A NEW ATTENUATED IBR LIVE VACCINE WITH DOUBLE GENETIC DELETION gE-tk- IS EFFICACIOUS IN FRONT OF EXPERIMENTAL BoHV-1 INFECTIONS, EVEN IN PRESENCE OF MATERNALLY DERIVED ANTIBODIES

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INTRODUCTION

IBR (Infectious Bovine Rhinotracheitis) eradication programs in the EU are based mainly on a DIVA (Differentiation of Infected from Vaccinated Animals) strategy by using marker vaccines. So far, all these IBR marker vaccines were based on single deleted BoHV-1 gE- strains: Bovine HerpesVirus-1 strains lacking glycoprotein E.

A new attenuated IBR vaccine which contains a double genetic deletion gE-tk- (Hipravovis® IBR Marker Live, HIPRA) has been recently developed and registered in the EU: as well as the gE deletion, which confers attenuation of the parental strain and allows for the serological marking, the enzyme thymidine kinase (tk) gen has also been deleted, as this confers also attenuation of the parental strain [(1)], reduces the probabilities of latency, reactivation, re-excretion and re-isolation in the field [(2)] and makes highly improbable the recovery of virulence after recombination [(3)].

According to the European Pharmacopeia newly registered IBR vaccines must demonstrate their efficacy in reducing the clinical signs and the viral shedding, both in amount of virus excreted and in the duration of the shedding itself (minimum 3 days) [(4)]. The three studies presented here focus on demonstrating the efficacy of this new vaccine.

MATERIALS AND METHODS

Animals: all the animals included in these trials were crossed-bred Friesians of 3 months of age, in good health status and free of BoHV-1.

Virus:
- Vaccine: minimum dose ($10^{6.3}$ $CCID_{50}$/calf, strain CEDDEL, gE- tk-), Hipravovis® IBR Marker Live vaccine
- Experimental infection: 10^{7} $CCID_{50}$/calf, virulent strain (Iowa) [(1)]
- Isolation and titration: on nasal swabs, by cell culture

Vaccination plan: two minimum doses, intramuscular route, 21 days apart

Experimental infection (intranasal):
- Study 1 - Efficacy basic vaccination plan: Infection 21 days post-vac
- Study 2 - Duration of immunity: Infection 6 months after vaccination
- Study 3 - Efficacy in presence of Maternally Derived Antibodies (MDA): Infection when MDA declined in the control group

Method:

Efficacy of the basic vaccination plan

The basic vaccination plan was administered to seronegative calves: 5 were vaccinated (Hipravovis® IBR Marker Live), and 5 were in the control group and received a blank vaccine. The intranasal challenge was performed 21 days after revaccination, and clinical signs, rectal temperature and viral shedding (nasal swabs) were monitored for 21 days after challenge.

Duration of immunity

The vaccination plan (Hipravovis® IBR Marker Live) was administered to 4 calves whilst the control group (4 calves) received a blank vaccine. The intranasal challenge was performed 6 months later. Clinical signs, temperature and viral shedding were monitored for 21 days after challenge.

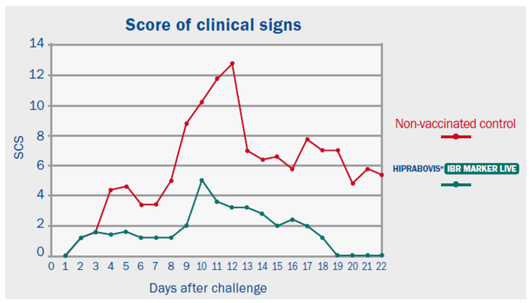
Efficacy in presence of MDA

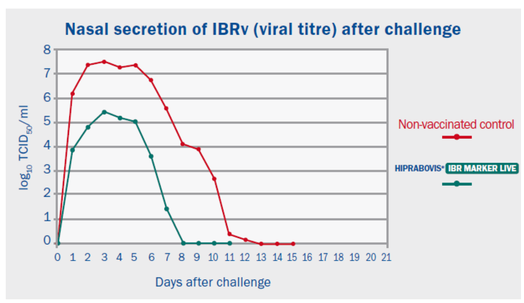
Three month old calves received the full vaccination plan: 10 calves (5 calves without MDA and 5 calves with MDA) were vaccinated, whilst 5 control calves, with MDA, received a blank vaccine. The intranasal challenge was administered to every calf only when MDA declined in the control, non vaccinated group. Clinical signs, rectal temperature and viral excretion were monitored for 21 days after challenge.

