



REFERENCE 4

# LAYERMUNE SE

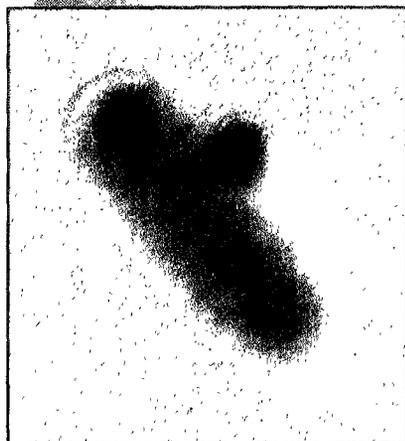
## *Salmonella Enteritidis* Bacterin



*A New Era In SE Control*

# BIOMUNE

## Introduction



*Salmonella enteritidis* (SE) causes an inapparent infection in egg laying flocks resulting in infection of the ovaries and consequent contamination of commercial table eggs. Preparation of contaminated eggs for human food in a manner which allows the SE to survive (served raw or undercooked) can result in serious human illness which may lead to death. Coordinated efforts by the poultry industry, under the guidance of veterinary scientists and regulatory agencies, have failed to dependably eliminate SE infection. Despite standard disease control measures including testing, biosecurity, cleaning and disinfection, SE contamination of shell eggs continues. Because of the inability to control SE by currently recommended procedures, Biomune initiated a directed research effort to develop **LAYERMUNE SE™** which would utilize the chicken's immune system to aid in the reduction of SE colonization. Due to the numerous sources of SE contamination, the use of **LAYERMUNE SE™** offers front line defense to the chicken, thus reducing the SE risk.

## Salmonella Enteritidis Occurrence

SE can gain access to and move through poultry flocks with little or no clinically apparent signs. For example, random testing of spent hens processed in the southeast showed 17% of the flocks were positive for SE. Most flock infections have been determined by "traceback" testing following an outbreak of foodborne disease in humans associated with the consumption of egg products. Serological testing of flocks or culturing of the environment is expensive (\$2,600/70,000 bird flock)<sup>1</sup> and only serves to determine the presence of SE. Disease control measures accepted as industry standards including sanitation, isolation, hygiene, clean stock and restricting other known contamination risk sources have not proved dependably effective. Recent studies have shown the infection can persist several months in hens and that certain phage types of SE are present in the yolk of eggs laid by hens with generalized infections.<sup>2</sup> Current findings in layer houses thoroughly cleaned and disinfected following traceback demonstrated that 28% of these houses became recontaminated with salmonella.<sup>3</sup>

## LAYERMUNE SE™

Immunization against salmonella generally is scientifically sound and has widespread acceptance as a health measure with animals, including avian species. An essential means to augment present efforts to protect the commercial egg industry and the public health would be to reduce the risk of eggs containing SE either by protecting the hen against infection of the ova or by reducing egg shell contamination. **LAYERMUNE SE™** has been designed to stimulate the hen's immune system to prevent SE from invading internal organs and gaining access to the reproductive tract. It will also aid in the reduction of colonization of the digestive tract by SE, thereby reducing shell contamination and invasion of the egg by SE.

## Results Of LAYERMUNE SE™ Research Studies

Immunogenicity studies were initiated using **LAYERMUNE SE™** in egg type chickens of varying ages. In all trials, two injections of **LAYERMUNE SE™** were given subcutaneously, four weeks apart. Challenge with virulent SE was by oral inoculation and consisted of a challenge dose far greater than would be encountered naturally. Nonvaccinated hens served as the controls and were challenged along with the vaccinates. These trials were designed to demonstrate the effectiveness of **LAYERMUNE SE™** in egg type chickens to:

- 1) provide protection to the internal organs to prevent transovarian transmission
- 2) provide protection to the intestinal tract to prevent colonization and shed
- 3) provide protection across phage types

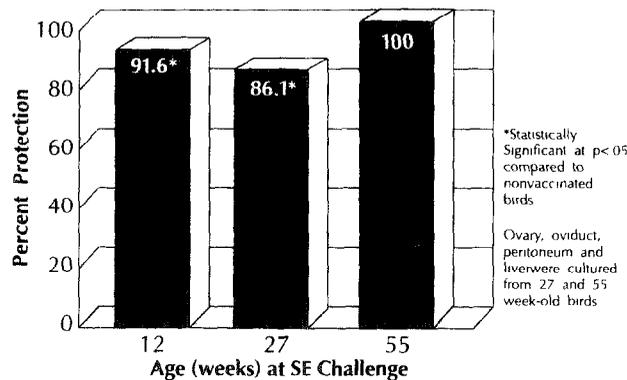
## Protection Of The Reproductive Tract And Intestine

Cultures of internal organs, including the reproductive tract, and the intestine were made to determine the incidence of SE colonization following challenge. Protection was determined by the failure to recover SE by standard culture techniques.

These studies demonstrated that **LAYERMUNE SE™** provided excellent protection which was statistically significant at  $p < .05$  (greater than a 95% confidence level) against infection of the internal organs including the reproductive tract. The protection of the internal organs, specifically the reproductive tract, reduces the risk of transmission of SE inside the egg. Also, **LAYERMUNE SE™** provided excellent protection of the intestine against colonization by SE. The ability of **LAYERMUNE SE™** to prevent infection and subsequent colonization of the intestine reduces fecal contamination by SE on the egg shell. The results of these trials are shown in the following figures.

