pupils dilated; eye dull; mucous membrane of mouth and nose of leaden color and mucous membrane of eyes congested; muscles continue to twitch; surface of body cool.

At this time (1 p. m.) the animal was given 1 ounce of 95 per cent. alcohol in 4 ounces of water.

At 2 p. m.—

Temperature	95.
Respirations	30.
Pulse	48.

Animal relatively more quiet; pupils continue to decrease in size; the mucous membranes of nose and mouth become slightly scarlet in color; muscles still twitch. Gave animal another ounce of alcohol.

At 3 p. m.—

Temperature	98.2
Respirations	28.
Pulse	50.

Pupils normal in size; muscles twitching less and more relaxed; mucous membranes of mouth and nose about normal in color, and surface of body warm.

Given another dose of alcohol with small quantity of lysol in it.

At 4 p. m.—

Temperature	99.6
Respirations	28.
Pulse	60.

Animal much better; given another dose of alcohol.

At 5 p. m.—

Temperature	100.4
Respirations	26.
Pulse	63.

At 5:30 p. m. animal was able to rise with a little help; muscles still twitching some; animal some weak, and wabbling, but able to walk about 200 yeards to a box stall.

Next morning her appetite was good, and she showed some signs of having had a hard drive, but 24 hours later she had entirely recovered.

From the three tests and from numerous cases where animals have eaten the leaves of Kalmia latifolia it is

very evident that the leaves contain an active poison. Several chemists and pharmacists have found indications of an alkaloid, but a sufficient quantity has never been isolated to test its poisonous effects on cattle or horses or sheep. Sheep and cattle eat the leaves of the shrub in winter or spring when pasturage is short, and the animals are hungry for green feed. No doubt they will eat it at any season where pasturage and feed are short, and the opportunity is given to them. This flowering shrub is very common in nearly all parts of Alabama; possibly more common in hilly regions and along mountain creeks. The shrub flowers in the spring, and is an evergreen, having green leaves all the year around. It is commonly called the laurel or laurel ivy.

TREATMENT.—Alcohol acts as physiological or chemical antidote. Whiskey, brandy or alcohol (dilute) may be given every two hours in 1 to 3 fluid ounce doses. Also, a purgative of 1 to 2 pounds of Epsom salts dissolved in 1 quart of water or 1 to 2 pints of raw linseed oil. Do not repeat the purgative under 24 hours. One to three fluid drams of creolin or lysol may be added to the purgative in order to check fermentation while the bowels are inactive.

The shrub should be cut down, or, better still, grub it up and burn it, and thus prevent cattle and sheep from getting it; this is possible and practicable in pastures.

The Red Buckeye (Aesculus Pavia, L.) is another shrub or small tree whose leaves are poisonous. The clinical symptoms are very like those of poisoning from Kalmia latifolia. The treatment is about the same; at first a good purgative is given and follow it with a stimulant, especially during the period of depression. In pastures grub it up and burn all the Red Buckeye bushes and small trees.

Batchelor (American Journal Pharmacy, 1873, p. 145), found in the seed of the red buckeye, a poisonous

glucoside ($2\frac{1}{2}$ per cent. in seed). It acted on the cat somewhat like strychnine. The leaves are said to be most poisonous just before, or about, the time of flowering. Cattle and sheep usually become poisoned by eating the leaves, and occasionally by eating the seed.

POISONOUS PLANTS CONTAINING HYDROCYANIC ACID.

Prof. E. R. Miller, Pharmacist at the Alabama Polytechnic Institute, found that the leaves, bark and root of the *Prunus Carolineanus* (mock orange) contained hydrocyanic acid.

Prunus serotina (wild cherry),

Prunus Virginiana (choke cherry, and

Prunus Persica (peach), all contain hydrocyanic acid at times in their leaves. They contain amygdalin, a glucoside and emulsin, a ferment or enzyme. In the presence of water the emulsin acts on the amygdalin and hydrocyanic acid, glucose and a volatile oil are formed. The action of the ferment is destroyed by boiling.

The leaves of these plants are said to be more poisonous or contain more hydrocyanic acid when kept in a wilted condition, without completely drying out, for several hours. In the rumen or first stomach of the ox or the sheep where there is little or no acid and where the food macerates in a watery secretion, neutral or slightly alkaline, would be an admirable place for emulsin to act on amygdalin and produce hydrocyanic acid.

Sorghum (*sorghum vulgare*), according to Peters, Slade and Avery, of the Nebraska Station, contains hydrocyanic acid when it is stunted or checked in growth by dry seasons and also *young, frosted* or second growth sorghum may contain it. No doubt, many of the reported cases of sorghum poisoning are due to acute indigestion (bloat) and not to hydrocyanic acid. As

the conditions now stand no one can tell when sorghum is poisonous without a feeding test or a chemical analysis. Cases have been reported of poisoning from feeding kaffir corn and pasturing Johnson grass, but the presence of hydrocyanic acid has not been discovered in Johnson grass.

In August, 1902, Mr. J. P. Logan, of Selma, Ala., reported the following facts to me:

Nine head of cattle were turned into a Johnson grass pasture for the first time; it was about four o'clock in the evening; the cattle became sick in ten minutes after eating the grass; gave 8 of them linseed oil and alum; 2 died that night and 6 recovered; one not treated died in three hours.

The Johnson grass from this field was tested for hydrocyanic acid, and none was found in it. The recoveries, by the treatment given, seems to indicate that the cattle had acute indigestion.

In July, 1899, during a very dry time, Mr. Hazzard, a dairyman of Birmingham, Ala., turned 20 cows into a sorghum field that had been injured by army worms and by drouth; in twenty minutes, he says, 18 were dead; 2 were saved by treatment. The 18 cattle died within 50 feet of the gate through which they passed into the sorghum field.

Hydrocyanic acid is a very unstable compound, and this accounts for the fact that many plants that sometimes contain it do so only under certain conditions and for a short time. Any condition that checks or stunts the growth of sorghum should lead one to regard it as a dangerous feed until proven otherwise.

SYMPTOMS OF HYDROCYANIC ACID POISONING are the same regardless of the source of the drug. Of course the larger the dost the more rapid and fatal its action. It can be absorbed from the unbroken skin when in a pure watery solution: it is readily absorbed from the alimen-

tary canal acting as a sedative and anaesthetic on the mucous membranes. Small doses depress the heart by stimulating the vagus centre in the medulla; large doses stimulate the vagus centre and depress the heart by acting directly on it, paralyzing it almost instantly. The vaso-motor centre is paralyzed and blood pressure falls very low.

The respiratory centre is paralyzed usually before the cardiac or vaso-motor centres. Toxic doses produce insensibility and coma; in animals convulsions may occur. Large dose paralyze the peripheral nerves and the voluntary muscles. Shortly before death the spinal cord is paralyzed. The pupils are dilated. In brief, hydrocyanic acid quickly depresses respirations, the pulse or heart action and blood pressure, and paralyzes the muscles and nerves of the limbs; depresses the action of the alimentary canal and dilates the pupil. In many cases these actions are so quick that there is no time to give antidotes or treatment. Drowsiness, running at eyes, twitching of the muscles, staggering gait, inability to stand, involuntary passing of urine and feces, dilated pupils, frothing at the mouth—are given by Peters as the prominent symptoms.

In cases where time is given for TREATMENT give a stimulant of 1 to 4 ounces of brandy, whiskey, or diluted alcohol or ether. When the animal can not swallow, give the drug per rectum or hypodermically. Stimulate respiration by holding dilute ammonia to the nose and by giving one-half grain doses of strychnine hypodermically once every three or four hours.

As soon as the animal can swallow give cow or ox 1 quart of melted lard (not too hot), or 1 quart or raw linseed oil and 1 pint of syrup diluted with 1 pint of water. If cow begins to swell from the formation of gas by fermentation in the stomach and intestines, give ½ ounce of creolin in 1 quart of water. Do not repeat purgatives under twenty-four hours. Sheep and calves

take doses of medicine about one-fourth as large as full grown cattle.

In all cases where possible prevent the animal from eating the leaves of the mock orange, the cherry and the peach—especially wilted leaves on recently cut or pruned branches. In case of sorghum, always test the stunted sorghum by cutting and feeding a little before turning cattle into the field to graze on it. In fact, it is best and safest to begin to feed it gradually, by the soiling method, and after the cattle have been brought up to full feed in that way, they may be turned into the field for a short time each day until they become accustomed to it. Very few cases of accidental poisoning have been produced by cutting sorghum and feeding it to cattle; yet such instances have occurred both with sorghum and kaffir corn.

Phytolacca decandra has been reported as poisonous for cattle. G. R. White, in the Journal Comp. Med. and Vet. Arch., 1902, p. 439, reports that 5 cattle out of a herd of 13 were affected with haemorrhagic enteritis accompanied with dysentery. These cattle had eaten large quantities of phytolacca, and White attributed the enteritis to the eating of that plant.

