



FishVet Group



# Clinical blood biochemistry as a tool for monitoring fish with pancreas disease (PD): an opportunity for improved fish welfare and reduced cost?

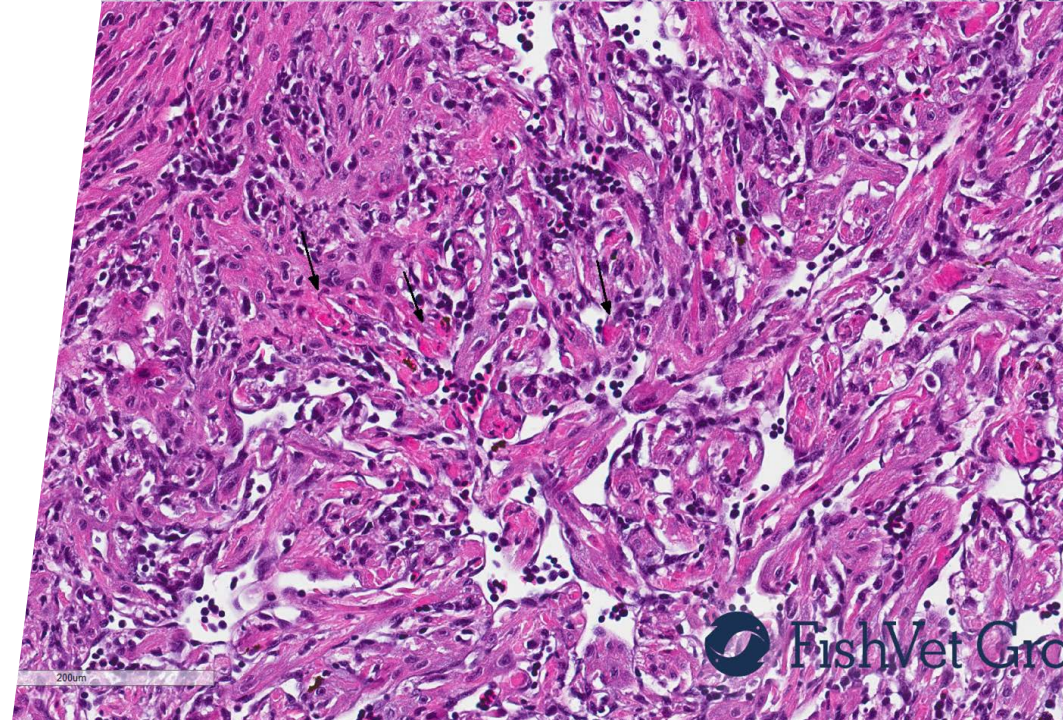
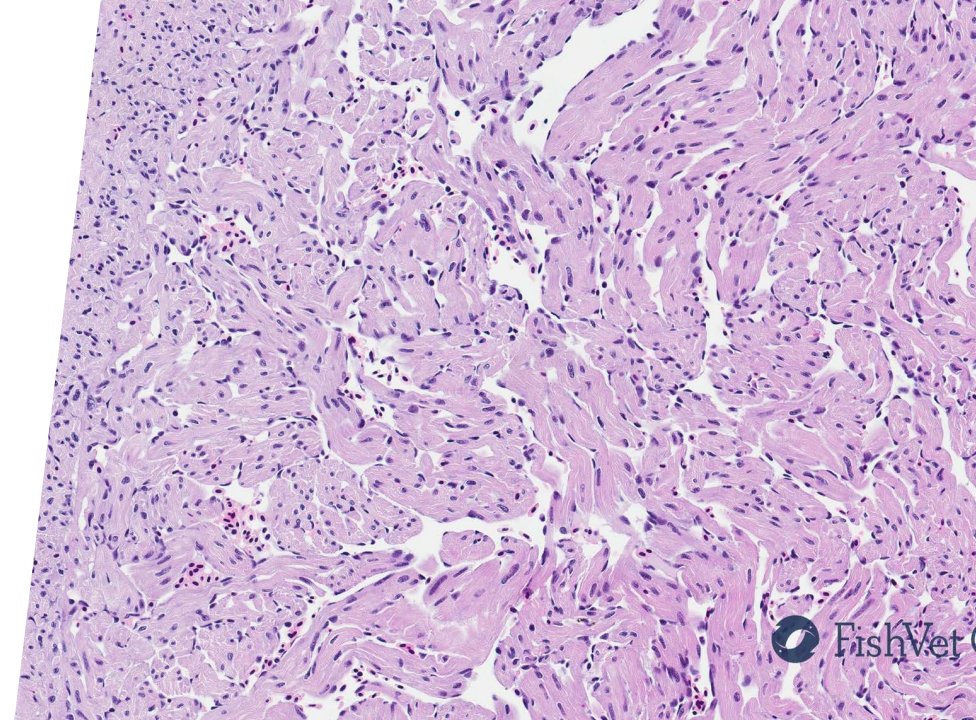
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## Background

- Histopathology has been the gold standard for assessing tissue damage in PD trials
  - Heart
  - Pancreas
  - Red muscle
  - White muscle
- Expensive analysis
- Require euthanasia





## Clinical chemistry

- Widely used in human and veterinary medicine (terrestrial animals)
- Analyses of markers of tissue damage and organ function
  - Muscle, liver, kidney, heart etc.
- Serum og plasma sample: non lethal sampling
- Quick and inexpensive
- Some time between tissue damage and response in blood





