



TRINATION

Celebrating 20 years of
collaborative research and
action
2005-2025

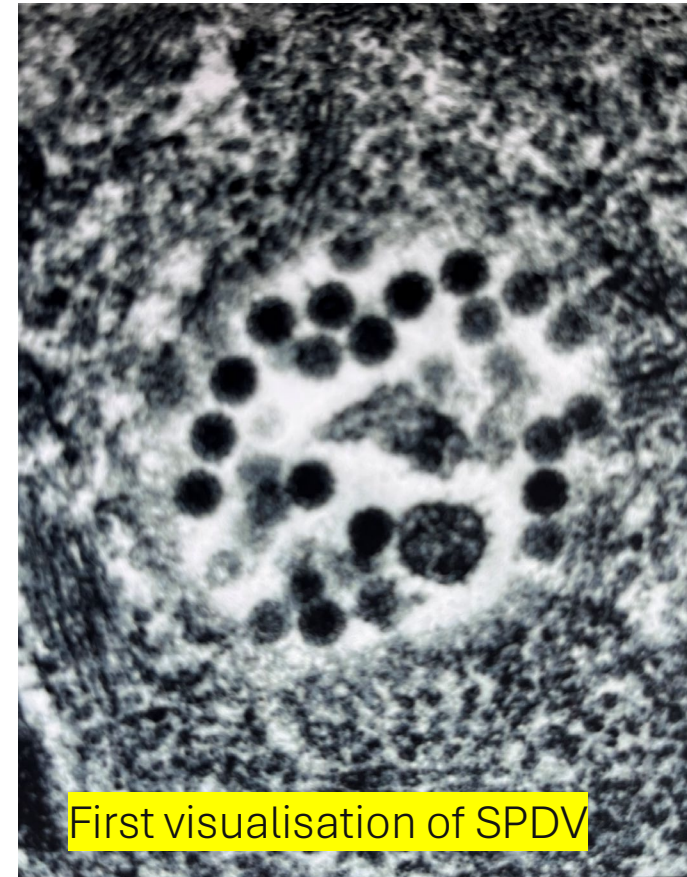
- Marian McLoughlin PHD MRCVS
- Micheal Ó Cinnéide

Pancreas Disease (PD) History- Early days

- PD was first recognised in Scotland in 1976 (Munro *et al* 1984)
- Poppe *et al*, described a similar condition in Norway in 1989 but was unsure of the cause as IPN and CMS were also prevalent.
- PD was causing devastating losses in Ireland from the mid 1980's (up to 50% losses) with the first published description by Rodger *et al* in 1991.
- Cause of PD was not known and there was considerable controversy re occurrence, diagnosis and severity.
- Both infectious and dietary causes were suggested

PD the 1990's

- Confusing array of clinical and histological findings in Ireland and not consistently recorded in Scotland and Norway.
- First sequential studies in Ireland and Scotland confirmed PD as a complex disease syndrome affecting a number of key organs in a temporal and consistent manner with varying degrees of severity.
- Strong circumstantial and experimental evidence emerged that PD was an infectious viral disease.
- A major breakthrough came with the isolation of Salmon Pancreas Disease Virus in 1993, the first alphavirus ever isolated from fish. (SAV) (Nelson *et al* 1995)
- Important to remember there was no PCR, gene sequencing at this time, it was old fashioned viral culture, histopathology and basic clinical biochemistry.



First visualisation of SPDV

Early 2000's- The Origin Of PD Trination

- First PD vaccine trials started in 1998, but commercial demand was mainly in Ireland where the disease continued to devastate.
- In 2003-2004 there was a significant increase in number of PD cases and geographical spread in Norway.
- On October 4th 2004, a seminar on PD in salmon was hosted by the Marine Institute in Galway with farmers, government, field vets and researchers, feed and pharmaceutical companies, from Ireland, Scotland & Norway.
- **Micheal Ó Cinnéide** had secured funding to initiate research on PD and saw an opportunity to collaborate internationally, particularly with Norway and Scotland,
- This was the beginning of the PD trination organisation which has meet regularly over the next 20 years and has become a model of international collaboration to effect rapid dissemination of information and action on fish diseases.