From an unpublished article of Prof. E. R. Miller, of the Alabama Polytechnic Institute, at Auburn, I obtained the following facts:

Three different times Prof. Miller became sick following the grinding of the roots of phytolacca. The sickness was very like the preliminary symptoms of influenza; alternate periods of chilling and high fever; intense headache; insomnia and restlessness; some irritation of nose and throat; lasting for about 24 hours. Two students were very similary affected; also a negro ground the roots of phytolacca and was similarly troubled. One student was not affected; another had irrita-

tion of the nose and throat and eyes, lasting about 24 hours.

The professor became affected three different times; 3 students and a negro once and one student was apparently unsusceptible. The following was reported to Prof. Miller:

A boy applied a decoction all over his body for the itch, it produced vesication, and the skin peeled off as from a blister. It is reported that many people eat young poke root as "greens;" possibly the cooking produces some change that renders the poison inert.

It is also suggested that the young plant may not have or contain the toxic principle; as a rule, most plants contain the greatest amount of their active principles just before or at the time of blossoming.

The seed or fruit of phytolacca are said to contain *phytolaccin*, phytolaccic acid, sugar and gum; the root of phytolacca a resin, probably a glucoside and a volatile acid. Prof. Miller and his students have obtained strong indications of several alkoloids.

Having never treated a case of phytolacca poisoning, I can only suggest that small oleaginous purgatives be given and the animal be fed soft feed in small quantities. Raw linseed oil one-half pint and creolin 1 to 2 drams might be given once or twice per day. If the animal is in pain give 1 to 3 drams of fluid extract of belladonna or 4 drams of tincture of opium two or three times per day.

DYSENTERY IN YOUNG ANIMALS.

Young calves, lambs or colts may have an infectious form of dysentery that begins usually during the first few days, or not later than two weeks, after birth; in some instances infection may occur in calves several weeks old. The cause of the disease, according to Nocard, is a short, stumpy, bacillus with rounded ends; frequently found arranged in parrallel lines, like a

comb, with short, close teeth; sometimes they are in linear series, having very short joints, becoming thicker until last segment, which is longer and club-shaped. Some are swollen in the centre and drawn into threads at extremities; others are ovoid like cocco-bacilli. From Nocard's description the bacillus seems to take on a variety of forms; it is found in pus and in free or intercellular masses. It is an obligative aerobe; stains always by Gram's method; grows in or on all media at a temperature above 86° F. (best at 95° F. to 100.4). It grows best on coagulated blood serum where in 36 to 39 hours appear a number of colonies with a shining surface, slightly raised in the centre, and appearing to send a number of roots into the medium; these colonies are white on serum from the horse, bright yellow on serum from the ox, and gray on coagulated blood.

Nocard, Lasage and Delmer believe that the principal, if not the only, method of infection is by way of the umbilical (navel) cord. Infection occurs during birth or immediately following birth while the cord is soft. Possibly it occurs in the vagina or vulva, or most likely after the cord is torn or broken, and the young is on the ground. Nocard attempted to infect calves by the alimentary canal and by the respiratory passages, and failed. But he succeeded by subcutaneous inoculation.

The experiments of Nocard, Lasage and Delmer were confined to calves in Ireland and on the continent of Europe; and their tests may not be conclusive, yet the evidence points very strongly toward navel infection.

Law, Friedberger and Frohner, de Bruin, Moussu, Deikerhoff, and others believe the disease is infectious. Many attending or predisposing causes are given, some of which are aids to transmission or infection. The following are given by various authorities as causes, both of infectious dysentery and of ordinary diarrhoea, or dysentery:

The young or new-born offspring failing to get the

first milk (colostrum) which is laxative in its action and is consequently required to remove the meconium (fœtal feces) from the alimentary canal of the young. Without it the young animal is liable to have indigestion, constipation or diarrhœa: any one of these conditions might favor infection with the germ of dysentery.

Filthy, dirty milk; sudden changes from whole milk to skim milk, or from skim milk to whole milk, or sweet milk to sour; putting a young calf on a cow far advanced in the period of lactation (milk contains too much solids); adding too much meal to milk or giving too much dry meal or corn to young calves when the salivary glands are insufficiently developed to digest the starchy food; giving cow's milk to the foal without proper dilution or modification; filthy buckets or udders; damp, filthy, unclean stalls, barns and pens; bad water from infected wells, tanks, troughs or vessels; ergotized grasses; mouldy, decaying, irritating vegetables or grains or hays; too much cotton seed or cotton seed meal; allowing colt or calf to suck when dam has been over-heated by violent exercise; feeding young calf or colt only once every twelve hours; feeding too much (over feeding); great irregularity in feeding, allowing calf or colt to get very hungry and then rapidly devouring a full feed.

Symptoms.—Some cases begin with constipation; others with soft, soon becoming watery, bowel discharges, which may be white like undigested milk, or grayish or yellow in color. At times the calf or colt is restless, with more or less straining to pass feces; appetite (stops sucking) is lost; abdomen may become distended or swollen and tender or tucked up (contracted) and tender; feces becomes frothy, bad smelling and sometimes streaked with blood; calf may bellow and slobber; the calf, colt or lamb may become dull,, stupid, weak, emaciated and die in one to three days, or may live one or two weeks and die or make a slow recovery.

Some cases have pneumonia, inflammation of the articulations, peritonitis, laminitis, hepatitis (inflammation of the liver), or opthalmia (inflammation of the eyes). This disease is very frequently found in herds where infectious abortion or tuberculosis exists.

About 80 per cent. of the cases in foals are fatal; 54 to 90 per cent. in calves and 66 per cent. in lambs.

POST MORTEM CONDITIONS—Here and there may appear erosions or desquamations and red or congested areas in the mucous membrane of the intestines, and sometimes in the stomach. Catarrhal exudate or pseudo-membranous patches may occur on the mucous membrane of the intestines. Peyer's patches may be infiltrated and prominent; sub-mucous infiltrated, softened, and marked by small red spots (hæmorrhagic spots.) Sometimes hæmorrhages may be found in the small or large intestine or in the stomach. In calves and lambs the desquamation of epithelium is most marked near the pyloric end of the fourth stomach. The contents of the intestines may be yellowish, white, gray, red, mucou-purulent and very fœtid. The intestinal lymph glands are usually enlarged.

Some cases show inflammatory changes in the lungs, liver, peritoneum, kidneys, spleen, heart, articulations, and eyes.

TREATMENT.—Prevention is the only means of successfully combatting this very fatal disaese. Cleanliness and disinfections will usually keep it from a place or herd. The stalls, pens, barns, buckets, water, feed, milk, cows and calves must be kept clean. Regular feed, with proper quantity and quality, avoiding any or all sudden or radical changes and the extremities of too little and too much feed, will tend to maintain healthy calves, colts and lambs.

It is always safer and better to milk a cow that is far along in the period of lactation and dilute the milk

with water that has been boiled and cooled and feed it to the calf than to turn a young calf to such a cow. Do not force meal, corn or other grain upon the young calf before its digestive apparatus is sufficiently developed to digest them. At least wait one or two weeks and then begin the use of such feeds very gradually. Never permit the calf to eat mouldy, decayed or rotten feed or hay or vegetables; keep it in well ventilated, clean, dry stall or pen and give it freedom in a clean, grassy pasture all the time that weather will permit.

Nocard recommends the following:

"White scours is generally the consequence of an umbilical (navel) infection which takes place at the time of parturition. Farmers may prevent the disease by conforming strictly to the folowing instructions:

1. Cows that are at the point of calving should be provided with dry and clean litter until after the act of parturition.

2. As soon as the premonitary signs of parturition are observed the vulva, anus, and perineum ought to be washed with a warm solution of lysol, of a strength of 20 grammes to a liter of water (2 per cent. solution). At the same time a large quantity of this solution may be used to syringe out the vagina.

3. As far as possible the calf ought to be received into a clean cloth, or at least on a thick layer of fresh litter, which has not been soiled by urine or excrement.

4. Immediately after birth the cord should be tied with a ligature (strong string) that has been soaked in lysol. (The tie is made 2 to 3 inches below the abdomen and the cord cut off one-half inch below the ligature.)

5. Mop or cover the umbilicus and remainder of the cord with the following solution:

Rain water .... 1 quart.
Iodine .... 30 grains.
Potassium iodine ..... 1 dram.

6. The disinfection of the umbilicus and cord should be completed by applying the following:

Methyl alcohol ..... 1 quart.
Iodine ....30 grains.

7. When the alcohol has evaporated the operation will be completed by dressing the cord and umbilicus with a thick layer of iodised collodion (1 per cent.). As soon as the collodion has dried the calf may be left with its mother."

In one outbreak of infectious dysentery in valves I have had good results by employing the following dust powder:

Tannic acid .... 3 ounces.
Boric acid .... 3 ounces.
Iodoform ..... 4 drams.
Salicylic acid ..... 4 drams.