## Clinical chemistry in fish

- Some results from Dr. Marian McLoughlin:
  - Serum lipase - indicates exocrine pancreas damage
  - Amylase – indicates acute pancreatitis
  - Lactate dehydrogenase (LDH) – indicates general tissue damage
  - Creatine kinase (CK) - indicates heart & muscle damage
  - Alaninetransaminase (ALAT) - indicates liver damage
  - Aspartatetransaminase (ASAT) - indicates liver & muscle damage
- Are any of these specific for PD?
- Experiment set up with SAV2 and SAV3 to further

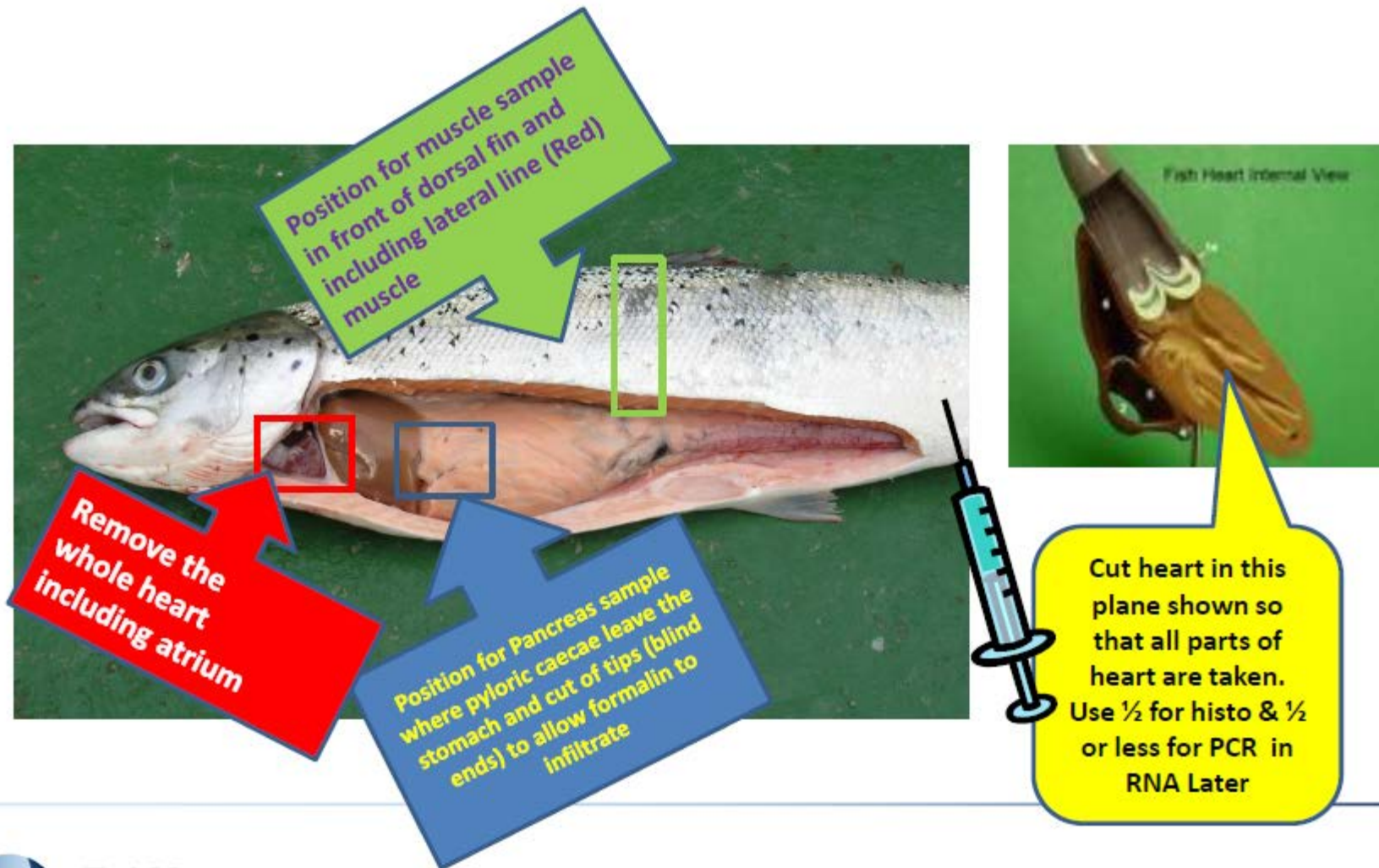




