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EFFICACY OF DIFFERENT INFECTIOUS BURSAL DISEASE VACCINES AGAINST THE CURRENT IBDV CIRCULATING STRAINS IN THE BENELUX AREA

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INTRODUCTION

The occurrence of acute Gumboro disease in the Benelux area is uncommon, despite a significant rise in the prevalence of new and highly virulent strains of infectious bursal disease virus (IBDV) in the region. The vaccination rate for IBDV in this area is high. It is imperative to determine the optimal timing for vaccination when employing conventional live attenuated vaccines for IBD. The "Deventer formula" proves valuable in calculating this timing for specific flocks, considering factors such as maternally derived antibody levels, the chicken's genetic background, and the specific IBD vaccine strain. Successful application of this formula requires knowledge of the breakthrough ELISA titre of the vaccine strain, which is unique to each strain and indicative of its level of attenuation. Hatchery vaccination is gaining popularity due to its numerous advantages in terms of vaccination precision and performance. In the context of IBDV vaccination, hatchery vaccination allows for immunization in the presence of maternally derived antibodies, ensuring the accuracy of individual in-ovo injections. Despite most farms implementing correct vaccination procedures with live attenuated vaccines, a considerable number are grappling with the emergence of a new reassortant strain known as "UK2019". While classified as a very virulent IBDV (vvIBDV), the clinical presentation of Gumboro disease caused by "UK2019" differs from the traditional acute form. Instead of the typical acute symptoms, affected flocks primarily experience reduced growth, intestinal disturbances, a slight increase in mortality and immunosuppression. To assess the extent of the reassortant's spread, HIPRA conducted a comprehensive screening of broiler farms in the Benelux region.

MATERIALS AND METHODS

Between June 2020 and May 2024, a total of 344 flocks underwent bursal sample analysis. Various veterinary practices across all regions of the Benelux, each implementing different infectious bursal disease (IBD) vaccination schemes, selected the farms. In each flock, eight bursas were imprinted on FTA cards and subsequently sent to HIPRA´s Laboratory Diagnos in Amer, Spain[1]. These samples were collected from vaccinated birds at least two weeks after the application of the Gumboro vaccine.

VACCINE TYPE	NUMBER OF PCR SAMPLES AND %
Non Vaccinated	22 (6.4%)
Intermediate	177 (51.45%)
Intermediate Plus	102 (29.65%)
Recombinant	16 (4.65%)
Immune-Complex	27 (7.85%)

Table 1. Type of vaccines and number of samples used

A reverse transcription-polymerase chain reaction (RT-PCR) test was conducted on all samples, amplifying a specific portion of the IBDV genome (VP2 gene). For positive results, nucleotide sequencing was performed using the Sanger methodology2. The obtained sequences were then compared with both IBDV reference strains from Genbank and field strains. To identify the reassortant strains an additional RT-PCR on VP1 was performed. To differentiate the efficacy of various vaccines in providing protection against IBDV, a logistic regression model with a Tukey post-hoc test was performed. The statistical analysis was done using the R software v3.1. A p-value < 0.05 was chosen as the limit for statistical significance.

RESULTS

In 94.87% of all farms positive to a field strain, the isolated strain was related to the “UK2019”-strain. This strain can be considered as the dominant strain in the Benelux area. For Belgium this dominance was 98.7%. Overall, 52.61% of the farms tested positive for a field strain of infectious bursal disease virus (IBDV) despite vaccination. In line with expectations for effective protection with a live vaccine, only 34.59% were solely positive for the vaccine strain. PCR results were negative in 9.88% of the farms. In farms utilizing intermediate vaccines, 62.15% tested positive for a field strain, while 22.03% were positive for the vaccine strain, indicating full protection.
Intermediate plus vaccines showed that 35.29% were solely positive for a field strain, and in 55.88% of these vaccinated farms, only the vaccine strain was detected. For recombinant vaccines, the absence of Bursa of Fabricius occupation makes it difficult to detect IBDV vaccine strains in bursal samples. However, in 68.75% of the flocks vaccinated with recombinant vaccines, a different IBDV strain was present in the Bursa. Flocks vaccinated with immune-complex vaccines exhibited a high level of positivity, with 85.19% of the flocks testing positive for the vaccine strains (Fig.1 and Fig.2).

