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EVALUATION OF ADDING DIFFERENT CONSENTRATIONS FROM CO-ENZYME Q10 ON IMMUNIZATION WITH CLASSICAL AND RECOMBINANT VACCINE AGAINST INFECTIOUS BURSAL DISEASE IN BROILERS

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ABSTRACT

This study was aimed to detect the effect of co-enzyme Q10 against infectious bursal disease vaccinated with different programs (recombinant HVT-IBD single dose at one day old, classical vaccines D78 at eight days old, and E228 at 16 days old) through the evaluation of levels of interferon-gamma (INF-γ) and tumor necrosis factor-alpha (TNF-α) in serum. Two hundred and ten broilers were divided into seven groups, with 30 chicks in each group. T1, feed Q10 (20 mg/kg diet) and vaccinated by (D78, E288); T2: feed Q10 (20 mg/kg diet) and vaccinated by (rHVT); T3: feed Q10 (40 mg/kg diet) and vaccinated by (D78, E288); T4; feed Q10 (40 mg/kg) and vaccinated by (rHVT): T5; vaccinated (D78, E288) only: T6; vaccinated (rHVT) only: T7; negative control. The results of the titers of interferon-gamma (INF-γ) on day 15 showed that T6 and T5 were significantly (P≤0.05) higher compared with other groups. In contrast, on days 25 and 33, they showed a decline throughout the experiment. At the same time, tumor necrosis factor-alpha (TNF-α) results indicated that T1 and T7 recorded a lower level than other groups at day 11. In comparison, on days 19 and 25, T1, T2, and T7 had the lowest titers among the different groups. In conclusion, the co-enzyme Q10 (40 mg/kg feed) enhances immunity function by modulating the immune response, especially (INF-γ), and decreasing pro-inflammatory markers (TNF-α).

Keyword: vaccines of Gumboro, immune response, broilers
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INTRODUCTION

Broiler hens are susceptible to infectious bursal disease (IBD) or Gumboro disease. The illness is both highly contagious and immunosuppressive. A new genetic variation of the virus has emerged, and the world's chicken industry has suffered heavy financial losses (,Adino *et al* 2022)The disease is very infectious and spreads quickly; IBD is caused by the IBD virus (IBDV). The characteristic signs are lesions in the fabric of the bursa (FB) and atrophy of the FB; immunosuppression occurs in birds aged three weeks to 3 months (Jumaa *et al*,2020, Orakpoghenor *et al*,2020 , Ulaiwi,2015). As IBDV is contagious, the virus is transmissible in many ways, and the standard way is by contact with ill birds or even with infected fomites (Zhang *et al*,2022). Decisive biosecurity measures may limit the spread of the illness (Dey *et al*,2019, Eterradossi &Saif. 2013, Kajal *et al*,2023). Bursal Disease Virus (IBDV) may be efficiently prevented and managed with attenuated live vaccines, provided they are delivered at the committed intervals. However, most of these live vaccinations may cause the bursa of Fabricius to atrophy during replication, which can cause moderate to severe lesions due to a brief drop in lymphocytes. The possibility that maternally derived antibodies (MDAs) could neutralize the vaccines (Kassab & Muhannad. 2006,