Mix and apply to the ligated cord and umbilicus (navel) immediately after birth and two or three times per day during the first three days. This thoroughly disinfects and also dries up the cord very quickly. It can be applied with a dust blower or sifter.

If calves are allowed to suckle a cow, it is always best to wash the udder once or twice daily with a 1 or 2 per cent. solution of creolin or lysol. Just before birth it is wise to wash the vulva, anus, perineum and tail of the cow with one the above disinfectants.

Barns, lots and pens must be thoroughly cleaned and disinfected. Change calves and cows from one cleaned and disinfected place to another and keep well calves entirely isolated from sick ones. Use plenty of lime, whitewash, carbolic acid, creolin, lysol and other disinfectants on walls, floors, etc. Above all wash and scrub often the walls and stalls.

CURATIVE TREATMENT is not very promising; hence the great number of remedies herein suggested.

It is usually best to begin the treatment with a purgative in order to remove the fermenting and irritating materials in the alimentary canal.

For the calf or colt give 1 to 2 ounces (2 to 4 tablespoonsful) of castor oil; the lamb can be given one-fourth as much. Or, rubarb may be given in 30 to 60 grain doses to the calf or colt and 7 to 15 grains to the lamb. Or, calomel 6 grains for colt or calf and 1 grain for lamb.

Tincture of opium is sometimes given with, or following, the purgative.

Law recommends the following:

Tincture of cinnamon.....	2 fluid ounces.
Chalk	1 ounce.
Gum arabic	4 drams.

Mix and give to calf or colt 1 tablespoonful 2 or 3 times per day.

Cadæc uses:

Subnitrate of bismuth	5 grains.
Salicylic acid	5 grains.
Naphtol 20	grains.
Syrup	5 ounces.
Distilled water	4 ounces.

Mix and give to calf or colt 1 to 2 tablespoonsful after each time it is fed.

Another authority advises the following:

Coal tar	5 ounces.
Boiling water	6 quarts.

Let cool and give one-half pint evry half hour. This is very useful in cases where liver is involved, (indicated by yellow mucous membrances).

Lime water is sometimes useful: Give on to four tablespoonsful after calf has taken its milk. It is well to boil the milk and allow it to cool without putting cold water into it.

Some give a one or two per cent. solution of creolin; 1 to 2 ounces for calf or colt once or twice a day.

If the calf, colt or lamb is very weak, it may require a stimulant; such as coffee or a teaspoonful (calf or colt) of turpentine with egg or milk, or tincture of capsicum, a teaspoonful.

Wine of ipicac is said to be very valuable in some forms of dysentery in man. It may be given to calves or colts in 1 tablespoonful doses; 10 drops to the lamb.

ACUTE INDIGESTION IN CATTLE.

This is sometimes called "hoven" or "bloat." In the first stomach or paunch, there may be undigested, fermenting food, resulting in the formation of gases(carbon dioxide, hydrogen sulphide, etc.) and possibly some acids or toxic alkaloids or glucosides.

The causes are not always apparent, but generally it is due to over feeding or sudden change from dry feed to green succulent peavines, potato vines, corn, sorghum, clover, oats, potatoes or turnips which undergo fermentation in the paunch. When a cow or an ox lies down for some time, as in milk fever, lung fever or tick fever, the digestive organs may be checked in action or partially paralyzed; then fermentation may occur.

SYMPTOMS.—If gas is formed the abdomen becomes distended and resonant; (left flank larger than the right,) respirations are rapid and shallow; temperature about normal; animal may grunt or moan.

In some cases (Dieckerhoff) the greatest swelling or distention of the abdomen may appear in 15 to 20 minutes after eating clover (especially when the clover is in a partially withered or wilted condition on a hot day).

In some cases of indigestion there is no appreciable quantity of gas formed and consequently little or no distention of the abdomen and flanks; the appetite may be partially or completely suspended; little or no rumination (chewing and regurgitating of the cuds), the paunch or first stomach is inactive or paralyzed; bowels normal in acting during the first day, constipated or inactive thereafter, except in few instances where the bowels may be very loose and active; pulse may be acceler-

ated; temperature normal; and in the cow the flow of milk is greatly decreased. The animal may die in 1 to 4 hours or may recover in from 2 to 8 days. When toxic gases, alkaloids or glucosides are rapidly forming death may occur in a comparatively short time.

Treatment may be preventative or curative. Avoid over-feeding of concentrates; such as corn, cotton-seed meal, oats, wheat etc., and decayed, moldy, rotton feed. But it is most difficult to prevent cattle from getting too much green feed when they accidentally get into the corn, sorghum, pea patch or clover. Prevention means continual care and watchfulness. Change from dry to green feed gradually. Curative remedies are directed toward removing the undigested food and preventing fermentation and death while removing these materials from the ailmentary canal. If the animal can swallow, give 1 to 2 lbs. Epsom salts and 10 to 20 drops of croton oil in one quart of water; do not repeat this under 12 to 24 hours. Follow or precede this with 1 tablespoonful of strong creolin in 1 quart of water. If you have nothing else and the animal continues to bloat or swell, repeat the creolin solution every two hours until the bloating ceases. If you have no creolin, dissolve as much table salt as you can in two quarts of warm water and give 2 quarts of salt water every 3 or 4 hours. If you have no Epsom salts give 1 to 2 pints of raw linseed oil, or castor oil, or cotton seed oil, or melted (not hot) lard. Remember, do not repeat the dose of Epsom salts or oil under 12 to 24 hours.

In case the animal is greatly swollen and about to die before purgatives and antiseptics can act, then you can puncture the rumen with a trocar and canula or a knife. This should be done on the left side some where between the hip point (haunch) and the last rib. Cleanse the left flank with soap and water and weak creolin solution; cut an opening through skin, about

one-half inch long; now push the trocar and canula into the paunch (3 to 4 inches deep), pull out the trocar and let the gas escape through the canula for one or more hours; when you desire to remove the canula always insert the trocar into it and remove both together, this prevents infection of the wound. In case you have no trocar get a long quill or better a joint of swamp cane about the size of a lead pencil or pipe stem, boil it in water, (at least scald it), make a sharp bevelled edge on one end, and push the sharp end into the paunch through the opening made in the skin as directed above. After removing the trocar and canula or cane stem, apply weak creolin solution to disinfect the place; also give purgatives and antiseptics internally if not already given.

Feed carefully for the next few days, always give salt every day; granulated salt is better than rock salt.

PART II.

BY G. F. MATTHEWS.

ABORTION.

Commonly known as miscarriage or losing, slipping or slinking the calf, colt, lamb, whichever the case may be.

Abortion may be defined as delivering (parturition) before the end of the regular period of pregnancy (gestation) or before the young has fully completed fœtal life whether the little creature be dead or alive. Foetal live refers to life before birth, the young up to this time being a foetus. The average period of pregnancy in farm animals is for mare and jennie, 11 months and 15 days; cow 9 months and 15 days; sheep and goat 5 months; sow 4 months. If an animal delivers a few days before time the deviation is unimportant since the

period of pregnancy may vary a few days with different individuals and under different circumstances.

Abortion, from an economic standpoint, takes rank among former animals as follows: Cow, Mare, Sheep, Sow. The cow is the most liable while the sow is seldom subject to the mishap.

The viability or whether the fœtus is capable of living is another question. Usually it is dead. A dead foetus may be delivered at any time during pregnancy, but when abortion occurs in the first two-thirds of pregnancy the foetus is always dead. In the last third a live fœtus is frequently born.

The later the stage the more likely is the little creature to live. Many die immediately, and others are weakly and prove to be absolutely worthless, and in rare instances one becomes sufficiently vigorous to develop into a valuable animal.

Some idea of the number of living calves delivered by aborting cows in the last months of pregnancy and their value may be had from the record reported by Nelson of the New Jersey Experiment Station. Twelve cows aborted. Four births occurred between the 6th and 7th months; four between the 7th and 8th months; and four between the 8th and 9th months. Three of the twelve were dead: 1 died; 6 were killed and 2 were raised. Thus only a small percentage were of sufficient promise to be kept, and it is a question if it ever pays in the long run to raise any of them.

Abortion may be either non-infectious or infectious. When occurring in the latter form it assumes an enzootic or an epizootic type and it is of greatest importance to recognize this form in order to prevent the spread of the contagion.

Non-infectious abortion.

Non-infectious abortion results from some known cause or accident, irregular feeding, improper feed, etc.,

or happens only as a casual affair not preceded or followed by miscarriage in the same individual or other members of the herd. Not only should the home herd be excluded as a sourse of the disease, but the mishap should be free from any relationship whatever with a similar accident among cows which the attending bull may have served.

Causes: The causes of non-infectious abortion are too numerous to discuss in detail. Frequently it is to be ascribed to the poor condition of the pregnant animal. This may result from insufficient or improper food and irregular feeding. The fœtus dies for the want of nourishment, and is expelled as a consequence. Chronic wasting diseases may have a like effect by deranging digestion impairing assimilation and impoverishing the blood.