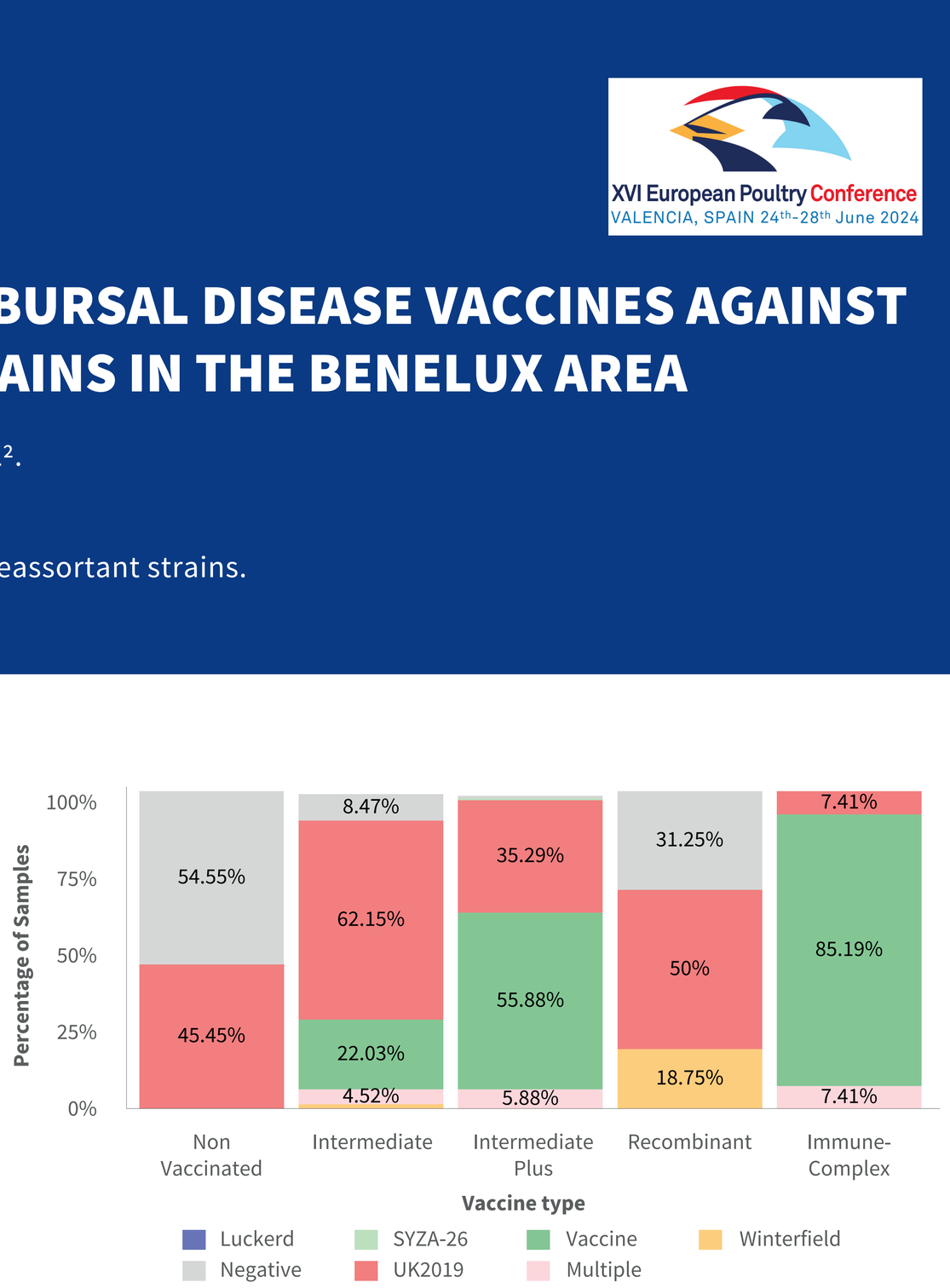

Figure 1. Percentage of samples per vaccine type and PCR result

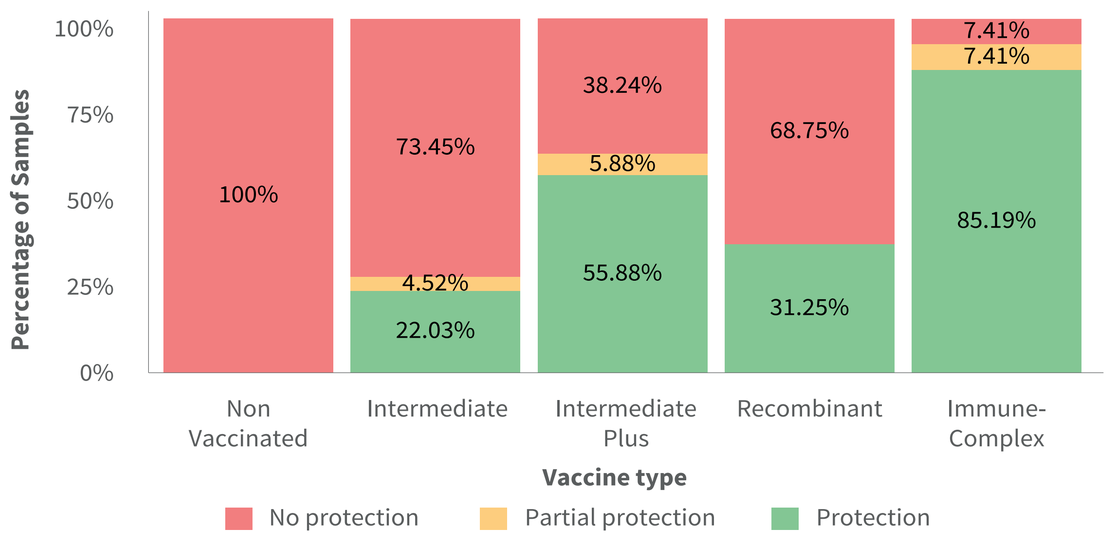

Figure 2. Percentage of samples per vaccine type and percentage of protection

DISCUSSION

In summary, our study provides valuable insights into the dynamics of infectious bursal disease (IBD) in the Benelux region, particularly with regards to the emergence of the "UK2019" variant.

Despite a high vaccination rate for IBDV, our findings reveal a substantial prevalence of field strains, challenging the efficacy of current vaccination strategies. Our comprehensive screening highlights the varied efficacy of different vaccines. Despite the challenges in detecting vaccine strains in recombinant vaccines, our results indicate the presence of a different IBDV strain in the Bursa in a significant percentage of flocks. Notably, immune-complex vaccines demonstrated a high level of effectiveness, with 85.19% of flocks testing only positive for vaccine strains. This study emphasizes the importance of continuous monitoring, adaptation of vaccination strategies, and further research to address the evolving landscape of IBDV strains. These findings have implications for the poultry industry in the Benelux region and beyond, guiding efforts to enhance the efficacy of IBDV vaccination programs and mitigate the impact of emerging variants on poultry health.

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