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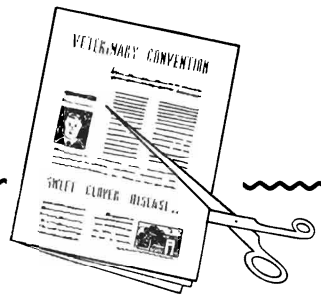
Abstracts

ABSTRACTS



RECENT STUDIES OF THE VAGINA OF THE COW. Recognizing that gaps exist in the knowledge of the physiology of the genital tract, this study was undertaken in an attempt to throw some light on the phenomena associated with the estrual cycle. Specifically, the author worked on the possible changes in the hydrogen-ion concentration of the vagina, the character of the secretions, histological changes in the mucosa and related changes in the ovary.

Results of over 400 complete examinations on 38 dairy cows show that:

1. The pH of the vagina of the cow ranged between 6.5 and 7.5 in 83.36 percent of the total readings. The total range in pH values was from 6.2 to 8.3 and individual cows showed little variation from the general trend.

2. Four of the 38 animals studied required 4 or more services before conception occurred. Whereas the pH range in these cows was 6.57 to 8.29 there was no apparent correlation between failure to conceive and the pH of the vagina; 48.33 percent of the values were below a pH of 7 and 51.67 percent were above a pH of 7.

3. Pathological conditions, such as cystic ovaries, persistent corpora lutea, retained placenta and metritis encountered during the experiment did not affect the constancy of the pH values to any degree.

4. Changes occur in the vaginal mucosa in the region of the external cervical os. In this region the vagina mucosa is characterized by a superficial layer of stratified squamous cells of varied thickness. The epithelium thickens during estrus and becomes thinner during the interestrual period. The low point is reached 1 to 2 days prior to the onset of estrus. The thickening at estrus results from the greatly increased height of the columnar type cells rather than from an increase in the number of layers of stratified squamous epithelium.

5. While leucocytic invasion of the subepithelial tissue was seldom seen during estrus, maximum invasion occurred 2 to 5 days after estrus.

6. Rhythmic changes in the quantity and consistency of vaginal secretions were noted during the estrual cycle. Secretions began to accumulate about 24 hours preceding the onset of estrus and reached the maximum during heat. Immediately following the cessation of heat the amount diminished so rapidly that within 3 to 5 days little or no secretions were present. Consistency of secretions varied directly with the quantity.

7. Graafian follicles in the ovaries could not be palpated with any certainty until about 12 hours before the onset of estrus. They developed rapidly from this time on and at full estrus about half the follicle extended above the surface of the ovary. Ovulation occurred within 24 to 36 hours after the onset of heat.

8. Corpora lutea developed rapidly and could be distinguished as early as 3 days after estrus. Maximum development was reached 9 to 11 days after estrus and this stage was maintained unchanged for the next 5 to 7 days. After this period there was a rapid degeneration down to $\frac{1}{3}$ to $\frac{1}{4}$ of the maximum size. Regression of the corpora lutea was not complete before

the onset of the next heat and the structure could be palpated through 2 or 3 succeeding cycles.

(Brown, P. C. 1944. Physiological and histological changes in the vagina of the cow during the estrual cycle. Am. J. Vet. Res. 5(15):99–112.)

PHENOTHIAZINE AS AN ANTHELMINTIC IN HORSES. Phenothiazine as an anthelmintic in horses for the treatment of primary strongylosis especially, has found reasonable success. Thousands of cases have been treated satisfactorily. However, 90 field cases and 22 experimental animals have become sick, with 32 deaths in the field and 5 deaths among the experimental animals.

Evidence presented indicates that these outbreaks are not due to toxic impurities in the drug, and the fact that cases occurred in several outbreaks wherein most of the animals treated were attacked rules out individual susceptibility and idiosyncrasy. Age and sex make no difference in results as cases are reported concerning both sexes and all ages. Anemic and constipated animals are especially susceptible to poisoning.

Anemia, frequent scanty urination, weakness, colic and constipation are recorded as symptoms of phenothiazine poisoning. Doses of 60–90 Gm. / 1000 lbs. caused a marked decrease in erythrocytes, often as many as 3,000,000 / cmm. of blood. A dosage of 30 Gm. / 1000 lbs. produced no clinically evident anemia.

