

1945

Abstracts

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Recommended Citation

(1945) "Abstracts," *Iowa State University Veterinarian*: Vol. 8 : Iss. 1 , Article 18.

Available at: https://lib.dr.iastate.edu/iowastate_veterinarian/vol8/iss1/18

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ABSTRACTS



COMPARISON OF THE INCIDENCE OF UDDER INFECTION AND MASTITIS IN TWO COW FAMILIES.

Data is presented on the incidence of mastitis obtained by chemical, biochemical, and bacteriological examinations of a herd of 60 Guernsey cows during a period of 6 years. Bacteriological examination was carried out by plating 1 cc. of 1:20 solution of foremilk in 12 cc. of blood agar. Leucocyte counts were of the Prescott Breed method. Physical examination of the udder was according to the methods of Udall and Johnson. Bacteriological and leucocyte counts were made at 30 and 60 day intervals. Physical udder examination was made every three months; and the foremilk was examined by a strip cup each day preceding the afternoon milking. The cows were maintained in the same herds and under the same management and the family histories were unknown to the investigators until the termination of the experiment.

In compiling the data each lactation period was divided into first, middle and last thirds. Each udder quarter was considered separately so that 12 possibilities existed for an infection rating in each cow's lactation period.

Family 283, composed of a dam, three daughters and two granddaughters, was studied for 17 lactation periods. In five of the six animals incidence of infection was over 50 per cent and in the other cow the incidence was 20.8 per cent. Family 247, comprised of a dam, four daughters and two granddaughters, was studied for 19 lactation periods. In 6 of the 7 cows

incidence of infection was below 20 per cent and the remaining individual had an incidence of 50 per cent.

Family 283 presented a leucocyte count of 500,000 per cc., or higher, in 42.1 per cent, and 425 of 454 daily strip-cup examinations showed the presence of flakes or other evidences of altered infection. The physical examination of the udders of these cows averaged No. 3 by the Udall system. Family 247 had a leucocyte count of 500,000 per cc. in 10.3 per cent positive strip cup test obtained from 192 of 454 daily samples. The udders of this group rated No. 2 Udall. Family 283 averaged slightly higher in milk yield and slightly lower in fat production than Family 247. Although some would consider some of the *Staphylococci* as normal bacterial flora, they were not so looked upon in this experiment, and *Staphylococci* or *Streptococci* infection was considered as of equal importance. Family 283 was infected with *Streptococci* during 24 per cent and with *Staphylococci* during 39.3 per cent of the milking period. Family 247 was infected with *Streptococci* 0.9 per cent and with *Staphylococci* 19.9 per cent of the milking period.

From the above data and observations of other investigators it is concluded that heredity definitely plays a part in bovine udder infection.

(Murphy, J. M.; Pfan, K. O.; Lepord, O. L., and Bartlett, J. W. 1944. *Comparison of the incidence of udder infection and mastitis in two cow families.* *Cornell Vet.* 34:185-192(3).)

SOME BACTERIAL ASPECTS OF PENICILLIN THERAPY.

Tests have been devised which enable a laboratory to give accurate information regarding the sensitivity of an organism to penicillin, and the extent to which the drug penetrates the blood and tissues after injection.

The sensitivity of 157 coagulase-positive strains of *Staphylococcus aureus* was determined. Results indicated that 90 percent of the strains were of a resistance comparable to that of the Oxford strain used in the evolution of penicillin, 9 percent were highly resistant, while only one strain was highly sensitive.

Tests on 33 beta-hemolytic strains of streptococci suggested that most of these strains were two to four times as sensitive to penicillin as the Oxford staphylococcus, and seven strains were highly resistant. The non-hemolytic and viridans strains were more resistant. All of the seven strains of pneumococci tested were resistant, while four of eight diphtheroid organisms tested were resistant. Tests on 10 strains of actinomyces seemed to indicate that these organisms are subject to control by penicillin therapy.