Aims of TriNation Forum

The aims of the group was to:

- Share knowledge and experience on pancreas disease.
- Accelerate progress in developing scientific control strategies.
- Identify knowledge gaps and future research strategies.

The role of the research co-ordinators involves:

- Ensuring project related activities (proposals, protocols, methodologies, developments etc.) are synchronised on a Tri-Nation basis
- To create dialogue (sharing knowledge, experiences) and co-ordinate communication between countries in the research area
- Communicate new results from the research area to the co-ordination committee and disseminate through the Trination meetings

Trination meetings 2005-06

Bergen February 2005 & Aberdeen March 2005

- The aim was to establish an international collaboration to address the increasing problems related to pancreas disease (PD). Several key knowledge gaps were identified, including transmission routes, possible reservoirs, stress factors, nutrition, and the relationship between PD and related diseases such as HSMI and CMS.
- The meeting concluded that coordinated international research was necessary. A follow up meeting occurred in Aberdeen in March 2005. A TriNation Alphavirus/PD research group was therefore established, with Gordon Ritchie proposed as coordinator.
- **Oslo Jan-Feb 2006 & Galway September 2006**
- Workshop at NVI on PD, Heart and Skeletal Muscle Inflammation (HSMI) & Cardiomyopathy Syndrome (CMS)
- During these meetings, the collaboration reviewed research progress from the previous year and agreed on a more structured organisation of the initiative.
- Steering Committee • Epidemiology • Aetiology and longitudinal studies • Diagnostics

TriNation Meetings 2007, 2008 & 2009



Aberdeen April 2007 & Bergen November 2007

- The meeting presented new findings on PD epidemiology, SAV virus diversity and diagnostic approaches. It also emphasised the need for improved monitoring and standardisation of diagnostic procedures.
- The November 2007 meeting in Bergen focused on translating research results into practical management strategies for the aquaculture industry. Topics included vaccination, virus transmission routes, site management practices, biosecurity measures and the impact of handling and temperature stress on disease outbreaks.

Galway May 2008 & Stirling 2009

- The 8th TriNation PD(+) seminar was held at the Marine Institute in Galway on May 7-8th 2008. Participation increased significantly and included representatives from research institutions, industry and regulatory authorities.
- Presentations highlighted that 2007 had been one of the most severe PD years across the three countries. The meeting also discussed vaccination strategies, functional feeds, changes in marine climate and improved management practices.
- Researchers presented new data on SAV subtypes and their geographical distribution. The meeting also addressed the question of vertical transmission and concluded that **PD was primarily spread horizontally** rather than through eggs.

Trination Meetings 2010, 2011 & 2012



Bergen April 2010 – The Ash Cloud & Belfast March 2011

- The PD situation had improved somewhat compared to previous years, but the disease remained a major challenge for salmon farming.
- The meeting included updates on vaccine development, epidemiology and improved disease management strategies.
- The 11th TriNation meeting took place in Belfast in March 2011. One of the most important scientific developments presented at this meeting was the identification and characterisation of the virus responsible for cardiomyopathy syndrome (CMS), now known as Piscine Myocarditis Virus (PMCV).

Leith, Edinburgh, Scotland September 2012

- Organisational transition for TriNation. **Gordon Ritchie** stepped down as chair after many years of leadership.
- **Charles McGurk** (Skretting ARC) took over as chair, while Britt Bang Jensen from the Norwegian Veterinary Institute assumed responsibility for the TriNation secretariat.