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Olesen *et al*,2018, Tsukamoto *et al*,2995, Van den & Meulemans.1991). While MDAs interfere with virus reproduction during immunization, the vaccinated broilers may not be defended from virulent or very virulent IBDV (vvIBDV) strains on the farm. To solve this problem, immunization consisting of strains at different attenuation levels has been enveloped and highly used according to broad MDA levels in different poultry fields. Although these boosters control Gumboro infection, another concern was the possible risk of infection by other pathogens because of the moderate to severe lesions that come with bursa atrophy. Recombinant turkey herpesvirus (rHVT) vaccines are a potential alternative to weakened live IBDV vaccinations. The rHVT-IBD vaccine was born from introducing the VP2 protein from IBDV into the HVT genome. (Bublot *et al*,2007, Prandini, 2009). The VP2 protein from rHVT triggers an antibody response that neutralizes IBDV (Lemiere *et al*,2011). Unlike attenuated IBDV live vaccines, the rHVT-IBD immunization does not damage the bursa, making it a safer alternative; the likelihood that IBDV maternal antibodies will have any effect on this vaccination virus is also low. rHVT-IBD may, therefore, resolve the efficacy and safety issues linked to IBDV vaccinations (Camilotti *et al*,2016, Gelb Jr *et al*,2016, Reddy *et al*,2024, Sedeik *et al*,2019). Coenzyme Q10, or ubiquinone, is a vitamin-like substance mainly found in mitochondria and a lipid-soluble molecule. In contrast, it has a significant role in producing adenosine triphosphate ATP, where it acts as an electron carrier in the electron transport chain (ETC). (Abdulidha et al,2020, Lenaz *et al* ,2007, Littarru *et al*,2017, Rauchova et al,1995). Coenzyme Q10 (CoQ10) is an exceptional fat-soluble antioxidant that may significantly reduce the damage from oxidative stress by scavenging free radicals (Littarru &Tiano,2007, Masoumi *et al* ,2021, Noh *et al*,2013). Not only does coenzyme Q10 directly neutralize free radicals, but it can also protect antioxidants like vitamin C (ascorbate) and vitamin E (a-tocopherol) (Gvozdjáková *et al*,2015). Coenzyme Q10 is crucial for mitochondrial immune system maintenance and acts as an immune modulator and non-specific stimulant of the host immunological defense system (El Basuini *et al*,2020). in addition to preventing tumor growth and lowering blood levels of tumor necrosis factor-α (TNF-α) and interleukin-6, taking a CoQ10 supplement enhances the immune response to different viruses (31). Immunological suppression associated with aging and chronic diseases may be curable with CoQ10 treatment and a significant increase in serum immunoglobulin G (IgG) levels (Bliznakov,1978, Kalantar et al,2019). The objective of the present study was to investigate the effect of the dietary supplement Coenzyme Q10 as an antioxidant, body performance, and immunomodulatory on different vaccine programs against infectious Bursal disease.

MATERIALS AND METHODS

Ethical approval: The study was done under decree of the College of Veterinary Medicine of Baghdad's animal ethics committee. The Veterinary Medicine College Scientific Committee of the University of Baghdad's Department of Pathology and Poultry Disease reviewed and approved the study's protocol.

Experimental design: Two hundred ten (210) one-day old broiler chicks (Ross-308) multi sexes brought under the optimum condition with feed (ad libitum) and lighting program (24hr) period five weeks (35 days old) in the animal house of the college of veterinary medicine - university of Baghdad. The chickens divide into six random groups as follows :

T1: Thirty chicks supplement with (CoQ10) (UK®) 20mg/kg diet in all periods with Classical vaccinal program (D78 at 8th days old & E 228 at 16th days old / drinking water) (MSD, US) with measurement of cellular (IFNγ) immune response and pro-inflammatory response (TNF-α) by ELISA Kit (5 serum samples) at (15th, 25th, and 33rd days old) and (11th, 19th, and 25th days old), respectively (Ulaiwi, 2015).

T2: Thirty chicks supplement with (CoQ10) (UK®) 20mg/kg diet in all periods with Recombinant vaccinal program (Poulvac®

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Procerta® HVT-IBD at 1st days old single dose s/c in.) (MSD –USAwith measurement of cellular (IFNγ) immune response and pro-inflammatory response (TNF-α) by ELISA Kit (5 serum samples) at (15th, 25th, and 33rd days old) and (11th, 19th, and 25th days old), respectively.

T3: Thirty chicks supplement with (CoQ10) (UK®) 40mg/kg diet in all periods with Classical vaccinal program (D78 at 8th days old & E 228 at 16th days old / drinking water) (MSD, US) with measurement of cellular (IFNγ) immune response and pro-inflammatory response (TNF-α) by ELISA Kit (5 serum samples) at (15th, 25th, and 33rd days old) and (11th, 19th, and 25th days old), respectively.