# Evaluation of clinical chemistry following SAV2 and SAV3 challenge

## EXPERIMENTAL DESIGN

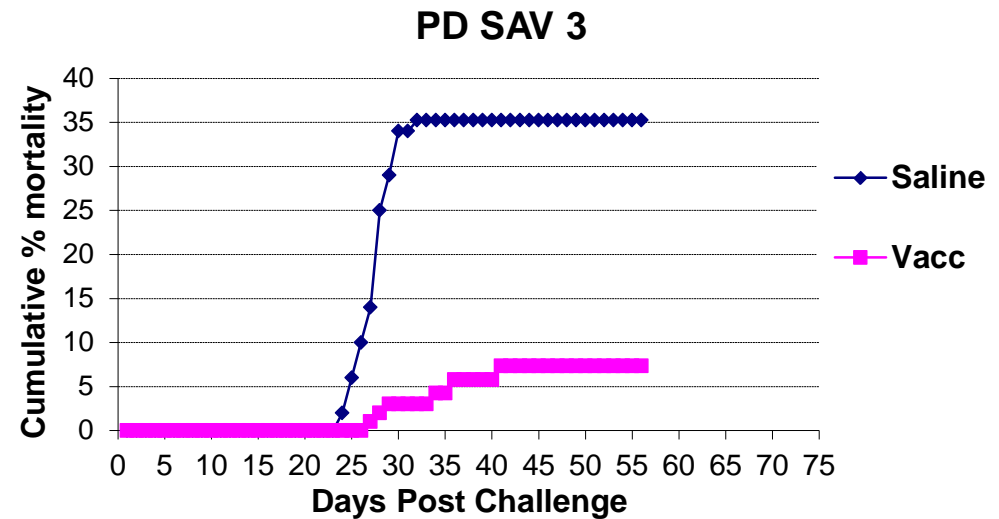
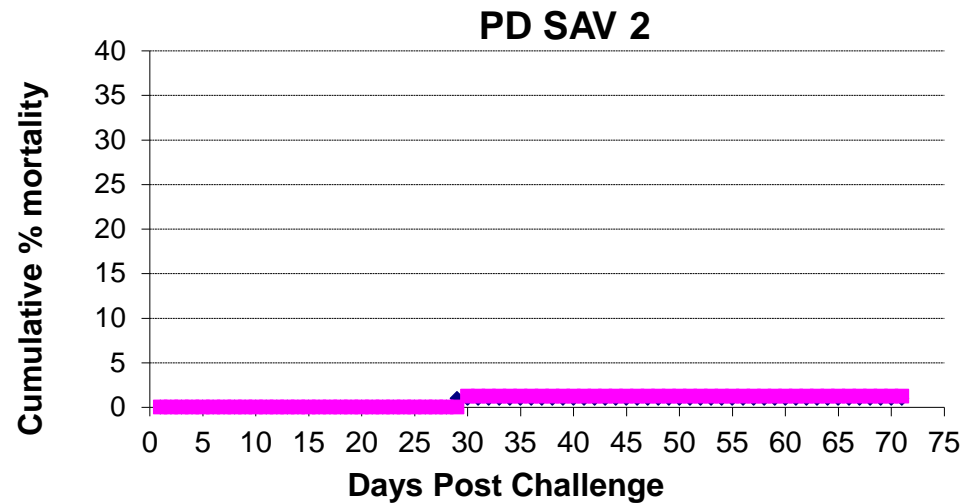
- 4 groups
  - SAV2 - vaccinated & unvaccinated (saline)
  - SAV3 - vaccinated & unvaccinated (saline)
- Co-habitation infection (30 % shedders)
- Sampling for histology, PCR and clinical chemistry
  - Before challenge - 20 fish
  - Week 4, 5, 6, 8 & 10 post challenge – 15\*- 20 fish/group





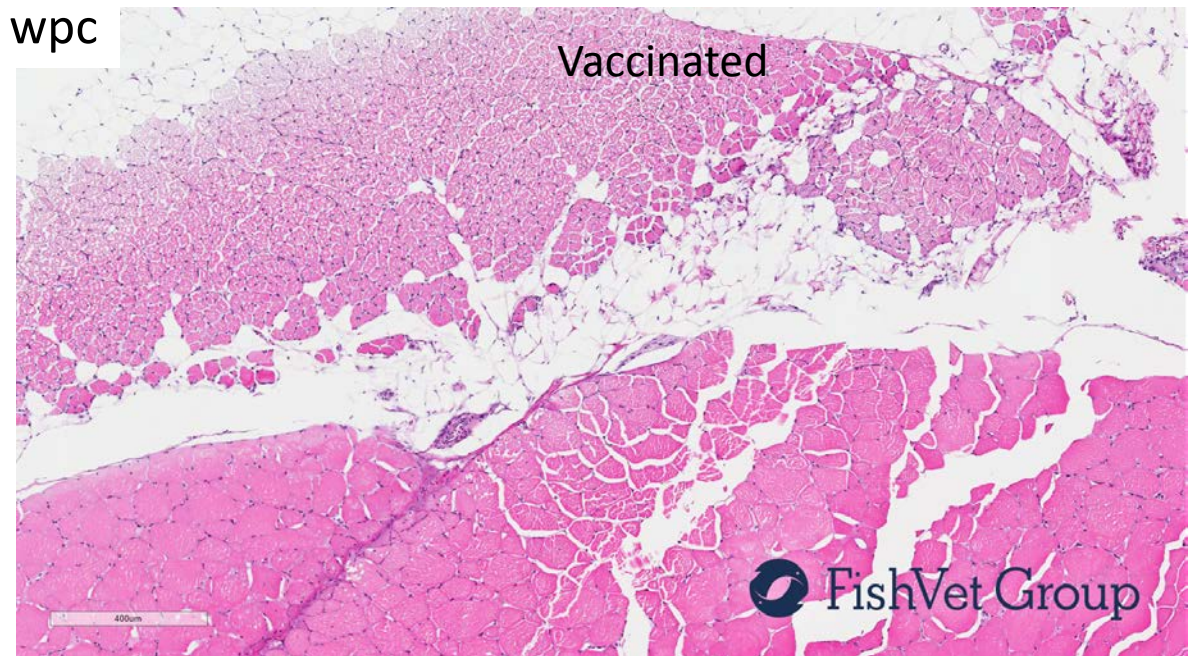
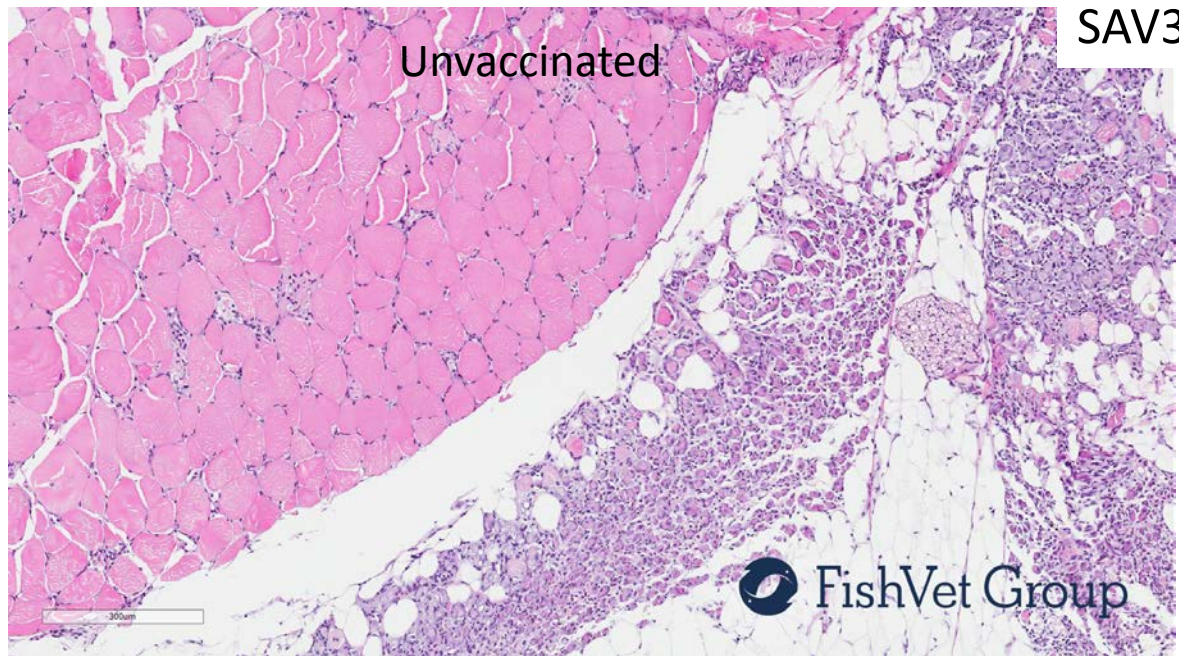
## Results mortality, PCR and histology

