FishEnds/FISHEnds-DIG

Presented by

Aurora Brønstad

University of Bergen

Objectives

- Improve and refine studies in fish by focus on Score sheets and Humane endpoints
  - ➢True predictors of animal going into a severe clinical stage
  - ➢Appropriate actions to mitigate pain, suffering and distress

1. Refinement of welfare indicator scores
   - ❑ Morphological (fishwell, gill score++)
   - ❑ Behavioral

   Available by daily, non-intrusive/invasive observations

2. Digital solution for recording, storing, reporting and learning

Refinement of Humane endpoints and Score sheets for studies in fish

Objective 1

5/6/2021

Welfare Indicators for farmed Atlantic salmon:
tools for assessing fish welfare

FISHWELL Morphological Operational Welfare Indicators (OWI's) for farmed Atlantic salmon v1.1

Severity and humane endpoints in fish research

SEVERITY AND HUMANE ENDPOINTS IN FISH RESEARCH

Experiment i fish has to be classified as Terminal, Mild, Moderate or Severe

Opening registration 08:00

Topics

- 0830-0850 Aurora Brønstad, UoB, Norway. Introduction and Humane endpoints.
- 0850-0935 Anne D. Degryse, FELASA (WG Severity Assessment, Severity classification.
- 09:35-10:15 Trygve Poppe, Norway´s Environmental and Life Sciences University, Norway. Why ethics also should apply to fish

WORKSHOP

04.10.2019 - 08.30–16.00
VilVite
Aurora Margrethe Brønstad
Registration deadline 23.09.2019 - 12.00

2019

Establishing score sheets and defining endpoints in fish experiments

SCORE SHEETS AND ENDPOINTS IN FISH RESEARCH

Program

8:00-9:00	Opening registration and coffee
9:00-9:45	Aurora Brønstad, University of Bergen (UoB): Introduction to humane endpoints in fish experiments
	Linda Andersen, ILAB & Anita Rønneseth, UoB: Outline for the workshop
Coffee r	
10:00	

WORKSHOP

28.01.2020 - 08.00–16.00
Universitetet i Bergen - Aulaen
Aurora Margrethe Brønstad
Registration deadline

2020

https://www.fishfarmingexpert.com/article/talking-our-language-welfare-indicators-handbook-now-available-in-english

06.05.2021

Score sheets

Standardized health and welfare assessment sheets for animal studies

TIME, DATE AND SIGNATURE

- Documentation of actual severity and mitigating factors
- Traceability
- Transparency

ENDPOINTS AND ACTION POINTS

- Endpoints based on
  - General welfare indicators
  - Study-Specific welfare indicators
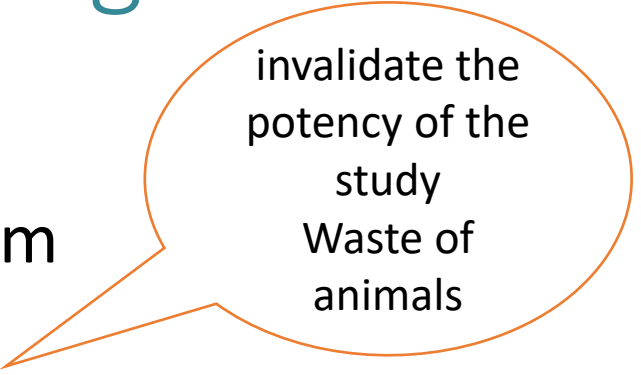- Actions to avoid unnecessary pain, suffering or distress

How humane is your endpoint?

- "Alternative to death" reflects a very narrow definition of humane endpoints (Ashall and Millar, 2014)

- It has been questioned if all earlier endpoints can be really considered "humane" (Franco et al., 2012)

- Other authors propose a broader definition of Humane Endpoint as a concept for continuous refinement of animal studies (Hendriksen et al., 2010).

5/6/2021

Do not want False positive or False negative EP

- False positive endpoints means aborting an animal from a study while the animal would have recovered and survived the observation period of the study.

invalidate the potency of the study
Waste of animals

- False negative endpoints means that the animal already died before it reached the predefined endpoint

compromise animal welfare

(Hendriksen, 2011)

Few or many parameters?

