STUDIES ON THE PULLORUM DISEASE I. SOME CONSIDERATIONS OF THE CONTROL OF THE PULLORUM DISEASE IN A FIELD WITH THE RAPID WHOLE BLOOD AGGLUTINATION

STUDIES ON THE PULLORUM DISEASE

I. SOME CONSIDERATIONS OF THE CONTROL OF THE PULLORUM DISEASE IN A FIELD WITH THE RAPID WHOLE BLOOD AGGLUTINATION

By

Masanori KATSUNO and Jinkichi FUJITA

Department of Animal Husbandry, Faculty of Agriculture, Tohoku University, Sendai, Japan

(Received April 25, 1956)

The rapid whole blood agglutination for diagnosis of the pullorum disease, which is generally used, was a comparatively accurate method in laboratory works(1). Using this method in a field, we found several considerable points. Herein we shall present the data obtained from the inspections of the pullorum disease in fowls at the Tohoku University farm, Kawatabi, Miyagi Prefecture, in 1951 and 1952.

Materials and methods

Rapid whole blood agglutination was about monthly tested on 324 fowls for a year extending from August 1951 to August 1952. The fowls showing positive and doubtful reaction were separated or killed after each test, and the hen-houses sometimes were disinfected with utmost care. A commercial stained antigen* was used. The tests in winter were performed under conditions kept at 22°C and in the other seasons at atomospheric temperatures (16° to 24°C), and judged with a magnifying-glass as follows. The reactions occured within one minute and within two minutes were respectively positive and very weakly positive, so called doubtful, and no reaction in the time was negative. Young plymouth Lock three months old which showed positive reaction at the first inspection were separated and transfered to a battery to determine the duration of the reaction.

Bacteriological observation was performed with SS agar and Kligler's iron agar.

Results and discussion

It seems to be difficult to determine exactly the pullorum disease by means of the rapid whole blood agglutination by monthly examination as shown in

* Made by the Government Experimental Station for Animal Hygiene, Tokyo, Japan.

figure 1. That is, it required ten months to discover all of the pullorum fowls, except for the group of young White Leghorn three months old at the first test. In adult fowls fifteen months old at the first test, it was difficult to select the pullorum carrier, because the positive reactor appeared gradually and at a small rate by every tests.

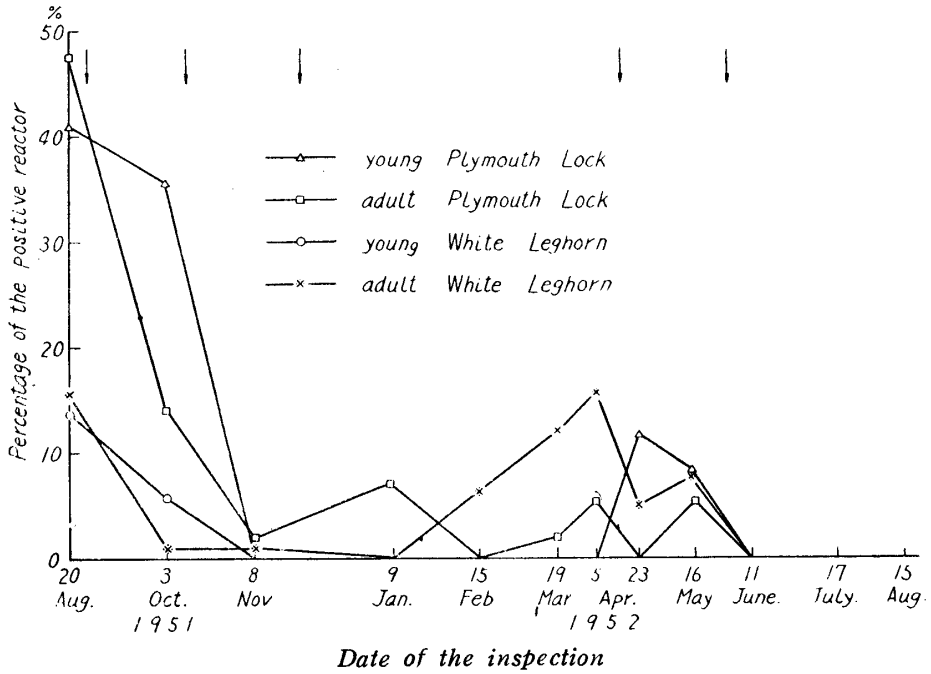

Fig. 1. The percentage of the new positive reactor at each inspection against the initial number of the fowl.

The marks of an arrow show disinfection of the hen-houses.
The numbers of each group are as follows. Young Plymouth Lock 59, adult Plymouth Lock 57, young White Leghorn 88 and adult White Leghorn 120 ; amounting to 324 in total.
The ages of the fowls at the first inspection are as follows. Young fowls three months old and adult fowls fifteen months old.

The percentages of the positive reactor discovered in the first two tests against the total positive reactor of each groups were 100 per cent (young White Leghorn), 80.4 per cent (young Plymouth Lock), 75.0 per cent (adult Plymouth Lock) and 27.1 per cent (adult White Leghorn), respectively (see table 1).

