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ABSTRACTS



Action of Penicillin on Mastitis Organisms. *In vitro* studies on the effectiveness of penicillin against several of the bacterial organisms commonly found in the bovine mammary gland were made to determine its relative effectiveness when used in udder infusions.

The medium used was sterile skimmed milk adjusted to pH 7.0 and inoculated with the test organisms. Penicillin was then added and the total volume divided into 5 ml. portions of the penicillin-culture mixture. These cultures were incubated at 37° C.

All organisms were susceptible to penicillin treatment except *E. coli*. The bacteria were found to be susceptible in the following order: *Str. agalactiae*, *Str. uberis*, *Staph. aureus*, *Str. viridans*, *Str. dysgalactiae*, *C. pyogenes*, and the hemolytic group C streptococcus. Variations in susceptibility between strains within a species were slight.

(Seeley, H. W. Jr., Anderson, E. O., and Plastridge, W. N. *Action of penicillin against mastitis organisms in milk.* *Jour. Dairy Sci.* 28(12):887-891. 1945.)

Bacillary Hemoglobinuria of Cattle and Sheep. Bacillary hemoglobinuria is a peracute infectious malady caused by *Clostridium hemolyticum*, characterized by high fever, depression, rapid hemolysis of red blood cells, hemoglobinuria and intestinal hemorrhages, with a usual termination of death in 24 to 36 hours. Primarily a disease of cattle, it also occurs in sheep and rarely in swine. It is commonly called "red water disease".

The disease is quite common over a large area of the western hemisphere. Bacillary hemoglobinuria is a lowlands disease, regardless of the altitude at which it occurs. Losses usually occur where drainage is poor. Drainage of flood water carries the disease from area to area. Cattle carry the infection, and hay may be infected.

Most cases of the disease occur between June and November, but sporadic cases may occur at any time. Previously unexposed or unvaccinated cattle are very susceptible and cases will appear in a week to ten days after arrival in infected areas.

Symptoms are fairly constant, running a uniform course. Appetite, rumination, lactation, and defecation cease suddenly. The animal keeps away from the rest of the herd and stands with back arched and tucked-up abdomen. Dyspnea is present, and the temperature varies from 103-106° F., but drops below normal shortly before death. The pulse is accelerated and weak, with marked jugular pulsations. The feces become deeply stained with bile or a mucoid bloody diarrhea appears.

The urine is dark red, due to the hemoglobin suspended in it. Up to 50 per cent of the red blood cells have been hemolyzed. The albumin test is positive, but no sugar or acetone can be demonstrated. If treatment is not instituted, the blood becomes thin and icteric and coagulates slowly. There is marked dehydration. Death results from anoxia.

Cows well advanced in pregnancy may succumb in 12 hours, and steers, bulls,

and non-pregnant cows may live three or four days, but the average case lasts about 36 hours. Pregnant cows often abort even if they recover after prompt antiserum treatment. Mortality is as high as 95 per cent in untreated cases.

As the high altitudes where bacillary hemoglobinuria usually occurs, the normal erythrocyte count varies from seven to eight million in dairy cows to ten or eleven million in yearlings and two year olds of the beef breeds, but in 19 cattle with characteristic clinical symptoms it ranged from 1,200,000 to 4,600,000. Hemoglobin ranged from 3.5 to 8 grams per 100 cc. in these cases. Leucocyte counts showed wide variation, usually ranging between 10 and 16 thousand. Blood calcium and phosphorous were apparently normal. Of the 19 cases three had agglutinins for *Cl. hemolyticum* in titres of 1-15 and 1-50. After serum treatment they rose to 1-40 to 1-800. Blood cultures showed this bacillus in only a few instances.

Other diseases may be confused with bacillary hemoglobinuria, but with the possible exception of anthrax, none shows the sudden appearance of urine with a port wine color or the very rapid destruction of erythrocytes. The course of other diseases is less acute. Urine examinations, erythrocyte counts, and hemoglobin determinations are valuable adjuncts in clinical diagnosis.

Rigor mortis sets in quickly. The perineal region and tail are soiled with bloody urine and feces. There may be some edema in neck, shoulder, and sternal regions. The subcutis is dry and icteric with variously sized hemorrhages. The thorax usually contains bloody fluid. The lungs and pleura appear icteric with confluent subpleural hemorrhages. The bronchi and trachea carry some bloody froth. Mediastinal lymph nodes are enlarged and edematous. The thymus is heavily petechiated. The pericardium is usually distended with fluid comparable to that in the pleural cavity, and there are well defined hemorrhages along the coronary vessels and under the endocardium.

In the abdomen a large quantity of

bloody fluid is usually present, parietal and visceral peritoneum are often a reddish icteric color and may display subserous hemorrhages from petechiae to large confluent types. The abomasum may be extremely hemorrhagic. The small intestine varies from intense hemorrhage to a cloudy brick-red and moderate edema. The contents of the large intestine are often very bloody. Mesenteric lymph nodes may be hemorrhagic. The most constant lesion in the liver is an anemic infarct. The spleen usually appears normal, but may have subcapsular hemorrhage. The kidneys are dark, friable, and show extensive petechiation. The bladder contains the dark red urine of this disease. A gravid uterus may show submucous and subserous hemorrhage, with cloudy red amniotic fluid, and the fetus often presents cutaneous hemorrhage. A characteristic clinging pungent odor is present.