Estimates of the penicillin content of the blood plasma of patients undergoing treatment by intramuscular injection every three hours showed that this method of penicillin therapy maintains a bacteriostatic concentration in the blood stream. Estimates on the serum of patients undergoing treatment by the intramuscular drip method indicated that this method maintains a higher bacteriostatic level than does the intermittent injection method.

Estimates on empyema fluids during the administration of 20,000 units of penicillin intramuscularly every three hours gave bacteriostatic dilutions that suggested that some penetration of penicillin into the fluid was evident.

Similarly, tests on fluid from abscesses associated with lesions of osteomyelitis gave results which indicated that some degree of penetration was obtained.

Tests on the cerebrospinal fluid suggested that there was no absorption of

penicillin into this fluid from the blood stream. However, upon intrathecal injection a high degree of retention was evident.

In these experiments in penicillin therapy there was found to be considerable variation in the rate of disappearance of the infecting organisms. In many cases the persistent organisms appear to be saprophytic varieties and have no unfavorable influence on the recovery of the patient. The persistence of organisms in cases that are apparently doing well should not be regarded as indications of failure in penicillin therapy.

In a small number of cases there was a detectable increased resistance built up against the action of penicillin. However, in most cases this increased resistance was overcome by increasing the dosage of penicillin.

Experiments with penicillin ointment gave unfavorable results. The ointment used consisted of a lanette wax base containing 250 units of penicillin per gm. In test tube experiments there was evidence that at body temperature only a minimal amount of penicillin diffused out into water or blood plasma during the first few minutes and none thereafter.

All observations in these experiments substantiate the outstanding value of penicillin as an antibacterial chemotherapeutic agent.

(*Selbie, F. R., Sinion, R. D., and McIntosh, J. 1945. Some bacterial aspects of penicillin therapy. J. Path. and Bact. 57: 47-58.*)

RATIONAL TREATMENT OF EQUINE COLIC.

The author has found that the most promising indications for treatment in a case of colic are, in order of significance, a normal or near normal temperature, no regurgitation of liquid from the free end of the stomach tube, no uneasiness when normal saline is pumped into the stomach, not too deep a coloration of the conjunctiva, and a good hearty gurgling at the end of the tube when first passed. The pulse can largely

be ignored as it tends to get very weak when pain is prolonged, even in cases that recover. The temperature may rise to 103° F. and the animal will recover, though tardily. Here there has been an enteritis.

A rapidly rising temperature and running down pulse as a rule contraindicate medicinal treatment, but the veterinarian should be loathe to advise destruction because many apparently hopeless cases recover, and some owners cannot be convinced of the incurability of a case.

Any sort of bulky drenching with oily or turpentine mixtures is barred because occasionally a drench goes the wrong way and traumatic pneumonia results. So the first medicinal means would be anodyne, antispasmodic, or narcotic. A subcutaneous dosage of one grain of atropine with 1.5 grains of morphine as an initial dose is recommended. Dosage with morphine alone has been disappointing and it is more costly than atropine. Atropine alone is satisfactory. The author has never found an instance of the use of narcotics being harmful to the animal.

Rationally, the next move is passage of the stomach tube. The veterinarian may then discover whether there is obstruction of the small intestine with gastric tympany. If there is no gastric tympany two or three gallons of tepid water into which is dissolved one-half pound of salt is pumped into the stomach. If there is no obstruction of the small intestine the horse will show no discomfort and the fluid rushing into the caecum can be heard by listening at the flank. If the animal shows discomfort the injection is stopped and the tube removed. Saline may also help soften impaction of the large intestine. The injection apparently does no harm and the recovered horse can go to work the next day without fear of superpurgation or other ill effect.

If impaction of the large intestine is suspected a 16-20 Gm. dose of aloes is administered in ball or capsule, along with the saline.

The patient is allowed to lie down, roll, get up, or seek ease from pain in any way he will.