From these facts, the application of the rapid whole blood test in the young fowls, especially when the time since they were infected is comparatively short, is thought to be more effective than in the case of the adult, though they will not show the positive reaction until one month old (2), (3). On the young White Leghorn, the rate of their infection being as low as 19 per cent, it was easily controled.

Table 1. The percentage of the new positive reactor at each inspection against the total positive reactor.

Date of inspection	1951			1952									Total number of positive reactor	Initial number of the fowls
	Aug.	Oct.	Nov.	Jan.	Feb.	Mar.	Apr.		May	June	July	Aug.		
	20	3	8	9	15	19	5	23	16	11	17	15		
Young Plymouth Lock	% 42.9	% 37.5	% 0	% 0	% 0	% 0	% 0	% 10.7	% 8.9	% 0	% 0	% 0	56 (95%)*	59
Adult Plymouth Lock	61.4	13.6	2.3	6.8	0	2.3	4.5	0	4.5	0	0	0	44 (77%)	57
Young White Leghorn	70.6	29.4	0	0	0	0	0	0	0	0	0	0	17 (19%)	88
Adult White Leghorn	25.7	1.4	1.4	0	6.8	19.2	25.7	8.1	12.1	0	0	0	74 (62%)	120

* Per cent of total positive reactor against initial fowls.

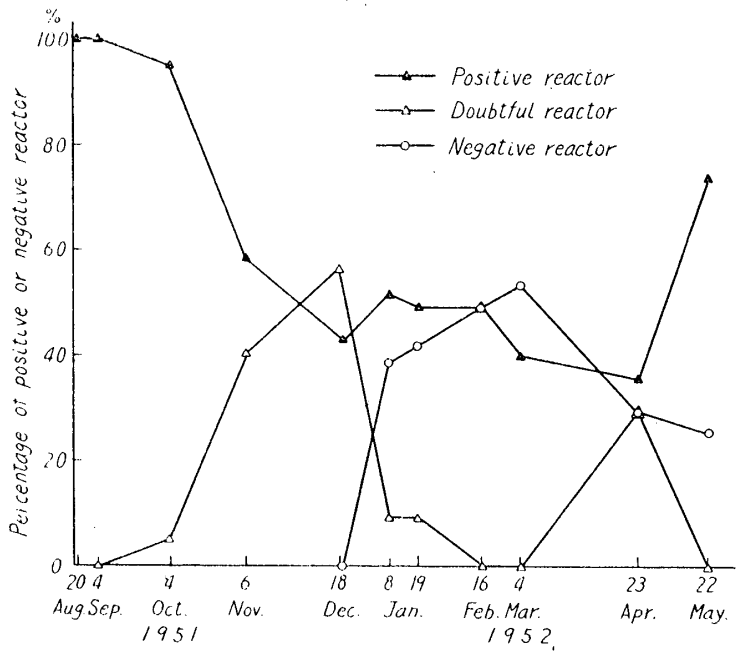

Fig. 2. Change of the reaction of the agglutination with the seasons.
Twenty four young Plymouth Lock which showed positive reaction at the first inspection were employed.

In winter, from November to February, the positive reactor appeared at lower levels, therefore the rapid agglutination test did not seem to be effective in this season, as explained in figure 2. The fowls which had distinctly shown positive reaction became gradually doubtful in their reaction with winter and finally 50 per cent of them became negative. The positive reactor tended to

increase again with spring. The cause of these changes of the agglutination remains still unknown. Production of antibody may be affected by the season, especially by the length of the day or strength of sun ligth, or it may be related only with the age of the fowl. It may be related with the concentration of the causative bacteria in the host, as suggested by N. Imai (4).

There were three types of the fowl in our experiment. The first is the one which continued positive reaction for several months, the second continued negative reaction after the positsve reaction had disappeared, and the third type showed negative or positive reaction alternately at irregular intervals (1 to 3 months). It will be due to this alternate change rather than new infection that the inspections were carried out as 9 times for complete control of the disease. As this alternate change may possibly occur weekly (2) (3), it is desirable to carry out the inspection at such intervals for confirmation.

From eight fowls out of the ten of the first type which continued positive reaction for nine months, *Sal. pullorum* was isolated. The bacteria was also isolated from one of the three negative reactors, which continued negative reaction for three to five months after positive reaction had disappeared. The fact that *Sal. pullorum* was isolated from the second type must be considered in the control of the pullorum disease when employing the rapid whole blool method.

Summary

We inspected the pullorum disease of the fowl by means of the rapid whole blood agglutination for a year and obtained data relating to complete selection of the carrier. These points were discussed.

Acknowledgement

We express our hearty thanks to professor T. Inoue for his advices and also Mr. S. Hoshi and Mr. Z. Teruya for their co-operation during this work.

References

1) Konno, K. and Goto, Y.: (1932) Japan. J. Vet. Sci., Vol. 11, p. 118.
2) Katsuno, M. and Fujita, J.: Will be published next paper (Tohoku J. Agr. Res.).
3) Iwamori, H. et al: (1952) Japan. J. Vet. Sci., Vol. 14, p. 392.
4) Imai, N. and Kamimura, T.: (1954) Sci. Report. Azabu Vet. College, No. 1, p. 28.