FURTHER DATA ON THE EFFECT OF VACCINATION AGAINST BOVINE INFECTIOUS ABORTION.

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In a recent monograph[1] two experiments were described dealing with the effects of vaccination on the incidence of abortion in heifers associated with *Bacillus abortus*. The first experiment dealt exclusively with the effect of living cultures on the first and second pregnancies. In the second experiment one group of heifers was treated with cultures killed by heat. In the publication referred to only the first pregnancies were reported. There are now available data on the second pregnancies which shed some additional light on the value of vaccination.

The methods pursued were the same as those described in the monograph. All fetuses obtainable were cultured and at the same time guinea pigs inoculated with washings from uterine swabs. The agglutinins towards *Bacillus abortus* in the blood were measured by a suitably graded series of tests.

All animals were treated with vaccine before the first pregnancy only. In Group A all heifers received 4 doses of a heated culture, 2 before and 2 after the first service. Similarly the group treated with a living culture before the first pregnancy was not injected thereafter.

The outcome of first and second pregnancies is shown in Table I. It will be noted that between the two pregnancies some animals were disposed of as of reduced economic value.

Although Group A treated with dead cultures appeared to possess

[1] Smith, T., and Little, R. B., Studies in vaccinal immunity towards disease of the bovine placenta due to *Bacillus abortus* (infectious abortion), Monograph of The Rockefeller Institute for Medical Research, No. 19, New York, 1923.

considerable resistance when compared with the controls in the outcome of the first pregnancy, it failed to hold its advantage in the

TABLE I.

No. of pregnancy.	No. of animals remaining available.	Full-term pregnancies.		Abortions.	Per cent aborted.	Per cent aborted and with placenta diseased.
		Normal.	With placenta diseased.			
Vaccinated Groups.						
Group A. (Heated vaccine.)						
First.....	34	25	4	5	14.7	26.4
Second.....	30	23	2	5	16.2	23.3
Group B. (Living vaccine.)						
First.....	9	9	(3)*	0	0	(33.3)*
Second.....	9	9	0	0	0	0
Control Groups.						
Group Bc.						
First.....	13	6	0	7	53.8	53.8
Second.....	11	8	2	1	9.9	27.3
Group C.						
First.....	9	4	1	4	44.4	55.5
Second.....	4	1	2	1	25.0	75.0
Group D.						
First.....	14	9	1	4	28.5	35.7
Second.....	9	6	2	(1)†	(11.1)†	22.2
Summary of Controls.						
First.....	36	19	2	15	41.6	47.2
Second.....	24	15	6	2	8.3	33.3

* Normal births with *B. abortus* in uterine washings.

† Vibrionic.

second. Thus the actual abortion rate compared with the controls was as 14.7 to 41.6 per cent in the first and as 16.2 to 8.3 per cent in

the second. When we include full-term pregnancies with diseased placenta, the difference is, however, still in favor of vaccination, 23.3 to 33.3 per cent.

Group B treated originally with one dose of living cultures is of interest in having maintained complete resistance in the second pregnancy. In the first all pregnancies terminated normally, but in 3 of the 9 animals the uterine swab produced the characteristic disease in guinea pigs, although the placentas were normal. In the second parturitions, also normal, all uterine swabs failed to infect guinea pigs. Although in one animal the placenta was retained, guinea pig tests of uterine swab and scrapings of chorion were negative for *B. abortus*. Sections of the placenta of this animal failed to show lesions and the cause of the retention remained undetermined. The

TABLE II.

Time.	Normal pregnancies.	Abortions.	Adherent placentas.	Per cent aborted.	Per cent aborted and with adherent placentas.
1924					
Jan.....	39	5	2	12.8	18.0
Feb.....	42	8	5	19.0	30.9
Mar.....	37	6	6	16.2	32.4
Total.....	118	19	13	16.1	27.1

animals of this group had been distributed among older cows to increase the opportunities for infection. These results can scarcely be regarded as of no significance, even in view of the small number of animals in the group.

The heifers in the control groups, of which only two-thirds remained in the herd, show a marked reduction in actual abortions but a relative increase in full-term pregnancies with diseased, adherent placenta.

During 3 winter months when most of the parturitions in the vaccinated and control groups occurred, the abortion rate among the cows making up the remainder of the herd is given in Table II. There were no special tests made to determine the nature of the disease in these animals. The table represents older and seasoned animals. The total figures approximate closely those of the group which received the heated cultures.

CONCLUSIONS.

The partial protection afforded by four injections of a heated culture of *Bacillus abortus* of normal virulence during the first pregnancy is in part lost in the second. The superiority of a single injection of a living culture of relatively low virulence is evident in both pregnancies. In the experiment described, the protection was complete.