According to some authors an extremely fat condition predisposes an animal to abortion. This is said to occur most frequently in old cows of improved beef breeds suffering with fatty degeneration of the heart, the circulation being weak and irregular and insufficient to supply the fœtus.

Drinking ice-cold water and feeding upon pastures covered by frost, or eating herbage which has been injured by frost, have caused abortion. One writer reports an instance where one-fifth of the pregnant ewes in a flock of sheep aborted immediately after drinking from a hole made through ice.

Overloading the paunch (rumen) with succulent foods, like green sorghum, clover and cow-peas, especially when covered by dew; apples, sweet potatoe vines or tubers, etc., and gorging the animal with stimulating foods like corn, wheat, peas, beans, cotton-seed and cotton-seed meal are exciting causes.

Foods improperly harvested and improperly cured, musty, molded and partially decayed foods may set

up fermentation in the paunch, which compress the womb and kill or displace the fœtus.

Acute diseases, manifested by colicy pains or circulatory disturbances, may be followed by abortion. Diseases of the rectum and urinary organs, as diarrhoea and inflammation of the kidneys, bladder, etc., are predisposing causes. Parasites, like worms in the intestines, liver or lungs, and lice, are accessory causes.

Medicines injudiciously administered to ailing animals are as liable to cause abortion as the affliction. Large doses of purgatives are to be avoided, also another class of drugs known as ecbolics, rye-smut, corn-smut; cotton-root bark; cotton-seed, and cotton-seed meal, probably possess to a slight extent the active principles of cotton-root bark. Evil effects from this source have been overestimated. Grain smuts, seeds, leaves, etc., containing medicinal principles, must be consumed in enormous quantities usually to cause deliterious effects upon healthy organs. Taking for example, the smut of rye (ergot), which is the most potent of the class; it is said to require 10 pounds of the select drug to produce acute poisoning in a 750-pound cow. Such enormous quantities are not likely to be consumed at one time. The chief danger is in pasturing cattle continually on pastures where smut is abundant. A moderate quantity is consumed each day, without bad effects at first, but after a few days the active medicinal principles in the smut will have accumulated to such an extent as to cause chronic poisoning (ergotism), and abortion. Chronic poisoning from rye smut is rare, and it is questionable if corn smut ever has that effect. Drugs, like spanish fly, which irritate the urinary organs, and purgatives which stimulate the involuntary muscles of the rectum to excessive action should be given to pregnant animals with caution, if at all.

Sudden fright, thunder storms, chasing by dogs, and

the smell of blood, or the discharge from an aborting animal, may cause abortion in sensitive, highly-bred Jerseys.

Miscarriage may follow sudden changes in the weather especially if the victims are poorly nourished.

Violence in any form is a fruitful cause of abortion. Mares which "balk" or refuse to pull and cows which "sulk" or refuse to travel about from the unmerciful beatings received.

Jars and jolts in railway cars, and shipping long distances may cause the trouble.

Mounting other cows or being mounted by other cows or the bull; falling into ditches or having the hind foot slip unexpectedly into gutters behind the cow; jumping fences; crowding through door ways; and so on indefinitely may result in abortion.

While it stands to reason that slight injury is less liable than severe violence to result in abortion, the results cannot be judged by the extent of the violence, for at one time an animal will carry her fœtus successfully through a violent accident, and at another time abort after sustaining the most insignificant injury.

In one case a calf which was born alive, but required the assistance of a surgeon for delivery, and died as a consequence of the manipulation, was found to have one hind leg bent at right angle just above the hock. When the flesh was boiled off, the bone showed evidence of having been broken, union being complete with the exception of a small spicule of bone projecting from that part where the tissue had separated most. The owner had not seen any accident, but remembered a break in a rail fence, made, probably, by this cow, about one month prior to delivery. At any rate, it shows that a pregnant animal may suffer violence little short of death of the fœtus and not abort.

On the other hand, the most insignificant accident may be responsible for abortion. A mare had one hind foot

to slip unexpectedly through the board crossing over an open ditch. The foot sank but a few inches, not more than 12 or 15, as the drain was not deep. However, the mare aborted and the owner could ascribe the mishap to no other cause.

A dead fœtus is seldom retained, though in exceptional cases it may remain in the womb until quite putrid. The fœtus may be killed as a result of external violence; die from displacement or twist of the womb; excessive collection of fluids in the fœtal membranes; deformation; diminished circulation or impaired nutrition, whether affecting it directly or indirectly through condition of the mother.

The symptoms, cause and after treatment does not differ materially from that of infectious abortion. The principal requisite in treatment is to remove the cause. Directions for treating retention of the after-birth (placenta) always a serious consequence in these cases and prolapsus of the uterus, will be given in the treatment of infectious abortion.

Infectious Abortion.

By infectious abortion is meant that form of abortion which has a tendency to recur in the same subject or is associated with—proceeds or follows—abortion in other animals. Single cases caused by infection cannot be distinguished from the non-infectious sort.

Prevalence in Alabama.—

Infectious abortion is said to be widely distributed over the civilized world. In Alabama it is confined largely to the herds in the vicinity of the larger towns and cities.

The hardy range or "scrub" cattle of the State, like wild cattle, are remarkably free from the disease.

At present marked interest is being manifested in breeding beef cattle. This interest is increasing.

Several herds have been started in various parts of

the State, and there is a growing desire to breed up the native cattle. Improved stock have been shipped from the North, Northwest and West for this purpose.

One purpose of this article is to acquaint present and prospective breeders with the nature of the disease and warn them of the dangers of introducing a disease which would prove detrimental to the business. The first requisite in breeding beef cattle is to secure the greatest number of vigorous calves. Infectious abortion strikes with certain fatality at this part of the industry. The only way to avoid incurring the dangers of an infectious disease is to prevent its introduction.

Dairymen, especially those who keep cows for milk and milk products, often fail to realize the economic importance of the disease. Such dairymen do not value the calves. Indeed, the loss of the calf in this case amounts to nothing, and the matter might be dismissed if there were not other sources of loss. There is another reason why some persons are led to believe abortion is no disadvantage. Occasionally a cow having missed one calving period, aborts before the next and begins to give a full flow of milk.

This is well illustrated by the report of four cases which came under the observation of W. W. Cook of Vermont Experiment Station. So also is the pecuniary loss illustrated.

One cow aborting two months before the time to drop a calf, yielded 200 gallons of milk, or the equivalent of 70 pounds of butter less than she had yielded the previous year after normal birth.

Loss from the second cow was 240 gallons of milk with a butter equivalent of 60 pounds and from the third 200 gallons of milk or 75 pounds of butter. The fourth cow, which had been milking 16 months and had carried her fœtus 7 months, miscarried without aparent disadvantage. In fact, this cow the previous year, 5 months after delivery, gave 15 pounds of milk per day and 21 pounds per day 5 months after aborting.

Causes.—Infectious abortion, as the name implies, is caused by an infectious agency, or contagion. Authors do not agree as to the nature of the germ or as to how the germ brings about the act of abortion. American and European investigators do not agree and European investigators do not agree among themselves as to the identity of the microbe. Some claiming a micrococcus and others a bacterium as the effective agent. American investigators have found true bacilli belonging to the coli group in the membranes and womb of aborting animals. Aside from this there are other reasons for separating the disease in America and that in Europe into two different types. The disease in Europe is more virulent; a longer time is required to establish immunity; and there seems to be a difference in the manner in which abortion is brought about, viz.: in some cases the germ invades the fœtus, inhabiting the alimentary canal, in one instance, and the meninges of the brain and spinal cord in another; again the infection is insinuated between the cotyledons on the maternal and fœtal membranes, and modifies the fœtal food supply, causing in either case the death of the fœtus, which, for that reason, is subsequently expelled. In America no writer has ever reported the presence of the germ in the fœtus, and the number of living fœtuses born indicate that death from modified food supply is not a prerequisite.

In view of these facts the writer will confine the discussions to what he may term the *American* form of *Infectious Abortion.*

It is singularly significant that all American investigators have found closely related, if not identical bacilli associated with the disease.

Chester, of the Delaware Experiment Station, isolated from the placenta of an aborted calf, a bacillus closely resembling the bacillus coli; which produced slight catarrh of mucous membranes when injected into the vagina of a cow. Law and Moore, of New York, found

in a number of aborting cows, widely distributed over the State, a bacillus almost, if not identical, with bacillus coli in form and culture characteristics. This, also, caused more or less catarrh when injecting into the vagina of healthy cows. Law further states that this particular microbe could not be found in the vaginal discharge of cows in herds free from infectious abortion.

Kilborne and Th. Smith studied a bacillus of the coli group, infesting the vagina of aborting mares. Supurating catarrh resulted from vaginal injections in mares and cows.

At this Station we have isolated from vaginal discharge and from ulcers on the vaginal mucous membrane of two heifers which have never been bred, but which are supposed to be infected with the abortion microbe, a bacillus which is indistinguishable from the bacillus coli morphologically and closely resembles Chester's bacillus in culture characteristics. Inoculation into the mucous membrane of the vulva of an old cow, not pregnant, was followed by the formation of a small ulcer and a discharge.