TriNation meetings 2014, 2015, 2016



Trondheim 2014

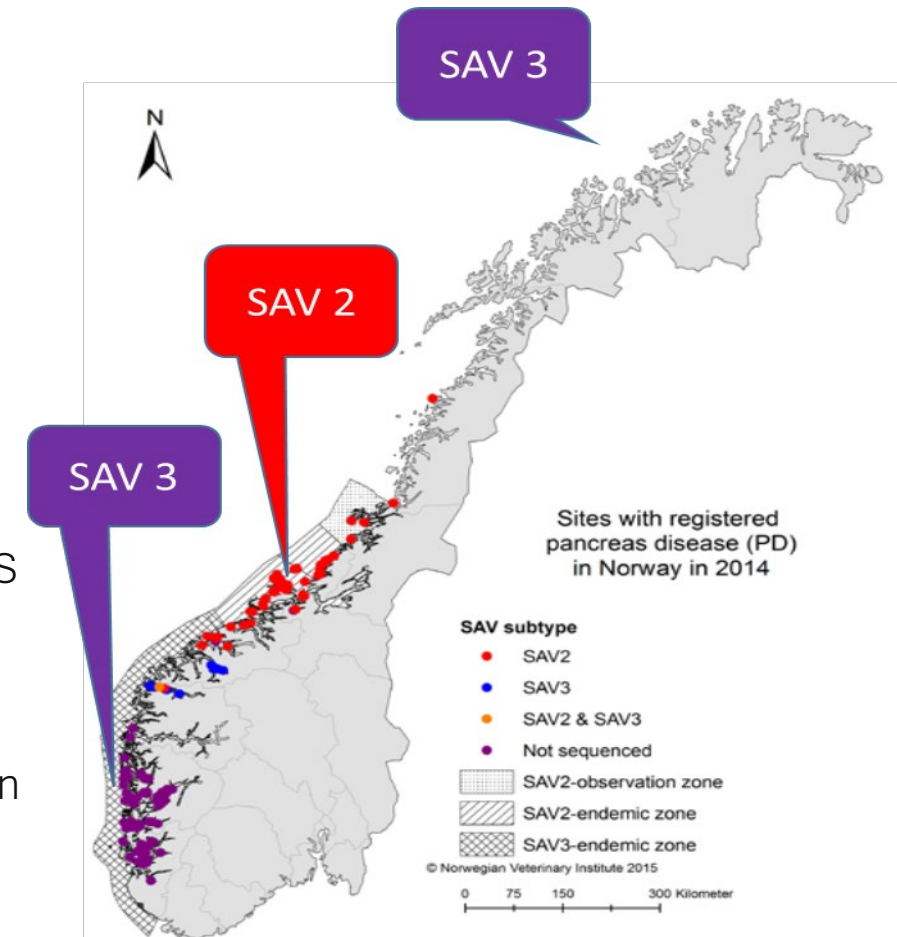
- Focused on **the spread of SAV2 in Norway** and the interaction between different viral diseases affecting salmon.
- New research also highlighted how muscle damage and viral myopathies could significantly affect product quality and economic returns in the aquaculture industry. **CMS described for first time in Ireland in 2012.**

Dublin 2015

- The 14th TriNation meeting was held at Trinity College Dublin in June 2015. Presentations focused on viral myopathies and the increasing importance of CMS and PRV infections in salmon populations.

Aberdeen 2016

- The fifteenth meeting in Aberdeen addressed epidemiology, reservoirs of infection and new developments in vaccination and nutrition strategies aimed at reducing disease impact. Potential for DNA-vaccine for PD was introduced.



TriNation meetings 2018,2019, 2021



Bergen 2018

- The 2017 meeting in Bergen provided updates on PD occurrence across the three countries and highlighted the growing importance of biomarkers and improved monitoring tools. Most of the committee indicated need for break from their active role. Many new steering committee members appointed and **Tore Hovland** became President. Steering committee: Tore Hovland, Britt Bang Jensen, Camilla MacDonald, Sonal Patel, Marit Stormoen, Kim Thompsen

Dublin 2019 – Meeting 17

- The 2019 meeting in Dublin marked approximately fifteen years of TriNation collaboration and highlighted the significant scientific progress achieved through international cooperation. PD Trination changed name to TriNation and got its own logo.