T4: Thirty chicks supplement with (CoQ10) (UK®) 40mg/kg diet in all periods with Recombinant vaccinal program (Poulvac® Procerta® HVT-IBD at 1st days old single dose s/c in.) (MSD-USA) with measurement of cellular (IFNγ) immune response and pro-inflammatory response (TNF-α) by ELISA Kit (5 serum samples) at (15th, 25th, and 33rd days old) and (11th, 19th, and 25th days old), respectively.

T5: Thirty chicks without supplements were given a classical vaccination program (D78 at 8th days old & E 228 at 16th days old / drinking water) (MSD, US) with measurement of cellular (IFNγ) immune response and pro-inflammatory response (TNF-α) by ELISA Kit (5 serum samples) at (15th, 25th, and 33rd days old) and (11th, 19th, and 25th days old), respectively.

T6: Thirty chicks with no supplement given Recombinant vaccinal program (Poulvac® Procerta® HVT-IBD at 1st days old single dose s/c in.) (MSD-USA) with measurement of cellular (IFNγ) immune response and pro-inflammatory response (TNF-α) by ELISA Kit (5 serum samples) at (15th, 25th, and 33rd days old) and (11th, 19th, and 25th days old), respectively.

T7: Thirty chicks with no supplement or vaccination (control negative) with measurement of cellular (IFNγ) immune response and pro-inflammatory response (TNF-α) by ELISA Kit (5 serum samples) at (15th, 25th, and 33rd days old) and (11th, 19th, and 25th days old), respectively.

Statistical analysis

The Statistical Analysis System (SAS, 2018) program was used to detect the effect of different factors on study parameters. The least significant difference (LSD) was used to compare the means (ANOVA/Two-way and ANOVA/One-way) significantly in this study (Cary, 2012).

RESULTS AND DISCUSSION

Determination of interferon-gamma (INF-γ) level in serum: The titers of Interferon-gamma showed that on the day (15) the levels in T6, T4, and T5 were the highest (18.212, 17.183, and 16.014), respectively, followed by T3, T1, and T2 (13.457, 12.556 and 11.382), While T7 recorded the smaller percentage (9.223) with statically high significance (P≤0.05) . On day 25, The results were the same as on day (15) with not a big difference; T6 and T5 (17.542, 15.551), respectively, were higher than T4, T3, and T 1 (12.989, 12.499, and 10.045) with statically high significant (P≤0.05), whereas T2 and T7 recorded the lowest percentage (9.432 and 9.008).On the other hand, day ,T5 and T6 remained at high levels all over the period (16.991 and 15.814), followed by T4, T2, T3, T1 (9.002, 8.938, 8.782, and 7.313) respectively. At the same time, T7 was lower than other groups (5.619) with statically high significance (P≤0.05) as in Table (1): These results were accepted by Slah and other researchers, who proved that Q10 has anti-inflammatory properties by reducing the production of cytokines promoting inflammation, such as Interleukin in T4, T3, T2, and T1 (Saleh *et al*,2017). Additionally, the supplementation with Q10 was determined to be an inflammatory cytokine (18). On the other hand, vaccinated broiler with Recombinant vaccine (HTV- IBD) and classical vaccine (D78 and E228), especially in groups T6 and T5 that had not been treated with co-enzyme Q10, could see that titers were higher than other groups on the same time. This result has been accepted by other researchers who explain that The cell-mediated immune responses partially IFN-γ induction against IBDV with a peak during

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three weeks post-vaccination were observed in broilers vaccinated with both attenuated live vaccines and rHVT-IBD via the subcutaneous and intraocular route (Ingrao *et al*,2017, Jakka *et al*,2014).