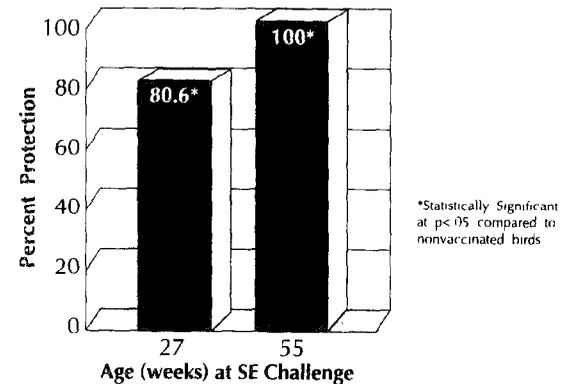
**FIGURE 1**

### Protection Of Internal Organs Of Vaccinated Chickens Following Virulent SE Challenge



**FIGURE 2**

### Protection Of Vaccinated Chickens Against Intestinal Colonization Of The Cecum Following SE Challenge

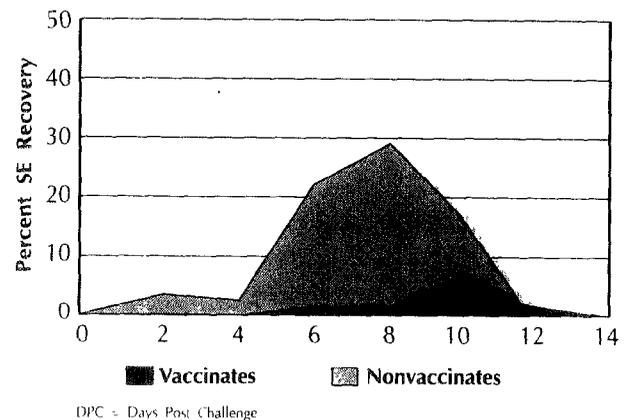


## Reduction In Egg Shell Contamination

**LAYERMUNE SE™** was shown to significantly lower the incidence of SE fecal contamination on the exterior shell surfaces of eggs laid by hens challenged with an invasive SE. As Figure 3 illustrates, subsequent to a high-dose challenge much greater than would be experienced naturally, **LAYERMUNE SE™** delayed the onset of SE colonization of the intestine and significantly reduced ( $p < .05$ ) the incidence of SE contamination on the egg.

**FIGURE 3**

### Incidence Of SE Recovery On Egg Shell Surface During 14 DPC



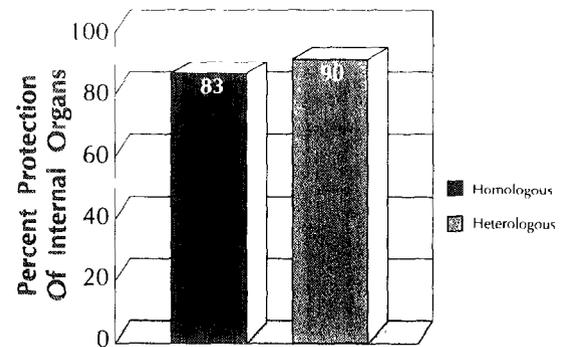
## Heterologous Phage Type Challenge Studies

Research trials at Biomune demonstrated **LAYERMUNE SE™** to be equally effective against challenge with phage types not contained in the bacterin (heterologous) when compared to homologous phage type challenge. Studies were conducted by the vaccination and subsequent challenge of highly susceptible young chickens. Phage types of SE not contained in the

bacterin were used to challenge birds using the same challenge methodology as with homologous SE phage type challenge studies. In heterologous SE phage type challenge studies, **LAYERMUNE SE™** demonstrated equal or slightly better protection of the internal organs than the homologous SE phage type challenge. Figure 4 illustrates the results of one of these studies demonstrating that **LAYERMUNE SE™** was effective against both heterologous and homologous SE phage type challenge. While SE phage type is interesting from an epidemiological point of view, there appears to be no influence of phage type on the ability of **LAYERMUNE SE™** to impart immunity to the internal organs.

**FIGURE 4**

**Demonstration Of Effectiveness Of LAYERMUNE SE Using Heterologous Phage Type Challenge**



## Summary

The use of **LAYERMUNE SE™** in hens of any age provides egg producers with the option of utilizing the chicken's immune system as a means to aid in the reduction of SE colonization in flocks. The immunogenicity studies demonstrated that **LAYERMUNE SE™** will significantly protect the internal organs and the intestinal tract against colonization by *Salmonella enteritidis*.

## Recommendations

**LAYERMUNE SE™** is recommended for use in pullets prior to the onset of egg production to complement existing control measures. Use of **LAYERMUNE SE™** reduces the risk of *Salmonella enteritidis* infection of egg producing flocks. **LAYERMUNE SE™** aids in the reduction of SE colonization of the internal organs, including the reproductive tract, and the intestine. Two injections administered prior to the onset of lay are required for maximum protection. Revaccination during molt is recommended. Vaccination of breeder pullets should be in accordance with provisions established by NPIP. To prevent interference with pullorum-typhoid testing, do not vaccinate breeder pullets that are to be tested for pullorum-typhoid until testing is completed. The dose is 0.5 ml (1/2 cc). See label for complete use directions and precautions.

## References

- <sup>1</sup>Mason, John and Eric Ebel Proc. 6th Regional Meeting on Practical Biosecurity For Poultry Univ. of Delaware, Newark, 1991
- <sup>2</sup>Gast, R. K. and C. W. Beard Avian Diseases 34:438-446, 1990
- <sup>3</sup>Davison, Sherrill, Robert J. Eckroade and Charles Benson Proc. 6th Regional Meeting on Practical Biosecurity For Poultry Univ. of Delaware, Newark, 1991

**LAYERMUNE SE™ is available only from Biomune Co. —  
your partner in progress for safe, profitable poultry production.**

# BIOMUNE

Biomune Co.  
8906 Rosehill Road  
Lenexa, KS 66215  
Telephone: 913/894-0230  
FAX number: 913/894-0236