The only treatment of any value has been intravenous administration of 500 cc. of potent antitoxin. This dosage is varied with the size of the animal. Stimulants, where cattle are tractable, are indicated. Allow plenty of water but withhold food. This may result in amazing recovery, signalized by return of normal color to the urine. A second dose of serum is rarely needed, but should be given in 16 to 20 hours if justified. The erythrocyte count returns to normal in two to three months, but lactation may not become normal till the next parturition.

An immunizing product was sought and after much experimentation an aluminum hydroxide-precipitated toxoid-formalinized bacterin seemed most satisfactory from all standpoints.

Vaccination under six months is not worthwhile but above that age yearly immunization is necessary, and will satisfactorily protect the cattle. When vaccinating make sure that the injection is subcutaneous and not intramuscular or intradermal. Abscess formation is common unless reasonably aseptic technic is used.

Experimentation with the disease indicates that a motile, sporulating, anaerobic

rod named *Clostridium hemolyticum* is the etiological agent. It has been consistently recovered from the heart blood, liver infarcts, spleen and other organs of cattle that died of this disease. It has been obtained fairly frequently from blood of cattle that are near death. On staining the organism obtained from tissues it appears Gram positive, but older cultures are Gram negative.

Heating at 65° C. for 15 minutes kills vegetative cells, but some sporulating cultures resist 90° C. for 15 minutes. All succumb to 95° C. They remain viable when frozen for as long as three years.

Cl. hemolyticum is an obligate anaerobe and is very exacting as to cultural requirements. Tryptophane and other products of protein hydrolysis are necessary as well as sulphur-containing amino acids.

The pH must be 7.4 to 7.6. Beef liver digest solution gives a vigorous and moderately gaseous growth overnight, until 16 to 18 hours when sedimentation begins. Dense wool-like colonies develop in deep agar shake cultures without dextrose. Surface colonies on agar are gray, pulvinate structures. Loose feathery or snowflake colonies are regarded as "rough types."

Blood agar is diffusely hemolyzed in 16 to 24 hours, gelatin liquefied in two to six days, purple milk unchanged. Hydrogen sulphide is produced, and dextrose and levulose fermented.

Two toxin fractions appear to be produced but have not been separated in a pure form. A necrotizing fraction is also found.

Horses are used for antiserum production. Healthy horses three to ten years of age are the best. Subcutaneous injections of bacterin are first used, followed by toxin, or toxin may be used alone, beginning with small amounts and gradually increasing this amount so that a response is always noted. When subcutaneous injections no longer evoke a reaction, intravenous treatment is begun.

(Records, Edward, and Vawter, Lyman R., *U. of Nevada, Technical Bulletin No. 173, June 1945.*)

Effect of Excessive Ingestion of Sodium Chloride on the Chick with Particular Reference to Renal Changes. Experiments were conducted to determine the effects of excessive salt intake in the food of recently hatched chicks, and three-week old chicks.

Symptoms included edema in subcutaneous tissues, chiefly in the loose skin about the neck and ventral aspects of the thorax and the abdomen, dyspnea, a watery diarrhea, and an unhealthy appearance with the feathers being very much roughened. Death occurred suddenly in convulsions or after a shock-like syndrome.

The total plasma proteins were lower in experimental birds without edema than in the controls. The proteins of the ascitic fluid were nearly as high as in the blood plasma. The plasma chlorides of experimental birds were markedly elevated.

Experimental birds made poor gains and consumed three to four times as much water daily as did the controls. The relation of water ingested daily to body weight was markedly increased in the birds fed excess salt. In controls it varied from 11.4 to 38.5 per cent of the body weight. In birds on the diet 3 per cent salt the variation was 30.2 to 75 per cent. In those birds drinking 0.9 per cent saline solution it was 36.1 to 120.8 per cent of the body weight.

The edema in the experimental birds was not uniform. Increased pericardial fluid was a rather constant symptom. Ascites was frequently seen. The serous fluids were clear and either light or deep yellow. With persistent ascites capsular thickening and nodularity was noted in the right lobe of the liver, the lungs were often edematous, the kidneys were pale and edematous, and in recently hatched chicks small renal cysts were found.