- Infection and PD histopathology confirmed for both genotypes
- Some mortality following challenge with SAV3 isolate
- No or negligible mortality following challenge with SAV2 isolate

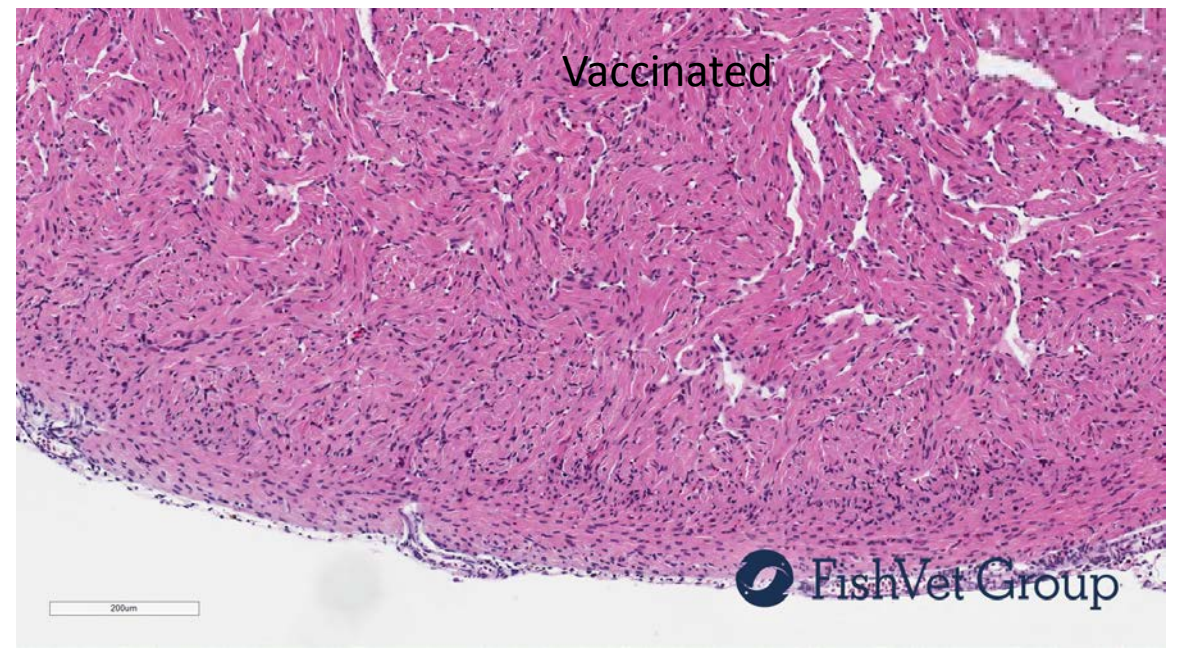
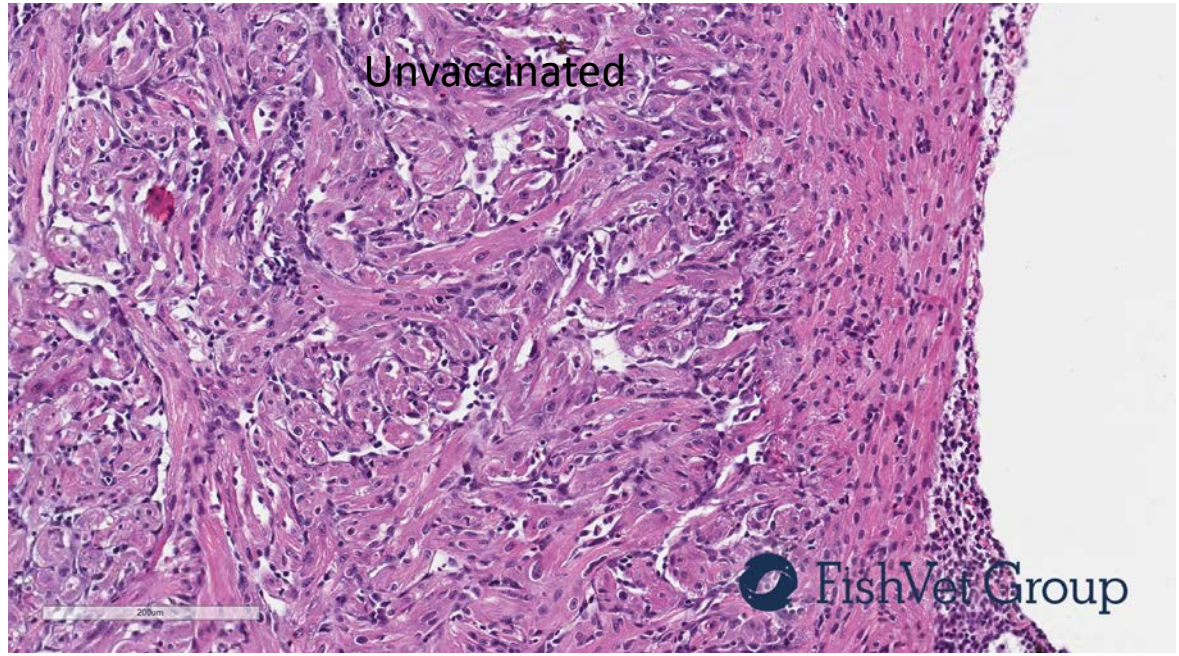




