**BC Sustainable Poultry Farming Group**

**Project Updates for the January 23, 2018 meeting**

## 2015-01 Genomic Analysis of Wetland Sediment as a Tool for Avian Influenza Virus Surveillance in Wild Waterfowl

- The project is on-going. A project team member attended the meeting to provide an update on the project and industry workshop.
- They've been working on the project since start in the 2014 AI outbreak. Most AI surveillance relies on testing a single bird. Their project differs where they test wetland sediment where birds rest and feed. This allows them to collect samples from many ducks rather than just one. They use two molecular technologies to test samples. Real time PCR to test for the presence or absence of AI genes and then target enriched genomic sequencing to determine which type of AI is present. In the pilot study they found AI in several locations; not just on one farm or in one wetland. It was a regional risk.
- Phase 2 study has two goals; AIV RNA in sediment versus AIV in wild birds and a cost-benefit analysis of different surveillance types in BC. The study has both intensive and extensive components. Intensive consists of sediment testing of three wetlands, monthly for 24 months, live caught birds – swabbed and tagged. Extensive includes samples from another 18 wetlands once in fall and hunter kills.
- They are in year two of the project and half way through data collection. They are still waiting for the AI sequencing test results to come back and to analyze the results.
- Funding for this project was also provided by: Genome BC, the BC Ministry of Agriculture, Canadian Food Inspection Agency (CFIA), Investment Agriculture Foundation of BC, and by the Governments of Canada and British Columbia through Growing Forward 2 , a federal-provincial-territorial initiative
- Institutions performing work for the project include: The Animal Health Center from the BC Ministry of Agriculture, the BC Center for Disease Control, the Canadian Food Inspection Agency, and Fusion Genomics.
- Producer meeting update. The meeting is anticipated to be held in the late summer or fall 2018.

## 2015-02 - The Development and Commercialization of Aerobic Digestion of Poultry Manure to Produce Bio-Active Fertilizers

- The project is complete and SPFG had the opportunity to review the draft final report t provide input.
- The Non-technical summary is below

Economically enhancing poultry manure was the goal. Success was twofold; manure was fermented to produce biologically active plant fertilizer solutions and the process could be expanded to utilize other organic wastes. The project was successful in developing greenhouse methods to safely grow food using these non-pathogenic microorganism rich

solutions. Recycling all greenhouse water was an additional significant accomplishment. Plant growth was lush and robust, in particular for the *Brassica* family and other heavy feeders.
What mechanisms are responsible for healthy plants? This may involve two hypotheses:

i. Fertile soils are so, in large part, due to microbial activity the same is true for biologically active nutrient solutions.
ii. The solutions' microbiological activity would suppress or counter soil pathogens.

The more densely populated an area the greater the challenge to dispose of manure and the greater the likelihood of nearby greenhouses. The BC lower mainland exemplifies this opportunity and dilemma. The project demonstrated how to process manure to make an odourless nutrient solution for greenhouse and field applications. [The lower mainland's Sustainable Poultry Farming Group, SPFG, provided industry seed money; the project is most grateful for SPFG and the Alberta Crop Industry Development Fund for financing.]

*Waste is a Resource* was demonstrated. Agriculture and food sectors now have another option for organic waste. Future developments will involve the co-fermentation of liquid and solid organic wastes. The fermentation broth's soluble carbon plummets within days; increasing the soluble carbon by feeding methanol increased the bacteria cell count a thousand fold. Enhancing the cell count serves to enhance the solutions since microorganisms are storehouses of plant nutrients.

**Hypothesis** *Microbial biomass becomes a "slow release source of nutrients, in particular chelated iron" to complement the solution of readily plant available nutrients.*

Co-fermenting manure with a soluble carbon waste stream would produce an ideal product while processing / disposing two waste streams.

Organic certification of the process would be a strong economic incentive for industry adoption.