The cow came in heat in a few days, but the symptoms were more pronounced than in ordinary oestrum.

Planted into the prepuce of a rabbit a small ulcer formed with undulating borders surrounding a slightly depressed granular surface.

The heifers in question, one an Angus and the other a Shorthorn, came to the hospital last February with a discharge from the vagina.

The Angus had been to the State fair in November previous, being shipped to and from the fair by rail. No disease of the kind had ever been observed in the herd prior to this outbreak, and it is supposed that the disease was contracted while at the fair or from the stock cars in which the animals were shipped.

There is a bare possibility that the germs might have been brought unintenionally to the Station on the

clothing of an attendant who came from another State about one month before the disease was first noticed.

No ulcers were found on the vaginal membranes of the Angus, but there was evidence of extensive previous ulcerations. The Angus was supposed to have contracted the disease first, gradually acquiring a resistance for the microbe, and was on the way to recovery. In this case the disease yielded readily to antiseptic treatment.

The Shorthorn probably contracted the disease from the Angus, though a steer occupied a stall between the two in the barn. This heifer was at the climax of an acute attack. There was ecchymosis of the mucous membrane of the vagina as for farward as could be seen, with extensive exfoliation of the epithelium and ulceration. The discharge was odorless, but dirty, grayish and heavily turbid.

The vagina was irrigated with 2 per cent. creolin solution and packed with iodoform gauze once per day for the course of two weeks.

This discharge soon ceased, but a kind of stimulation of the genitals, probably irritation, continued as the animal was frequently in heat.

Oestrum, or heat, recurred every seven to ten days, manifested by a swollen and loose condition of the vulva. The discharge was somewhat profuse and yellowish, translucent instead of transparent.

The ulcers gradually disappeared from the visible mucous membranes and the application of medicine was discontinued. About two weeks later the animal was brough up for final examination and dismissal. But it was found that another crop of ulcers had appeared. This time the catarrh was much less severe, and the visible ulcers were very few, limited in size and closely resembled the one on the prepuce of the inoculated rabbit.

The animal was subjected to another course of treat-

ment. Iodoform incorporated in vaseline was applied at intervals of three days by means of a swab of gauze introduced into the vagina and so manipulated as to smear the salve over all parts of the vagina. Rapid improvement followed.

About three weeks later another examination was made and a few small transparent vesicles but little larger than a pin-head were found. These vesicles were kept under observation one week. No change occurred in size, but they became somewhat more raised and translucent. There was no zone of congested capillaries surrounding the vesicles, but the vaginal mucous membrane remained more congested than normal.

This is believed to be the third crop of colonies.

Where could this renewed infection have come from? The tail and external parts were carefully disinfected and cleaned from all locia. Evidently the source of reinfection was from the uterus (8) Fig. 12—through the os uteri.

There is no doubt that the microbe inhabits the womb. Law and Moore found it on the "uterine mucosa and fœtal membranes."

Then, the successive reinfections of the vagina is accounted for by the fact that the microbe growing in the uterus (8) is protected from therapeutic measures and passing out through the os uteri (7) re-establishes a footing in the vagina as soon as the field is free from disinfectants. This, doubtless, also accounts for the almost invariable failures, however thorough the measures may have been to rid aborting animals of the infection.

Modes of Distribution.

1. The infection may be introduced into a herd by the admission of cows or bulls from infected herds. When a newly purchased cow is the carrier, whether she may abort or not, transmits the disease to cows

usually in adjoining stalls, which miscarry, sometimes one after another in consecutive order down the line of stalls. The disease may be confined to one side of the barn for years. If the bull distributes the infection, infection occurs promiscuously through the herd.

2. Allowing the bull to serve infected cows or patronizing a bull which has served infected cows.

3. Shipping in cars and keeping in pens or stalls which have been occupied by aborting animals.

4. An attendant who removes the afterbirth of an infected cow has been known to transmit the disease to other cows operated on afterwards.

5. It is possible to have the infection transmitted from one herd to another by the interchange of help or by securing milkers, herdsmen, etc., from dairies where the disease prevails. Overalls and like clothing which are worn at one farm go with the owner to new localities, oftimes without even a washing.

6. The manner of handling manure in cow barns where one trench receives the excrement from a whole row of cows in open stalls may be responsible for the spreading of the disease in the herd. It is the rule to begin at one end of the trench and push the manure along until enough accumulates to shovel in quantities, thus the discharge from an aborting cow may be scattered behind a dozen or more animals.

How the germ gains access to the genetal organs may be explained as follows:

When the bull is infected, it is easily understood how germs would be introduced into the vagina at copulation. There are a number of instances on record where the purchase, borrowing or patronizing of bulls have been responsible for serious outbreaks. More often the disease spreads from one cow to the next nearest, and so on as already indicated.

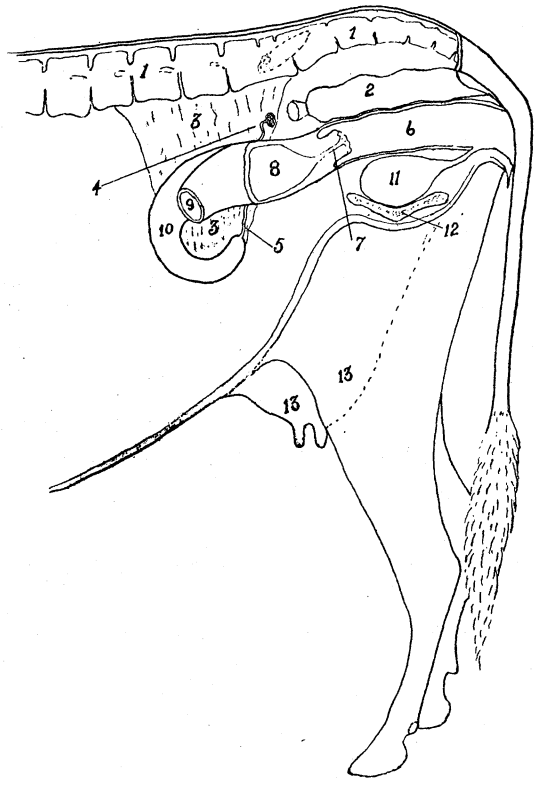


Fig. 12.—1, backbone; 2, rectum or last gut; 3, broad ligament of womb; 4, ovary or pride; 5, Fallopian tube; 6, vagina or first division of womb; 7, os uteri or opening between the two parts of the womb; 8, uterus or deep portion of womb; 9 and 10, horns of the womb; 11, bladder; 12, pelvic bone. [Nos. in () refer to Fig. 12.]

In order to understand how this may occur the reader who has no knowledge of the female generative organs, is referred to the diagram Fig. 12.

To exemplify one possible course the infecting agents might take, we will say: A cow lying in the stall has the switch on the tail soiled in a manure trench, which

has been smeared with infection from an aborting subject. The cow goes out to pasture; the filth dries and is scattered over the rump by the switching tail. Some germs lodge upon the vulva and find their way into the vagina (6) where they multiply with prodigious rapidity. The germs are actively motile, and make their way through the os uteri (7) into the uterus or inner division of the womb (8), thence through the horns of the womb (9 and 10), and possibly up the Fallopian tubes (5) to the prides or ovaries (4).

Remembering the catarrh caused by the microbe, it would be strange indeed if its presence in the small Fallopian tubes did not sometimes result in obliteration of the passage and sterility. In fact, many animals do become sterile.

The existence of the Microbe in the Womb.

The indications are that the germ causing abortion remains in the infected womb for years, though no more than one, two or three abortions may occur. This is not incompatible with our knowledge of germ life. A little blood from one of our Southern cattle, apparently in perfect health, injected into the circulation of cattle brought from the North is followed by violent fever, typical of Southern cattle, or Texas fever. In this way it is proved that an animal which has had no fever for one, two or more years harbors the living parasite in its blood, and is capable of transmitting the disease to susceptible animals. Authorities are now agreed that the infection causing swine plague, often mistaken for hog cholera, live in the lungs of the pig after recovery from the acute attack, and continues to be a source of infection for other pigs many months and possibly years. This explains the reason the disease breaks out year after year when once introduced.

Nelson, after the second year's experience with the disease in the herd at the New Jersey Experiment Station, observed that either the microbe had modified its life habits to better suit the cow or the cow acquires a tolerance for the germ. At any rate, the cow carried her calf longer the second time and often carried the full period the third time. But newly purchased cows were attacked with renwed violence and young cows were more susceptible than old cows. One young cow, $1\frac{1}{2}$ years old, aborted $2\frac{1}{2}$ months after conception, and two cows, each 2 years old, aborted at 2 months, while older cows aborted after the fifth month, and the second year no cow aborted under 6 months.

Immunity.

