大韓獸醫學會誌(1995) 第35卷 第2號
Korean J Vet Res(1995) 35(2): 337-345

Effects on the pathogenicity and the immunogenicity of *Eimeria tenella* to the chickens treated with dexamethasone and testosterone propionate and on the relation with antibody titers for Newcastle disease virus

Hee-jeong Youn, Jae-wuk Noh*, Hwa-gyun Oh**

College of Veterinary Medicine, Seoul National University
*Bayer Veterinary Medical Research Institute, Bayer Vetchem**
*Central Research Institute, Dept of Chem Lab, Taihan Sugar Industrial Co, Ltd***

(Received Jan 12, 1995)

덱사메타손과 테스토스테론 호르몬으로 처리된 닭에서 *Eimeria tenella*의 병원성 및 면역원성과 뉴캣슬병 바이러스에 대한 항체가의 비교

윤희정 · 노재욱* · 오화균**

서울대학교 수의과대학
한국바이엘화학(주) 동물의약연구소*
대한제당(주) 중앙연구소 발효연구실**

(1995년 1월 12일 접수)

초록 : 면역억제가 닭 콕시듐증 *E tenella*의 병원성과 면역원성에 미치는 영향을 조사하기 위하여 일반 육용계 아바에이카 초생추에 1일령, 2일령과 7일령에 수당 40mg의 testosterone propionate(TES) 또는 0.1ml의 dexamethasone(DEX)을 근육내 접종한 후, 14일령에 *E tenella*의 오오시스트 100개로 면역시킨 2주 후, 역시 *E tenella*의 오오시스트 100,000개로 공격접종하여 다음과 같은 성적을 얻었다. *E tenella*에 대한 병원성과 면역원성을 관찰하기에 앞서 2주령에 Newcastle disease(ND) oil-emulsion vaccine으로 예방접종하고 ND 바이러스에 대한 혈구응집억제반응 항체가를 조사한 결과 testosterone propionate 처리군이 dexamethasone 처리군과 대조군에 비하여 높게 나타났다. 약물투여 초기 2주간의 증체량은 대조군이 264.2g인데 비하여 TES접종군은 171.9g이고 DEX접종군은 238.1g 이었다. 사료요구율은 대조군이 1.23인데 비하여, TES접종군은 1.63이고 DEX접종군은 1.32 이었다.

E tenella 면역접종 2주후 증체량은 무투약 대조군이 488.2g인데 비하여, 무투약 면역접종군은 483.9g이고 TES주사 대조군은 252.5g이고 TES주사후 면역접종군은 196.0g이며, DEX주사 대조군은 503.3g이고 DEX주사후 면역접종군은 498.9g 이었다. 사료요구율은 무투약 대조군이 2.09인데 비하여 무투약 면역접종군은 2.40이고 TES접종대조군은 2.59이고 TES주사후 면역접종군은 3.85이며, DEX주사 대조군은 2.19이고 DEX주사후 면역접종군은 2.38이었다.

E tenella 공격접종 1주후 증체량은 무투약 대조군이 393.4g인데 비하여 무투약 면역접종군은 380.6g이고 무투약 공격접종 대조군이 318.4g인데 비하여, 무투약 면역후 공격접종군은 288.6g이고, TES주사 대조군은 312.6g이고

Address reprint requests to Dr Hee-jeong Youn, College of Veterinary Medicine, Seoul National University, Suweon 441-744, Republic of Korea.

TES주사후 면역접종군은 254.0g이며, TES주사후 공격접종군은 232.5g이고 TES주사 및 면역후 공격접종군은 197.7g이며, DEX주사 대조군은 445.0g이고 DEX주사후 면역접종군은 417.3g이었다. DEX주사후 공격접종군은 293.2g이고 DEX주사 및 면역후 공격접종군은 293.3g 이었다. 사료요구율은 무투약 대조군이 2.15인데 비하여 무투약 면역접종군은 2.41이고 무투약 공격접종 대조군이 2.90인데 비하여 무투약 면역후 공격접종군은 2.93이고, TES주사 대조군은 2.69이고 TES주사후 면역접종군은 2.86이며, TES주사후 공격접종군은 3.63이고 TES주사 및 면역후 공격접종군은 3.46이며, DEX주사 대조군은 2.25이고 DEX주사후 면역접종군은 2.39이었고 DEX주사후 공격접종군은 2.89이고 DEX주사 및 면역후 공격접종군은 2.87 이었다.

