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EVALUATION OF DIFFERENT VACCINATION PROGRAMS FOR ND, AI AND IBD VIRUSES IN BROILER CHICKENS

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A B S T R A C T

In the present study we try to evaluate of Newcastle Disease (ND), Avian Influenza (AI) and Infectious Bursal Disease (IBD) antibody levels after different vaccination programs was conducted on broiler chickens distributed in four farms in Kaluobia governorate using Haemagglutination Inhibition test for ND and AI and ELISA test for IBD. In addition, we try to modify a vaccination program, to compare our program with the field programs. The present study it was concluded as following : 1-Using of lentogenic NDV live vaccines in day old chicks by aerosol followed by a booster dose of Clone-30 at 12 days of age in drinking water produce higher HI antibody titers than vaccination with HB1 followed by La Sota alone with 10 days interval in between. 2- Vaccination with ND inactivated vaccine proceeded or followed by vaccination with lentogenic ND vaccine produce higher HI antibody titers than uses of live vaccine alone. 3-Vaccination of AI (H5N2) killed vaccine at 11 days of age produce good HI antibody titers in maternally immune chicks. 4-Farms and experimental birds vaccinated with two doses of IBD vaccine (Intermediate and Intermediate plus strains) produce higher immune response than that received one dose of Intermediate vaccine classical strain

KEY WORDS: Vaccination, Evaluation, ND, AI, IBD.

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1- I N T R O D U C T I O N

Broiler farms in Egypt are attacked by many of viral diseases most of them became endemic disease .Newcastle disease, Avian Influenza and Infectious Bursal disease viruses cause many economic losses and deaths in broiler farms. Newcastle disease (ND) is a major constraint to village poultry production throughout the developing countries, frequency causing mortality rates of 75% to 100% in unvaccinated flocks [1].The disease causes great losses in most scavenger and commercial flocks [2].Recently, the highly infectious ND is reported to have almost reached 100% mortality in some African countries [3] . Avian Influenza become the most disaster threat to the poultry industry all over the world after the occurrence of highly pathogenic AIV (HPAI) outbreak in many parts of the world [4]. The first record of HPAI H5N1 in Africa was reported in Nigeria in early 2006 [5] and subsequently in Egypt in 17 February 2006 [6].Vaccination could be a useful tool in controlling AI outbreaks. However, a carefully conceived vaccination strategy must be accompanied by strict biosecurity measures and efficient monitoring systems. Extensive vaccination programs are currently ongoing in South East Asia and Egypt to control the H5N1HPAI epidemics [7].Vaccination does not confer complete sterilizing immunity and some vaccinated birds may continue to be infected and hence be contagious. If not monitored properly, the virus can circulate silently within a vaccinated flock [8]. Reverse genetically H5N1 Chinese strain (A/goose/ Guangdong /1/1996) and H5N2 low pathogenic killed

Mexican strain (A/ chicken/ Mexico/ 232/ 94) vaccines are widely used in Egypt. The main aim of AI vaccination is to decrease the impact of the disease on the industry and decrease virus load in susceptible avian species and environment [9]. Infectious bursal disease (IBD) causes a variable degree of immunosuppression in the affected birds. When the chickens are infected in the early age, they display a severe and prolonged immunosuppression, compromising both humoral and cellular response of chickens [10].IBD, Chicken Infectious Anemia (CIA) and Marek's disease (MD) are major infectious diseases that increase susceptibility to viral, bacterial, and parasitic diseases and interfere with acquired vaccinal immunity [11]. Different modified live vaccines (MLVs) have been developed and classified as "mild", "intermediate", "intermediate plus" IBD vaccines, depending upon their ability to break through maternally derived antibodies (MDA) that can neutralize the vaccine virus. MLVs sometimes are not completely efficacious against very virulent IBDV, when they are applied in presence of significant MDA titres [12] and the vaccinated chicks should have a booster dose in next 2 weeks to get the optimum antibody protection against IBD infection, on the other hand the intermediate-plus or hot vaccines are suitable for the high MDA chickens [13]. Therefore, the aim of this study was to obtain insight into evaluation of humoral immune response to three common diseases ND, AI and IBD in broiler chicken farms applied different vaccination programs with a trial to assess a modified vaccination programs.

