Experimental evaluation of the protection conferred by nine commercial coryza vaccines.

Pagès-Manté A., Bentué M., March R., Artigas C.

Laboratorios Hipra, S.A., Amer, Girona, España

INTRODUCTION

Infectious coryza (IC) is an acute respiratory disease of chickens caused by *Haemophilus paragallinarum*. The chicken is the natural host for *H. paragallinarum* and they are susceptible at all ages. However, variations in age and breed may influence the severity of the clinical signs. Generally, IC is characterized by high morbidity and low mortality. The economic losses result from poor growth performance and reduction in egg production.

The economical impact of IC in multi-age layer farm is enormous and the disease control is partly achieved by means of biosecurity and vaccination.

The implementation of strict biosecurity measures is difficult in the multi-age farms. There are a number of commercial vaccines, whose overall efficacy is influenced by various factors. They have been widely reviewed in previous publications (Blackall, P.J., 1995).

The variable performance of the commercial vaccines indicates that there is a need to develop vaccination-challenge studies. This particular study evaluates the protection conferred by nine coryza vaccines.

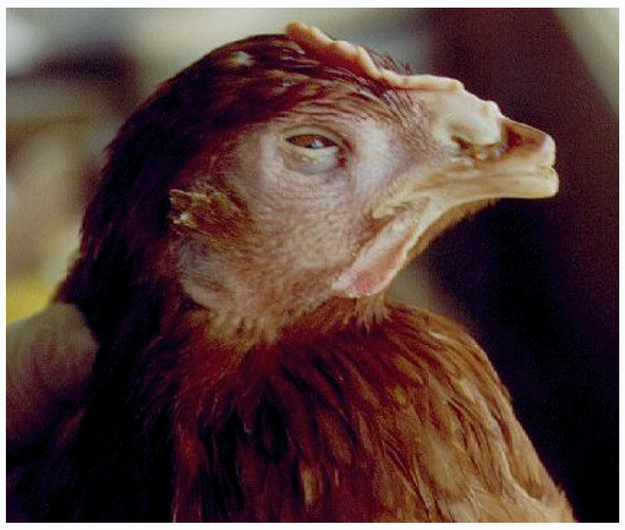

Figure 1. Layer showing the signs of infection compatible with Coryza

MATERIAL AND METHODS

Vaccines: 9 vaccines were included in the vaccination-challenge study (Neuva Corivac, Neuva HG-Gelvac, Fort Dodge Coryza Oil, FortDodge Coryza Vac Plus Bacterin, Merial Haemovax, Bivalent Coryza Vaccine Kitasato, Intervet Nobilis Coryza, Hipra Coripravac AH, , Hipra Coripravac). The commercially available vaccines were based on different adyuvants and even two out of nine were bivalent vaccines (Serotype A and C). The vaccines were labelled with random numerical references in order not to disclose the efficacy of each commercial vaccine.

Birds: The trial was performed using a total of 240 Lohmann Brown commercial layers of 9 weeks of age. They were raised in a single-age system in isolation, under quarantine condition in a controlled environment house. Feed and water was provided *ad libitum* and temperature maintained within 19-24° C. At the beginning of the vaccination-challenge experiment they were divided in 30 groups of 8 birds each. Three separate rooms were made available to house each group prior to the challenge with serotypes A, B, C.

Bacterial strains: Three strains of *H. paragallinarum* were used to challenge the birds; strain 0083 (Serotype A), strain 0222 (Serotype B) and strain Modesto (Serotype C).

Egg yolk of SPF (specific pathogen free) embryonated eggs were inoculated with each strain of *H. paragallinarum* and incubated at 37°C. The egg yolk was harvested 24 hours later to prepare the material of infection which contained 5 x 10^6 colony forming units/ml.

Vaccination: Each commercial vaccine was administered intramuscularly into the breast muscle at 10 and 16 weeks of age.

Challenge: The individual birds were challenged 4 weeks after the last vaccination. The challenge was performed injecting into the left sinus 0.2 ml of the infected egg yolk containing 5 x 10^6 colony forming units/ml of one specific serotype (A, B, C). One group acted as the unvaccinated control.

Evaluation of clinical signs: The clinical signs (swollen sinuses and nasal discharge) of each individual bird were evaluated daily during seven days (Figure 1). Although, the applied computation only took into account those clinical signs that were observed 48 hours after the challenge, which is when the clinical signs peak. They were scored from normal (0) to very severe swelling and/or nasal discharge (3).

Seven days after the challenge, the birds were euthanised and the presence of mucus in nasal sinuses was assessed. At this point the birds were inspected and scored; no presence of mucus (0) to very abundant (3).

In order to determine the presence of any challenge organisms, one cotton swab was inserted in each sinus, with a view to performing a bacterial culture in chocolate agar plates for 72 hours at 37°C and 5 % CO_2. The culture was scored from no colonies (0) to overgrowth (4).

Layers were considered protected under the following conditions: they should not show any clinical signs of coryza (swollen sinuses/nasal discharge) at 48 hours after the challenge; they should not have abnormal excess of mucus at the necropsy after the seven-day post-challenge; and the challenge strains should not be isolated from the sinuses.

The protection rate was calculated in terms of the percentage of birds per group without clinical signs, nor mucus in the sinus, nor bacterial isolation.

RESULTS

The following table shows the protection rate for each group of birds.

Protection expressed in terms of percentage of birds protected against each Hp serotype

Serotype	Vaccines labelled with random numerical references									
	1	2	3	4	5	6	7	8	9	Control
A	12.5	0	75[a]	62.5[a]	87.5[a]	75[a]	87.5[a]	37.5	37.5	12.5
B	62.5[a]	25	75[a]	62.5[a]	75[a]	62.5[a]	75[a]	0	0	0
C	75[a]	25	12.5	12.5	62.5[a]	37.5	12.5	12.5	0	0

[a] Indicates significant differences between vaccinated groups and control group (Chi Square Test $p<0.05$).

DISCUSSION AND CONCLUSIONS

The experimental results showed that the vaccines 3, 4, 5, 6 and 7 provided solid protection against the experimental challenge with serotype A, whereas vaccines 1, 2, 8 and 9 showed a much lower protection against this seroptype. It was obvious that most of the vaccines formulated with oil adyuvants provided higher protection rates. These findings are in line with previous studies, which demonstrated that the protection of mineral oil-based vaccines outperform aluminium hydroxide vaccines (Coetze et al., 1982).

With respect to serotype B, vaccines 1, 3, 4, 5, 6 and 7 showed the best protection. In contrast, vaccine 2 showed low protection. Vaccines 8 and 9 did not provide any protection because they were bivalent vaccines, containing only the serotypes A and C. The need to include serotype B in the inactivated vaccines had already been evidenced in previous researches. In fact, serotype B is increasingly considered as a necessary strain in all coryza inactivated vaccines. (Jacobs et al., 1992).

Vaccines 1 and 5 proved fair protection against the challenge with serotype C, in contrast with vaccines 2, 3, 4, 6, 7 and 8, which showed low protection. Even vaccine 9 did not provide any protection at all. The cause of the low protection against serotype C could not be determined.

The efficacy of the coryza vaccines on the market varied significantly from one to another. The most complete protection against the experimental challenge with the different serotypes A, B and C was conferred by vaccines 5 and 6. Worthwhile to mention that they were trivalent oil based vaccines.

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