Muscle



Heart

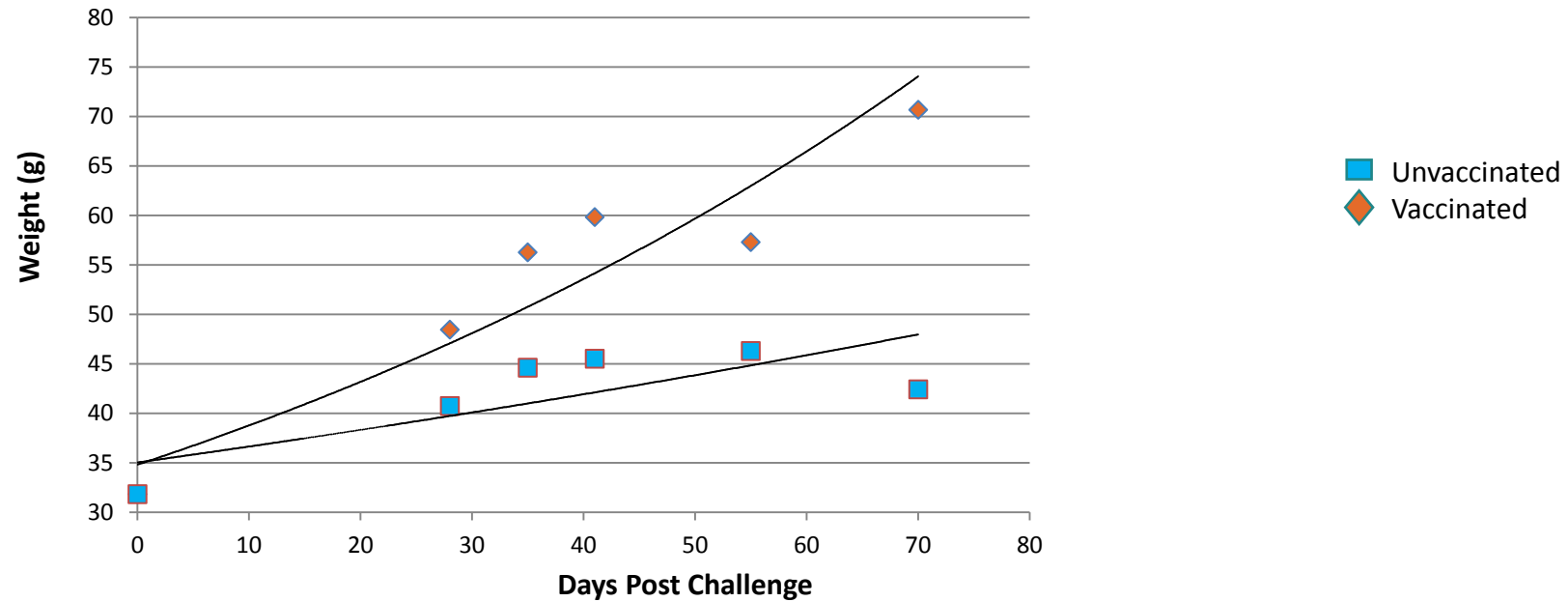






## Growth data SAV2 vaccinated vs. unvaccinated

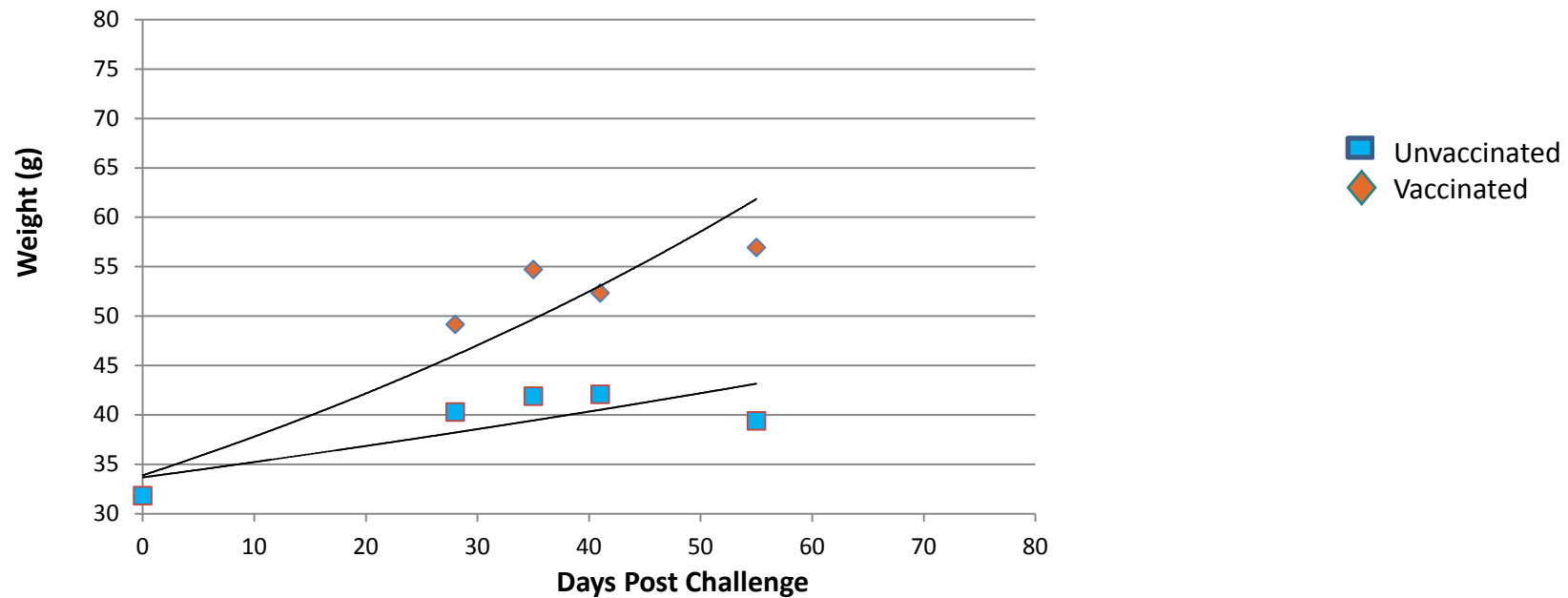
Avg. weight per sampling time - PD SAV 2