This tendency on the part of the microbe and its host to adjust themselves to each other results after two or three abortions in a form of immunity. However immunity in this case is not meant to convey the idea that the cow is rid of the germs, but that she simply will not abort again, while for a long period the germs remain in the womb and may be transmitted to susceptible animals.

SYMPTOMS.—The first one or two months of pregnancy abortion occurs without labor pains or straining, and sometimes the fœtus lodges for a few hours in the vagina with portions of the fœtal membranes hanging from the vulva or the fœtus may be found in the stable or pasture. If these evidences pass unobserved, the discharge from the vulva may be mistaken for heat; but if the cow refuses the bull then, and allows service in due course of time, the evidence, in connection with supposed previous pregnancy, though circumstantial, is quite conclusive that abortion had occurred. Known

non-infectious cases are traced to some misfortune or accident. But cases caused by infection, not being expected, more frequently pass without due consideration. However, it may be a serious mistake to neglect such cases because of the danger of disseminating the disease. Though many have claimed that abortion seldom occurs before the fifth month, the contrary is quite probable, but, being of apparently little consequence, is not taken into account.

Referring again to Nelson's experience, four cows supposed to be pregnant required service again, and abortion was suspected, though no expelled fœtus was found. This supposition was strengthened by the fact that these cows had already aborted or did abort later.

The last half of pregnancy the symptoms are more marked and the consequences more grave.

One, two or three days before delivery the ligaments relax, the flanks sink, the vulva enlarges, and the milk has a colostrum-like appearance. The discharge from the vagina is less thansparent than normal—yellowish red in cows and white in mares. Labor pains precede delivery. The animal walks around in a circle, looks at the side, lies down and gets up again; strains; and the fœtus is expelled.

The fœtal membranes pass out with the fœtus in the early stages of pregnancy, but are liable to be retained during the last half. This not infrequently happens after regular birth, but more is liable to occur after premature deliveries. The afterbirth may come away in the course of three or four days, and no further trouble be experienced. Occasionally the placenta is retained until it decays in the womb. The animal ceases to ruminate, and eats sparingly and irregularly. She stands alone with the head down, or occasionally turns to look at the side. She is dull, weak and listless. The dis-

charge from the vulva may be profuse or slight; it is watery and carries more or less decayed tissue, making it heavily turbid and giving a dirty, nasty appearance, and an offensive odor. The tail is soiled by the putrid discharge. Frequent efforts are made to urinate. The animal becomes lean and bony (emaciated), and may linger weeks in this condition. The system may cast off the putrid matter, and the cow recover, or if the condition grows worse, she grows weaker and weaker until death. Less frequently the animal dies from blood poison.

Prolapsus of the uterus or inversion of the womb is sometimes a sequel to abortion. Inversion of the womb is recognized by a tumor-like mass projecting from the vulva, moist and red at first, but becoming dark—almost black—and dry after long exposure.

TREATMENT.—Retention of the afterbirth (placenta) and inversion of the womb occur so frequently in connection with abortion that it is deemed advisable to include these accidents in the treatment.

Where the womb is inverted, secure the cow in a narrow stall; wash with 2 per cent. creolin solution; oil with vaseline or lard and when the cow is not straining replace by pressing against the mass with the palms of the open hands. If the effort is not successful, or if the womb is inverted again as often as replaced, obtain the assistance of a surgeon or some one who has had experience with such cases.

An afterbirth retained longer than three or four days should be removed by manual effort. Secure the animal in a narrow, open stall.

The arm bare to the shoulder, is washed in 2 per cent. creolin solution and introduced. The os uteri (7) will be found dilated as long as the afterbirth remains

connected with the womb, and should the afterbirth decay in the womb, the os uteri will remain sufficiently open to admit a man's hand long after delivery. (If all the fœtal membrane is expelled when the calf is born the os will close in one to three days.) Whatever parts of the afterbirth protrudes from the vulva is grasped by the free hand and gently pulled while the hand in the womb traces the membrane to its attachments and each attachment is separated by teasing with the ends of the fingers.

In neglected cases where the afterbirth has decayed, the membrane will be found in a semi-fluid state collected in the deepest cavities of an apparently paralyzed womb. The putrid content is scraped or scooped out with the hand, fingers kept close together and bent half way to palm.

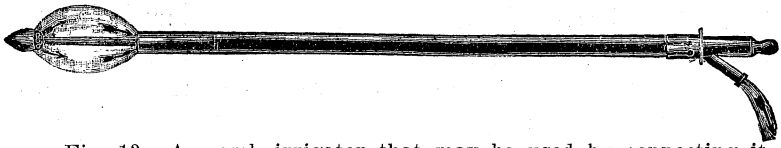


Fig. 13.—A womb irrigator that may be used by connecting it to a fountain syringe.

The womb is flushed, with 2 per cent creolin solution, and again scooped out and the process repeated until the womb is clean. Creolin solution may be introduced by means of an ordinary fountain or rubber bulb syringe with a long rubber discharge tube, the free end being carried arm's length into the womb by the hand.

PREVENTION.—Referring now to the disease proper prevention is urged as the only economical course to pursue. Enough has already been said to imply that the infection once introduced will baffle the most careful effort to effect its destruction. Some of the principle means by which the disease is distributed have been detailed

and it is not necessary to refer to the subject again, except to urge that no animal be purchased from any herd where the disease prevails, or has been known to exist in enzootic or epizootic form. Equal care should be exercised over the bull's patronage where the disease is suspected in the vicinity.

After the disease has appeared in the herd the affected animals should be isolated, at any rate given a special corner in the barn to themselves. And immediately after the bull serves an infected cow the penis and prepuce should be thoroughly disinfected.

The different methods of treatment have given uncertain results:

1. Efforts have been made to control the disease by injecting small quantities of some antiseptic, like carbolic acid, under the skin at long or short intervals, or by requiring the animal to consume such remedies with the food. But it is quite probable the only good accomplished was to satisfy the owner until the affected cow acquired immunity.

2. Flushing the womb with solutions of disinfectants have not been attended with the results expected. Persons who have applied these remedies with the greatest care and thoroughness have been surprised to see the disease appear again in the subjects treated. We have already considered the structure of the female generative organs, and it is readily understood how the germ inhabiting the deeper portions of the womb, cut off from the outer portion with the exception of a small opening, the os uteri (7), could escape the most thorough effort to apply remedies in such manner as to be efficient.

3. Attempts to stamp out the disease by means of antiseptics has met with so little success that some writers have recommended the slaughter of all animals affected. Disposing of the animals with a view to pur-

chasing new subjects is, however, an unsatisfactory practice. All experience goes to prove this. For example, Mörck refers to a herd where the animals were sold off as they aborted and new ones purchased to take the place for a period of eight years without improvement. The owner then resolved to keep the animals at all hazards, and within two years abortion disappeared from the herd. This method would be practicable where the owner is prepared to sacrifice all exposed animals for slaughter and begin business with new stock and in different quarters. A cow, it matters not how valuable her milking qualities, should never be sold for breeding purposes if she is suspected of having infectious abortion.

4. There is another recourse for the breeder; he can establish immunity in his herd. This will, perhaps, entail the loss of two or three calves, for each cow, and a reduction of milk during as many periods of lactation, but, after all, it is doubtles the most economical course to pursue.

In making up a forecast for a line of treatment we are reminded that cows which miss one calving period and abort before the next or those which carry almost full time, often give a full flow of milk, seeming to suffer no inconvenience from the mishap. Also the number of living calves delivered by aborting cows implies that it may be possible to bring the infected cow to the full period of pregnancy, thereby securing a viable calf. Then, presupposing irritation, as previously intimated, to be the active cause of abortion, the first object of treatment should be to tide animals which show signs of aborting over the crisis by giving anodynes. Such a course of treatment gave highly satisfactory results at the Vermont Experiment Station. After four abortions had occurred three out of nine other cows pregnant, showed signs of aborting, but the act was pre-

vented by the administration of laudanum and all the animals delivered without accident at the proper time. These animals were kept under the influence of the drug two weeks. Pulverized opium or laudanum may be used. For the cow the powder may be given in 2 or 3 drachm doses, or the laudanum in wine glass doses six hours apart. To counteract the tendency of the opium to constipate the animal one-fourth pound of Epsom salts may be given in the feed or as a drench dissolved in water twice a day. Fluid extract of Indian hemp is a better remedy, if a reliable quality of the drug can be had. Its effect endures longer and it also has the advantage of not interfering with the action of the bowels. The dose is one fluid ounce two or three times a day. In either case the remedy should be given several days, and weeks, if necessary.

If by this means cows can be rendered immune without ill effects upon the animal or loss of calf or milk product to the owner, all will be accomplished that could be expected.

Much can be done to prevent the spread of infection by disinfecting infected cows and bulls and premises occupied by such animals. As a matter of fact treatment is not complete without the general use of disinfectants. There is a bare posibility of freeing the animal of infection if the case be taken in hand immediately after delivery before the os uteri (7) has closed. Then the deeper parts of the womb (8) may be irrigated with the solution to be used.