E tenella 공격접종후 2주간의 증체량은 무투약 대조군이 789.1g인데 비하여 무투약 면역접종군은 722.0g이고 무투약 공격접종 대조군이 659.9g인데 비하여 무투약 면역후 공격접종군은 468.3g이고, TES주사 대조군은 652.7g이고 TES주사후 면역접종군은 545.2g이며, TES주사후 공격접종군은 399.5g이고 TES주사 및 면역후 공격접종군은 360.4g 이었다. DEX주사 대조군은 759.4g이고 DEX주사후 면역접종군은 745.1g 이었으며, DEX주사후 공격접종군은 664.1g이고 DEX주사 및 면역후 공격접종군은 577.1g 이었다. 사료요구율은 무투약 대조군이 2.27인데 비하여 무투약 면역접종군은 2.48이고 무투약 공격접종 대조군이 2.74인데 비하여 무투약 면역후 공격접종군은 3.05이고, TES주사 대조군은 2.70이고 TES주사후 면역접종군은 2.80이며, TES주사후 공격접종군은 3.46이고 TES주사 및 면역후 공격접종군은 3.43이며, DEX주사 대조군은 2.36이고 DEX주사후 면역접종군은 2.40이었고 DEX주사후 공격접종군은 2.72이고 DEX주사 및 면역후 공격접종군은 2.81 이었다.

E tenella 면역접종 1주후 각 시험군마다 맹장 병변도는 관찰할 수 없었다. *E tenella* 공격접종 1주후 각 시험군마다 맹장 병변도는 무투약 공격접종 대조군이 2.8인데 비하여 무투약 면역후 공격접종군은 2.4이고, TES주사후 공격접종군은 4.0이고 TES주사 및 면역후 공격접종군은 2.4이며, DEX주사후 공격접종군은 2.8이고 DEX주사 및 면역후 공격접종군은 2.4이었다. *E tenella* 공격접종 후 각 시험군마다 생잔율은 TES주사 후 공격접종군은 61.5%이고 TES주사 및 면역후 공격접종군은 83.3%이며, 나머지 모든 시험군에서는 맹장콕시듐에 의한 폐사는 없었다. F낭과 흉선의 크기는 TES접종군에서 다른 시험군에 비하여 매우 위축되었으며, 기능적인 변화도 보였다. 그러므로 testosterone propionate는 닭에 있어서 성장에 미치는 영향이 클 뿐만 아니라, *E tenella*에 대한 저항성을 약화시키는 데에도 크게 영향을 주는 것으로 나타났다.

Key words : *Eimeria tenella*, pathogenicity, immunogenicity, dexamethasone, testosterone propionate, Newcastle disease virus antibody titers

Introduction

Avian coccidiosis is responsible for substantial losses to the poultry industry in various countries of the world including Korea. For the control of avian coccidiosis, numerous anticoccidial drugs have been developed and used. Among the anticoccidial drugs, polyether ionophorous antibiotics have mainly been used. Although those drugs are very effective for the protection from avian coccidiosis, there has been some problems in the use of the anticoccidial drugs. One of them is the emergency of the drug resistant strains accrding to the continuous use or misuse of the drugs. Then, the development of new drugs and rotation programs in the use of the drugs were demanded. In other hand, the anticoccidial feed additives increased expenditure of poultry products the drugs or antibiotics would reside in poultry product and these residual drugs may have a harmful influence to the final consumer, the human being. Therefore, the enforcement of the regulations of the anticoccidial drugs should be strengthened gradually. For the safe and economic control of avian coccidiosis, we are concerned about the development of vaccine. Dickinson et al[6] carried out the initial study of coccidial immunity with *E tenella*, *E acervulina, E maxima, E necatrix* and *E praecox*. Rose[17] also reported about the immunity and the prospects for prophylactic im-