2. MATERIAL AND METHODS:

2.1. Chickens and chicks:

Hubbard strain chickens distributed in four farms (designated as A,B,C and D) at Kaluobia governorate each of them using different vaccination programme and also, atotal of 60 Cobb strain chicks were experimentally used to assess a modified vaccination programme.

2.2. Commercial vaccines:

Commercial vaccines used in the study are mentioned at table (A).

2.3. Vaccination programmes:

Vaccination programmes of farms A, B, C, D and experimental chicks were summarized in tables 1-6 which includes also the serological results.

2.4. Sampling:

Step 1: thirty blood samples were collected randomly from each farm by puncture of the wing vein or jugular vein at ages 15, 21, 28 and 35 days. Step 2: Blood samples were also collected randomly at ages 17, 21, 24, 27, 30, 37 and 43 days from group 1 and group 2. The number of samples in-group 1 (control birds) is 5 samples in every age, and 7 samples in group 2 (vaccinated birds) at every age this means 35 samples from group 1 and 49 blood samples from group 2 (72 samples were collected at step 2 from group 1 and group 2). Sera are separated and stored at -20 °C until examined.

2.5. Viruses and antisera:

- La Sota strain of NDV with a titer of $10^{6.5}$ EID_{50}) was supplied from Abbassia Laboratories in Egypt.
- Specific monoclonal antiserum against Avian Influenza subtypes H5N2 was produced in Boringer's Lab.

2.6. HA and HI tests:

This technique is done according to OIE [14]. It was used for evaluation of humoral immune response for ND and AI.

2.7.ELISA test for evaluation of IBD :

IBDV commercial ELISA kits (Synbiotics Laboratories, USA) were used according to the manufacturer's instruction to evaluate humoral immune response against IBDV in collected sera.

2.8. Statistical analysis:

Data were analyzed by one way ANOVA. Means with different alphabetical superscripts in the same row are significantly different at $P \leq 0.05$**.**

3. RESULTS:

Experimental birds (group 2) get better NDV-HI Gm antibody titers at 18 days of age (4.20) than farms (A, B, C & D) at 15 days of age (2.50, 1.50, 1.17 and 1.33) respectively as mentioned in Tables (1-6) .
AI-HI Gm of experimentally vaccinated birds showed higher titers than farm D and other farms B&C (8.43, 6.00, 4.67 and 6.00), but farm A (AI non vaccinated) which showed significant decrease in AI-HI antibody titers (2.50± .224 at 15 days and 1.83± .401 at 35 days of age). IBD- ELISA Gm for the chickens at 35 days of farms A, B, C and D was 3153.67, 1092.17, 1229.00 and 2123.00 respectively and was 4300 for group 2 at 37 and 43 days. Control group showed 0.00 ND-HI, AI-HI and IBD-ELISA titers at 43 days.

4. DISCUSSION:

The geometric mean of ND HI antibody titers for farm A were decreased with increase of age although the birds were vaccinated with NDV vaccines Decreased antibodies at 15 days of age may be due to neutralization of vaccinal virus with maternal antibodies as mentioned by [15], but the continuous decrease of antibodies after vaccination at 18, 28 days in drinking water may be as mentioned by occurred due to inappropriate administration and miss handling of vaccine, improper vaccination program and failure to follow the manufacture's recommendation [16] and may be due to the short interval between the vaccination time in which the antibodies produced by the first dose of vaccine is more likely interfere with the multiplication of the second dose of the virus, therefore, there is little to be gained by reducing the interval between vaccinations [17].