The only other instrumental treatment is the use of trochar and cannula to relieve acute intestinal tympany observed as a result of bowel indigestion, due perhaps to food allergy.

(*Rainey, J. W. 1944. The rational treatment of equine colic. Aust. Vet. J. 20:251-265*)

RUMEN SYNTHESIS OF THE VITAMIN B COMPLEX AS INFLUENCED BY RATION COMPOSITION.

It has long been known that some members of the vitamin B complex were synthesized in the rumen. There is general agreement that thiamine, riboflavin, pyridoxine, and pantothenic acid are produced therein. In this experiment the effect of nitrogen added to the ration as urea, and how much actual synthesis took place in the rumen, were noted. In addition an attempt was made to correlate the relationship between added nitrogen and carbohydrate on the vitamin synthesis. Cows and calves with rumen fistulae were used.

The rations, fed in sequence, consisted of (a) timothy hay, (b) timothy hay plus corn molasses, (c) same as (b) but with 200 grams of urea per day, (d) timothy hay, (e) timothy hay plus corn molasses and starch, (f) the same as (e) plus 200 grams of urea per day, (g) timothy hay plus corn molasses and starch, and acid washed casein, (h) the same as (g) plus 200 grams of urea per day. Timothy hay was the only part of the ration containing an appreciable amount of the vitamins. At the conclusion of each period a sample of the rumen content was removed through the fistula opening and assayed for vitamins.

Adding nitrogen as urea produced a greater synthesis of biotin, riboflavin, nicotinic acid, and pantothenic acid, but, significantly, only when molasses or another readily fermentable carbohydrate was added to the ration. In the absence of carbohydrate the population of microorganisms was probably also very low.

Synthesis of pyridoxine and "folic acid" apparently was not correlated with a more abundant urea intake.

Thiamine was found in about the same quantities in the ruminal content as in the feed. It may not be synthesized, but it more likely was destroyed or absorbed as quickly as it was formed.

(Tardinois, C. C., Mills, R. C., Elvehjem, C. A., and Hart, E. B., 1944. *Rumen synthesis of vitamin B complex as influenced by ration composition. Jour. Dairy Sci.* 27:579-583).

SULFA COMPOUNDS ON EIMERIA TENELLA. This series of experiments was run to determine the prophylactic and therapeutic values of various sulfonamides on coccidiosis in fowl.

Laboratory animals used were Single Comb White Leghorn chickens ranging in age from two days to 2½ months. Each sex was equally represented, and while data was kept separately for each sex, no significant difference could be seen.

Previous use of sulfadiazine in experiments with coccidiosis, and its availability, suggested its use in this series.

Through feeding experiments 0.0128 gms. per gm. weight of bird was decided upon as optimum. Heavier dosage resulted in decided and rather rapid weight losses. An inability to carry out normal digestive processes apparently caused a semi-starvation. Caecal pouch contents were coarse and flaky, darker than normal and the bacterial flora was greatly reduced.

First, an attempt was made to determine the prophylactic value. The birds were divided into nine groups, one being entirely normal, one infected and untreated, one treated six days prior to infection, one five days prior and so on till a group was reached that was treated the same day in which it was infected. Each bird was given 400,000 oocysts. Seven days later all were killed to determine those which had resisted infection. Of the birds infected on zero day all were negative, those treated one day prior were about one half negative and beyond that

all were severely infected. The uninfected untreated group was negative. Thus, as a preventive the day of infection was the only time at which a dosage of sulfadiazine was effective. Protection was probably effected by an attack on the sporozoites when they were released from the oocysts.

