Antibody yield for polyclonal egg yolk antibody (IgY) production in laying hens

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BACKGROUND

Antibody production in egg yolks of immunized laying hens is an alternative to conventional mammalian production. Freund's Complete Adjuvant (FCA) is a potent adjuvant but has potential for negative side effects of injection site necrosis and anaphylactic shock. C-phosphate-guanosine oligodeoxynucleotides (CpG-ODN) have been proposed as a suitable alternative adjuvant.

OBJECTIVE

To determine the antibody titer temporal profile for antigen-specific antibodies generated using an aIL-10 peptide as the antigen and its emulsion with CpG-ODN and FIA in phosphate buffered saline (PBS).

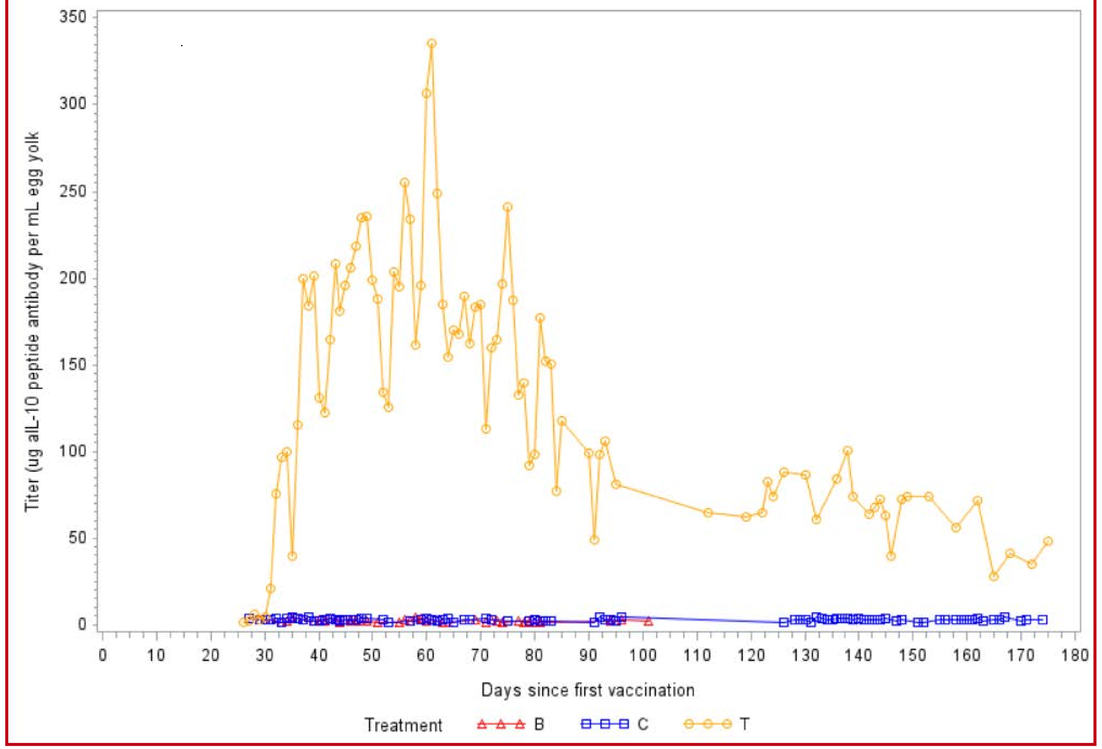
MATERIALS & METHODS

- Peptide was synthesized by GenScript to match an 8 amino acid sequence from the surface of the bovine IL-10 protein (VMPQAENG)
- Injected antigen was the IL-10 peptide emulsified with CpG-ODN and FIA in PBS
- Treatments:
  - Blank (B): 8 hens received injected PBS
  - Control (C): 20 hens received the vaccine components emulsified together, but without the IL-10 peptide
  - Peptide (T): 60 hens received the complete vaccine, containing peptide
- All hens were immunized with 0.25 mL in 4 locations, each breast and each thigh
- Vaccinations were given on days 1, 15 and 29
- The complete peptide vaccine delivered:
  - 0.6 mg IL-10 peptide
  - 8 µg CpG-ODN
  - 0.33 mL FIA
- Eggs were collected regularly until 175 days after the first immunization
- Anti IL-10 peptide activities of the yolk were determined by ELISA
- 2,456 Egg titers by treatment were analyzed with a repeated measures ANOVA in SAS

RESULTS

Figure 1. Antibody production by treatment

Mean titer by treatment group across time



CONCLUSIONS

- CpG-ODN appears consistent with other research, in producing higher titers that remain high longer than vaccine protocols without this adjuvant
- Freund's complete adjuvant (FCA) is not needed to obtain a high and long-duration titer when CpG-ODN is included as the adjuvant

SUMMARY

- Supplementation of FIA with CpG-ODN produced high titers, of over 100 µg of antibody per mL of yolk (µg Ab/mL yolk), around day 33 through day 76, with a slow decline through day 175 when average titers remained above 40 µg Ab/mL yolk
- Peptide egg titers were significantly higher than Blank or Control titers from day 31 though day 175 ($P < 0.0001$)
- Titers reported here exceeded those of Marcq et al. (2015) by 1.5 to 7-fold over the same number of days

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REFERENCE

- Marcq, C., D. Marlie and Y. Beckers. 2015. Improving adjuvant systems for polyclonal egg yolk antibody (IgY) production in laying hens in terms of productivity and animal welfare. Veterinary Immunology and Immunopathology 165:54–63.