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Serological Assessment of IBV in Broilers from Dolj County

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Abstract: This study aimed to assess the seroprevalence and antibody titers against *Infectious Bronchitis Virus (IBV)* in poultry from Dolj County, Romania, over a four-year period (2018–2021).

A total of 430 serum samples from 24 poultry halls were tested using the ELISA method. Of these, 373 samples (86.74%) were positive for *IBV* antibodies, while 57 samples (13.26%) tested negative. Notably, all 24 poultry houses recorded positive samples, and 18 of them also included negative ones, indicating possible uneven immune response or gaps in vaccination coverage. Antibody titers varied substantially across years and halls, with only five poultry halls, three in 2019 and two in 2020, showing average values exceeding 9000. Such elevated titers may indicate field strain infections rather than responses to vaccination.

Coefficients of variation were generally high, suggesting heterogeneity within stocks. Particularly, the years 2019 and 2020 presented the highest maximum titers (up to 15883), further raising concerns about wild-type *IBV* circulation.

These findings underline the importance of continued serological monitoring to evaluate vaccine efficacy and detect potential *IBV* outbreaks.

Variability in antibody levels across different years and poultry houses emphasizes the need for more targeted biosecurity and immunization strategies in commercial poultry operations.

Keywords: ELISA, poultry, seroprevalence, antibody titers, wild-type strains

• Introduction

The *infectious bronchitis virus (IBV)*, a member of the genus *Gammacoronavirus* within the *Coronaviridae* family and *Nidovirales* order, is recognized as a highly contagious pathogen affecting domestic poultry, particularly chickens (*Gallus gallus*). First identified in the United States during the 1930s, *IBV* is the etiological agent of infectious bronchitis, an acute respiratory condition characterized by clinical manifestations such as coughing, sneezing, nasal and ocular discharge, and respiratory distress. Beyond its primary tropism for the respiratory tract, *IBV* exhibits a systemic pathogenic profile, with certain strains inducing renal lesions and reproductive dysfunctions, including decreased egg production and impaired eggshell quality, thereby posing significant economic threats to the global poultry industry [Cook et al., 2012, Kariithi et al., 2023, Orghici et al., 2024].

• Material and method

The present study was conducted on broiler chickens of the Ross 308 breed, aged between 35 and 45 days, originating from commercial farms located in Dolj County, Romania. Serum samples were collected from a total of 430 birds, raised in 24 distinct poultry houses, over a four-year period (2018–2021).

All selected flocks had a documented history of respiratory disorders and were vaccinated against major avian respiratory pathogens, including *IBV*.

From each poultry house, between 10 and 30 birds were randomly selected for sampling.

The collection process was accompanied by the recording of relevant data regarding the flocks and the technological conditions of the housing systems. Blood samples of approximately 1–2 mL were drawn from the brachial (wing) vein using sterile, single-use syringes.

The collected blood was transferred into anticoagulant-free tubes, positioned vertically to facilitate clot formation. Serum was obtained by spontaneous decantation, following the methodology described by Barberis et al. (2018). Once separated, the serum was transferred into Eppendorf tubes, kept under cold chain conditions, and transported to the Synevet Romania laboratory for further processing. Upon arrival, samples were centrifuged at 3,000 rpm for 5 minutes and stored at –20°C until the time of serological analysis.

Between 2018 and 2021, a total of 430 blood samples were collected from broiler chickens raised in five commercial farms, each located in a different county in Dolj. Each farm represented one county, selected based on regional distribution. The geographical location of the sampled farms is illustrated in figure 1, while the distribution of collected blood and serum samples is shown in figure 2.



Figure 1. Geographical distribution of the five broiler farms in Dolj, sampled between 2018 and 2021.



Figure 2. Distribution of collected blood and serum samples from broiler chickens (2018–2021).

• Results and discussions

Antibody titers varied considerably both between and within years. Notably, titers exceeding 9000, suggestive of possible wild-type *IBV* infections, were detected in five poultry houses: three in 2019 (DJ-H24, DJ-H25, DJ-H26) and two in 2020 (DJ-H21, DJ-H22). No such elevated titers were recorded in 2018 or 2021. The highest antibody titer recorded during the study was 15,883 in hall DJ-H26 in 2019, while the lowest was 46 in 2021.