Table 1. Effect of groups and period in Result of INF-γ

Groups	Mean ±SE of INF-γ (ng/L)		
	15 days	25 days	33 days
T1	12.556 ±0.74 C a	10.045 ±0.62 C ab	7.313 ±0.32 BC b
T2	11.382 ±0.57 CD a	9.432 ±0.45 C a	8.938 ±0.45 BC
T3	13.457 ±0.75 BC a	12.499 ±0.71 BC ab	8.782 ±0.52 BC b
T4	17.183 ±0.92 A a	12.989 ±0.66 BC b	9.002 ±0.58 B c
T5	16.014 ±0.87 A a	15.551 ±0.80 AB a	15.814 ±0.75 A a
T6	18.121 ±0.90 A a	17.542 ±0.87 A a	16.991 ±0.91 A a
T7	9.223 ±0.67 D	9.008 ±0.75 D	5.619 ±0.56 C
LSD: 3.877 *			

Means having with the different big letters in same column and small letters in same row differed significantly. * (P≤0.05).

Determination of TNF alpha level in serum: Table 2 shows that all groups at (11, 19, and 25) days old recorded highly significant differences at the level (P≤ 0.05) of TNF-α titer in serum against Infectious bursal disease Eliza Results of TNF-α at 11 days showed that T6 and T5 (31.538 and 29.104) respectively and followed by T4, T3 and T2 (28.921, 28.096 and 28.095) while T1 and T7 were recorded the lowest percentage (25.614 and 23.848). On day 19, the results were similar to day 11, with a little decline. On day 25, T5 and T6 had a high percentage (28.633 and 28.057) compared with other groups, followed by T3, T4, and T1 (22.376, 21.611, and 21.601), respectively. At the same time, T2 and T7 were recorded as the lowest Titers (20.099 and 19.8760) as in Table (2). These results agreed with researchers who revealed that taking a CoQ10 had several positive effects; some of these effects include preventing tumor growth, decreasing blood level of tumor necrosis factor-α (TNF-α) and interleukin-6, and enhancing the immunological response to viral infection in different types of animals used for experimental (Liu *et al*,2015, Salary *et al*,2014, Tanner,1992). Beyond that, the defense mechanism of quails CoQ10 has been the subject of several investigations. Research conducted by Rafieian-Naeini et al. found that quails reduced the expression of IL-6 and serum TNF-α, in addition to a drop in liver ions (Rafieian-Naeini *et al*,2023,Bayril *et al*,2018) discovered that CoQ10 exhibited anti-inflammatory properties in avians related to cold stress by constraining nitric oxide, tumor necrosis factor-a (TNF-a), IL-1b, and mitogenic protein kinases, which may indicate that CoQ10 might be an effective anti-inflammatory drug (Bayril *et al*,2018, Zahrooni *et al*,2019).

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Table 2. Effect of groups and period in Result of TNF alpha

Groups	Mean ±SE of TNF-α (ng/L)		
	11 days	19 days	25 days
T1	25.614 ±1.35 CD a	23.233 ±1.29 B a	21.601 ±1.27 B a
T2	27.095 ±1.52 BCD a	20.247 ±1.07 B b	19.876 ±0.93 B b
T3	27.096 ±1.39 BCD a	24.202 ±1.36 B ab	22.376 ±1.21 B b
T4	28.921 ±2.07 ABC a	24.977 ±1.40 B ab	21.611 ±1.06 B b
T5	29.104 ±2.19 AB a	29.211 ±2.54 A a	28.633 ±2.15 A a
T6	31.655 ±2.64 A a	30.976 ±2.60 A a	28.057 ±1.86 A a
T7	23.848 ±1.24 D a	20.688 ±1.06 B a	20.099 ±0.97 B a
LSD: 4.518 *			

Means having with the different big letters in same column and small letters in same row differed significantly. * (P≤0.05).

CONFLICT OF INTEREST

The authors declare that they have no conflicts of interest.

DECLARATION OF FUND

The authors declare that they have not received a fund.