Concerning farm B, C and D (tables 2,3 and 4) we noticed a significant increase in NDV-HI antibody titers at 15, 21 and 28 days of age this may be due to short time between repeated vaccinations,but we noticed a significant increase of HI antibody titers in farm B ,C and D at 35 days of age compared with that at 21 days of age in contrast to farm A showed a significant decrease in ND-HI antibody titers at 35 days of age this may be due to vaccination with ND inactivated vaccine followed by live lentogenic vaccines at farms B, C and D but not in case of farm A, this result is agreed with [18] who confirmed that the concurrent administration of oil emulsion and live NDV vaccines induced the best antibody response,but there was no significant difference in protection with those vaccinated either with live or killed vaccine alone. Because of the programme of farm D showed better immune response than other farms we apply this programme with slight modification in our experimental birds (table 6).
Comparing our experimental results with other farms we noticed that vaccination with NDV Clone-30 vaccine give better results than vaccination with La Sota strain vaccine at 27 and 37 days of age, which quite similar to results of farm D at 28 and 35 days of age, but differs with HI titer of other farms A, B and C (tables 1, 2 & 3). Our result agreed with [19] who concluded that Avinew and Clone-30 vaccines were better than La Sota vaccine regarding vaccine reactions. Our result was disagree with [20] those concluded, La Sota strain produce higher immune response than Clone-30 and B1 strains.
The aerosol vaccination of one-day old chick in our experimental program get better HI Gm antibody titers at 18 days of age than other farms at 15 days of age. Higher HI antibodies due to aerosol method was detected by Mousa [21]. In general, [22]who stated that the efficacy of immunization is closely related to the type of vaccine used as well as to the intervals between and route of vaccination.

Table (A) Commercial vaccines used in the study

Vaccine	Components	Company	Farm
BAL- ND+IB®(L)	NDV(HB1)-IB(Mass. strain)	Bestar Lab. ,Singapore	A,D&G(2)
CEVAC BIL ®(L)	NDV(HB1)-IB(Mass. strain)	CEVA Phylaxia, Hungry	B
BIOVAC ND-IB®(L)	HB1(ND)+Mass.(IB) strains	Farto SPA , Italy	C
LIOPEST®(L)	ND (La Sota strain)	Iven Lab. ,Spain	A & B
CEVAC®VITAPEST(L)	ND (PHY.LMV.42 strain)	CEVA Phylaxia in Hungry	B & C
AVINEW®(L)	NDV(VG/GA Strain)	Merial, lab. , France	C
BAL ND Clone®(L)	NDV(Clone-30 strain)	Bestar Lab. , Singapore	D& G(2)
Izovac La Sota®(L)	NDV (La Sota strain)	IZO S.P.A, Italy	D& G(2)
CEVAC® IBD (L)	IBDV(Intermediate plus 2512 strain & IBD Antibodies)	CEVA Phylaxia in Hungry	A
Bursa Vac*3®(L)	IBDV (Intermediate classical strain)	Intervet,Schering ,USA	A,B&G(2)
HIPRA-GUMBORO-CH/80®(L)	IBDV(Intermediate strain) cloned live vaccine	Hipra , Spain.	C
BAL-IBD®(L)	IBDV(intermediateD-78 strain)	Bestar Lab. ,Singapore	D
AVIPRO®201ND-IB(K)	NDV(HB1)-IB(Mass. strain)	Lohman animal health, USA	B & C
CEVAC®New Flukem(K)	AI (H5N2)and ND(La Sota) Sota)	CEVA Salud Animal, Mexico	B
VOLVAC®	AI (H5N2)and ND(La Sota)	Boehringer Ingelheim Vetmedica,Mexico	C,D&G(2)

L=live vaccine K=killed vaccine G(2)= group(2)