Creolin or lysol in the proportion of 1 part to 50 of water is preferable for flushing out the womb. Either solution may be left in the womb with little danger, since neither drug is poisonous. However, if the animal does not eject the surplus fluid, which usually happens within half an hour, it may be well to wash out the

womb with water which has been boiled and cooled These applications should be made two or three times a day while the os uteri (7) remains open, but after the os closes the application once a day should be continued for ten days.

Other antiseptic solutions, as carbolic acid 1 to 40 parts water, or corrosive sublimate 1 to 3,000 or 1 to 5,000 parts water, may be used, but requires to be washed out in a very short time because of the poisonous nature of the drugs.

The tail and other parts near the vulva should be frequently cleaned with the antiseptic solution employed.

An ordinary fountain or a rubber bulb syringe may be used for injecting solutions. The nozzle should be carried arm's length into the womb.

To disinfect bulls the nozzle of the syringe is introduced into the prepuce, and the fore-skin is held tightly about the nozzle until the cavity flows full. The practice of irrigating the genital organs with antiseptic solutions just prior to service is not to be encouraged, since conception is very uncertain after such applications. Every precaution should be taken to disinfect premises occupied by aborting animals. All dead fœtuses and membranes should be burned or enveloped in quicklime and burned.

Litter in the stall where abortion occurs should be piled up in a corner, or, better, shoveled into a box and mixed with milk of lime (1 measure of freshly slaked lime with 2 measures of water). Mop the stalls with bluestone solution (4 pounds bluestone, 4 pounds fresh lime, dissolved in 40 gallons of water), and whitewash as soon as dry.

Abortion occurring in cows which have been purchased from herds the reputation of which are not known should arouse suspicion and be isolated from other ani-

mals, and not allowed service by a bull kept for general use. Some young or old bull ready for castration may be used to test such cows.

MILK FEVER.

DROPPING AFTER CALVING.—PARTURIANT FEVER.

Cause.—The cause is unknown.

Opinions on this part of the subject are very numerous and varied. Some claim the disease is caused by the growth of bacteria in the udder or the elaboration of bacterial products which are absorbed into the circulation. Others hold that it is due to a bloodless condition of the brain or, on the the contrary, to the congestion of the brain.

The view once held that the shock at the time of calving could be responsible for the disorder is hardly tenable, since it seldom, if ever, occurs in connection with difficult parturition. More recent investigators have turned their attention to the modification of the blood, finding it extremely rich and dense, so dense in fact, that the red blood corpuscles are reduced fully one-half normal size. Whether this is due to the blood being surcharged with albuminous and fatty matters stored up for the formation of colostrum or first milk, failing to be excreted by the udder, or whether the current of nutrition intended for the fœtus failing to find its way out through the usual channel, reacts on the system through the blood, has not been determined.

Another line of argument purports to establish the theory that toxic products are produced in the womb and absorbed, leading to a form of intoxication. The arguments adduced are interesting. The fact is pointed out that the os uteri or neck of the womb (7) is open

quite a long period of time before the expulsion of the fœtus, thus admitting infection and allowing time for the development of poisonous products. The absorption of these products is facilitated by the absence of a material placenta in the cow to which the disease seems peculiar. The parts are retracted and the blood irregularly distributed in the womb and intestines. This in connection with the presence in the womb of a profuse adherent and semi-solid gelatinuous mucoid substance, translucent in appearance and far less ropy than the clear and liquid discharge after normal delivery particularly favors this idea.

As a matter of fact calving is an essential condition; the disease never appears except in connection with calving, usually one or two or three days after that act, and, in rare instances, may occur a few hours beforehand. Two other conditions, less essential, but quite as constant, should be mentioned. First, the cow is nearly always a deep milker and in full flesh. Second, the disease occurs in mature cows seldom earlier than the third calving, and when delivery is easy. More or less disorder of the digestive organs always accompany the disease, but this is probably secondary, though some have thought this a source of a part, at least, of primary cause.

All breeds are subject to the malady, but the leading milk breeds, Jerseys, Holsteins, Geurnseys and Ayershires are the most frequent victims.

An animal which has once suffered with the disease is liable to have it recur at the next calving.

Symptoms.—The cow calves with ease, in most instances the afterbirth (placenta) is passed with the calf. For a period of time varying from a few hours to three and rarely four days, the cow is in apparently good health. Then, if the first signs are noticed, the cow

looks anxiously after the calf; the gate is unsteady; the knees appear weak and the hind quarters rock from side to side, and the hind feet are awkardly lifted and replaced one after another in order to regain equilibrum. This is the treading act sometimes noticed. The tail also swings back and forth, following the motion of the body. The temperature is now 102-103°, the normal being 101°. Pulse only slightly accelerated, full strong and regular.

In the course of half an hour the cow staggers, bellows, walks blindly against objects, and, at times, tries to mount the manger. The hind feet are lifted high and awkardly, apearing to strike at the abdomen. She stumbles over objects and falls completely or only to the knees, but rises again. The eyes wander, appear wild and glassy or peculiarly lusterless, the rays appear to be reflected rather than transmitted. The head hangs pendant from the withers and is disposed to swing far to one or the other side. The animal seems to lose her balance and falls; falls with the limbs sprawled as if under the influence of an intoxicant. She is now unable to rise again to her feet, but at times, seeming to recover, momentarily from a torpor, an effort is made to rise. The result is characteristic. The cow comes to her knees, but the effort of the hind limbs to bear up the posterior part of the body overbalances the equilibrum at the front and the cow tumbles a half length forward. The pulse is now rapid, weak and irregular; temperature uncertain, but may be 103-105°; head and horns are said to be hot; membranes of the eye red and tears flow freely. The sphincter muscles at the anus relaxes; heat radiates from the part and rectal temperatures become less and less reliable.

After a varying period the torpor passes into complete coma. The cow lies on her breast with her head turned

around to one side, the muzzle resting on the ground. This position illustrated in figure 14 is a characteristic

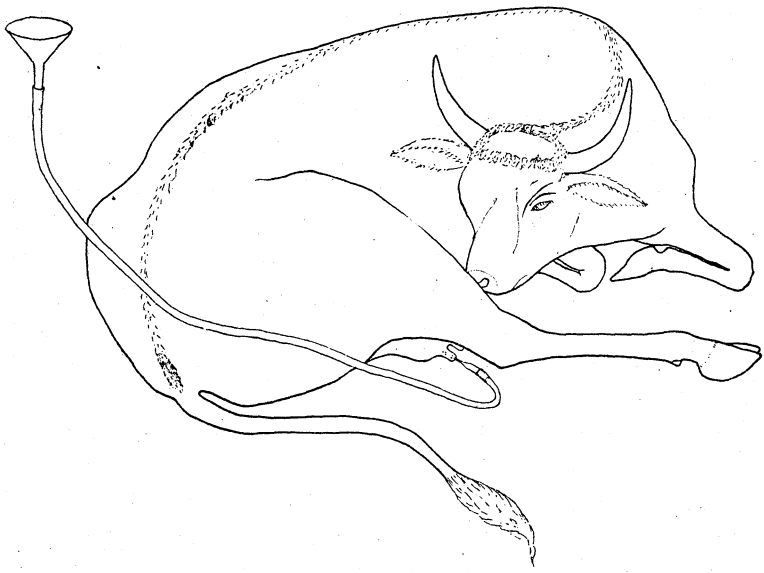


Fig. 14.—Characteristic position of cow in comatose condition. Funnel, rubber tube and milk-tube arranged for injecting Schmidt's solution.

symptom. Or the animal may stretch broadside upon the ground. While in this position the paunch (rumen) is more elevated than the head and fluids from the paunch flow to the head. About one gill of green fluid carrying particles of masticated food in suspension collect in the uppermost nostril. The presence of this fluid accounts for the rattling, gurgling sound which now accompany breathing. The muscular tissue of the gullet (œsophagus) is paralyzed. So, also, are the muscles of the voice box (larynx). Thus, when the head rests on a plane lower than the paunch liquids may

gravitate unhindered to the head, collect in the nose and when the head is raised, which occurs periodically, the fluid flows back to the pharynx, thence between the paralyzed vocal cords and down the wind pipe to the lungs. Ordinarily this would cause violent coughing, but the cow is not now capable of the act. However, in fatal cases, when the wind pipe is opened after death, particles of food are found adhering to the surface of the inflamed mucous membrane. The rattling, gurgling sounds just referred to should be distinguished from sonouous vocal sounds emitted by animals when no fluids have been allowed to come in contact with the vocal cords. These sounds are low and moaning, and are due to the vibrations of the relaxed vocal cords during expiration.

Sensibility has disappeared, the animal no longer responds to pin pricks. A better test for the comatose state, however, is to place the finger on the eyeball: If the eyelids do not close the animal is insensible. Respirations are slow and indicate deep sleep. Temperature normal or below normal.