Microscopically, there were changes in the renal glomeruli. The glomerular vessels were widened and apparently more tortuous. There was an increase in size and volume of the core and the formation of glomerular loops and lobules. The degree to which these glomerular changes occurred was dependent upon the age,

rate of growth, and length of time on experiment and concentration of sale employed. Except for the immediately subcapsular ones, all the glomeruli of the cortex might be enlarged, with progressive increase in size from the peripheral to the juxtamedullary ones. There appeared to be increased deposition of collagen and reticulum beneath the basement membrane of the capsule. From these fibrosed areas, coarser more abundant reticular fibers swept through the core toward the increased reticular deposits about the hilus of the glomerulus. There was also a deposition of fine droplets of isotropic subanophilic fat with the

Three types of renal changes were observed: an increased number of casts made up of red blood cells; regenerated tubular sectors made up of more basophilic, flatter, more closely crowded cells; and fine droplets of fat in the epithelium of some of the tubular sections.

The toxicity of sodium chloride for young chicks seems to be due to: (1) The indiscriminate feeding habits of the fowl. (2) The morphologically different type of renal glomerulus in the fowl. (3) The normal low plasma proteins in the fowl.

(*Krakower, Cecil A. and Goetlich, Marianne. Effect of excessive ingestion of sodium chloride on the chicks, with particular reference to renal changes. Arch. Path. 40:209-219. 1945.*)

Vitamin A and Carotene Content of Blood Plasma of Dairy Calves. Blood samples were studied from calves of the Holstein, Ayrshire and Guernsey breeds under 4 months of age to determine the carotene Vitamin A content in the blood plasma. The values for the Holstein and Ayrshire breeds are in close agreement, but those of the Guernsey calves were somewhat higher.

The animals were fed lespedeza, clover and timothy hays. The blood plasma carotene and Vitamin A picture was somewhat higher for the calves fed lespedeza hay, probably due to a higher intake of carotene in this hay than in the clover and timothy.

When the calves were placed on a Vitamin A deficient diet, the Vitamin A content of the blood dropped sharply. In all cases the Vitamin A content of the blood plasma of these calves varied from 7.2 to 14 micrograms per 100 milliliters of blood. These values are in the range of deficiency and indicate the possible advantage of supplementing the rations of calves up to 4 months of age with Vitamin A, especially where difficulty is encountered in raising the calves due to pneumonia and scours.

(*Moore, L. A. and Berry, M. H. Vitamin A and carotene content of the blood plasma of dairy calves from birth up to 4 months of age. Jour. of Dairy Sci. 28(11): 821-826. 1945.*)

Measures Used in Control of an Infectious Type of Calf Scours. A study was made in an attempt to determine the nature of infectious diarrhea of calves from a few days to three months of age, and to determine the value of various methods in its control. These observations were made on calves in a Guernsey herd. Pneumonia was often an accompaniment or a sequel to scours.

Preventive measures such as isolation and chemoprophylaxis were tried. Careful sanitation of premises and segregation of infected animals did not perceptibly decrease the incidence of the infection. Hyperimmunization of the preparturient dam by subcutaneous injections of an autogenous bacterin also failed to give any noticeable decrease. Immunization of the newborn calf with a commercial polyvalent antibacterial serum failed to lower the incidence, but its combination with preparturient immunization of the dam did produce some reduction. Sulfaguanidine administered orally during the first 3 or 4 days of life protected the calves during this period, but had no further prophylactic value. For such a method to be effective sulfaguanidine would have to be administered for at least six weeks, a procedure that is certainly impractical.

Sulfaguanidine was administered after

fasting the calf by suspending 4 grams of the drug in one half pint of water. This was followed by three gram doses at 4 hour intervals. This is the standard dose for a 60-70 pound calf. This treatment resulted in cure in 95 per cent of 95 cases.

(Wire, George H. and Coarsey. *Measures used in control of an infectious type of calf scours. Corn. Vet. 35:320-328. 1945*)

In litters whelped at the Gaines Research Kennels, Ridgefield, Conn., male puppies out-number females in the ratio of 1½ to 1. Analyzing 25 litters representing 10 different breeds, they discovered that out of the total of 164 puppies whelped, 97 were males and only 67 were females. Students of the canine species have long assumed the average male-female ratio in dogs to be 118 males to each 100 females. Among other domestic animals, there is an excess of males over females in swine and cattle, and an excess of females over males in horses and sheep.

Three litters of Cocker Spaniels, totaling 24 puppies, yielded 14 males and 10 females. Three litters of Irish Setters totaling 29, numbered 20 male puppies and only 9 females. Four wire-haired

Fox Terrier litters, totaling 17 puppies, were comprised of 11 males and 6 females, while 8 litters of Pointers, totaling 55 puppies, yielded 31 males and 24 females.

Counting all puppies in the 25 litters, an average of 6.05 puppies of the litter was achieved. Only Cocker Spaniels, Irish Setters and Pointers had litters of 10 puppies or more.

The Cocker Spaniel leads as the favorite breed of visitors at the Gaines Research Kennels.

A group of 524 visitors, while signing the Kennels' guest book, were asked to also indicate their favorite breed. The results are given below. Listed are only the breeds mentioned ten or more times.

Cocker Spaniel	106
Irish Setter	70
Collie	38
Wire Fox Terrier	31
Great Dane	29
Boxer	27
Scottie	25
English Setter	24
Pointer	17
German Shepherd	15
Sealyham	13
Poodles	13

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