Toxic reactions to phenothiazine arise when intestinal peristalsis is decreased. Delayed passage of phenothiazine provides greater opportunity for oxidation products to form, especially in the cecum with its high bacterial count. Phenothiazine is oxidized to the toxic salt, potassium leucophenothiazone sulfate, which, when in the blood stream, causes hemolysis of the red blood cells resulting in clinical anemia. Unless particles of phenothiazine move through the digestive tract fairly rapidly they are unduly exposed to oxidation and consequent absorption from the upper part of the alimentary canal. Any factor which tends to slow peristalsis may aid in causing phenothiazine poisoning. Excessive doses aggravate conditions as phenothiazine itself tends to cause constipation.

Because of the constipating effect of the drug, thorough preparation of the horse with several bran mashes before treatment followed by administration of a single dose of phenothiazine in a bran mash is recommended as a routine treatment. Experimentation has indicated that small repeated dosages are safe for weak and anemic horses, brood mares and weanlings. There is probably very little absorption with this method. No staining of the urine is noted with daily dosages of less than 3 Gm. When 1 to 3 Gm. are mixed with powdered blood and digestive stimulants, results are very satisfactory.

Phenothiazine poisoning can be kept at a minimum by preparation of the horse with bran mashes, and by using doses no larger than 30 Gm. / 1000 lbs.

(Britton, J. W. 1944. Phenothiazine as an anthelmintic in the horse. Vet. J. 100(5):102–105.)

A VARIABLE PHYSIOLOGICAL FACTOR NECESSARY FOR THE SURVIVAL OF BULL SPERMATOZOA. Recently investigators have tried to prolong the life of mammalian spermatozoa by nutritional or other variations of their surrounding media. Under certain conditions it would seem that an additional factor should be added so the ability of the sperm cell to withstand abnormal environments would be strengthened. This additional factor was first suggested in 1939 when spermatozoa collected from Arizona bulls failed to live for more than 24 hours under controlled conditions while the spermatazoa from Missouri bulls would survive several days under the same conditions.

The first endeavor in the investigation of this factor came with a study of the behavior of ejaculated and epididymal spermatozoa with or without the addition of the egg yolk diluter. Various experi-

ments were performed on the ability of spermatozoa to resist adverse environmental conditions. Six bulls from Arizona and 3 bulls from Missouri were used in the experiments.

Twenty-two samples were taken from the Arizona bulls and carefully studied. All of the spermatozoa in the undiluted samples were dead after 144 hours of storage while the samples with the egg yolk diluter came through the storage period with 63.2 percent live spermatozoa. These results show the inability for spermatozoa from Arizona bulls to withstand the environmental conditions without the aid of the egg yolk diluter.

The spermatozoa from the Missouri bulls were subjected to the same test and found that without the diluter 34.5 percent of the spermatozoa remained alive while with the diluter 61.1 percent survived.

There seemed to be a regional differance in the viability of the spermatozoa, but it was largely eliminated by the addition of the egg yolk diluter.

There exists a direct relationship between the survival time of bull spermatozoa under storage conditions and the degree of their resistance to low temperature shock. Therefore the cold shock technique can be utilized to measure the storage potentialities of semen specimens.

Epididymal spermatozoa are much more resistant to cold temperature shock than ejaculated sperm. Apparently a varying proportion of epididymal spermatozoa lose their resistance by the time they are ejaculated, but some of the ejaculated spermatozoa still possess the faculty of becoming resistant.

In no case, either storage or cold shock methods, did this diluter enable 100 percent survival of the spermatozoa. This would indicate that some of the spermatozoa are not receptive to protective action of the diluter. However, these experiments would show that it is a step in the right direction in increasing spermatozoa viability.

(Lasley, J. F. and Mayer, D. T. 1944. A variable physiological factor necessary for the survival of bull spermatozoa. Animal Sci. 3(2):129–135.)

OBSERVATIONS ON THE THERAPEUTIC ACTIVITY AND TOXICITY OF PENCILLIN. The promise that penicillin holds as a therapeutic agent of merit is based upon the advantages it exhibits over the sulfonamides. This antibiotic agent is definitely bactericidal and not just bacteriostatic. Its activity against many of the Gram positive cocci is many times greater than that of the sulfonamides. Its action is not inhibited by substances such as pus and tissue fluids which do counteract the action of the sulfonamides. Therefore it is active against far greater numbers of organisms than are the sulfa drugs.

