Summary and Conclusions. 1. Stimulation of the central end of any intercostal nerve causes a reflex inhibition of respiration and effects a concomitant drop in blood pressure. 2. The lower intercostal nerves (7-12) elicit a greater response than do the upper ones. 3. Stimulation of the intercostal branches to the parietal pleura, diaphragmatic pleura, and rectus abdominis muscle give the respiratory inhibition and lowered blood pressure (approximately 25 mm of Hg.) 4. Stimulation of sensory or intercostal fibers in the diaphragm causes reflex contraction of the abdominal musculature through reflex connection with other lower intercostal nerves. 5. Among other things, these results furnish the physiological mechanisms involved in referred pain and muscular rigidity in the lower abdominal quadrant as a result of involvement of the base of the lungs, in lobar pneumonia for example. 6. Both expiration and inspiration cause the intercostal nerves to be stimulated and thereby effect reflexly respiratory inhibition. a. Inspiration more strongly inhibits respiration than does expiration. b. At the end of inspiration, the intercostal nerves aid the Hering-Breuer reflex. c. After expiration the intercostal nerves constitute a factor that determines lapse of time before the next inspiration. 7. Abnormal respiration and tightening of the abdominal musculature may be indicative of an irritation in the peripheral region of the diaphragmatic pleura.

I hereby wish to acknowledge that Dr. Arno B. Luckhardt suggested the problem and rendered valuable aid in its prosecution.

11512

H Ion Concentration of Various Fluids of the Genital Tract of the Cow.

HENRY A. LARDY, W. D. POUNDEN AND PAUL H. PHILLIPS.

From the Departments of Biochemistry and Veterinary Science, College of Agriculture, University of Wisconsin, Madison.

In a study of certain reproductive phenomena in dairy cattle a few questions were raised which made it necessary to determine the pH of various fluids of the genital tract of the cow. This problem is of considerable scientific and practical interest since it is reported by Warren[1] and others that sex can be controlled by the simple ex-

[1] Warren, Carl, *Animal Sex Control*, Orange Judd Co., 1940.

TABLE I.
The pH of Various Fluids of the Cow.

Fluid	No. of cases	pH	
		Range	Avg
Vaginal douche (Anestrus)	3	6.0-6.7	6.4
Cervical fluid	17	7.6-8.9	8.33
Uterine wash*	13	6.6-7.15	6.8
Amniotic fluid from calf fetus	6	7.0-7.4	7.12
Follicular fluid	3	7.52-7.7	7.6

*5 cc double distilled water was washed through the uterus and the pH of the wash determined.

pedient of acid or alkaline vaginal douches at the time of breeding. The fluids in our studies were obtained as follows:

Specimens of vaginal and cervical fluid were collected from cows in the University herd by means of a speculum and pipette. The other fluids were obtained from cows immediately after slaughter. The pH determinations were made with the Coleman glass electrode apparatus.

In the cow there is very little vaginal secretion during anestrus. The data obtained upon the pH of the various portions of the genital tract of the cow are summarized in Table I.

During estrus a cord of heavy gelatinous mucus is secreted from the cervix into the vagina. This secretion is distinctly alkaline with an average pH of 8.3 and as it flows into the vagina it changes the reaction in that organ to a slightly alkaline one. For this reason the vagina of the cow in estrus is alkaline. These observations support the findings and hypotheses of McNutt[2] *et al.* This reaction is quite different from the reaction found in the rat, according to Beilly,[3] where the vaginal fluid is most acidic during estrus.

From the data given in Table I the sequence of events in the impregnation of the cow would indicate that the sperm are ejaculated into an environment with a slightly alkaline reaction. From there the sperm must pass through the cervical gateway in a medium whose pH normally lies between 8.0 and 9.0. After passing through the cervix the sperm arrives in the uterus which maintains an environment at an average pH of 6.8. This is the pH range which we have found to be optimum for bull sperm storage.[4] Thus all sperm on an impregnation journey in the normal cow pass through an alkaline bath before arriving in the uterus where a more optimum pH prevails. The pH of solutions of pure sodium bicarbonate is

2 McNutt, S. H., Schwarte, L. H., and Eveleth, D. F., *Cornell Vet.*, 1939, **29**, 415.
3 Beilly, J. S., *Endocrinology*, 1939, **25**, 275.
4 Phillips, P. H., and Lardy, H. A., *J. Dairy Sci.*, 1940, **23**, in press.

about 8.8 which lies within the range of alkalinity of the cervix during heat. Furthermore, 10 cc of cervical fluid with a pH of 8.3 requires 3 to 4 cc of N/10 HCl to bring it to pH 6.5. Thus the advocates of pH controlled vaginal douches for the control of sex must go beyond the cervix to make their procedure effective in the female bovine.

Summary. A study of the pH of the genital secretions of the cow has shown the vagina to be slightly acid in anestrus and slightly alkaline in estrus due to the distinctly alkaline character of the cervical discharge at that time. The fluids of the cervix during estrus average pH 8.3 with a range from pH 7.6-8.9. The fluids present in the uterus during estrus have an average pH of 6.8 which is a favorable one for sperm survival.

11513

Lessened Effectiveness of Bacteriostatic Agents vs. Tuberculous Infection in Rabbits with Impaired Functional Efficiency.

ARTHUR LOCKE, ROSE B. LOCKE AND HELEN SCHLESINGER.
From the Western Pennsylvania Hospital Institute of Pathology, Pittsburgh.

This is a report of a study of the effect of administered sulfanilamide (SA) and *p*-caproylaminobenzenesulfonhydroxamide (CH)* on the rate of increase in size of the local lesion produced by subcutaneous injection of a suspension of avian tubercle bacilli, in the rabbit, and on the bearing—on that effect—of the functional status of the rabbit as indicated by its reaction to chilling.[1, 2]

Table I indicates the comparative intensity of the growth-restraining effect exerted by SA and CH in cultures of the avian tubercle bacillus in broth. The strain used was *M. avium* No. 30, from the Phipps Institute. It formed smooth, moist, cream-colored colonies on Lowenstein's medium. In broth, it grew in sedimenting, flocculent masses which formed an even suspension on agitation. The culture medium was glycerine veal heart infusion broth of pH 6.8, distributed in 25 cc amounts in 50 cc Erlenmeyer flasks. The

* Supplied by Dr. Maurice Moore, Sharp and Dohme, Philadelphia.

1 Locke, A., *J. Infect. Dis.*, 1937, **60**, 106; *J. Immunol.*, 1939, **36**, 159; Locke, A., and Main, E. R., *Ibid.*, 173.

2 Locke, A., Locke, R. B., Bragdon, R. J., and Mellon, R. R., *Science*, 1937, **86**, 228; Locke, A., Main, E. R., and Mellon, R. R., *J. Immunol.*, 1939, **36**, 183.