Overall, antibody levels showed high variability within flocks, as reflected by elevated coefficients of variation, which in some cases exceeded 100% (e.g., DJ-H23 in 2020). The years 2019 and 2020 were characterized by the greatest intra-hall variation and the highest maximum titers, raising further concerns about potential *IBV* field strain circulation despite ongoing vaccination efforts.

Between 2018 and 2021, our study of 24 poultry barns in Dolj County, Romania, revealed high intra-flock antibody variability, with coefficients of variation occasionally exceeding 100% (e.g., DJ-H23 in 2020). Titers above 9000 were recorded only in 2019 and 2020, suggesting possible *IBV* field strain circulation despite ongoing vaccination. No such elevated titers were observed in 2018 or 2021. (Fig. 3-6)

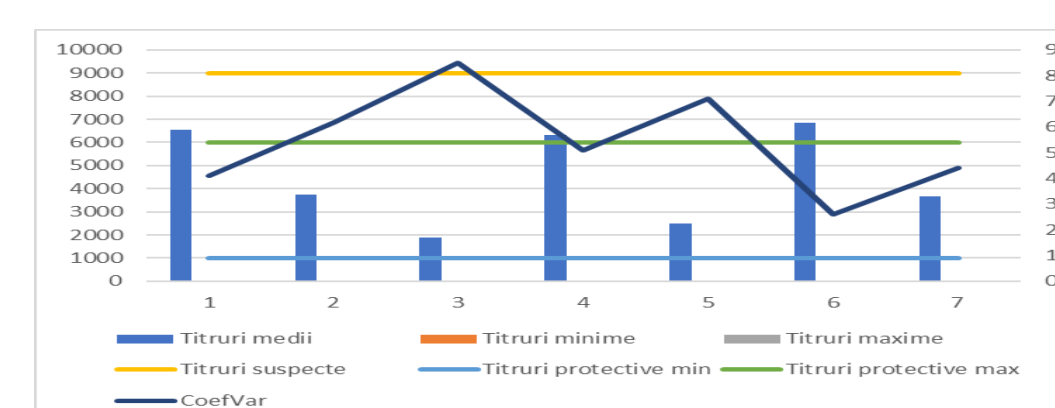


Figure 3. Graphical representation of antibody titers in serum samples from Dolj County – 2018.

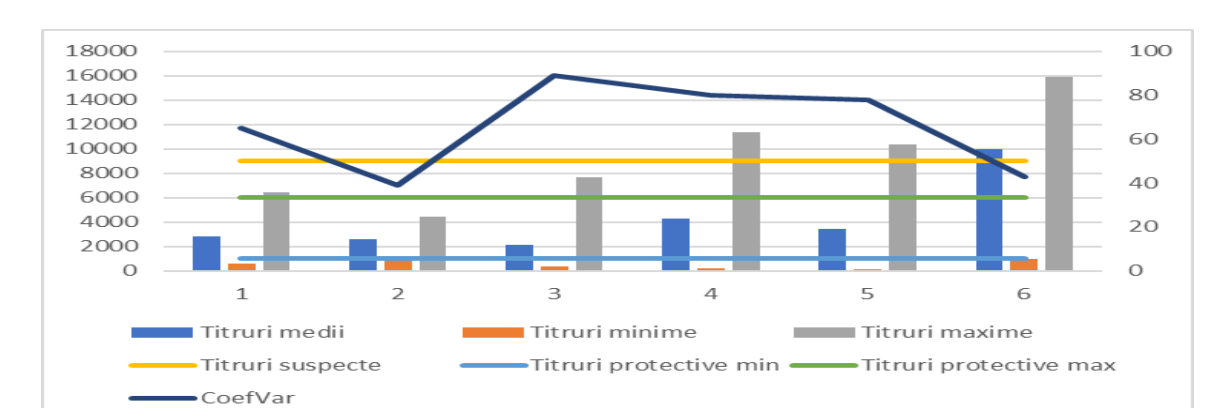


Figure 4. Graphical representation of antibody titers in serum samples from Dolj County – 2019.

