

Effects of *Salmonella senftenberg* Injection on Chicks Hatched from Eggs in Treatment of Testosterone Propionate

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(Tables 1-3; Plate 1)

It has been shown that the growth and function of bursa Fabricii is concerned with antibody reproduction in young chicks by GLICK¹⁾²⁾ (1960, 1961), SADLER & GLICK³⁾ (1962), MAY & GLICK⁴⁾ (1964), SATO & GLICK⁵⁾ (1965). GLICK⁶⁾ (1967), MEIR & JAAP⁷⁾ (1968) have reported the genetic correlation between bursa weight at hatching and body growth of chickens. On the other hand, ASPINAL, MEYER & RAO⁸⁾ (1960), MAY & GLICK⁹⁾ (1964), WILSON & GLICK¹⁰⁾ (1966) have dealt with morphological studies on the bursa to induce testosterone propionate (TP) into fertile eggs.

In a previous paper, the author¹¹⁾ (1967) reported that the quantitative changes occurring in the weight of the bursa of Fabricius and thymus in chicks hatched from eggs in treatment in varying levels of TP. The worker observed a significantly smaller bursa, or no bursa at all, in chicks hatched from eggs through TP treatment.

The purpose of the present paper is to report the effects of injection of *Salmonella senftenberg* on smaller bursa chicks hatched from eggs in TP treatment. On the basis of these data it became interesting to make a study of the effects of antibody reproduction on the differentiation of the bursa.

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MATERIALS AND METHODS

Fertilized eggs of White Leghorn strain furnished the material for the present study. In the first experiment, 150 eggs were injected in 1.0 mg. testosterone propionate per suspension distilled water for injection into the albumin portion on the five days of incubation. In next experiment, smaller bursa chicks hatched from eggs in TP treatment were injected 0.5 ml of *Salmonella senftenberg*, contained 3.0×10^8 organisms intra-muscularly 14 days of age after hatching. *S. senftenberg* used for injection was inoculated in ordinary bouillon and incubated at 37°C for 20 hr. Normal chicks of control were injected in same manner. After injection, smaller bursa chicks and normal chicks were observed in resting power against to *S. senftenberg*, and the bursa and thymus of chicks were recorded in morphological and histological observation at one day and seven days after injection.

RESULTS AND DISCUSSION

In the previous study, the author has made some morphological studies on effects of the bursa of Fabricius and thymus in chicks hatched from eggs in treatment of testosterone propionate. Based on the results of observations, the suggestion is possibly made that TP hormone has great influence on the differentiation of the developmental bursa in the immature stage of chick. The present data observed a significantly smaller bursa in chicks hatched from eggs injected in TP 1.0 mg. into the albumin portion in the same manner of previous experiment. Number of the chicks hatched from eggs of TP injection was observed small in average number compared with control (Table 1). Twenty-three chicks in TP treatment were given injection of *S. senftenberg* at 14 days of age after hatching. The smaller bursa chicks showed an higher mortality rate than normal chicks at the injection of *S. senftenberg*. That is, smaller bursa chicks in injection of *S. senftenberg* suggested 65.2 percent in the death rate. The control chicks in injection of same dose of *S. senftenberg* took 28.0 percent in average (Table 2). The data obtained

Table 1. Number of chicks hatched from TP injected eggs.

Section	Number of experiment	Number of hatching	Hatchability
TP treatment	150	48	32.0%
Control (Dist. water treatment)	120	50	41.7%

Table 2. Number of mortality rate of chicks at treatment of *Salmonella senftenberg*.

Section	Number of chicks at injection	Number of death	Mortality rate
Smaller bursa chick	23	15	65.2%
Control	25	7	28.0%

from this observation, have shown that the bursa of Fabricius is correlated to with antibody reproduction in young chicks. The average weight of internal organs of chicks that received the injection of *S. senftenberg* showed in Table 3. The spleen of chicks of bacterial treatment recorded a more remarkably large weight than that of control chicks in both smaller bursa chicks and normal chicks at 15 days and 21 days of age after hatching. On the other hand, the thymus showed no remarkably variation of weight in comparison with control. The histological observation of the bursa gave no remarkably transition in compared with control as sign Figs. 1-2.

A good deal of work has been published so far on the function of the bursa

Table 3. Effects on internal organs of chicks at injection of *Salmonella senftenberg*.

Section	Application	Number of chicks	age	Average weight of spleen mg.	Average weight of thymus mg.
I	Smaller bursa chicks at bacterial injection	4	15	77.31	264.00
	Control	4	15	45.71	281.10
	Normal chicks at bacterial injection	7	15	87.10	260.00
	Control	7	15	69.79	264.00
II	Smaller bursa chicks at bacterial injection	4	21	289.70	1066.63
	Control	7	21	165.02	1173.34
	Normal bursa chicks at bacterial injection	6	21	229.55	1271.96
	Control	9	21	153.92	1185.44

Fabricii in young chick. In the present investigation we have dealt with the study of the bursa Fabricii concerned with the antibody reproduction in chicks. Smaller bursa chicks in TP treatment were observed to be of higher mortality rate than normal young chick at injection of *S. senftenberg*. Based on these data, it is presumed that bursa Fabricii in young chick may undergo antibody reproduction. But, it is not determined that the Bursa undergoes effects of steroids in immediate reaction. In the average weight of internal organs of chicks that received the injection of *S. senftenberg*, the spleen of chick has revealed to be remarkably larger in weight than control chicks in both smaller bursa and normal chicks 15 days and 21 days of age. MIKAMI & HACHINOE¹²⁾ (1967) reported that the weight of the bursa of Fabricius and spleen are not related to susceptibility to *S. pullorum*. It is a study for further discussion on the relation between bursa and thymus of chicks as lymphatic tissues.

SUMMARY

The data obtained in the present investigations were described being of two kinds.

(1) Number of the chicks hatched from TP 1.0 mg injected eggs was observed in an average small number compared with control. Bursa size and weight of chicks of TP treatment were observed to show remarkable reduction in the same way of previous report.

(2) Smaller bursa chicks in TP treatment showed higher mortality rate than normal chicks at injection of *Salmonella senftenberg* at 14 days of age after hatching. From the results of this present study, it is presumed that the bursa of Fabricius is concerned with antibody reproduction in young chicks. The spleen of chicks that

received the injection of *S. senftenberg* observed remarkably large weight as compared with to that of control chicks.

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TP 処理鶏卵による退化ファブリシウス嚢雛に及ぼす サルモネラ菌接種の影響について

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鶏のファブリシウス嚢の機能を研究する目的で孵卵5日目鶏卵にテストステロンプロピオネート (TP) 1.0 mg を卵白内に注入し、更に孵化後ファブリシウス嚢の退化した14日令雛にサルモネラ菌 0.5 ml (生菌数 3.0×10^8) を筋注して、その影響について研究した。

実験結果は (1) TP 処理卵は前報と同じく孵化率が低かった。TP 処理のファブリシウス嚢の大きさと重量は対照区と比較して小さかった。(2) ファブリシウス嚢退化雛に生菌接種した場合斃死率は対照区の生菌接種と比べ極めて高かった。これらの成績からファブリシウス嚢は抗病性と関連した機能をもつ事が判った。この場合の臓器影響は、脾臓の肥大が顕著で、同一淋巴様組織である胸腺の影響は本実験では認めなかった。

EXPLANATION OF FIGURES

Plate 1. Photographs of the bursa of Fabricius from 15 days-old chick, (100×).

Fig. 1. Normal bursa Fabricii of chick as lymphatic tissue.

Fig. 2. Smaller bursa of chick in TP treatment.