- Avoid irrelevant endpoint parameters
  - General welfare assessment information
  - Information from study-specific procedures

- Don't add additional burden to the animals

Information from study-specific procedures
  - Weighing
  - Blood samples

Don't add additional burden to animals
  - General welfare assessment information
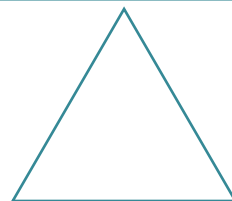
Aim 1:
IMPROVE ENDPOINTS
based on
DAILY WELFARE ASSESSMENTS
FROM HOME TANK OBSERVATIONS

FISHEnds-DIG

an app for tank-side registration of
clinical scores in fish
- an aid to the use of
humane endpoints for fish studies

Recording, storing, reporting and learning

Objective 2

eMar – App

http://www.emar.no/

eMar

Dashboard
- Intuitive, graphic interphase
- Share key data between project partners

Fish Welfare – Digitized and Reported

BRUK AV DYR I FORSØK I 2020

Antallet forsøksdyr er innrapporterte tall fra forskere og forsøksdyrvirksomheter.

Art	Antall
[A1] Mice (Mus musculus)	50 222
[A2] Rats (Rattus norvegicus)	3 355
[A3] Guinea-Pigs (Cavia porcellus)	296
[A7] Other Rodents (other Rodentia)	568
[A8] Rabbits (Oryctolagus cuniculus)	8
[A10] Dogs (Canis familiaris)	201
[A12] Other carnivores (other Carnivora)	125
[A13] Horses, donkeys & cross-breeds (Equidae)	59
[A14] Pigs (Sus scrofa domesticus)	696
[A16] Sheep (Ovis aries)	736
[A17] Cattle (Bos primigenius)	14
[A27] Other Mammals (other Mammalia)	541
[A28] Domestic fowl (Gallus gallus domesticus)	1 298
[A29] Other birds (other Aves)	11 435
[A30] Reptiles (Reptilia)	27
[A32] Xenopus (Xenopus laevis and Xenopus tropicalis)	13
[A34] Zebra fish (Danio rerio)	38 867
[A35] Other Fish (other Pisces)	2 174 234
SUM	2 282 710

2020 report

Zebrafish	38 867
Other fish	2 174 234
All other animals	69 609

2020 Fish numbers correspond to >97% of animals used in research

Research Article

Refining Humane Endpoints in Mouse Models of Disease by Systematic Review and Machine Learning-Based Endpoint Definition