Table (1) Results of antibody titers of HI & ELISA tests for farm A

Age of bird and type of vaccine		Age of sampling	Titer(±S.E)		
Age (day)	Type and route of vaccine		HI of ND (log2)	HI of AI (log2)	ELISA of IBD
8	BAL-ND+IB® (D.W)	15 day	2.50±.224^{b}	3.00±.258^{b}	895.5±.07773^{c}
15	CEVAC IBDL® (E.D)	21 day	1.50±.224^{b}	0.67±.211^{b}	700.00±.06346^{c}
18	LIOPEST® (D.W)				
24	Bursa-Vac.3® (D.W)	28 day	1.33±.221^{ab}	0.50±.224^{b}	2141±.06731^{b}
28	Liopest® (D.W)	35 day	1.83±.401^{a}	0.17±.167^{a}	3153.67±.05017^{a}

D.W = Drinking water E.D = Eye drops,

Data were analyzed by one-way ANOVA. Means with different alphabetical superscripts in the same row are significantly different at $P \leq 0.05$

Table (2) Results of antibody titers of HI & ELISA tests for farm B

Age of bird and type of vaccine		Age of sampling	Titer±S.E		
Age (day)	Type and route of vaccine		HI of NDV (log2)	HI of AI (log2)	ELISA of IBD
6	Avipro®201ND+IB (S/C*)				
7	CEVAC BIL® (D.W)	15 days	1.50±.224 ^{c}	6.67±.494^{b}	889.17±77.126^{b}
9	CEVAC® NEWFLUKEM (S/C*)	21 days	1.33±.221^{bc}	6.00±.632^{ab}	0.00±.000^{c}
12	BURSA-VAC3® (D.W)				
17	CEVAC®VITAPESTL® (D.W)	28 days	2.33±.422^{ab}	5.83±.401^{ab}	0.00±.000^{c}
24	LIOPEST® (D.W)	35 days	2.50±.224^{a}	4.67±.422^{a}	1092.17±76.261^{a}

D.W = Drinking water *= .5 ml / bird S/C=Subcutaneous injection
Data were analyzed by one-way ANOVA
Means with different alphabetical superscripts in the same row are significantly different at $P \leq 0.05$

Table (3) Results of antibody titers of HI & ELISA tests for farm C

Age of bird and type of vaccine		Age of sampling	Titer±S.E		
Age (day)	Type and route of vaccine		HIof NDV (log 2)	HI of AI (log 2)	ELISA of IBD
6	VOLVAC® (S/C*)				
7	Bio-Vac ND-IB® (D.W)	15 day	1.17±.307^{b}	2.33±.211^{c}	3454.17±.243.904^{a}
9	Avipro® 201 ND-IB (S/C*)				
15	HIPRA GUMBORO-CH/80® (D.W)	21 day	1.33±.211^{b}	4.83±.167^{b}	2456.00±253.061 ^{b}
17	BAL-ND Clone® (D.W)	28 day	1.33±.211^{b}	6.33±.211^{a}	1068.00±32.704^{c}
25	VITAPEST L® (D.W)	35 day	2.33±.422^{a}	6.00±.365^{a}	1229.00±20.672^{c}
30	AVINEW®(D.W)				

D.W = Drinking water *= .5 ml / bird S/C=Subcutaneous injection, S.E=Standard Error
Data were analyzed by one-way ANOVA
Means with different alphabetical superscripts in the same row are significantly different at $P \leq 0.05$

Table (4) Results of antibody titers of HI & ELISA tests for farm D

Age of bird and type of vaccine		Age of sampling	Titer±S.E		
Age (day)	Type and route of vaccine		HIof NDV (log2)	HI of AI (log2)	ELISA of IBD
1	BAL-ND +IB® (S)	15 day	1.33±.211[b]	7.5±.428[a]	925.00±.12889[c]
11	VOLVAC®(S/C*)	21 day	2.00±.365[b]	6.33±.422[a]	1500.00±.12693[b]
12	BAL-IBD® and BAL-ND Clone® (D.W)	28 day	3.33±.333[a]	6.00±.516[a]	1893.00±.15545[a]
20	BAL-ND Clone® (D.W)				
28	IZO VAC La Sota® (S)	35 day	3.50±.428[a]	6.00±.632[a]	2123.00±.19039[a]