RESULTS AND DISCUSSION

Efficacy of the basic vaccination plan

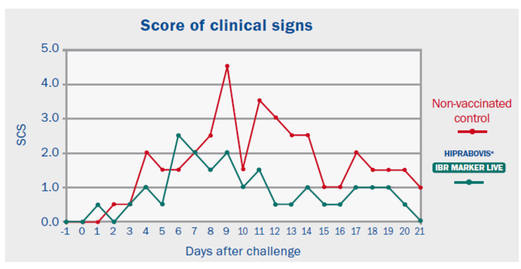
Vaccination produced a significant decrease of respiratory and general clinical signs (72% reduction, with 2 days of pyrexia in vaccinated per 13 days in control) and of viral shedding in both intensity and duration (5 days shorter in vaccinated than in control calves).

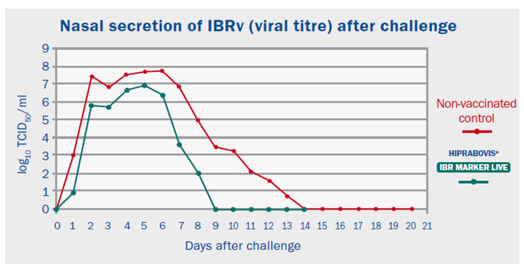




Duration of immunity

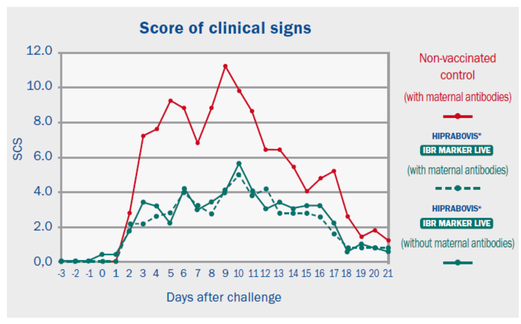
Six months after vaccination there is also a significant decrease of respiratory and general clinical signs (48% reduction) and of viral shedding in both intensity and duration (5 days shorter).

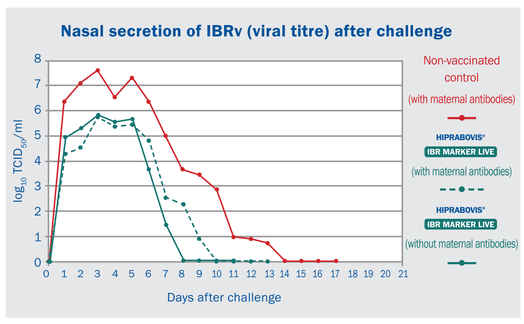




Efficacy in presence of MDA

Vaccination also produced a significant decrease of: Respiratory and general clinical signs (53% reduction without MDA, 56% reduction with MDA); rectal temperature (pyrexia for 9 days in the control group, 1 day in the two vaccinated groups); viral shedding in both intensity and duration (6 days shorter without MDA and 4 days shorter with MDA).





CONCLUSIONS

- The attenuated MLV IBR vaccine with a double genetic deletion gE-tk- (Hipravovis® IBR Marker Live, HIPRA) proved to be effective, fulfilling the requirements of the monograph of the European Pharmacopeia for live vaccines against IBR.
- The duration of immunity for this vaccine has been established in 6 months.
- The effect of the presence of MDA at the time of vaccination was very slight on the performance of the vaccine. The efficacy was satisfactory both in presence and absence of MDA.

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