## Growth data SAV3 vaccinated vs. unvaccinated

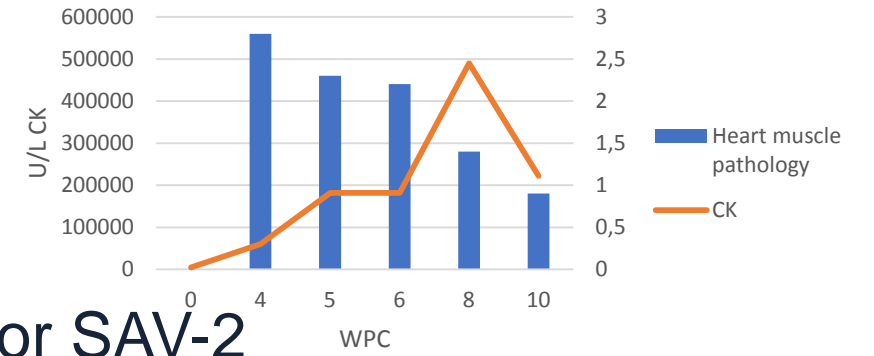
Avg. weight per sampling time - PD SAV3



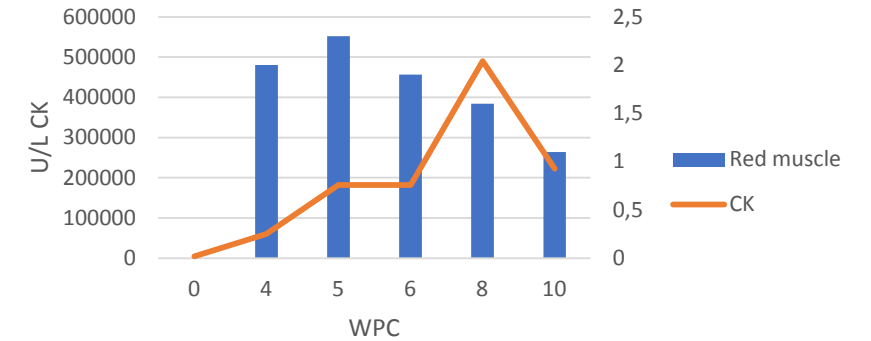


## Muscle damage detected by CK in blood for SAV-2

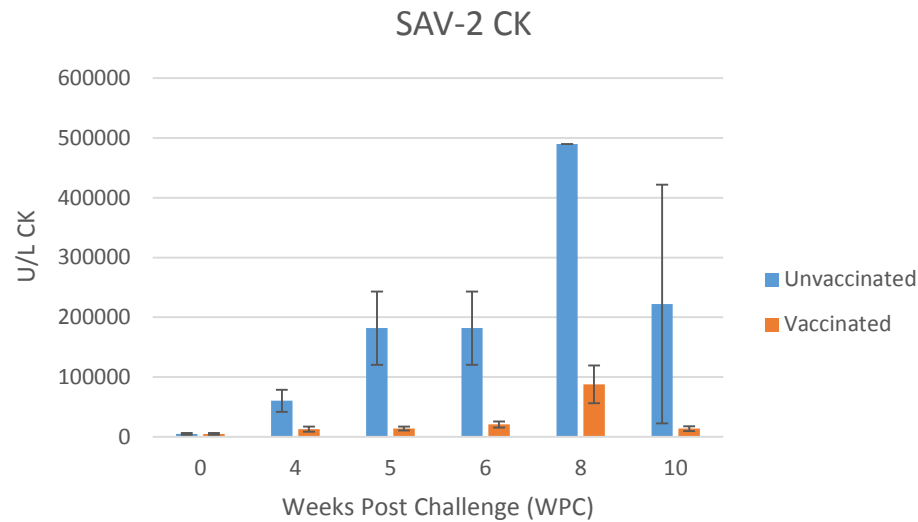
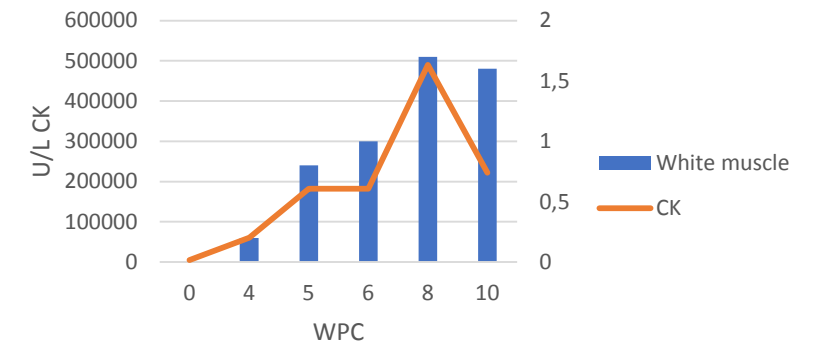
### SAV-2 Unvaccinated heart pathology and CK