D.W = Drinking water S= Spray *= .5 ml / bird S/C=Subcutaneous injection
E.D = Eye drops S.E=Standard Error Data were analyzed by one-way ANOVA
Means with different alphabetical superscripts in the same row are significantly different at $P \leq 0.05$

Table (5) Vaccination program of group 2

Age (day)	Type of vaccine	Route of administration
1	BAL-ND +IB®	A
11	VOLVAC®	S/C*
12	BAL-ND Clone®	D.W
15	CEVAC IBDL®	E.D
20	BAL-ND Clone®	D.W
24	Bursa-Vac.3®	D.W
28	IZO VAC La Sota®	S

D.W = Drinking water *= .5 ml / bird A = Aerosol E.D = Eye drops
S/C=Subcutaneous injection S.E=Standard Error

Table (6) Results of ELISA and HI tests for Group 2 (vaccinated experimental birds and group 1 (control experimental birds) (Antibody titre against IBD, ND and AI).

Titer ±S.E	HI for NDV(Log2)		HI for AIV(Log2)		ELISA for IBD	
Age (day)	Group(1)	Group (2)	Group (1)	Group (2)	Group(1)	Group (2)
17	1.20±.49^{d}	1.57±.812^{cd}	4.20±1.241^{b}	1.00±.378^{d}	4420±124.727^{a}	2420±80.734^{e}
21	0.00±.00^{d}	0.00±.000^{d}	1.60±.400^{d}	3.71±1.107^{bc}	3800±71.999^{b}	3400±90.450^{c}
24	0.00±.00^{d}	0.71±.286^{d}	0.60±.400^{d}	6.86± .634^{a}	2400±118.060^{e}	2810±68.450^{d}
27	0.00±.00^{d}	3.57±1.152^{abc}	0.80±.374^{d}	7.29±.606^{a}	1200±66.015^{f}	3455±100.38^{c}
30	0.00±.00^{d}	2.00±.845^{bc}	0.20±.204^{d}	8.43± .481^{a}	900±18.807^{g}	4500±107.88^{a}
37	0.00±.00^{d}	4.43±1.043^{a}	0.60±.600^{d}	8.71± .474^{a}	0.00±.000 ^{h}	4300±117.62^{a}
43	0.00±.00^{d}	4.00±.690^{ab}	0.00±.000^{d}	8.43± .297^{a}	0.00±.000 ^{h}	4300±117.62^{a}

D.W=Drinking water *=.5 ml/bird A=Aerosol S/C=Subcutaneous injection S.E=Standard Error. Data were analyzed by one-way ANOVA. Means with different alphabetical superscripts in the same row are significantly different at $P \leq 0.05$

According to the results of AI-HI antibody titers for farms A, B, C and D (tables 1, 2, 3 & 4) we noticed that in farm A the maternal antibodies were decreased gradually 1.83±.401 at 35 days of age which may expose the flock to infection with AI during the period of rearing. Decline of MDA to marginal levels by 2 to 3 week of age was observed by [23]. Other farms B, C and D programmes included vaccination with AIV killed H5N2 vaccine combined with ND La Sota at ages of 9 or 6 or 11 days of age in farm B, C and D respectively (farm B showed significant decrease in titers of AI-HI antibodies at 15 days of age (6.67±.494) comparing to titer at 35 days of age (4.67±.422) farm B was infected with IBDV at 28 days of age which explain the significant decrease of AI-HI antibodies at 35 days of age than 15 days of age also we noticed that maternal antibodies of IBDV were decreased to zero although chickens were vaccinated with IBDV intermediate vaccine strain at 12 days of age. This infection may be due to uses one vaccination only without booster vaccine which neutralize the maternal derived antibodies titers [24], or may be due to failure of vaccine application as confirmed with [16].The significant increase in ELISA titer at 35 days of age in farm B confirm infection with IBDV. AI-HI antibody titers in farm C,D and our modified program were ranged from 6.00 , 6.00 and 8.43 respectively at 35 days of age , these titers were protective for birds as mentioned by [25] whom supposed that HI antibody titers of 4 log 2 or higher of vaccinated chickens were completely protective from virus challenge. Also [26] and [27] found that vaccination with AIV H5N2+ND vaccines were more preferable for broiler flocks in Egypt than the homologous H5N1 vaccines. Concerning the age of AIV vaccination we noticed that farm C ,D and our experiment (group 2) vaccinated with AIV H5N2+ND La Sota killed vaccine at ages 6, 11 and 11 days of age respectively, we noticed that although farm D and our experiment were vaccinated at the same age (11 days) but the GM of HI of experimentally vaccinated chickens showed higher titers than farm D