REFERENCES

Abdulidha, N. A., A. A. Jaccob, and M. S. AL-Moziel. 2020. Protective effects of Co-Q10, Ginkgo biloba, and l-carnitine on brain, kidney, liver, and endocrine system against sub-acute heavy metals toxicity in male rats. J. Toxicol. Environ. Health Sci., 12: 331-341. https://doi.org/10.1007/s13530-020-00061-7

Adino, G. W., and M. D. Bayu. 2022. Review of diagnostic and vaccination approaches of infectious bursal disease of poultry. Open J. Vet. Med., 7: 22-8. http://dx.doi.org/10.26627/IJALS/2018/11.01.0047

Ahmed, A. I. 2020. Molecular characterization of infectious bursal disease virus isolated from naturally infected broiler chickens in Erbil, Iraq. Iraqi J. Vet. Med., 44(E0): 21-27. https://doi.org/10.30539/ijvm.v44i(E0).1015

Al-Zuhairy, M. A. 2002. Resistance of four different local hybrid chickens to infectious bursal disease infection. Iraqi J. Vet. Med., 26(1): 126-134. https://doi.org/10.30539/ijvm.v26i1.1130

Bayril, T., F. Akdemir, H. Aksit, and D. Aksit. 2020. Dietary coenzyme Q10 may improve the growth performance and antioxidant status in quails exposed to cold stress. J. Anim. Feed Sci., 29(1): 67–74. https://doi.org/10.22358/jafs/118790/2020

Bliznakov, E. G.1978. Immunological senescence in mice and its reversal by coenzyme Q10. Mech. Ageing Dev., 7: 189-197. https://doi.org/10.1016/0047-6374(78)90065-9

Bublot, M., N. Pritchard, F. X. Le Gros, and S. Goutebroze. 2007. Use of a vectored vaccine against infectious bursal disease of chickens in the face of high-titred maternally derived antibody. J. Comp. Pathol., 137: S81-S84. https://doi.org/10.1016/j.jcpa.2007.04.017

Camilotti, E., L. B. D. Moraes, T. Q. Furian, K. A. Borges, H. L. D. S. Moraes, and C. T. P. Salle. 2016. Infectious bursal disease: pathogenicity and immunogenicity of vaccines. Braz. J. Poult., 18: 303-308 . https://doi.org/10.1590/1806-9061-2015-0148

Cary, N. 2012. Statistical analysis system, User's guide. Statistical. Version 9. SAS. Inst. Inc. USA .

Dey, S., D. C. Pathak, N. Ramamurthy, H. K. Maity, and M. M. Chellappa.2019. Infectious bursal disease virus in chickens: prevalence, impact, and management strategies. Vet. Med.

Iraqi Journal of Agricultural Sciences –2026:57(3):1038-1046
P-ISSN: 0075- 0530 /E-ISSN: 2410-0862
DOI: https://doi.org/10.36103/75ma3871