Digital 2021 – Meeting 18, Covid

- The 2021 meeting was attended by around 120 delegates and continued challenges with increasing CMS, and vaccine development against PMCV not being an easy task. Blood biochemistry for early detection and potential tool for heart diseases was discussed. Secretariat passed over from **Britt Bang Jensen** to **Sonal Patel**.

TRINATION meetings 2022 & 2024

Bergen 2024



Edinburgh 2022 – Meeting 18

- The meeting in Scotland in 2022 focused primarily on cardiac diseases in salmon, particularly CMS, PD and HSMI.

New research highlighted how cardiac anatomy, temperature stress and handling could influence the severity of disease outcomes. Statutes for committee and Reference group established, and new members taking active role.

Bergen 2024 – Meeting 19

- The 19th TriNation meeting was held in Bergen in March 2024 and attracted around 120 participants, from 12 countries for a review of the latest status from the field and research for the heart diseases PD, CMS * HSMI.
- By this time PD cases had declined significantly in Norway due to coordinated management strategies, while CMS had become an increasingly important viral disease.

Achievements of TriNation Approach

- The PD Trination initiative (est. 2005) has proved to be an excellent working model. (Since 2004 over 200 papers on PD published.
- It both integrates and focuses the activities of academia and industry from Norway, Ireland, Scotland and more recently other salmon farming regions.
- This industry led initiative has made major contributions to developing a fuller understanding of PD and related conditions by encouraging new and collaborative research and sharing of results in a transparent manner.
- Greater knowledge of the risks associated with the development and spread of the disease as well as an understanding of the viral characteristics have helped shape strategies for disease prevention and mitigation for the benefit of the salmon farming industry. (Since 2004 over 200 papers on PD published)
- The commitment of farming companies, scientists and governmental institutions to this initiative is matched by the focus and drive of the Steering Committee (SC), which has played a crucial role in these achievements.
- This model of co-operation has been adopted by other serious disease issues in the salmon industry such as Gill Health, Cleaner Fish, Sea Lice, SRS.

Current Trination Steering Committee

Chairman: Tore Hovland, Aqua Kompetanse, Norway

Secretary: Sonal Patel, *Norwegian Veterinary Institute, Norway*

SC Members:

- Tore Hovland, Aqua Kompetanse, Norway
- Sonal Patel, *Norwegian Veterinary Institute, Norway*
- *Marit Stormoen, NMBU, Norway*
- *Sven Martin Jørgensen, FHF, Norway*
- *Kim Thompson, Scotland*
- *Silvia Soares, Marine laboratory, The Government of Scotland*
- *Kimberley McKinnell, Bakkafrost, Scotland*
- *Susie Mitchell, Stim, Ireland*
- *Samantha White, Marine Institute, Ireland*



Key Leadership Roles

- Initiator (2004): Micheal Ó Cinnéide – Marine Institute, Ireland
- Chair (2005 - 2012): Gordon Ritchie – Marine Harvest
- Chair (2012 – 2016/2018): Charles McGurk – Skretting ARC
- Secretary (2012 - 2020): Britt Bang Jensen – Norwegian Veterinary Institute
- Secretary (2021 – to date): Sonal Patel – Norwegian Veterinary Institute
- Chair (2018 – to date): Tore Hovland – Aqua Kompetanse
- **There are so many key contributors to this innovative project that I don't want to leave anyone out, but you know who you are and congratulations on your efforts to ensure a few more farmed salmon survive and are healthier due your persistence, expertise and collaboration.**



Sponsors – Thank you!





Thank you for your attention
Enjoy the conference and your visit to
Belfast