and other farms B and C 8.43, 6.00, 4.67 and 6.00 respectively, this may be due to better vaccination practices or because of better health management of the experimentally raised birds as mentioned before [28]. The suitable age for vaccination for AIV vaccine is controversy, some authors found that vaccination at one day of age is better than other ages [27] who recorded that birds at 42 days vaccinated at one day old of age had a significant high titer values than birds vaccinated at 7 days of age for all vaccination types except for the Egyptian vaccine that has a vas versa effect. While [26] reported that the vaccination of the chicks at seven days-old showed higher GM HI titer and protection percentage than vaccination at one day-old. Also Sabry et al., [29] concluded that the vaccination of broilers with H5 AI vaccines at a later age (15 days-old)seems to be valuable recommendation.

The results of IBD for farms A, B, C and D were mentioned at tables (1, 2, 3 and 4).

The ELISA titer for the chickens of farm A which vaccinated with intermediate plus strain at 15 days as eye drops then revaccinated with live intermediate classic strain vaccine at 24 days in drinking water was decreased to reach 700 at 21 days suggested that neutralization of the antibodies from maternal immunity with those obtained from the vaccine ,this finding is similar to that obtained by [30] who mentioned that MDA is known to neutralize IBDV ,then antibody titer increased to reach 2141 at 28 days and continue in increasing to reach 3153.67 at 35 days and this increase is due to the second vaccination with intermediate classic strain ,also, [24] whom reported that birds vaccinated at 14 days old produce primary immune response somewhat higher than those vaccinated at 7 days but after booster dose at 21 days , the secondary immune response is good and the titer become increased.

The chickens of farm B were vaccinated with intermediate classic strain at 12 days in drinking water as mentioned at table (2) and the GM of ELISA antibody titre to IBDV was 889.17 which is considered maternal immunity then decreased to reach zero at 21 days and 28 days then increased to reach 1092.17 at 35 days and this was because this farm was infected with IBDV when it was about 28 days, and this agree with [31]who challenged chicken at 5-week old with low ELISA S/p ratio (0.182) and after challenge with IBDV S/p ratio increased to reach 0.799 ,so the ELISA titer of IBD increased after IBDV infection.

The chickens of farm C were vaccinated with intermediate vaccine (cloned live vaccine) at 15 days and GM of ELISA antibody titre to IBD at table (3) was 3454.17 at 15 days, which is considered high maternal immunity. Then it decreased to reach 2456.00 at 21 days and continue until reach 1068.00 at 28 days then increased to 1229.00 at 35 days. It indicated that vaccine failed to stimulate immune system because maternal antibody react with live vaccine virus and become neutralized or interference of maternally derived antibody [32].