Res.: 85-97 .
https://doi.org/10.2147/VMRR.S185159
El Basuini, M. F., I. I. Teiba, M. A. Zaki, A. N. Alabssawy, A. M. El-Hais, A. A. Gabr, ... and S. Dossou.2020. Assessing the effectiveness of CoQ10 dietary supplementation on growth performance, digestive enzymes, blood health, immune response, and oxidative-related gene expression of Nile tilapia (*Oreochromis niloticus*). Fish Shellfish Immunol., 98: 420-428 .https://doi.org/10.1016/j.fsi.2020.01.052
Eterradossi, N., and Y. M. Saif. 2013. Infectious bursal disease. Diseases of poultry: 219-246.
https://doi.org/10.1002/9781119421481.ch7
Gelb Jr, J., D. J. Jackwood, E. M. Brannick, and B. S. Ladman. 2016. The efficacy of recombinant HVT-IBD vaccines administered to broiler chicks from a single breeder flock at 30 and 60 weeks. Avian Dis., 60(3): 603-612 .
https://doi.org/10.1637/11344-120815-Reg.1
Gvozdjáková, A., J. Kucharská, J. Dubravicky, V. Mojto, and R. B. Singh.2015. Coenzyme Q 10, α-tocopherol, and oxidative stress could be important metabolic biomarkers of male infertility. Dis. Markers, 2015 .
https://doi.org/10.1155/2015/827941
Hafez, M. H., S. E. S. El-Kazaz, H. I. Ghamry, and M. Shukry. 2023. Coenzyme Q10 enhances testicular functions and sexual behavior by regulating steroidogenic-related gene expression and inflammatory pathways of Japanese quail (Coturnix japonica) against cadmium. Poult. Sci., 102(4): 102517 .
https://doi.org/10.1016/j.psj.2023.102517
Ingrao, F., F. Rauw, T. van den Berg, and B. Lambrecht. 2017. Characterization of two recombinant HVT-IBD vaccines by VP2 insert detection and cell-mediated immunity after vaccination of specific-pathogen-free chickens. Avian Pathol., 46(3): 289-299 .
https://doi.org/10.1080/03079457.2016.1265083
Jakka, P., Y. K. Reddy, J. J. Kirubaharan, and N. D. J. Chandran. 2014. Evaluation of immune responses by live infectious bursal disease vaccines to avoid vaccination failures. Eur. J. Microbiol. Immunol., 4(2): 123-127 .
https://doi.org/10.1556/eujmi.4.2014.2.5
Jumaa, R. S., A. B. Allawi, and R. N. Jabbar.2020. Genetic analysis of field isolates of infectious bursal disease virus in Iraqi farms. Iraqi J. Vet. Med., 44(1): 18-28 .
https://doi.org/10.30539/ijvm.v44i1.931
Kajal, S., G. Narang, B. L. Jangir, P. Kundu, D. Lather, and R. Chhabra.2023. Studies on immunopathological changes induced by commercial IBD live vaccines in poultry birds. Sci. Rep., 13(1): 12379.
https://doi.org/10.1038/s41598-023-39017-5
Kalantar, M., S. M. Hosseini, M. R. Hosseini, M. H. Kalantar, and L. G. Yang .2019. Effects of in ovo injection of coenzyme Q10 on hatchability, subsequent performance, and immunity of broiler chickens. Biomed Res. Int., (1): 7167525
https://doi.org/10.1155/2019/7167525
Kassab, A. K., H. F. Muhannad. 2006. The effect of licorice root powder on experimental infection of infectious bursal disease in broiler chickens. Iraqi J. Vet. Med., 30(2): 65-78 .
http://dx.doi.org/10.30539/iraqijvm.v30i2.818
Le Gros, F. X., A. Dancer, C. Giacomini, L. Pizzoni, M. Bublot, M. Graziani, and F. Prandini. 2009. Field efficacy trial of a novel HVT-IBD vector vaccine for 1-day-old broilers. Vaccine, 27(4): 592-596 .
https://doi.org/10.1016/j.vaccine.2008.10.094
Lemiere, S., S. Y. Wong, A. L. Saint-Gerand, S. Goutebroze, and F. X. Le Gros. 2011. Compatibility of turkey herpesvirus–infectious bursal disease vector vaccine with Marek's disease ripens vaccine injected into day-old pullets. Avian Dis., 55(1): 113-118.
https://doi.org/10.1637/9507-081810-ResNote.1
Lenaz, G., R. Fato, G. Formiggini, and M. L. Genova.2007. The role of Coenzyme Q in mitochondrial electron transport. Mitochondrion, 7: S8-S33 .
https://doi.org/10.1016/j.mito.2007.03.009
Littarru, G. P., and L. Tiano. 2007. Bioenergetic and antioxidant properties of coenzyme Q 10: recent developments. Mol. Biotechnol., 37: 31-37 .
https://doi.org/10.1007/s12033-007-0052-y
Littarru, G. P., F. Bruge, and L. Tiano.2017. Biochemistry of coenzyme Q10. Antioxidants

Iraqi Journal of Agricultural Sciences –2026:57(3):1038-1046
P-ISSN: 0075- 0530 /E-ISSN: 2410-0862
DOI: https://doi.org/10.36103/75ma3871

in andrology: 23-34 https://doi.org/10.1007/978-3-319-41749-3_2

Liu, H. T., Y. C. Huang, S. B. Cheng, Y. T. Huang, and P. T. Lin. 2015. Effects of coenzyme Q10 supplementation on antioxidant capacity and inflammation in hepatocellular carcinoma patients after surgery: a randomized, placebo-controlled trial. Nutr. J., 15: 1-9. https://doi.org/10.1186/s12937-016-0205-6

Masoumi, M., M. Salehi, S. A. Angaji, and M. Hashemi. 2021. Effects of coenzyme Q10 and diamond nanoparticles on ischemia-reperfusion-induced testicular damages in rats. Galen Med. J., 10: 2029 . https://doi.org/10.31661%2Fgmj.v10i0.2029 33.