Results of recent studies show that the therapeutic efficacy of penicillin can be determined accurately *in vitro*. Also it has been demonstrated that the drug is effective against bacterial infection when administered either locally or systemically One injection of penicillin will protect mice against a light infecting dose of pneumococci while repeated treatment was effective against larger doses. Both well established local and systemic infections in rabbits could be treated by repeated intravenous injections of penicillin.

Strains of pneumococci resistant to the sulfonamide drugs and which are still fully virulent to mice are completely susceptible to the action of penicillin. While strains of staphylococci, pneumococci, and streptococci may become resistant to penicillin *in vitro*, this increased resistance is accompanied by loss of virulence, and morphological and metabolic changes that appear to be permanent.

A strain of *Staphylococcus aureus* was rendered more virulent and for this reason more resistant to penicillin by serial passage in mice treated with penicillin. However, susceptibility to penicillin *in vitro* was unchanged by such passage.

Compared to the other antibiotic substances from the growth of unicellular organisms, penicillin has first and foremost the features of high activity, high solubility and low toxicity. Even in impure form penicillin is many times less toxic for animals than any other well known anti-biotic substance. In purer

forms and in single therapeutic doses its toxicity may be considered non-existent. While penicillin is rapidly excreted, demonstrable amounts can be detected in the urine of mice as long as 8 hours after injection.

(Rake, G., McKee, C. M., Hamre, D. M. and Houch, C. L. 1944 Studies on penicillin. II. Observations on the therapeutic activity and toxicity. J. Immun. 48 (5):271–289.)

EFFECTS OF UNFRACTIONATED PITUITARY EXTRACT ON NYMPHOMANIA. Methods of treatment of ovarian cysts in cattle have been based on repeated manual rupture of the cysts and irrigation of the uterus with a mild antiseptic. Because these methods have not proved sufficiently effective to warrant the tedious and expensive procedure in most cases, this study was undertaken to attempt to determine systematically certain effects of unfractionated pituitary extracts upon the ovary and on the sexual behavior when injected into cows with cystic ovaries.

Data included in this study were obtained from cattle under the direct observation of the authors since 1937, and from cows studied through the co-operation of a group of herdsmen and veterinarians for one and one-half years. A total of 96 cows with cystic ovaries were observed and these were classified into groups. Group I included cows showing nymphomaniac behavior but possessing normal genital tracts; Group II demonstrated nymphomania and showed marked uterine or tubal pathology. Group III, which also had cystic ovaries, exhibited no signs of nymphomania and had apparently normal genital tracts.

Unfractionated extracts prepared from acetone desiccated sheep pituitary powder (Wilson and Co.) were injected intravenously in doses ranging from 0.67 to 2.5 gram-equivalents. Complete records were kept on the behavior, estrual periods and breeding dates. All pregnancy determinations were made by manual examination per rectum.

Of the 96 cows with cystic ovaries, 81 animals exhibited nymphomaniac symptoms when treatment was begun. A single injection of pituitary extract caused the symptoms to disappear in 72 of these cows. There was apparently no difference in the ability of the treatment to dispel the symptoms in Groups I and II. However, the recurrence of nymphomania was more prevalent in those animals possessing uterine or tubal pathology, for 6 out of 9 cases in Group II as compared to 8 out of 63 cases in Group I again showed symptoms of nymphomania during the observation periods which varied in the groups from 4 to 398 days.

Within 31 days after treatment, corpora lutea were formed in 74 of the 96 cows and their occurrence was equally proportional within the 3 groups. This same consistency was observed in the appearance of a normal estrus following treatment but there was some delay in Groups II and III as compared to Group I. Normal estrus was demonstrated in 69 cows following a single injection of pituitary extract.

Cattle in Groups I and III appeared to conceive with equal readiness but none of the animals with uterine or tubal pathology conceived. Thus of 56 cows that were bred following a single injection and which showed no recognizable pathology of the genital tract, 36 became pregnant.

Retreatment of 16 animals was tried either because the ovarian cysts persisted after the first treatment or recurred some time later. Six of these cows, all with normal genital tracts, conceived when bred. In 3 cases a third injection was given but no pregnancies resulted when these cows were bred again.

Although the experiment was admittedly uncontrolled and of necessity free from random selection, the results obobtained from use of the pituitary gonadotrophin in the unfractionated state indicated a positive action upon cystic ovaries.

(Casida, L. E., McShan, W. H., and Meyer, R. K. 1944. Effects of an unfractionated pituitary extract upon cystic ovaries and nymphomania in cows. J. Animal Sc. 3(3):273–282.)