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Risk factors for Infectious Salmon Anemia (ISA) outbreaks and virus transmission in farmed salmon from Southern Chile

Monti G[a]; **Mendoza**[a,b] **A**; **Frankena K**[c] **and De Jong M.C.M.M**[c],

[a] Institute of Preventive Medicine, Faculty of Veterinary Sciences Universidad Austral de Chile (UACh), Chile, PO BOX 567, Valdivia [b] SGS, Puerto Varas, Chile [c] Quantitative Veterinary Epidemiology group, Wageningen University, Wageningen, The Netherlands

Objectives

The aims of the study were:

A) to identify host, environmental and management risk factors associated with ISAv outbreaks for a year class of Atlantic salmon under the current conditions of the Chilean production system;

B) to assess space-time clustering of outbreaks.

Material and Methods

• The retrospective study with all smolts stocked from a company (01/ 2008 until reaching commercial weight or by stamping out due to ISA.

•A case was defined as a net-pen that presented fishes with clinical signs (or lesions consistent with ISA), a disease-induced mortality rate of at least of 0.01% and at least one fish testing positive to reverse transcription-polymerase chain reaction test for ISAv.

•A suspected net-pen was one that fulfills at least one of the 3 criteria above or if it had received live fishes from another suspected or confirmed case site or net-pen.

•A personally administrated questionnaire was applied to each veterinarian responsible for the site and it contained several questions related to site-level and net-pen–level, for production conditions, environmental, health and management practices, etc.

•The incidence rate of outbreaks was estimated as the number of new cases over the number of net-pens-month-at-risk, on a monthly basis.

•A Cox proportional hazard model containing random and fixed effects was used to evaluate potential risk factors.

Finally a space-time retrospective analysis (using cases only) was performed using SATScan.

Conclusions

More outbreaks occur late in the 1st year of the marine-phase.

More net pen-level variables than site-level variables were statistically associated with risk of outbreak.

There was space-time heterogeneity that needs to be considered

Results

All sites presented outbreaks and 139/243 (57.2%) net-pens were defined as cases .

Median time from stocking time to outbreak was 251 days, IQR= 142.

The final model contained 9 main effects and 3 interactions (but only one statistically significant), those that increased the risk of outbreak (P< 0.05) were:
- •total no. stressing events (HR 1.31),
- •total no. outbreaks of vibriosis and Salmon Rickettsial Syndrome, previous to ISA outbreak (HR 2.06),
- •no. sea lice treatment-baths (HR 3.37),
- •no. husbandry practices applied on the net-pen (HR 1.89).

Variables associated with a decreased risk of an ISA outbreak (P< 0.05) were;
- •average stocking weight (net-pen) (gr) (HR 0.99),
- •proximity (mt) to a net-pen with an outbreak (HR 0.98),
- •site not sharing wharfs (HR 0.005),
- •plant B where fish is processed (HR 0.19);
- •and surveillance district in which the site is located

Interactions
- •Total No. stressing events* No. sea lice treatment-baths (HR=0.96)

The space-time analysis detected a cluster composed by 2 sites during 09/2008 to 12/2008.