**CAUTION** *Qualified Authorities need to vet the process with regard to organic certification.*

An exploratory economic analysis [**not including facility, overhead and utilities costs**] at the 1,000 liter scale suggests it's economically feasible to pursue the technology [or more prudently seek organic certification and /or scale up development]. The 1,000 liter scale is likely inadequate for industry. Scaling up the technology involves using commercially available equipment to develop robust support equipment for feeding, dosing and harvesting the bioreactor.

**CAUTION** *Qualified Authorities need to assess the field and greenhouse regulatory landscape. Since the product is neither manure nor is it compost (nor compost tea).*

**2015 07b Reducing Salmonella and Campylobacter contamination of poultry**

- The project is complete and a report will be posted on the SPFG website once it finishes the review process. A brief summary is provided below.

During the past 6 months of this project, we mainly focused on chicken experiment to test the effect of vaccinations. Extensive chicken experiment was conducted to test the effect of the encapsulated bioactive compounds and Lactobacillus on Salmonella and C. jejuni colonization of chickens.

The detailed protocols of the chicken experiments were summarized in the "research data" file along with the photos of the major steps of the chicken experiments shown in the last progress report (Jan – Jun 2017) as well as the attached research data in the current report. Because the previously encapsulated Lactobacillus and diallyl sulfide did not show a significant elimination effect against Campylobacter in chicken GI tract, we attempted to use other bioactive compounds isolated from other plants, conducted the microencapsulation, and performed the chicken experiment again during the past 6 months.

Three bioactive compounds, namely carvacrol, cinnamon oil and curcumin, were selected. The encapsulation of these compounds was conducted. The detailed procedure was included in the attached research data. We then tested the antimicrobial effect of each encapsulated bioactive compound against both Campylobacter and Salmonella. We also tested the synergistic antimicrobial effect between the encapsulated bioactive compound and the encapsulated Lactobacillus against both Campylobacter and Salmonella. We used three different approaches to analyze the antimicrobial data as well as the synergistic antimicrobial data. The three approaches are time-killing method, fractional inhibitory concentration index method, and mathematical modeling. In brief, the encapsulated cinnamon oil along with the encapsulated Lactobacillus were selected for the following chicken experiment in that this combinational treatment offered the enhanced synergistic antimicrobial effect and reduced the treatment towards both Salmonella and Campylobacter.

By conducting the chicken experiment, neither the individual encapsulated bioactive compound nor the encapsulated Lactobacillus could significantly reduce the colonization of Campylobacter and Salmonella in chickens. In contrast, the synergistic treatment of the encapsulated Lactobacillus and cinnamon oil could significantly reduce the colonization of both Campylobacter and Salmonella in chickens. The reduction level was about 100 times compared to the positive control group. However, this synergy treatment was unable to completely eliminate the colonized pathogens in chicken gastrointestinal tract.

**2016-02 One-day knowledge translation** workshop in April 2017 on Wetland Sediment testing as a Tool for Avian Influenza Virus Surveillance

- The workshop has been delayed.

**2016-06 BCAC's Public Trust Initiative**

- Sharon Eistetter has resigned from her position of Manager of Public Trust due to health reasons, but the project will continue. The project has been active over the past months and still has plans in place. Accomplishments to date:
    - Information advertorials in Country Life profiling the issue of transparency and public trust in the BC food system. First issue will profile Salmon Growers of BC; the second profiled two greenhouse vegetable growers.
    - Sharon and BC Young Farmer directors attended five Career Education Fairs in BC in late Nov and early December to highlight careers in agriculture.
    - A one day workshop was held for a BC Hub or Community of Practice of staff from all commodity groups and food processors to start the process of working collaboratively together to share wins and opportunities in the public trust arena for agriculture in BC
    - Four farmer training sessions will be held concurrently with Pacific Ag Show. Two focusing on how to have discussions on tough/contentious issues on your farm and industry and two on How to Host a Farm Tour.