The next experiment was aimed at establishing the therapeutic value of the drug. The birds, all of them two days old, were again divided into nine groups. One was normal, one infected but untreated, one treated at the time of infection and the rest at nine hour intervals afterward. Each bird was given 0.5 gms. of sulfadiazine as a single dose. In addition another group was given 0.5 gms. of sulfadiazine per day for five days. On the seventh day all birds were autopsied to learn the therapeutic value of the compound. Birds treated on the third day received the most value from the drug, probably due to disruption of the life cycle in the first generation merozoite stage. A cure of over 80 percent was affected by treating at that time. The failure of the zero day group was due to the low level of sulfadiazine given.

Work was also done on the value of sulfadiazine in treatment of birds with a firmly established infection. Three groups of 88 day old birds were infected and treated, one six days later, one six and seven days later, and one group seven days later, all with 0.0128 gms. per gm. weight of bird. Upon autopsy it was determined that those treated in the first two groups had very few oocysts, and of these very few sporulated. Sulfadiazine given on the seventh day had little value. Treatment as much as five days and 22 hours after infection, even in those showing severe cecal hemorrhage, resulted in failure of *E. tenella* to complete its life cycle. It was believed that in this instance the sulfadiazine attacked the second generation merozoites. It is conceivable that if given at the time of, or after the appearance of blood in the feces, sulfadiazine could help prevent an epidemic of coccidiosis. However, once oocysts are formed, sulfadiazine will not have an appreciable effect.

Sulfadiazine was also given in the feed, and a level of 1 percent gave complete protection if begun before or at the time of infection. Lower dosages were ineffective, and higher dosages caused marked reduction in the amount of gain.

Other sulfonamides were of little benefit. Sulfathiazole was of value if given before or at the time of infection, but not later.

(Ripsom, C. A., and Herrick, C. A., 1945. *Effects of various sulfa compounds on the protozoan parasite Eimeria tenella. J. of Parasit. 31:98-108*).

THE MECHANICAL MILKER IN RELATION TO COMPLETENESS OF MILKING AND UDDER INJURY. There are two main objections to the use of the mechanical milker, even though many believe it is better than hand milking. One is that it causes injury to the teats and the udder, and the other that many cows cannot be completely milked out, making it necessary to resort to hand milking to finish the process.

Trauma is an important predisposing factor to mastitis, clinical mastitis ordinarily following injury to the teat and udder and the inner lining of the gland and teat.

Use was made of excised mammary glands in the study of the action of the mechanical milker. They were suspended in approximately the normal position, the gland cisterns were cannulated with glass cannula and sterile milk or physiological saline was infused by gravity into the sinuses. The tonicity of sphincter muscles was well retained and the preparation was very valuable.

The action of the milker could be observed through lateral incisions. By this means the action of the teat cup on the teat, the intra sinus pressure, and rate of flow were studied. The "massage" action of the rubber inflation upon the teat was measured by insertion of a small rubber bulb attached to a manometer into the teat sinus. All observations were made on the double action milker.

The force used in hand milking was also measured, both on the excised gland and milking cows. It was found to be greater than that exerted by the milking machine at the recommended pressures.

Using the mechanical milker, milk flow was found to decrease and finally cease before the gland was completely emptied in nearly every instance. When the teat cup was pulled down on the teat every cow was completely milked out. When the teat cup creeps up on the teat the orifice between the teat sinus and the gland is closed, stopping the flow of milk. The teat cup creeps up as a result of increased vacuum within the teat when intra sinus pressure is reduced. When a smaller quantity of milk rushes out of the teat in response to the vacuum created there is more pull on the teat and gland itself and the cup tends to set higher on the teat. Thus when the gland is partially emptied and the intra gland pressure falls milk flow slows and ceases. When the teat cup is tugged down on the teat the orifice between teat and gland can not be closed and milking continues until the gland is empty.

When the milker is left on after milk flow begins to decrease and ceases the vacuum in the teat sinus is the same as in the milk line. This very likely has a traumatizing effect on the epithelium lining the gland and sinus, especially the thin epithelium of the accessory secreting glands.

The conclusion was drawn that if properly operated the mechanical milker is less likely to injure the teat and udder than is hand milking.