Noh, Y. H., K.-Y. Kim, and M. S. Shim. .2013. "Inhibition of oxidative stress by coenzyme Q10 increases mitochondrial mass and improves bioenergetic function in optic nerve head astrocytes. Cell Death. Dis., 4(10) article e820. https://doi.org/10.1038/cddis.2013.341

Olesen, L., R. Dijkman, R. Koopman, R., Gardin, Y. van Leeuwen, R. M. Dwars, and J. J. de Wit. 2018. Field and laboratory findings following the large-scale use of intermediate-type infectious bursal disease vaccines in Denmark. Avian Pathol., 47(6): 595-606 . https://doi.org/10.1080/03079457.2018.1520388

Orakpoghenor, O., S. B. Oladele, and P. A. Abdu. 2020. Research Note: detection of infectious bursal disease virus antibodies in free-living wild birds in Zaria, Nigeria. Poult. Sci., 99(4): 1975-1977 . https://doi.org/10.1016/j.psj.2019.11.036

Rafieian-Naeini, H. R., M. Zhandi, M. Sadeghi, R. A. Yousefi, H. Marzban, and P. A. Benson. 2023. The effect of dietary coenzyme Q10 supplementation on egg quality and liver histopathology of layer quails under cadmium challenge. J. Anim. Physiol. Anim. Nutr., 107(2): 631-642 . https://doi.org/10.1111/jpn.13715

Rauchova, H., Z. Drahota, and G. Lenaz. 1995. Function of coenzyme Q in the cell: some biochemical and physiological properties. Physiol. Res., 44: 209-209. https://doi.org/10.1016/j.mito.2007.03.009

Reddy, V. R., C. Bianco, C. Poulos, J. A. Brodrick, S. Nazki, A. Schock, and J. A. Broadbent. 2024. Reassortant strains of infectious bursal disease virus (IBDV) belonging to genogroup A3B1 predominate in British broiler chicken flocks. bioRxiv: 2024-04. https://doi.org/10.1101/2024.04.24.590994

Salary, J., F. Sahebi-Ala, M. Kalantar, and H. R. H. Matin. 2014. In ovo injection of vitamin E on post-hatch immunological parameters and broiler chicken performance. Asian Pac. J. Trop. Biomed., 4: S616-S619 . https://doi.org/10.12980/APJTB.4.2014APJTB-2014-0088

Saleh, A. A. S., M. I. Shahin, and N. A. Kelada.2017. Hepatoprotective effect of taurine and coenzyme Q10 and their combination against acrylamide-induced oxidative stress in rats. Trop. J. Pharm. Res., 16(8): 1849-1855 . https://doi.org/10.4314/tjpr.v16i8.14

Sedeik, M. E., N. A. El-Shall, A. M. Awad, 42M. E. Abd El-Hack, A. N. Alowaimer, and A. A. Swelum.2019. Comparative evaluation of HVT-IBD vector, immune complex, and live IBD vaccines against vvIBDV in commercial broiler chickens with high maternally derived antibodies. Animals, 9(3): 72 .https://doi.org/10.3390/ani9030072

Tanner, H. A. 1992. Energy transformations in the biosynthesis of the immune system: their relevance to the progression and treatment of AIDS. Med. Hypotheses, 38(4): 315-321 . https://doi.org/10.1016/0306-9877(92)90024-7

Tsukamoto, K., N. Tanimura, S. I. Kakita, K. Ota, M. Mase, K. Imai, and H. Hihara.1995. Efficacy of three live vaccines against highly virulent infectious bursal disease virus in chickens with or without maternal antibodies. Avian Dis.: 218-229 . https://doi.org/10.2307/1591863

