

BIOBOS IBR MARKER VACCINE FIELD EFFICACY

Background

Biobos IBR Marker Vaccine provides active immunisation of cattle to reduce clinical symptoms caused by infection with bovine herpesvirus type 1, and to reduce excretion of the field virus.

Study Objective

To determine the clinical efficacy of Biobos IBR Marker Vaccine on commercial dairy farms.

Study Design

This field efficacy study was undertaken on three commercial Holstein dairy farms. Thirty calves (3 months of age) and 60 pregnant cows were vaccinated with Biobos IBR Marker Vaccine. All animals were administered two doses of vaccine intramuscularly 21 days apart.

Efficacy was evaluated using a commercial ELISA test to monitor antibody response to IBR vaccination. Blood samples were taken from calves at vaccination, revaccination, 21 days following booster dose and six months after this final dose. Antibody titres in cows were measured at each vaccination and 21 days after the booster vaccine dose.

The following tests were conducted within this clinical evaluation:

- a) Evaluation of the vaccine efficacy in animals of the minimum age recommended for vaccination
- b) Evaluation of the effect of passively acquired maternal antibodies on the vaccination of calves
- c) Evaluation of efficacy of the vaccine administered to pregnant cows

Results

The results of individual serological examinations are summarised in Tables 1 and 2 following. The tables show the values relative to a positive control serum as a percentage, which were calculated by comparing the optical density (OD) of the sample to the positive control serum by ELISA parameters. Results above 40 are evaluated as positive; the values 30-40 are regarded as limit values and the values below 30 are regarded negative.

The results of serological tests were processed statistically using the analysis of variance (ANOVA) including the change in antibody levels over time within the vaccinated groups.

Cows:

Biobos IBR Marker Vaccine is an inactivated vaccine that enables use of the DIVA (Differentiating Infected from Vaccinated Animals) principle. Cows being managed under an IBR vaccination program in European countries are routinely vaccinated every six months. This was true for the herds included in this study, so cows had been vaccinated six months prior to this study. In previously IBR vaccinated cows, the statistical evaluation of antibody response to administration of Biobos IBR showed that mean antibody levels were not different after one vaccine dose.

On Farm 1, cows vaccinated with Biobos IBR showed a statistically significant increase in antibody levels when comparing levels before vaccination, revaccination, and 3 weeks after the vaccination course. On the other 2 farms, no statistically significant increase in antibody levels was seen, due to prior vaccination history in these animals resulting in high levels of pre-existing antibody.

| Sample Timing | ELISA result (% relative to positive control) | | |
|---------------|---|---------------------|-----------------------------------|
| | Vaccination | Booster Vaccination | 21 days after booster vaccination |
| Mean Farm 1 | 288.33 | 294.29 | 320.81 |
| Mean Farm 2 | 307.74 | 315.85 | 332.19 |
| Mean Farm 3 | 317.85 | 296.92 | 327.47 |

Table 1. IBR ELISA levels in cows on each of the three farms

Calves:

On farm 1, calves were grouped into ‘low’ maternal antibody and ‘high’ maternal antibody groups based on the antibody result at time of first vaccination. The low maternal antibody group likely had poor colostrum intake.

All calves on farms 2 and 3 had relatively high levels of antibodies at the time of the first vaccination.

On farm 3, a group of 10 calves remained unvaccinated as a control group. This group showed a waning of antibody levels over the six month period. The calves on farm 3 vaccinated with Biobos IBR had significantly more antibodies at three weeks and six months post vaccination compared to the unvaccinated control calves, despite having high levels of antibody present at first vaccination at 3 months of age.

| Sample Timing | ELISA result (% relative to positive control) | | | | | |
|------------------------------|---|------------|---------------------|-----------------------------------|------------------------------------|------------|
| | Vaccination | | Booster Vaccination | 21 days after booster vaccination | 6 months after booster vaccination | |
| | BoHV-1 Ab ELISA | gE ELISA | BoHV-1 Ab ELISA | BoHV-1 Ab ELISA | BoHV-1 Ab ELISA | gE ELISA |
| Farm 1 Mean low* | 49.075 | Neg | 151.575 | 334.025 | 217.575 | Neg |
| Farm 1 Mean high* | 194.25 | Neg | 152 | 279.617 | 189.05 | Neg |
| Farm 2 | 203.93 | Neg | 144.07 | 270.9 | 198.23 | Neg |
| Farm 3 vaccinated | 212.01 | Neg | 165.92 | 266.65 | 203.06 | Neg |
| Farm 3 unvaccinated controls | 212.82 | Not tested | 151.75 | 93.86 | 30.48 | Not tested |

Table 2. IBR ELISA levels in calves on each of the three farms. *On farm 1 calves were grouped into low maternal antibody and high maternal antibody groups.

Key:

BoHV-1 AB ELISA is typical ELISA measuring glycoprotein B (present on all vaccine and wild-type viruses)

gE ELISA is differentiating ELISA measuring glycoprotein E (not present on marker vaccines but present on other vaccines and wild-type viruses)

Discussion

The pregnant cows in this study had high levels of antibodies at the start of testing, as a result of an ongoing IBR eradication programme (involving 6 monthly revaccination). This also meant relatively high levels of antibody was detected in young calves as a result of colostrum transfer, where colostrum intake had been sufficient.

A statistically significant increase in antibodies was recorded in calves on all farms at three weeks post vaccination. There was also a statistically significant increase in antibody levels between booster vaccination and 21 days after booster vaccination. The difference in the level of antibodies six months after vaccination compared with the baseline (relatively high) level of antibodies was statistically insignificant. This shows the efficacy of vaccination with Biobos IBR Marker Vaccine administered to calves in the presence of colostrum antibodies.

Conclusion

Biobos IBR vaccination resulted in significant increases in antibody levels in both cows and calves. This occurred despite high maternal antibodies (as colostrum antibodies in calves born to vaccinated cows were very high).

Vaccination of calves from 3 months of age was effective, even in the face of high colostrum antibody transfer.

Vaccination titres remained high in both calves and cows for 6 months following vaccination, which was the duration of this field efficacy study.

This field study proved that Biobos IBR Marker Vaccine was safe and efficacious for use in pregnant cows, as well as in calves aged 3 months of age despite prior vaccination in their dams.

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