Jie Mei[1], Stefanie Banneke[2], Janet Lips[1,3,4], Melanie T. C. Kuffner[1,4,5], Christian J. Hoffmann[1,4,6], Ulrich Dirnagl[1,3,4,7,8], Matthias Endres[1,4,6,7,8], Christoph Harms[1,3,4,6] and Julius V. Emmrich[1,2,6]
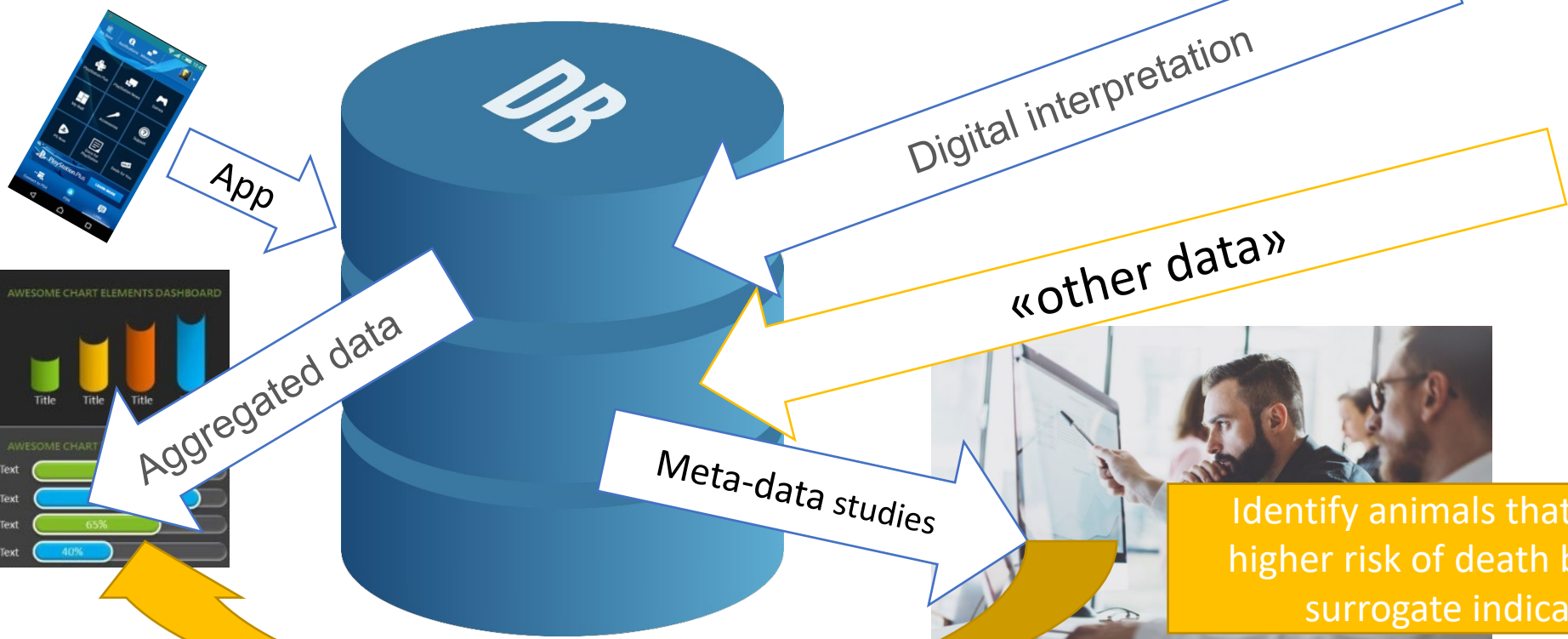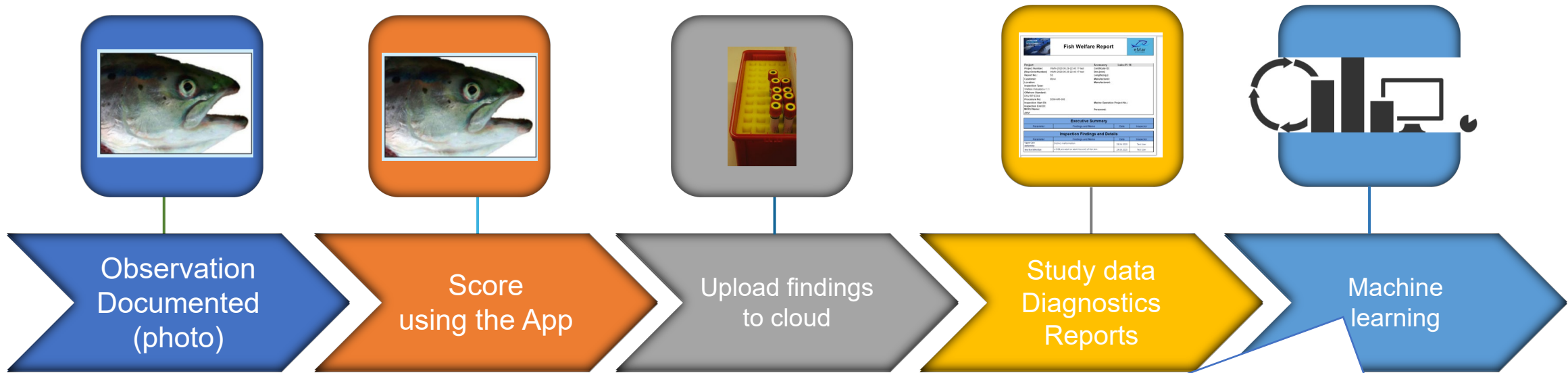
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Abstract

Ideally, humane endpoints allow early termination of experiments by minimizing an animal's discomfort, distress and pain while ensuring that scientific objectives are reached. Yet, lack of commonly agreed methodology and heterogeneity of cut-off values published in the literature remain a challenge to the accurate determination and application of humane endpoints.

With the aim to synthesize and appraise existing humane endpoint definitions for commonly used physiological parameters, we conducted a systematic review of mouse studies of acute and chronic disease models that used body weight, temperature and/or sickness scores for endpoint definition. We searched for studies in two electronic databases (MEDLINE/Pubmed and Embase). Out of 110 retrieved full-text manuscripts, 34 studies were included. We found large intra- and inter-model variance in humane endpoint determination and application due to varying animal models, lack of standardized experimental protocols, and heterogeneity of performance metrics (part 1).

We then used previously published and unpublished data on weight, temperature, and sickness scores from mouse models of sepsis and stroke and applied machine learning models to assess the usefulness of this method for parameter selection and endpoint definition across models. Machine learning models trained with physiological data and sickness

Observation Documented (photo) → Score using the App → Upload findings to cloud → Study data Diagnostics Reports → Machine learning

App

Digital interpretation

«other data»

Aggregated data

Meta-data studies

Alarms/alerts

Identify animals that are at a higher risk of death based on surrogate indicators

Dashboard
• Intuitive interphase
• Share key data between project partners

06.05.2021

Aim2:

REFINE predictors of animal going into a distressing, helpless, life threatening, irreversible or severe clinical stage – so that mitigating actions can be made and fish studies REFINED

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