Survival of Yolk’s Immunoglobulins Directed against Salmonella Enteritidis and Salmonella Typhimurium in the Gastro-intestinal Tract of the Broiler Chicken

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Introduction
Salmonella remains a major cause of human foodborne infections which is commonly associated with the consumption of contaminated broiler chicken meat [1]. This microorganism can be carried asymptomatically in the chicken digestive tract and is transmitted via the slaughter process to raw, finished meat products. In this context, it is important to develop strategies to prevent intestinal colonization of chicken with Salmonella.

Objective
The aim of this study is to investigate in vitro and in vivo approaches the gastrointestinal stability of IgY simultaneously directed against Salmonella Enteritidis (SE) and Salmonella Typhimurium (ST) and presented under different forms as poultry feed additives.

Materials and methods
Three egg yolk powders
- Freeze-dried yolk powder (FYP)
- Spray-dried yolk powder (SYP)
- Whole yolk powder

Hyperimmune eggs containing high levels of IgY simultaneously directed against SE and ST were obtained through immunization of laying hens as previously described in [4].

Results
In vitro acidic incubations
As shown in Fig. 5, IgY levels fall quickly when egg yolk powders were exposed to acidic solutions (results of incubations at pH 2.0 are presented here). On the opposite, IgY were stable at neutral pH (data not shown). This suggests digestion in the proximal and proximal ileal level between 1.8 and 2.5 could have a great impact on antibodies contained in the poultry feed additive. Interestingly, whole yolk revealed a potentially protective effect on IgY when subjected to acidic conditions while degradation was more important in pH levels of 2.0 when IgY were under WSFP form (p < 0.05).

In vivo force-feeding trial
When IgY were distributed in the WSFP or FYP form, the levels of total and specific immunoglobulins found throughout the intestine were dramatically reduced for IgY activity studied some level below the ST whereas its initial level was almost ten fold higher. This confirms the protective effect of whole yolk observed in vitro.

Conclusions
IgY distributed in dried yolk can partially resist digestive conditions in poultry. Adding antibodies in the form of spray-dried whole egg yolk powder to poultry feed may be the most effective way of inclusion to maintain immunological activity because of the protective function of yolk. Nevertheless, additional protections should be searched to limit observed digestive deactivation of IgY and maximize the anti-Salmonella effect of the feed additive.

Acknowledgments
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References
4. LESSIRE [1990]. Effect of feeding technique, ad libitum, dry or wet force feeding, on the metabolisable energy values of raw materials for poultry. British Poultry Science. 31:705-709

For further information
Please contact marcq.c@fsagx.ac.be. More information on the related projects can be obtained at www.fsgx.ac.be/zt.