munization and Rose and Hesketh[18] studied the immunity to coccidiosis. Long and Millard[13], and Long et al[14] studied the immunization of young chicken in farms. The possibility of vaccination to the avian coccidiosis has been also studied by other scientists. In recent, the development of avian coccidial vaccine is accomplished by two methods; genetic engineering technology and avirulent coccidial oocysts. Danforth and Augustine carried out the method of genetic engineering technology with recombinant DNA technique by *Escherichia coli*, but this immunogen was estimated to be no-effect. The other was the use of avirulent coccidial oocysts with the precocious line and the application of γ-irradiation methodology. Many scientists studied on the precocious line to immunogen of avian coccidiosis. Youn et al[21,22] reported the effects of γ-irradiation from Cobalt-60 on pathogenicity and immunogenicity of *E tenella*.

On the other hand, to study immunogenicity on the chicken treated with chemicals or hormones to *E tenella*, many scientists applied some drugs, such as dexamethasone, cyclophosphamide, cyclosporin, testosterone propionate and so on[3,7,8,9,10,11,12,15,19,23]. Adams[1] reported the investigation with dexamethasone of the processes which have shown moderate immunity against the nematode *Haemonchus contortus* in sheep. The effect of immunosuppression with cyclophosphamide, cyclosporin or dexamethasone on *Salmonella* colonization of broiler chicker was reported by Corrier et al[5]. The effect of dexamethasone-induced immunosuppression on the development of faecal antibody and recovery from and resistance to rotavirus infection was reported by Oldham and Bridger[16]. Therefore, we thought that dexamethasone and testosterone propionate were very effective to evaluate the pathogenicity and immunogenicity of *E tenella* on chicken. So that, in this study, to evaluate the humoral and cellular immunity of chickens againnst *E tenella*, and to evaluate the immunosuppressive activity of testosterone propionate and dexamethasone to chickens, we investigated the effects of those drugs on the hemagglatination inhibition(HI) titers against Newcatsle disease, the pathogenicity and immunogenicity of *E tenella*.

Materials and Methods

Eimeria tenella : A reference stock of *E tenella* was provided from the Protozoology Laboratory of the USDA and oocysts propagated in the specific pathogen free(SPF) chickens were used in this experiment on the drug efficacy. The oocysts were preserved in 2% potassium dichromate solution to be sporulated and in a refrigerator(2-5℃) until used. It was used to investigate the drug efficacy by comparison of the survival rate, body weight gain, the weights of the bursa of Fabricius and thymus, and the lesion score. Oocysts of *E tenella* were infected two times, such as immunization(VAC) with 100 oocysts/chick at 2 weeks old and challenge(CHA) with 1×10^5 oocysts/chick at 4 weeks old.

Drug and hormone : In order to suppress the humoral or cellular immunity, 0.1ml/chick of dexamethasone(DEX) and 40mg/chick of testosterone propionate(TES) were administered at 1-, 2- and 7-day old, respectively.

Vaccination of Newcastle disease(ND) : In order to prevent the emergency by Newcastle disease and evaluate the humoral immunity to experimental chickens, all birds were vaccinated with ND oil-emulsion vaccine at 2 -weeks old.

Experimental animals : One hundred and eighty 1-day old broiler chicks(AboAcer) of the same numbers of sex were used for the experimental animals. They were reared 15 chicks per group in cage.

Experimental feed : Experimental feed is manufactured for early broiler without anticoccidial feed additives at Kun-Kuk feed manufacture company and its composition followed the commercial chicken production manual. Feed and water were administered at liberty.

Distribution of experimental groups : Experimental groups were distributed 12 groups and each group was composed with 15 chicks, such as DEX-V & C (VAC and CHA), DEX-VAC, DEX-CHA, DEX-CON, TES-V & C, CON-VAC, CON-CHA and CON-CON groups(Table 1). DEX, TES and CON is the groups treated with dexamethasone and testosterone propionate, and not-treated, respectively.