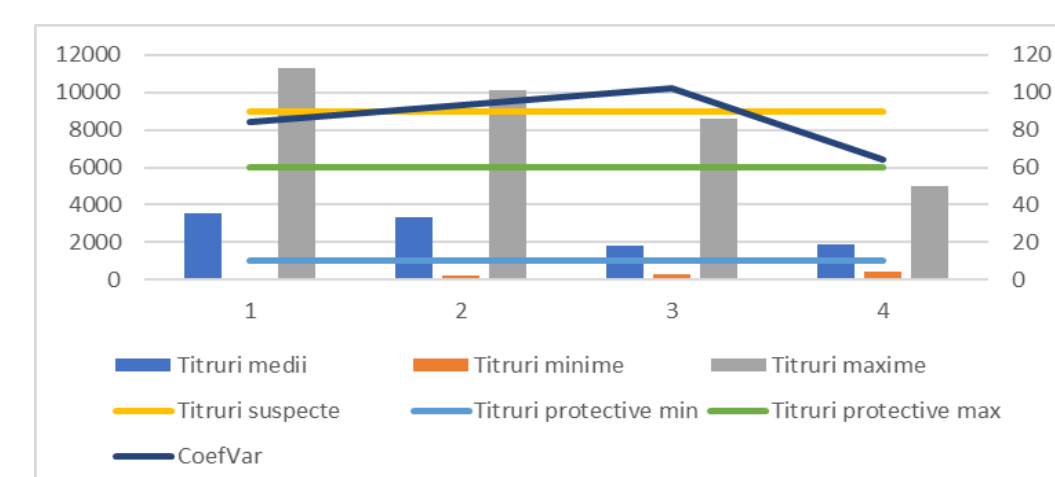


Figure 5. Graphical representation of antibody titers in serum samples from Dolj County – 2020.

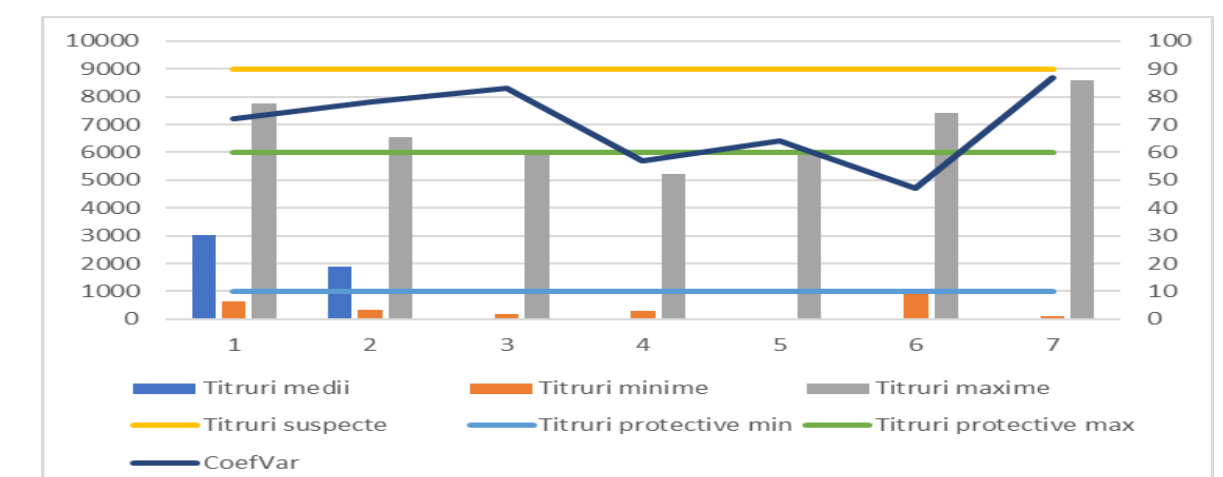


Figure 6. Graphical representation of antibody titers in serum samples from Dolj County - 2021

• Conclusions

The present study provides a comprehensive serological assessment of *IBV* in broiler chickens from Dolj County, Romania, over a four-year period. The high overall seroprevalence (86.74%) confirms widespread exposure to *IBV* or effective immunological response following vaccination. However, the simultaneous detection of seronegative samples in the majority of poultry houses and the substantial variation in antibody titers, both between and within flocks, underscore inconsistencies in vaccine coverage and raise concerns about the circulation of wild-type *IBV* strains. Elevated titers observed particularly in 2019 and 2020 further support this hypothesis. These findings highlight the critical need for enhanced vaccination protocols, regular sero-monitoring, and molecular surveillance of circulating strains. Tailored immunization strategies, supported by improved biosecurity measures, are essential for achieving more consistent and protective immunity in commercial poultry operations.