

# Chicken Antibody Response to *Salmonella enteritidis* Vaccine in Advanced Intercross Lines and Parental Lines

## A.S. Leaflet R2379

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### Summary and Implications

In five pure genetic lines of chickens, along with the Iowa *Salmonella* Response Resource Population (ISRRP) AIL-F13 generation, antibody levels to an anti-*Salmonella* vaccine were measured as an estimate of early immune response to bacterial infections. Knowledge of the early immune response and its genetic control factors may aid in understanding host-pathogen interactions and, therefore, improve vaccine development strategies. Using vaccines in poultry facilitates control and reduces the prevalence of bacterial infections in animals and humans.

### Introduction

*Salmonella* bacteria of several serotypes are frequently reported causes of foodborne illnesses. Any raw food of animal origin, such as meat, poultry, eggs, milk, dairy products, and some fruits and vegetables may carry *Salmonella* bacteria. If not properly handled, the bacteria may enter the human food supply. Healthy individuals typically clear the infection in a few days, but the young, old and immunocompromised may become seriously ill or die. Identifying important factors in the host immune response to bacterial infections may help to reduce *Salmonella* infection by effective use of vaccinations.

### Materials and Methods

Chicks were vaccinated subcutaneously in the nape of the neck at 10 days of age with Biomune Layerimmune attenuated SE bacterin. Blood samples were collected 11 days after the vaccination; serum was isolated and kept frozen until assayed. A total of 942 serum samples were collected from the AIL-F13 generation, which included five pure lines (broiler, G-B2, G-B1, M15.2 and M5.1), along with the Iowa *Salmonella* Response Resource Population (ISRRP) AIL-F13 lines (broiler X Leghorn; broiler X Fayoumi).

Serum anti-*S. enteritidis* antibody levels were measured by using an IDEXX Flockchek *S. enteritidis* antibody ELISA test kit with minor modifications to optimize detection of antibodies in young birds.

### Results and Discussion

Our findings identified the important genetic factors in level of antibody response to *Salmonella*. These factors included the genetic line, dam and sex of the chick (Table 1). The G-B1 line's *S. enteritidis* antibody production capacity was significantly higher than the broiler, M15.2, M5.1, AIL Fayoumi and AIL Leghorn lines, while the G-B2 line was intermediate to these lines (Figure 1). Antibody production against SE vaccine in male birds was higher than females,  $P < 0.0307$ . The random effect of hatch was significant, as is frequently the case in assays of immune response. The specific ELISA plate on which samples were run was also significant, as often occurs with this assay technique. The sire did not affect the antibody level of its offspring. This research has effectively identified genetic variation factors that are associated with strength of antibody response to *Salmonella* vaccine.

### Acknowledgements

The Farm Staff at the Iowa State University Poultry Science Farm, Elizabeth M. Gaul, Ashley M. Allman, and Jared T. Jacobson are acknowledged for their technical assistances.

**Table 1. The effects (*P* values) of variables on *Salmonella enteritidis* vaccine antibody response in ISRRP AIL-F13 generation.**

	<b>P value</b>
	AIL-F13
<b>Source of variance</b>	(n = 942)
Sire(Line)	0.7280
Dam(Line, Sire) (random)	0.0092
Line	<.0001
Sex	0.0307
Hatch(random)	<.0001
ELISA plate (random)	<.0001
Line X Sex	Excluded

Figure 1. Line differences in antibody production to *Salmonella enteritidis* vaccine at 21 days of age with Tukey ranking given by different letters at the top of each line's data plot. Antibody levels are expressed as 1-(Sample/Plate Negative average).