Table 1. The scheme of experimental groups

Group*	Number of chicks	DEX	TES	VAC	CHA	Items of investigation**			
						SR	BWG	LS	W of FB&Th
DEX-V&C	15	yes	non	yes	yes	yes	yes	yes	yes
DEX-VAC	15	〃	〃	〃	non	〃	〃	〃	〃
DEX-CHA	15	〃	〃	non	yes	〃	〃	〃	〃
DEX-CON	15	〃	〃	〃	non	〃	〃	〃	〃
TES-V&C	15	non	yes	yes	yes	〃	〃	〃	〃
TES-VAC	15	〃	〃	〃	non	〃	〃	〃	〃
TES-CHA	15	〃	〃	non	yes	〃	〃	〃	〃
TES-CON	15	〃	〃	〃	non	〃	〃	〃	〃
CON-V&C	15	non	non	yes	yes	〃	〃	〃	〃
CON-VAC	15	〃	〃	〃	non	〃	〃	〃	〃
CON-CHA	15	〃	〃	non	yes	〃	〃	〃	〃
CON-CON	15	〃	〃	〃	non	〃	〃	〃	〃

* : DEX; dexamethasone(0.1ml/chick at 1-, 2- and 7-days old), TES; testosterone propionate(40mg/chick at 1-, 2- and 7-days old), V&C; immunization(VAC; 100 oocysts/chick at 2 weeks old) and challenge(CHA; 1×10^5 oocysts/chick at 4 weeks old), CON; control.

**: SR; survival rate(%), BWG; body weight gains, LS; lesion score, W of FB&Th; weights of the bursa of Fabricius and the thymus.

VAC is the groups immunized with 100 oocysts/chick of *E tenella*. CHA is the groups challenged with 1×10^5 oocysts/chick of *E tenella*. Two chicks of DEX, TES and CON groups were autopsyed at 1 day- and 2 weeks old, respectively. Three chicks of each groups were autopsyed at 3 and 5 weeks old, respecively and all chicks remained were autopsyed at 6 weeks old.

Hemagglutination-inhibition(HI) titers of antibodies for Newcastle disease : HI titers were detected by the method of Beard et al[2].HI titer was estimated from 10 birds per each experimental group at 1-day 1-, 2-, 3-, 4-, 5-, 6-week old.

Degrees of the pathogenicity of experimental *Eimeria tenella* : Survival rate; The survial rate was estimated that the number of survival chickens was divided by the number of initial chickens except accidental dead chickens. Lesion score; The lesion score of each group was investigated according to the method suggested by Conway[4] at the 7th day after immunization and challenge. Body weight gain, feed conversion rate and weights of the bursa of Fabricius and thymus; The body weight gain, feed conversion rate and the weights of the bursa of Fabricius and thymus of the chicken in each group were investigated at the 1st and the 2nd week after immunization and challenge.

Statistical analysis : The results of body weight gain, the weights of the bursa of Fabricius and thymus, and lesion score were analyzed by Tukey's studentized range test.

Results

HI titers of antibodies for NDV : In Newcastle disease, the antibody titers of the group treated with TES were higher than those of the groups treated with DEX and CON group during 3 to 6 weeks (Table 2).**Survival rate** : The survival rates of TES-CHA(61.5%) and TES-V&G(83.3%) groups were lower than those of all of the other experimental groups. Those of the other groups were 100%(Table 3).

Lesion score : The lesion score of TES-CHA group(4.00) was the highest of all experimental groups. Those of DEX-CHA and CON-CHA groups were 2.80. Those of DEX-V&C and TES-V&C groups were 2.40. On the other hand, those of the other gruops were zero(Table 3).