The chickens of farm D were vaccinated with Cloned intermediate vaccine (lyophilized live vaccine D-78 strain) at 12-days in drinking water (table 4) and GM of ELISA antibody titre to IBDV was 925.00 at 15 days then increased to reach 1500.00 at 21 days and showed significant increase to reach 1893.00 at 28 days and 2123.00 at 35 days, this results was also recorded by [33] who found marked differences in titre of antibody produced against IBD by different vaccines. Similar results were obtained by [34] who found that intermediate strain vaccine was found to be unable to neutralize high levels of MDA in chickens and failed to induce IBD antibodies. In our modified program where chicks vaccinated with Intermediate plus strain at 15 days as eye drops, then revaccinated with live intermediate classic strain vaccine at 24 days in drinking water as in table (5) the GM of ELISA antibody titre to IBD (table 6) was 2420 at 18 days. This titre was lower than non-vaccinated

group at the same age due to neutralization of the antibodies from maternal immunity with those obtained from the vaccine and this finding was similar to that obtained by [30] who mentioned that MDA is known to neutralize IBDV , then increased to reach 3400 at 21 days and this increase in titer was due to replication live virus vaccine , this is mentioned by [35] that the birds vaccinated with live vaccine established a reservoir of vaccine virus within the flock after the MDA decay which allows lateral transmission. The titre decreased to reach 2810 at 24 days, and then the titre increased to reach 3455 at 27 days and giving significant increase to reach 4500 at 30 days. This increase was due to booster vaccination with intermediate vaccine at 24 days. This result agree with Alam et al., [24] who mentioned that chicks vaccinated at 14 days old produced primary immune response higher than those vaccinated at 7 days. On the other hand, after booster dose at 21 days, the secondary immune response is good and the titer become increased at 37 and 43 days of age. The IBDV titers reached 4300, which considered as non-significant decrease.

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مجلة بنها للعلوم الطبية البيطرية
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تقييم برامج تحصين مختلفة لأمراض النيوكاسل وأنفلونزا الطيور ومرض التهاب غدة كيس فابريشي فى بداري التسمين

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الملخص العربي

أجرى تقييم الأجسام المناعية لأمراض النيوكاسل وأنفلونزا الطيور ومرض التهاب غدة كيس فابريشي بعد إتباع أربعة برامج تحصين مختلفة فى أربع مزارع بدارى التسمين بداية من اليوم الأول من العمر موزعة فى محافظة القليوبية وذلك باستخدام اختباري المثبط للتلازن الدموي لمرض النيوكاسل وأنفلونزا الطيور وباستخدام اختبار الإليزا لقياس الاجسام المناعية لمرض التهاب غدة كيس فابريشي. ومن جهة أخرى تم تطوير أحد برامج التحصين بتطبيقه إختباريا.لمقارنة برنامجنا مع البرامج الحقلية. نستخلص من النتائج ما يلي:

1- التحصين ضد مرض النيوكاسل فى اليوم الأول من العمر بلقاح هتشنرب1 عن طريق الرش متبوعاً بجرعه لاحقه بلقاح كولون 30 فى مياه الشرب عند 12 يوم من العمر أعطى نتائج أفضل فى قياس الاجسام المناعية المثبطة للتلازن الدموي من التحصين باستخدام لقاح هتشنرب1 يتبعه لقاح لاسوتا بعد 10 أيام.

2- التحصين بلقاح النيوكاسل الميت مسبوقاً أو متبوعاً باللقاح الحي الضعيف أعطى نتيجة أفضل فى قياس الاجسام المناعية المثبطة للتلازن الدموي من التحصين بلقاحات النيوكاسل الحية الضعيفة بمفردها.

3- التحصين باللقاح الميت لأنفلونزا الطيور (H5N2) عند عمر 11 يوم أعطى نتيجه جيده فى الكتاكيت ذات المناعة الأمية.

4- المزارع والطيور التجريبية المحصنة بجرعتين من لقاح مرض التهاب غدة كيس فابريشي بالعترة المتوسطة والعترة المتوسطة الموجبة أعطى استجابة مناعية أعلى من الطيور التي تم تحصينها مره واحدة باستخدام العترة المتوسطة بمفردها مما يعرض الطيور للإصابه بالمرض كما حدث فى حالة مزرعة ب.

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