Course—The disease appears one, two and rarely three or four days after delivery. The sooner the more serious will be the consequences.

Taking a case of average severity, the couse will be about as follows: One-half hour after the first symptoms, which are seldom observed, appear, the cow is staggering, bellowing and falling; a half to one hour later she is down, but able to make efforts to rise; one to three hours she lies in a semi-conscious condition, then passes into a state of coma. In order to test whether the cow is conscious offer to put the finger in the eye, if the eye is not sensitive to the touch, the comatose stage is reached. Coma persists six to fifteen hours in favorable cases, or in fatal cases, until death, which

transpires from one to four days after the first symptoms are noted.

TREATMENT—All cows which are heavy milkers and in good flesh, especially cows which have suffered an attack of milk fever, should have the feed reduced, or, what is better, be turned out to find a living on scant pastures. Lean cows are seldom (if ever) attacked, therefore an effort shauld be made to reduce the cow's flesh as a preventative measure. Some regime of exercise on a reduced food supply should begin not less than two weeks, and longer, if possible, before the cow is due to deliver. The practice of giving a purgative when the cow begins to spring is of questionable utility, if not objectionable. It is not a good practice to give purgatives to heavily pregnant animals. Three courses of medicinal treatment are admissible and attended with varying degrees of success.

1. Give a purgative while the cow is conscious, but by all means never administer drenches after the animal is unable to hold up the head. Medicines are then liable to go down the wind pipe, causing pneumonia and death.

During the comatose stage the animal must be kept braced in a normal position . This is one of the most important features of treatment, and should be executed even if it is necessary to watch over the animal day and night. Bags filled with straw or cotton-seed hulls are very convenient for bracing the animal on the breast. If she lies stretched upon the side, bags should be used to elevate the head as high as the highest part of the body.

For a good purgative use Epsom salts 1 pound, common table salt ½ pound, ground ginger 1 ounce, and aloes ½ ounce. Mix in two quarts of water; shake and drench.

Drench always through the mouth and never through the nostrils.

2. The second course of treatment aims at the same result, *i. e.,* to empty the bowels, but has the advantage of avoiding the dangers of giving drenches. Divide two grains of eserine sulphate in three parts, dissolve each part in a little water and inject into the wind pipe at half hour intervals by means of a hypodermic syringe. Repeat in twenty-four (24) hours if the animal shows no signs of recovery. This course is attended with moderate success.

3. The third course is that of Schmidt. This is by far the safest and most successful treatment known, 90 per cent. of cases are said to recover.

Dissolve 2 drachms of iodide of potash in one quart of water which has been boiled and cooled to blood heat. Inject one-fourth of the solution into each teat after milking out thoroughly. Leave this in the udder 12 hours; milk out and repeat if the animal shows no signs of improvement.

A funnel, rubber tube 3 to 5 feet long, and milk tube, connected as illustrated in Fig. 14, may be used for injecting the solution. The milk tube is inserted into the teat and some of the solution is poured into the funnel by an assistant. If the liquid refuses to flow at first compress the rubber tube a few times in the hand. This will force out some of the air and start the flow. If a milk tube cannot be secured, almost any druggist can make a tube that will serve by heating a glass rod of suitable size in an alcohol flame and drawing it out to the proper proportions. Then the broken ends of the glass are rounded in the flame.

A rubber bulb or fountain syringe may be used instead of a funnel. All vessels and apparatus to be used

for injecting medicine should be thoroughly disinfected in boiling water before use.

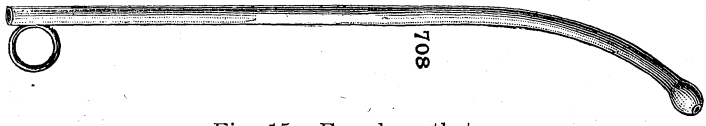


Fig. 15.—Female catheter.

Some think it advisable to introduce the hand into the womb, remove the mucous and portions of placenta that may have been retained, and irrigate the womb with 2 per cent. creolin, or some other suitable antiseptic solution. The foregoing courses of treatment should be supplemented by one-half grain doses of strychnine given hypodermically, or one grain doses given in capsules on the root of the tongue every three or four hours. Keep the animal braced in a normal position or the head elevated and expect recovery in 15 to 24 hours.

In some instances the animal suffers with debility after recovery from the acute attack. The writer's experience with such cases is limited, but usually the animal eats sparingly, digestion is impaired, and the excrement softer than normal, and lacking color. If there is no improvement, death occurs in the course of one, two or three weeks.

Some animals never fully overcome the effects of an attack of milk fever. This is manifested by the reduction in milk flow. In order to ascertain approximately the amount of permanent injury sustained from milk fever, questions were addressed to four parties taken at random, whose cows had been successfully treated with Schmdt's remedy.

Mr. L. H.: Has your cow given as much milk since she had milk fever, and how much has been the reduction?

Ans. "My cow does not give as much as before the

attack. She gave a little more than three gallons, but since she has given but little more than two gallons, and I have never been able to get her above two and one-half gallons per day."

Mr. J. T.: "My cow has had two attacks, the first severe, and the second very mild. There was a reduction of one-half gallon in the milk flow after the first attack, but have not noticed any reduction after the second."

Mr. S. T.: "My cow has her third calf. Nearly two months ago she suffered a severe attack of milk fever. The milk yield is now nearly three gallons per day, which is better than at any time in her previous history."

Mr. W.: "My cow suffered a severe attack of milk fever about one month ago. She is 10 or 12 years old. She improved rapidly and as evidence that her health is unimpaired she has a ravenous appetite. She gives as much milk as ever, about 3 1-2 gallons, without extra feed."

These animals were treated by the writer or Dr. C. A. Cary, and we testify that the cases were genuine milk fever or parturient apoplexy of a severe type. Each animal passed through a stage of complete coma lasting for several hours.

INFLAMMATION OF THE UDDER—GARGET—MAMMITIS—MASTITIS.

The udder of the cow is divided into four distinct glands or portions, with complete partitions, i. e., one-quarter is not connected with another.

Prominent among the causes are imperfect milking, allowing some of the milk to remain in the udder which becomes infected, curdles, begins to decompose, and inflammation follows.

Heavy milkers are most frequently attacked. Ex-

tremely easy and extremely difficulty milkers are equally liable. Hard milkers because these are more liable to be imperfectly milked; easy milkers because a drop of milk is often carried suspended to the point of the teat, which, becoming infected, infects the milk within the udder. Milk is an ideal medium for the growth of bacteria. Injuries to the udder, like kicks, blows, etc., and even the calf punching the bag while sucking, are claimed to cause the disease.

Symptoms.

The bag is swollen, feverish, painful, and red with congested blood. Milk flow is reduced, and the milk is changed in appearance and character. The milk is lumpy or watery and may be tinged with blood. As the disease progresses it assumes the appearance of whey, containing shreds or floccules of solid matter. In some cases there is little flow or none from the teat, the bag becomes hard and unyielding, if a hind quarter the inflammation extends far up toward the vulva.

Pus or matter may form and decay progress till the affected quarter literally rots out or if inflammation is limited the pus may be discharged, the bag softens and recovery follows, though the power of the gland to secrete milk may be permanently diminished. Often the diseased products are not cast off through the teat, but an abscess forms between the teats or to one side of the bag, and opens. Pus in varying quantities discharge and stringy, ragged particles of decayed tissue may be drawn out. Such cases are prone to recover after apparently successful treatment.

Treatment.

Prevention: Milk cows with new-born calves, especially heavy milkers, not less than four times a day for

a few days after delivery. Forbid the filthy practice of moistening the teat with milk before milking. Allow no filth from the bedding or portions of the after-birth to adhere to the udder or to the legs near the udder. Provide clean stables and clean bedding. Cleanliness, in all probability, is the best preventative.

Remedial: Treatment is systemic and local. Drench the animal at once with the following: Epsom salts, 1 lb., common table salt, 1-2 lb., powdered ginger 1 oz., powdered belladonna (roots or leaves) 1-2 oz., mixed with two quarts of water. Supply abundance of fresh cool water.

Begin local treatment by injecting into each teat 1-2 pint of Schmidt's iodide of potash solution (potassium iodide 2 drachms, water which has been boiled and cooled, one quart.) After the first application inject onece per day, 1-2 pint into the affected quarter only.

Rub the affected part once each day with campho-phenol (a saturated solution of camphor gum in carbolic acid; carbolic acid 1, camphor 3-5.) This medicine may be applied with the bare hands with perfect safety, and is the remedy par excellence for external use in garget. It relieves pain, and penetrating destroys infection, and acting as a counter-irritant (a mild blister) it softens the parts and hastens absorption of diseased products.

A simple treatment for which much is claimed is the application of water as hot as can be borne, at frequent intervals, followed by glycerine, vaseline or lard smeared over the parts. Glycerine is to be preferred. Empty the teats frequently by hand or by means of a milk tube, if necessary. (Fig. 10.)