### SAV-2 Unvaccinated red muscle pathology and CK

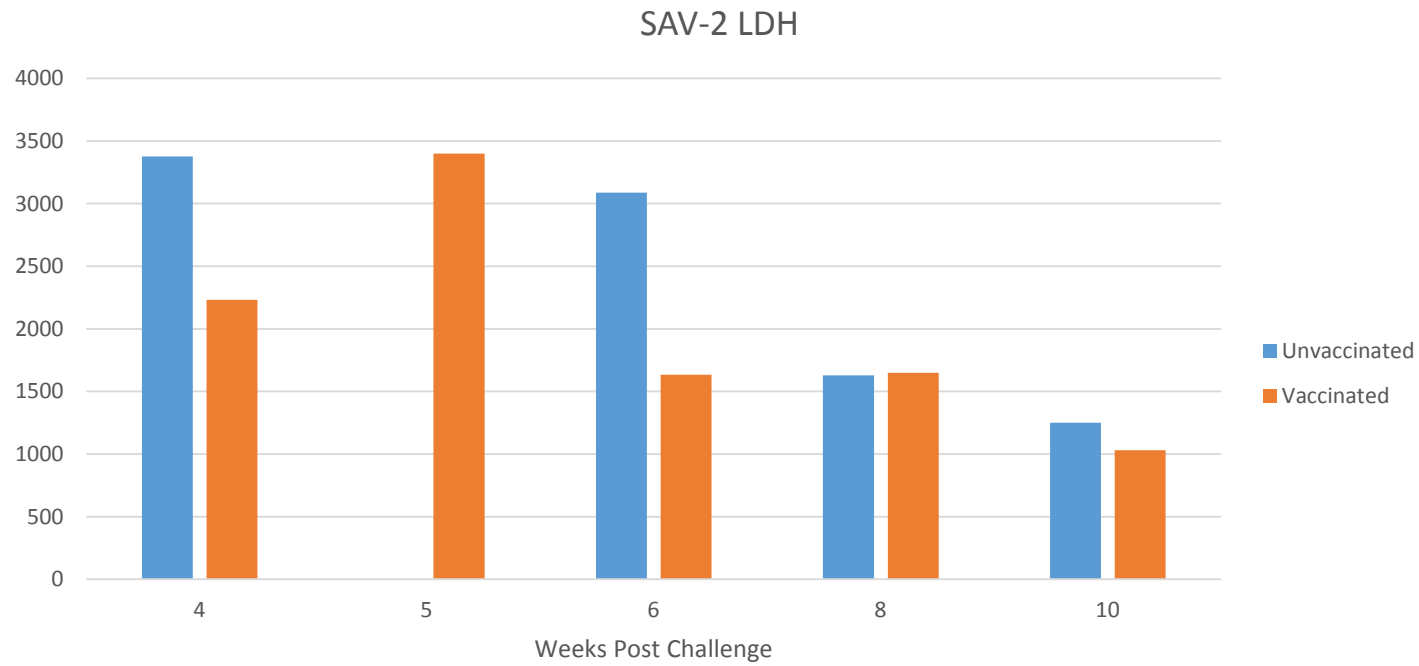


### SAV-2 Unvaccinated white muscle pathology and CK



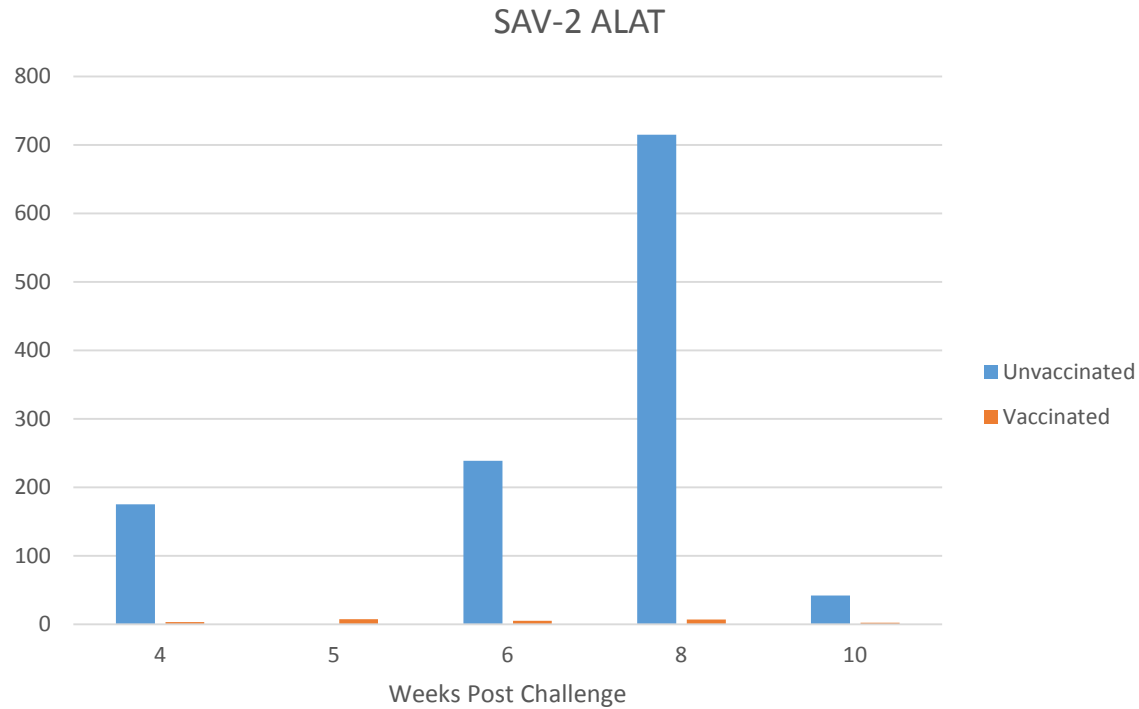


## LDH – did not correlate well with PD





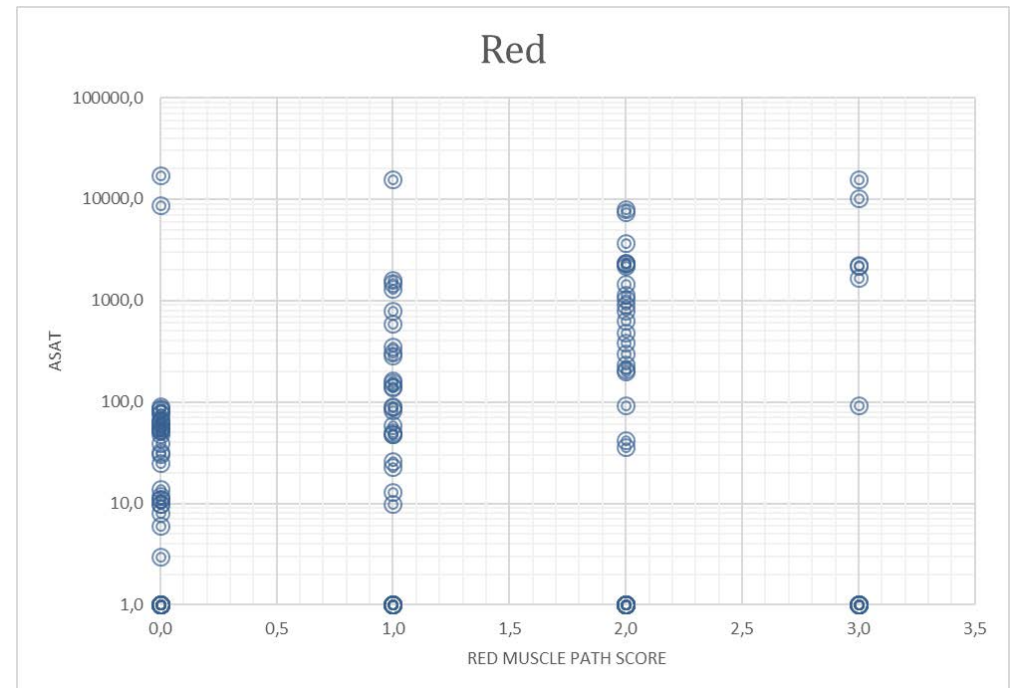
## ALAT (liver damage) – possible correlation with PD, but liver pathology not scored in trial





## ASAT - correlated well with red muscle damage

- Not complete data set, but all data combined (time, genotype, vaccinated and unvaccinated) showed a strong correlation between ASAT and red muscle pathology
- ASAT levels  $\log^{10}$





## Conclusions general: possible uses of clinical chemistry

- Supplement and reduce number of histopathology samples in infection studies
  - Reduce cost of analysis
- Assessment of tissue damage/fish welfare/prognostic/recovery indicator in field situation
  - Pre movement or lice-treatment
- Disadvantages
  - Not all markers are specific for PD (or even an infection)
- Advantages
  - Cheap, quick
  - Non lethal
  - Can sample at lice counting





## Conclusions this trial:

- Have identified markers that correlate with clinical PD in laboratory trials
  - Field application needs validation
- Potential as general fish welfare indicators
  - Other diseases
  - Handling
  - Treatments







## Funding



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Questions?