Body witht gain : The body weight gains of TES groups were lower than those of DEX and CON groups at the 1st and the 2nd week after immunization of 100 oocysts/chicken of *E tenella*. Especially, those of TES-immunized groups were the lowest of all experimental grups. Those of TES groups were lower than those of DEX and CON groups at the 1st and the week after challenge with 1×10^5 oocysts/chicken of *E tenella*. Especially, those of TES-immunized and challenged groups(TES-V&C,

Table 2. Antibody titers against Newcastle disease to chicken treated with dexamethasone and testosterone propionate

Group	1 day	1 week	2 week	3 week	4 week	5 week	6 week
DEX		3.8±0.45	2.2±0.84	1.0^b±0.50	2.3±0.67	2.9^a±0.91	3.4^b±1.05
TES	5.4±1.10	3.4±0.55	2.8±0.45	2.0^a±0.47	2.6±0.97	3.2^a±1.15	4.5^a±0.76
CON		3.8±1.10	1.8±0.84	1.3^b±0.48	2.0±0.50	2.3^b±0.72	3.0^b±1.15

a and b values with different superscripts differ significantly($p<0.05$)

Table 3. The survival rate and the lesion score of the chicken treated with dexamethasone and testosterone propionate

Group*	Survival rate(%)	Lesion score
DEX-V&C	100	2.40^b±0.55
DEX-VAC	100	0.00^a±0.00
DEX-CHA	100	2.80^b±0.00
DEX-CON	100	0.00^a±0.00
TES-V&C	83.3	2.40^b±0.89
TES-VAC	100	0.00^a±0.00
TES-CHA	61.5	4.00^c±0.00
TES-CON	100	0.00^a±0.00
CON-V&C	100	2.40^b±0.55
CON-VAC	100	0.00^a±0.00
CON-CHA	100	2.80^b±0.45
CON-CON	100	0.00^a±0.00

*: DEX; dexamethasone(0.1ml/chicken at 1-, 2-, and 7-days old), TES; testosterone propionate(40mg/chicken at 1-, 2- and 7-days old), V&C; immunization(VAC; 100 oocysts/chicken at 2 weeks old) and challenge(CHA; 1×10^5 oocysts/chicken at 4 weeks old), CON; control.

a, b and c values with different superscripts differ significantly($p<0.05$).

Table 4. The body weight gains of the chicken treated with dexamethasone and testosterone propionate

Group*	After immunization		After challenge	
	1 week	2 week	1 week	2 week
DEX-V&C	195.3^{a} ± 20.32	507.4^{a} ± 42.12	294.9^{b} ± 95.38	577.1^{bc} ± 135.97
DEX-VAC	189.9^{a} ± 17.88	490.4^{a} ± 56.14	417.3^{ab} ± 49.43	745.1^{ab} ± 81.75
DEX-CHA	198.3^{a} ± 16.79	467.8^{a} ± 42.03	293.2^{b} ± 86.88	664.1^{bc} ± 197.02
DEX-CON	201.5^{a} ± 15.50	538.8^{a} ± 57.36	445.0^{a} ± 59.98	759.4^{ab} ± 127.05
TES-V&C	67.6^{b} ± 30.44	202.3^{bc} ± 86.25	197.7^{c} ± 97.81	360.4^{d} ± 63.84
TES-VAC	61.6^{b} ± 28.27	189.6^{c} ± 71.26	254.0^{bc} ± 92.84	545.2^{c} ± 147.93
TES-CHA	82.2^{b} ± 28.01	244.2^{bc} ± 77.53	232.5^{bc} ± 107.31	399.5^{d} ± 91.24
TES-CON	66.1^{b} ± 26.68	260.4^{b} ± 53.16	312.6^{b} ± 37.40	652.7^{bc} ± 50.71
CON-V&C	189.9^{a} ± 16.34	511.0^{a} ± 54.11	288.6^{bc} ± 59.58	468.3^{cb} ± 67.69
CON-VAC	191.9^{a} ± 18.31	456.8^{a} ± 47.21	380.6^{ab} ± 61.05	722.0^{ab} ± 128.89
CON-CHA	200.9^{a} ± 21.72	518.8^{a} ± 54.54	318.4^{b} ± 63.81	659.9^{b} ± 83.43
CON-CON	162.1^{a} ± 23.18	457.7^{a} ± 56.68	393.4^{ab} ± 71.03	789.1^{a} ± 131.01

*: DEX; dexamethasone(0.1ml/chicken at 1-, 2-, and 7-days old), TES; testosterone propionate(40mg/chicken at 1-, 2- and 7-days old), V&C; immunizaiton(VAC; 100 oocysts/chicken at 2 weeks old) and challenge(CHA; 1×10^{5} oocysts/chicken at 4 weeks old), CON; control.

a, b c and d values with different superscripts differ significantly($p<0.05$).

