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MOWI Scotland

Policy on Integrated Pest Management (IPM) for sea lice control

Integrated Pest Management (IPM) involves a multifaceted and systematic approach to pest management and is considered highly important for effective sea lice management. IPM for sea lice is based upon proven techniques and approaches to terrestrial parasite management for agriculture systems. It accounts for multiple objectives in managing the problem, considers available preventative and intervention options and makes informed decisions aimed at achieving optimal results.

Mowi recognizes the importance of IPM to reduce lice infection pressure, resistance development and medicine use, and optimize lice control in our operations. The following key elements are identified as part of Mowi's IPM approach:

Lice levels and monitoring

- Adhere to National thresholds/limits on sea lice levels and required actions
- Keep lice pressure as low as possible throughout the production cycle
- Lice counting and reporting by trained staff, at a frequency defined by local regulations
- Weekly and precise counting, and reporting, of sea lice levels on all seawater sites
- Monitor lice development on all seawater sites

Husbandry and management

- Only single year-class stocking
- Fallow between production cycles
- Health management / veterinary health plan in operation
- Maintain clean nets to increase water flow
- Routine removal of moribund fish
- Monitor fish health status, behaviour and disease

Prevention

- Use cleanerfish where experiences are good and cleanerfish are available
- Re-stock with additional cleanerfish as and when required
- Integrate preventive tools (skirts, deep-feeding, deep-lights etc) where conditions permit and such tools are available
- Apply functional feeds with proven effect
- Coordinate lice management plans within the ABM

Intervention

- Only use authorised medicines, prescribed by a veterinarian, and according to clinical needs.

- Minimise internal infection pressure and handling by treating on pen level (single pen treatment strategy)
- Use the appropriate intervention tools for the lice stages being targeted Ensure sufficient capacity on intervention tools
- For each production cycle, and where available, evaluate and use non-medicinal treatment tools
- Practice intervention rotation, where possible and permitted
- Maintain treatment records and monitor treatment efficacy
- Coordinate treatments within the ABM, where possible
- Have knowledge of the resistance status in the ABM

Mowi Scotland has, at its disposal, various non-medicinal sea lice interventions. The availability of these is assessed and applied throughout the cycle. All Mowi Scotland ASC sites have the following interventions available:

Skirts

All sites should have skirts from smolt input, ideally skirts should be placed before the smolts arrive to the sites. Skirts should be actively managed, and informed decisions taken to decide how to best use them. It is recommended to keep skirts for as long as possible. This will not apply to sites with enviro nets or square pens. Skirts assist in excluding lice from fish in the upper levels of the water column and have been demonstrated to minimize lice contact.

Cleaner fish

Mowi Scotland has developed a non-medicinal strategy to control sea lice using cleaner fish. This is the preferred strategy for managing sea lice infections. Cleaner fish are species which display a natural behaviour of removing parasites from other fish species. The main interest is in wrasse of the genus Labroides, of which there are a number of species indigenous to European waters. Mowi Scotland will endeavour to stock all sea sites with cleaner fish. This will involve the stocking of wrasse at a minimum stocking rate of up to 6% of the salmon pen population. Cleaner fish are already deployed in Mowi farms in Scotland with good success. Results to date illustrate that cleaner fish will maintain ovigerous lice levels on salmon in pens at below 0.1 lice per fish. It also has the beneficial effect of radically reducing the use of chemical treatments and, therefore, treatment dispersal.

Mechanical delousing Methods

Non-chemical treatments are used by Mowi amongst which:

- **Combination Freshwater and FLS**: Salmon are pumped gently into a pipe. They swim against water current and travel down the pipe, tail first. They are then exposed to freshwater for 3 hrs which weakens sea lice and go through a flusher system on the way back to the pens. The jet is insufficient to stop the salmon from passing through the pipe but is powerful enough to strip sea lice off the salmon. This is achieved because each louse is only attached to the salmon by a suction cup on its thorax. The jets lift the abdomen of each louse, which is not attached and this dislodges the lice from the salmon as they pass. FLS uses less water pressure than the previously used hydrolicer (half) and the efficacity is increased as sea lice are easier to dislodge following the freshwater bath. Detached lice are removed and destroyed automatically whilst the deloused salmon are returned to their pen.

- **Thermolicer**: Salmon are pumped gently into a pipe. They swim against water current and travel down the pipe onto a de-waterer. They are then subjected to a warm water bath for the duration of <30s which creates a temperature shock that detaches the lice. Detached lice are

removed and destroyed automatically whilst the deloused salmon are returned to their pen after being once more de-watered.

Sea lice levels in our operations are reported regularly through several public channels. Links to publicly available sea lice data are provided below. In addition, through our annual report, we disclose the % sites above national trigger levels (at any time), the proportion of fish treated with nonmedicinal systems and the quantity of sea lice medicines (oral, topical) used in our operations (as g active ingredient/t produced).

Mowi is actively investing in R&D on cleaner fish. Main goals of this research are to secure good welfare, survival and efficacy of the cleaner fish. To reach these goals we work on areas of feed development, vaccines, production optimization and developing best practices.

The % of sites above national trigger levels is registered on a monthly basis for each of our farming operations and the average calculated on an annual basis. This does not mean that a site above the limit at any time will continue to be above the limit. On the contrary, when a site is registered above the limit, then action is taken to get below the limit. Meaning, all sites registered above the limit (at any time) would be treated to, again, be below the limit. In Scotland, Ireland, Faroes, Canada and Chile, regulatory sea limits are limits for action to be taken.

Scotland Reporting - https://mowi.com/uk/sustainability/lice-mortality-reporting/

Scotland – Lice Limits

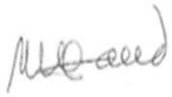
2 adult females/fish (reporting) and 6 adult females/fish (intervention), all year round

Species: *Lepeophtheirus salmonis*

During sensitive periods for out-migrating salmonid species, identified as 1st February to 30th June, the farm must maintain lice levels below 0.5 adult female per fish.

Unless a farm specific IPM is deemed appropriate this document is applicable to all Mowi Scotland ASC sites and will be reviewed annually.

Signed on behalf of Mowi Scotland



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