(Petersen, W. E. 1944. *The action of the mechanical milker in relation to completeness of milking and udder injury. Jour. Dairy Sci. 27(6):433-440.*)

NUTRITION IN EQUINE PERIODIC OPHTHALMIA. In the outbreaks noted by the authors the first and most characteristic changes were the appearance of numerous tiny blood vessels in the stroma of the cornea, usually followed at

a later date by lesions of the iris and structures posterior to it.

The animals were fed liberal rations of oats, corn, timothy hay, and occasionally alfalfa hay and bran. They had practically no grass for two years. Most of them were in excellent condition. The feed-stuffs were analyzed and found to be rather deficient in riboflavin. Alfalfa hay had the highest content of this vitamin, which is found quite abundantly in leafy green plants, especially when immature.

The effect of a riboflavin deficiency was checked in man, dogs, and rats. Though species variation, dietary preferences and habits introduce variations, it has been found that nutritional deficiencies usually result in similar lesions. Under controlled experiments with rats, the typical corneal vascularization appeared. Four dogs with naturally occurring cases were examined, and the symptoms relieved by administering riboflavin. There is an ocular syndrome in man which has the typical vascularization of the cornea as part of the symptomatic picture. The early symptoms of this condition are relieved promptly by administering riboflavin.

As part of the enzyme system of the body, riboflavin is essential in intracellular metabolism. Ascorbic acid is apparently synthesized in the body of the horse. One of its physiologic functions appears to be maintenance of the intercellular matrix. Capillary fragility and permeability result from a deficiency.

It is believed that the intraocular fluid is secreted by ciliary epithelium. Ascorbic acid, in the normal animal, is found to be 20 times as concentrated in the intraocular fluid as anywhere else in the body. It is possible then that the deficiency of riboflavin results in a lowered production of ascorbic acid, with subsequent capillary permeability and the entrance of erythrocytes and fibrin into the intraocular fluid. This produces the corneal vascularity, and later the retention of leucocytes and fibrin give the eye its opacity. The breakdown of the ocular tissue also produces an opaqueness. Checks made on the eyes of horses suffering from periodic ophthalmia showed a marked decrease in the amount of ascorbic acid present. In the aqueous

humor the amount dropped from 19.33 mg. per 100 cc. to 0.94 mg. per 100 cc. The drop in the vitreous humor was less prominent, being from 19.55 to 8.36 mg. per cc. of fluid. In the eyes of horses suffering an acute attack the drop was even more noticeable.

(Jones, T. C., Major V. C., Maurear, Paul D., Major V. C., Roby, Thomas, Lieut. V. C. 1945. *The role of nutrition in equine periodic ophthalmia*. *Am. J. Vet. Res.* 6(19):67-80.)

Prefrontal lobotomy is a brain-cutting operation performed for the relief of the mental disease, schizophrenia. At the recent meeting of the American Psychiatric Association in Philadelphia, Drs. Freeman and Watts of Washington, D. C., reported that more than 50 per cent of the patients operated upon were cured and have been usefully occupied after six months to seven years, and but 15 per cent had to be kept in a mental hospital.

The frontal lobes of the cerebrum are cut but no part removed, and the result, as a layman would say, is a changed personality, quoting, "sometimes more productive than before." There is also importance in the knowledge of mental disorders that may stem from this operation.

A cooperative project between the Wyoming Hereford Ranch and the Department of Veterinary Anatomy of the Veterinary Division, concerned with studies related to pregnancy in the bovine uterus will be undertaken in September, 1945. Some of the work will be conducted at the Wyoming ranch and some will be done by the Department of Anatomy here. Dr. H. E. Kingman is the veterinarian at the Wyoming Hereford Ranch.

Penicillin has been found to have important action against Weil's disease (leptospirosis) in experimentally infected guinea pigs. Of 32 infected animals, none of the treated animals died, while the infection was fatal in 28 out of the same number of controls.