Table 5. Feed conversion rate of the chicken treated with dexamethasone and testosterone propionate

Group	After immunization	After challenge	
	2 week	1 week	2 week
DEX-V&C	2.38	2.87	2.81
DEX-VAC		2.39	2.40
DEX-CHA	2.19	2.89	2.72
DEX-CON		2.25	2.36
TES-V&C	3.85	3.46	3.43
TES-VAC		2.86	2.80
TES-CHA	2.59	3.63	3.46
TES-CON		2.69	2.70
CON-V&C	2.40	2.93	3.05
CON-VAC		2.41	2.48
CON-CHA	2.09	2.90	2.74
CON-CON		2.15	2.27

*: DEX; dexamethasone(0.1ml/chicken at 1-, 2- and 7-days old), TES; testosterone propionate(40mg/chicken at 1-, 2- and 7-days old), V&C; immunization(VAC; 100 oocysts/chicken at 2 weeks old) and challenge(CHA; 1×10^{5} oocysts/chicken at 4 weeks old), CON; control

Table 6. The weights of the bursa of Fabricius and the thymus in the chicken treated with dexamethasone and testosterone propionate

Group*	Fabricius bursa(g)		Thymus(g)	
	4 week	6 week	4 week	6 week
DEX	$0.868^{b}\pm0.163$	$1.828^{a}\pm0.417$	$0.218^{a}\pm0.076$	$0.573^{a}\pm0.366$
TES	$0.170^{c}\pm0.207$	$0.643^{b}\pm0.283$	$0.056^{b}\pm0.024$	$0.190^{c}\pm0.040$
CON	$1.225^{a}\pm0.087$	$1.798^{a}\pm0.395$	$0.210^{a}\pm0.034$	$0.317^{b}\pm0.081$

*: DEX; dexamethasone(0.1ml/chicken at 1-, 2- and 7-days old), TES; testosterone propionate(40mg/chicken at 1-, 2- and 7-days old), CON; control.
a, b and c values with different superscripts differ significantly($p<0.05$).

TES-VAC and TES-CHA) were lower than those of not-challenged DEX and CON groups(DEX-VAC, DEX-CON, CON-VAC and CON-CHA) at the 1st and the 2nd week after challenge(Table 4).

Feed conversion rate : The feed conversion rates of TES groups were higher than those of DEX and CON groups at the 2nd week after immunization of 100 oocysts/chicken of *E tenella*. Especially, those of TES groups were higher than those of DEX and CON groups at the 1st and the 2nd week after challenge with 1×10^{5} oocysts/chicken of *E tenella*. Especially, those of TES immunized and challenged groups(TES-V&C and TES-CHA) were the highest of all experimental groups. Also, those of challenged DEX and CON grups(DEX-V&C, DEX-CHA, CON-V&C, CON-CHA) were higher than those of not-challenged DEX and CON groups(DEX-VAC, DEX-CON, CON-VAC and CON-CON) at the 1st and the 2nd week after challenge(Table 5).

Weights of the bursa of Fabricius and the thymus : The weights of the bursa of Fabricius and the thymus in the chicken of the group treated with TES (0.170, 0.643, 0.055 and 0.190g, respectively) were lower than those of the group treated with DEX(0.868, 1.828, 0.218 and 0.573g, respectively) and CON(1.225, 1.798, 0.210 and 0.317g, respectively) groups at 4 and 6 weeks old. The bursa of Fabricius and the thymus in the chicken of TES groups were severely atrophied in the comparison of those of DEX and CON groups(Table 6).

