

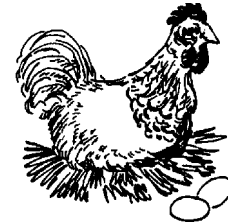


The University of Georgia

**Cooperative Extension Service**

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## **COMMERCIAL EGG TIP...**

### **COMPETITIVE EXCLUSION AND VACCINATION FOR REDUCTION OF *Salmonella enteritidis* CONTAMINATION OF EGGS**

The *Salmonella enteritidis* (SE) pilot project (Schlosser et al. 1995) showed that the risk of eggs being contaminated with SE could be reduced by proper house cleanout and disinfection, rodent control, biosecurity, and by housing SE-free chicks and pullets. As a result, the focus for SE risk reduction in the commercial egg industry has been on adoption of voluntary egg quality assurance (QA) programs (e.g. the Pennsylvania and California Egg Quality Assurance Programs, and others modeled after them) which stipulate specific standards for management practices. QA programs appear to have been successful for reducing the incidence of SE in eggs in regions of the United States where SE has been a problem.

New methods for controlling SE in poultry have been developed, such as competitive exclusion of SE in the intestinal tract and SE vaccination. Presently, the number of commercial products available for either of these options is limited, but commercial offerings no doubt will increase if these approaches to SE control prove effective in the field.

Competitive exclusion (CE) cultures contain microflora that can live in the digestive tract of a chicken. In fact, these cultures are derived from intestinal samples taken from mature chickens. When established in a bird's intestinal tract, the CE culture hinders colonization by salmonellae bacteria. One advantage of CE cultures is that they exclude many species of *Salmonella*, not just *Salmonella enteritidis*. The protection they offer is immediate. To be effective, a CE culture must be administered before a bird is exposed to salmonellae because the culture will not reliably eliminate salmonellae which already reside in the bird's intestinal tract. Field trials have demonstrated that salmonellae contamination of processed broiler carcasses was reduced when chicks from hatcheries having low environmental levels of salmonellae were treated with a CE culture (Blankenship et al. 1993). By preventing early colonization of chicks by salmonellae, the CE culture appears to forestall buildup of the bacteria in the growing environment, leading to lower levels of contamination when flocks reach market weight. Currently, there is little published scientific data for commercial layers regarding the efficacy of CE cultures but it stands to reason that similar control of salmonellae, including SE, could be achieved during pullet growout and at other specific times in the life of a hen.

#### **PUTTING KNOWLEDGE TO WORK**

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A chicken is especially vulnerable to salmonellae colonization when its digestive tract does not have an established population of normal microflora, as occurs at hatch, after administration of antibiotics, and apparently also during feed deprivation. A hen is very susceptible to SE infection during the feed withdrawal phase of an induced molt.

In environments where SE is present, competitive exclusion cultures would have their greatest potential to control SE infection of commercial layers if applied specifically at times when the flock is unusually susceptible to SE colonization. These times would be at hatch and housing, after antibiotic treatment, and perhaps during induced molt feed withdrawal and any other occasion which might cause the flock not to feed. Once mature microbial populations have been established in the gut of a chicken, CE cultures offer little additional protection against salmonellae. This may explain why in the example mentioned above, salmonellae contamination of processed broiler carcasses was not entirely eliminated in flocks treated with a CE culture. One cannot expect that CE products would give commercial layers total protection from SE.

SE vaccines operate differently than competitive exclusion products in that they cause a chicken to develop antibodies which protect it specifically against SE, as opposed to other Salmonella species. Immunization makes a bird more resistant to SE than it would otherwise be in normal circumstances, and the protection lasts for months. Protection obtained from SE vaccination develops gradually as the chicken's immune system forms antibodies. To develop immune protection by the start of egg laying, SE vaccine must be administered to pullets during the growing period. A booster vaccination during an induced molt may also be advisable.


SE vaccination cannot guarantee total protection against SE because any immune system can be overwhelmed by high doses of an infectious agent, but field trials suggest promising reductions of SE occurrence in vaccinated flocks (Schlosser et al. 1995). SE vaccination would be particularly useful in situations where an SE population might persist after cleanout of an SE-positive house, or when an SE challenge is likely, as in an SE-positive complex where rodents can travel between houses.

Neither competitive exclusion nor SE vaccination will eliminate the need for a comprehensive egg quality assurance program because the best way to ensure that eggs do not become SE contaminated is to make sure hens are never exposed to SE. In environments where SE might be present, both competitive exclusion and SE vaccination, properly applied, would be useful components of a QA program to minimize risk of SE contamination of eggs.

#### References:

Blankenship, L.C., J. S. Bailey, N.A. Cox, N.J. Stern, R. Brewer, and O. Williams, 1993. Two-step mucosal competitive exclusion flora treatment to diminish Salmonellae in commercial broiler chickens. Poultry Science 72:1667-1672.

Schlosser, W., D. Henzler, J. Mason, S. Hurd, S. Trock, W. Sischo, D. Kradel, and A. Hogue, 1995. Salmonella enteritidis Pilot Project Progress Report. U.S. Government Printing, Washington, DC.



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**\*\*Consult with your poultry company representative before making management changes.\*\***

“Your local County Extension Agent is a source of more information on this subject.”