Ulaiwi, A. H.2015. Effect of Force 6® Poultry on Infectious Bursal Disease Virus in Vitro: Amjed H. Ulaiwi1, Shony M. Odishio2 and Salah M. Hassan3. The Iraqi J. Vet. Med., 39(2): 87-90 . https://doi.org/10.30539/iraqijvm.v39i2.183

Iraqi Journal of Agricultural Sciences –2026:57(3):1038-1046
P-ISSN: 0075- 0530 /E-ISSN: 2410-0862
DOI: https://doi.org/10.36103/75ma3871

Van den Berg, T. P., and G. Meulemans.1991. Acute infectious bursal disease in poultry: protection afforded by maternally derived antibodies and interference with live vaccination. Avian Pathol., 20(3): 409-421. https://doi.org/10.1080/03079459108418779

Zhang, W. Y., X. M. Wang, Y. L. Gao, and X. L. Qi. 2022. The over-40-years-epidemic of infectious bursal disease virus in china. viruses 2022, 14: 2253 . https://doi.org/10.3390/v14102253

Zahrooni, N., A. S. Hosseini, A. Ahmadzadeh, K. Ahmadi Angali, and A. M. Assarehzadegan. 2019. The effect of coenzyme Q10 supplementation on vascular endothelial growth factor and serum levels of interleukin 6 and 8 in women with breast cancer: a double-blind, placebo-controlled, randomized clinical trial. Ther. Clin. Risk Manag.: 1403-1410. https://doi.org/10.2147/TCRM.S234930

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تقيم اضافة تراكيز مختلفة من المرفق الانزيمي Q10 في التحصين باللقاحات الكلاسيكي والمعاد توليفة ضد مرض الجراب المعدي في فروج اللحم

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المستخلص

هدفت هذه الدراسة إلى تحديد تأثير المساعد الانزيمي- Q10 ضد مرض الجراب الفيروسي المعدي بعد التلقيح ببرامج مختلفة (الجرعة الفردية من اللقاح المعدل وراثياً HVT-IBD في اليوم الأول، واللقاحات الكلاسيكية D78 في اليوم الثامن، وE228 في اليوم السادس عشر) من خلال تقييم مستويات الإنترفيرون-غاما وعامل النخر الورمي-ألفا في المصل. تم تقسيم 210 من افراخ اللحم إلى سبع مجاميع وكل مجموعة تحتوي على 30 فرخا؛ T1: غذيت Q10 (20 ملغم / كغم علف) ولقحت ب (D78, E288)؛ T2 :غذيت بـ Q10 (20 ملغم / كغم علف) ولقحت ب (rHVT)؛ T3: غذيت بـ Q10 (40 ملغم / كغم علف) ولقحت ب (D78, E288)؛ T4: غذيت بـ Q10 (40 ملغم / كغم علف) ولقحت ب (rHVT)؛ T5: لقحت ب (E288, D78) فقط؛ T6: لقحت ب (rHVT) فقط؛ T7 : مجموعة السيطرة السالبة. أظهرت نتائج تراكيز الإنترفيرون-غاما في اليوم 15 أن T6 و T5 سجلت مستوى أعلى وبشكل ملحوظ ($P\leq0.05$) مقارنة بالمجموعات الأخرى. بالمقابل، في الأيام 25 و 33، أظهرتا انخفاضاً على طول التجربة. في الوقت نفسه، أشارت نتائج عامل نخر الورم-ألفا إلى أن T1 و T7 سجلتا مستوى منخفض بالمقارنة بالمجموعات الأخرى في اليوم 11. وبالمقارنة بالأيام 19 و 25 كانتT1 و T2 و T7 لديها أقل مستوى بين المجموعات المختلفة. في الختام، يعزز تأثير المساعد الانزيمي Q10 (40 ملغم / كغم) وظيفة المناعة عن طريق تنظيم الاستجابة المناعية وخاصة الإنترفيرون-غاما وتقليل عامل النخر الورمي-ألفا.

الكلمات المفتاحية: لقاحات الكمبورا ، الاستجابة المناعية، فروج اللحم.