Discussion

In general, the HI titers for ND virus was about 5.0$\log_2$ at 3 to 4 weeks after immunization with ND oil-emulsion vaccine[24]. In this experiment, the HI titers were 3.0-4.5$\log_2$ at 4 weeks after immunization with ND oil-emulsion vaccine. The HI titers of DEX and CON groups were lower than that of TES group. We anticipated that the HI titer of TES group was very low, but this result differed from our anticipation. We anticipated that the chicken treated with them was very immunosurppressd during experimental period. In the chickens treated with testosterone propionate, the bursa of Fabricius and the thymus were atrophied.

In this experiment, the resistance to the pathogen of the chicken treated with testosterone propionate were reduced, so that the survival rate of TES-CHA and TES-V&C groups were lower than those of other groups. Also, the lesion of the ceca in the chicken of TES-CHA and TES-V&C groups were severer than those of the other challenged groups. But, dexamethasone had not influence on the pathogenicity of *E tenella* to the chicken. The body weight gain of the chicken treated with testosterone propionate was lower than those of control or dexamethasone treated groups. Testosterone propionate suppressed the de-

velopment of the immune organs and reduced the body weight gain, so the body weight gain was very low. The weights of the bursa of Fabricius and thymus in the chicken treated with testosterone propionate was lower than those of control and dexamethasone-treated groups. The immunization of small number of oocysts, such as 100 oocysts/chicken, was not made an offer of resistance against *E tenella* in all experimental groups. It was the same as that the previous report of gamma-irradiated experiment[21,22]. The size of the bursa of Fabricius in the chicken of TES groups were very atrophied, but those of DEX groups were not changed. The size of the thymus in the chicken of TES groups was very atrophied. In this experiment, the inoculum of *E tenella* was very low pathogenic, so that the body weight gains of challenged groups were reduced only small amounts. Visco[20] reported that testosterone affected the weight of the bursa of Fabricius and infection of *E tenella*. Corrier et al[5], Larsson[11], Oldham and Bridger[16] reported that dexamethasone induced immunosuppression, but it was not induced in this experiment. The skin and muscle of the chicken treated with dexamethsaone were very soft.

Summary

To evaluate the pathogenicity and immunogenicity of *Eimeria tenella* to the chicken treated with dexamethasone(DEX) and testosterone propionate (TES), we administered 0.1ml/chicken of dexamethasone and 40mg/chicken of testosterone propionate at 1-, 2-, and 7-days old, respectively. We also immunized with ND oil-emulsion vaccine at 2 weeks old. After that, we immunized and challenged with 100 and 1×10^5 oocysts/chicken of *E tenella* at 2 and 4 weeks old, respectively. And then we investigated the HI titers for ND virus, survival rate, body weight gain, lesion score and the weight of the bursa of Fabricius and thymus. The titers for ND virus in the groups treated with TES were higher than those in the groups treated with DEX and CON during 3 to 6 weeks. After challenge, the survival rate of testosterone propionate treated-challenged(TES-CHA) and TES-immunized and challenged(TES-V&C) groups were 61.5 and 83.3% and those of the other groups were all 100%. At 1 week after challenge, the lesion scores of TES-CHA group(4.0) was the highest of all experimental groups. Those of DEX and control-challenged(CON-CHA) groups were 2.8, and those of all V&C groups were 2.4. During 1 and 2 weeks after immunization, the body weight gains of TES groups were severe low(61.6-82.2g and 189.6-260.4g). During 1 and 2 weeks after challenge, the body weight gains of all CHA groups were lower than those of not challenged groups. But, those of all VAC groups were not different from those of not immunized groups. At 4- and 6-weeks old, the weight of the bursa of Fabricius and thymus in the chicken of all TES groups were lower than those of all control (CON) and DEX groups. Therefore, testosterone propionate acted as immunosuppressive drug. Also, it was thought that the chicken affected a little humoral immunity to *E tenella*.

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