Reports and Comments

Welfare indicators for farmed Atlantic Salmon

The FISHWELL project, supported by the Norwegian Seafood Research Fund (FHF), began in 2015 and has involved welfare scientists and veterinarians from Nofima, the Institute of Marine Research (IMR), the Norwegian Veterinary Institute (NVI), Nord University, and the University of Stirling's Institute of Aquaculture, working together to produce a practical handbook on how to assess the welfare of farmed Atlantic salmon. Originally published in Norwegian in 2017, *Welfare Indicators for Farmed Atlantic Salmon: Tools for Assessing Fish Welfare*, has more recently been published in English.

Although there is a steadily growing body of both fundamental and applied aquaculture research, the authors acknowledge that this information may not always be readily available to the farmer or other end-users. Additionally, once the information has been accessed, there may be further challenges when attempting to interpret and use the data — depending on factors, such as fish species, life stage, practicality, differing husbandry routines and infrastructure.

The main objective of the handbook has therefore been: "to assemble a farm-friendly toolbox of fit for purpose Operational Welfare Indicators (OWIs) and Laboratory-Based Welfare Indicators (LABWIs) for use out on fish farms in different production systems and husbandry routines."

Over 90 environmental and animal (group- and individual-) based welfare indicators were evaluated for their relevance, usability on-farm, reliability and suitability for aquaculture. Approximately 50 welfare indicators were then selected for inclusion in the handbook: operational welfare indicators are those which may be used to assess fish welfare on the farm, and laboratory-based welfare indicators require a sample to be sent to a laboratory.

The handbook is divided into three main sections: Part A, Knowledge and theoretical background; Part B, Fit for purpose OWIs for different production systems; and Part C, Fit for purpose OWIs for different routines and operations.

Production systems considered in Part B include: flow-through; recirculating; sea cages (submerged and snorkel); and semi-closed containment systems. Lice skirts are also discussed. Fourteen welfare indicators (including: opercular damage; snout damage; scale loss; sea lice infection; jaw deformity [upper and lower], fin damage [healed and active], eye haemorrhage and emaciation) are then described in more detail using a 0–3 scoring system where 0 is normal, level 1 minor, up to level 3 (clear evidence of the OWI). Part C considers how best to monitor welfare in a variety of situations, including: crowding, pumping slaughter, transport, and grading, amongst others. Summary tables of suitable OWIs and LABWIs for each of the different production systems (Part B) and routines/operations (Part C) are provided within each section.

The handbook is comprehensive and has been well-received by the industry. Another handbook focusing on welfare indicators for rainbow trout is expected to be released later in the year. There are also plans for the FISHWELL project to progress to a 2nd Stage, which would involve auditing and interpreting data and, potentially, a 3rd Stage (Development of assessment tools and/or protocols/standards).

The English version of the handbook, along with a useful poster illustrating morphological operational welfare indicators, is freely available.

Welfare Indicators for Farmed Atlantic Salmon: Tools for Assessing Fish Welfare (November 2018). A4, 351 pages. Available for download from the following website: https://nofima.no/en/nyhet/2018/11/the-english-version-of-the-fishwell-atlantic-salmon-welfare-handbook-is-out-now/.

E Carter,
UFAW

Hazard identification and ranking for poultry at slaughter

National Contact Points (NCPs) are independent organisations that are responsible for sharing best practice and providing technical and scientific information. They are based in all European Union countries and Associated States, as well as in some non-European countries.

The Animal Health and Welfare (AHAW) Network on 'NCP for EC Regulation 1099/2009' was established under Article 20 of Council Regulation (EC) 1099/2009 on the Protection of Animals at the Time of Killing. The Network meets once a year and at the October 2018 meeting the European Food Safety Authority (EFSA) asked the NCPs to identify and rank hazards for poultry at all stages of slaughter, including: arrival, unloading, lairage, handling and moving of animals, restraint, stunning, and bleeding. Hazards which may result in reduced animal welfare were listed for each stage and the NCPs then voted for hazards that were present in their country.

The three most common hazards for each of the seven stages were: 1) Arrival, prolonged waiting time to unloading, poor environmental temperatures and overstocking of birds; 2) Unloading, rough handling leading to fear and physical injury, container tilting and birds bunching, and noise; 3) Lairage, poor environmental temperature, poor air movement/ventilation, and poor humidity; 4) Handling and moving of animals, rough handling during removal from crates, tipping or dumping of birds on conveyors, and lack of any contingency plan; 5) Restraint, improper shackle resulting in leg compression, improper shackling of birds, and birds being shackled when injured; 6) Stunning, inefficient stunning due to different sizes of animals being processed, lack of or poor calibration of monitors during either gas, electrical or water-bath stunning, and pre-stun shocks during water-bath stunning; 7) Slaughter, poor neck-

https://doi.org/10.1017/S0962728600010952 Published online by Cambridge University Press

cutting practices, neck cutting conscious birds, and prolonged stun-to-neck cutting interval.

EFSA considers that the resulting ranking of hazards gives an indication of the most common threats which poultry may encounter during the slaughter process, thus highlighting the areas which should be focused on in order to improve animal welfare.

Hazard Identification and Ranking for Poultry at Slaughter (October 2018). A4, 7 pages. European Food Safety Authority (EFSA). https://doi.org/10.2901/sp.efsa.2018.EN-1519.

E Carter,
UFAW

https://doi.org/10.1017/S0962728600010952 Published online by Cambridge University Press