Recombinant *Eimeria Maxima* Protein Delivered as Nanoparticles

Coccidiosis, a poultry disease caused by *Eimeria* pathogens, causes weight loss, poor weight gain, low feed-to-growth ratios, and mortality in poultry. Prevention of avian coccidiosis estimated to be a $3B global market. Current treatment options vary in effectiveness and side effects, and no available vaccines protect against all seven species of *Eimeria*.

Invention

USDA and SIU researchers have developed a nanoparticle-based vaccine to protect poultry against *E. maxima*, one of the most common coccidiosis-inducing pathogens. The vaccine comprises ~20 nm polystyrene nanoparticles which are conjugated to *E. maxima* immune-mapped protein 1 (EmaxIMP1).

Key Advantages

- Complete protection against *E. maxima* in chickens observed in battery cage studies.
- Partial protection against *E. maxima* in chickens observed in floor pen studies.
- Platform technology can be adapted to deliver multiple *Eimeria* antigens (*E. maxima, E. tenella, E. acervulina*) simultaneously.
- Immunogenic compositions can be formulated for oral or nasal delivery.

Status

U.S. patent application #16/245,773 was filed January 11, 2019. The technology is available for license.

NP-EmaxIMP1 (B,D) and NP-NR (A,C) in epithelium and lamina propria of chickens’ small intestinal villi 6 h after per os administration. Fluorescence signal from accumulated NPs in serosa 6 h post-inoculation (E,F) indicates NP crossing of mucosal-lumen interface to reach circulation.

This is a joint technology with USDA. Other opportunities related to this technology, included but not limited to sponsored and/or collaborative research, may be available.