Tuesday September 4th – Archibald / Campbell
Sea Lice 3
Moderator – Mark Fast (Atlantic Veterinary College / UPEI)

1:15 PM	Sea Lice 3	Bui - Effect of Lice Prevention Technologies on Salmon Welfare and Infection Status
1:30 PM		Elghafghuf - Quantifying and Modelling the Impact of the Influx of Sea Lice From Neighbouring Farms in Grand Manan, New Brunswick
1:45 PM		**Nilsen - Production of Atlantic Salmon (*Salmo salar*) in Closed Confinement Systems (CCS)**
2:00 PM		Kattambally - Marine Fishes From Kerala Coast, India Are the Potential Hosts for Caligids (Caligidae: Copepoda)

Effect of Lice Prevention Technologies on Salmon Welfare and Infection Status

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The impact of sea lice (*Lepeophtheirus salmonis* and *Caligus* spp.) on the salmon aquaculture industry extends to the environmental, welfare, and economic burdens associated with their treatment and control. With the increasing pressure to suppress sea lice levels in salmon farms, many farmers will consider implementing multiple prevention methods throughout a production cycle, and possibly even use methods simultaneously to maximise their integrated pest management (IPM) strategy. However, often new cage technologies have not been thoroughly verified in their efficiency, or impact on fish welfare and behaviour. We aimed to determine whether certain technologies could have a cumulative effect on preventing sea lice infestations or welfare status, at a commercial scale. Four prevention approaches were tested: the use of cleaner fish, the provision of feed that has been enhanced with functional ingredients, the implementation of a deep light source in combination with deep feeding zones, and the use of a non-permeable lice skirt.

A commercial-scale study was conducted over 14 months, following the welfare and infection status of salmon held in sea cages with increasing cumulative prevention/control methods (in 4 treatment groups). All cages were sampled every 3-4 weeks, with detailed welfare assessments and lice counts recorded. Welfare was determined using the Salmon Welfare Index Model which uses ratings of factors such as skin, fin, eyes and gill condition, condition factor, presence of wounds, and parasite load, to calculate an Overall Welfare Index. This value allows direct comparison of welfare status across treatment groups. Vertical swimming behaviour of the school and environmental conditions was monitored throughout.

Overall welfare status fluctuated with season, however cages with the addition of deep lights + deep feeding, and lice skirts, demonstrated a slightly better welfare score over the 14 months compared to the groups without. The treatment group with all technologies generally supressed new infestations more than those groups with fewer technologies. During the winter peak of infestation pressure, cages with all technologies acquired approximately 50% fewer lice than the others. However, the lower new infestations over the 14 months did not translate to fewer delousing events, indicating a possible negative interaction between the efficiency of cleaner fish and the deep lights + deep feeding or skirts.

Industry decisions on integrated pest management should incorporate scientific evidence on new technology efficiencies and welfare impact, to create optimal solutions that consider fish health and welfare.

Conference Session Designation: (Parasitology Sea Lice – Ectoparasites)
Presentation Format: (Oral or Poster)

Quantifying, and Modelling the Impact of, the Influx of Sea Lice from Neighbouring Farms in Grand Manan, New Brunswick

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Sea lice infestation is a major challenge for salmon aquaculturists in Canada and worldwide. The parasites cause welfare problems for farmed salmon and lead to economic losses on farms. We here quantify the infestation pressure from sea lice on farms in Grand Manan using four different methods, and estimate the effects of these pressures on farm-level sea lice abundance using a multivariate state-space model. The state-space model includes, in addition to the internal and external infestation pressure variables, seawater temperature, bath and in-feed treatments as covariates. In the analysis, we allow for the effects of internal and external infestation pressures to be estimated either as a common parameter across all production cycles or as different parameters (i.e., each production cycle has its own parameters). Other variable effects in the model are estimated as common parameters across production cycles. The performance of methods for quantifying infestation pressure and models within the same method are compared based on the sample-size corrected Akaike Information Criterion (AICc).
The results showed that the model with common internal and external infestation pressures across all production cycles had the best fit. Furthermore, methods of quantifying infestation pressure that take into account water temperature and development times of the pre-infective stages of lice had better model fits.

Conference Session Designation: (Parasitology Sea Lice)
Presentation Format: (Oral)

Production of Atlantic Salmon (*Salmo Salar*) in Closed Confinement Systems (CCS)

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There is increasing concern about Norwegian salmon farming and the possible environmental impacts from sea lice, escaped fish and release of toxic chemicals and organic emissions to the coastal waters. Closed containment systems (CCS) have the potential to eliminate the problems with salmon lice (*Lepeophtheirus salmonis*) and to reduce escapes and emissions. From May 2012 to May 2017 we monitored post-smolt (90 – 1000 g) in 30 closed cages and 9 open reference cages. We report the effect on salmon lice, growth rates (SGR/TGC), feed conversion ratio (FCR), crude mortality rates, cause specific mortality rates and mortality patterns. We also describe the specific mortality causes, identified pathogens and the most important risk factors.

Conference Session Designation: (Parasitology Sea Lice – Ectoparasites)
Presentation Format: (Oral)
Student Presentation: (Yes)

Marine fishes from Kerala coast, India are the potential hosts for Caligids (Caligidae:Copepoda)

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Caligids, generally called as sea lice comprising over 30 genera and 465 species causing severe economic losses to fin-fish aquaculture. The present paper reports the massive infection of caligids on the marine fishes of Kerala coast, India. 24 species of caligids from 6 genera including *Caligus, Hermilius, Synestius, Euryphorus, Caligodes, Parapetalus* were recovered from 21 species of fishes belonging to 13 families (Scombridae, Coryphaenidae, Carangidae, Stromateidae, Priacanthidae, Polynemidae, Cichlidae, Scatophagidae, Trichiuridae, Mugilidae, Arridae, Belonidae, Rachycentridae). The maximum species of caligids were recovered from the fish family Scombridae. The genus *Caligus* dominates with 18 species. All recovered caligids showed wide variation in their prevalence, intensity, host specificity, site specificity and microhabitat preference. The highest prevalence (71.4%) was shown by Caligus *rotundigenitalis* infecting the fish *Scatophagus argus*. The maximum intensity (5.3) was shown by *Euryphorus nordmanni* infecting the fish *Coryphaena hippurus*. The further aspects of host fish-caligid interaction are also discussed.

Conference Session Designation: (General session-Parasitology Sea Lice-Ectoparasites)
Presentation Format: (Oral)