



# Update on RMS in rainbow trout

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## The problem with RMS

- RMS is a slowly developing skin disease caused by MLO



Weeks: 6 8 9 10 11 12 13 14 15 18

- Fish are “ugly”, but apparently welfare is relatively unaffected (no obvious behavioural changes).
- Large fish affected => Sales affected
- In Denmark around a third of rainbow trout farms are affected

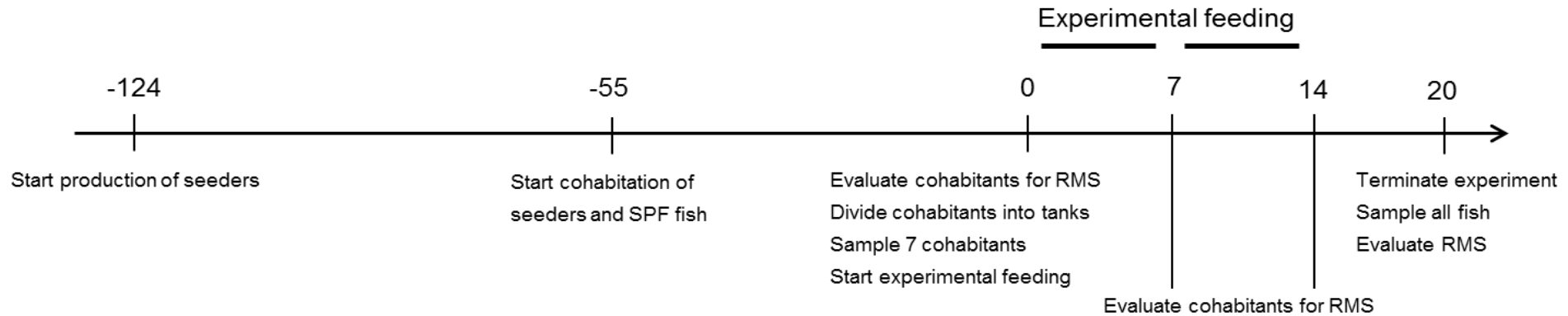
# Learning more about RMS

- MLO cannot be cultured *in vitro* making RMS experiments difficult
- Instead we have developed a cohabitation infection model
- We have used this model to study RMS for three years now

# Learning more about RMS

- **At previous AWs I have presented results on**
  - The development of RMS lesions
  - Evidence for MLO as causative agent of RMS
  - The immune response in skin of RMS-affected fish
  - Spatiotemporal distribution of MLO in cohabitants
- **Here I will present results obtained since the last AW**
  - Effect of antibiotics
  - Brown trout as susceptible species?
  - Protection during 2<sup>o</sup> cohabitation 12 months after 1<sup>o</sup> cohabitation

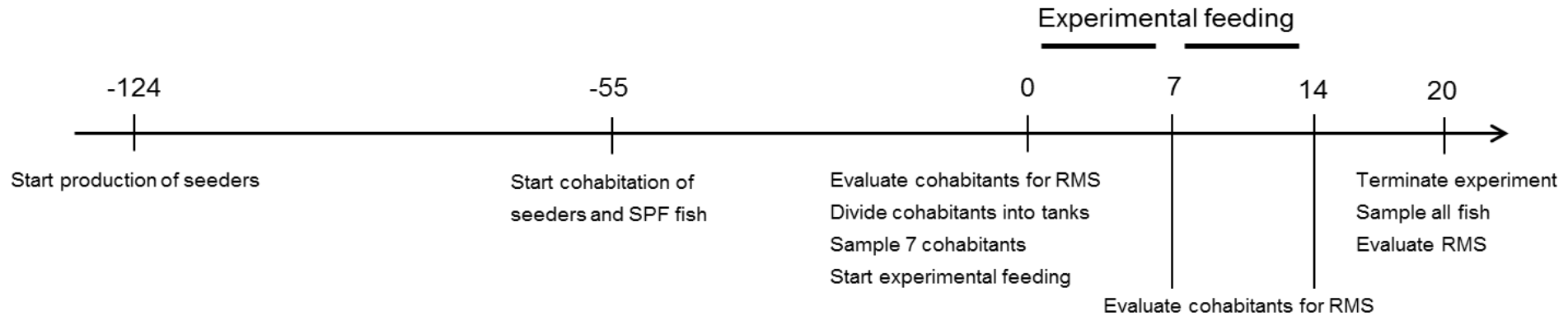
# Effect of antibiotics on RMS and MLO



- **Methodology:**

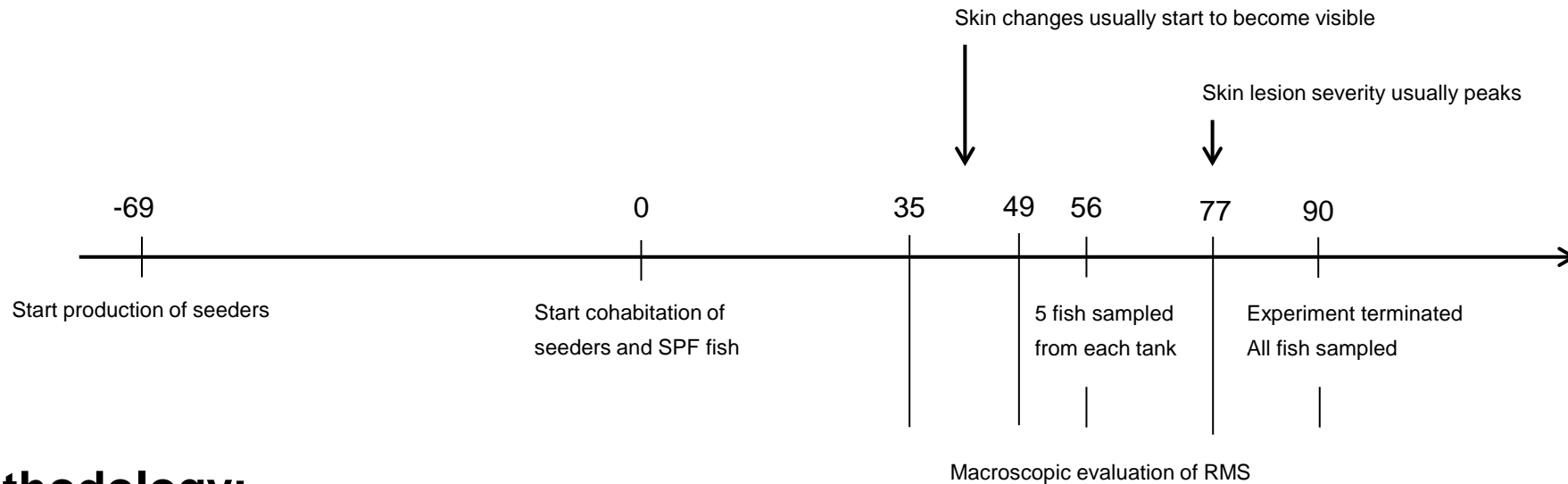
- SPF fish cohabited with seeders
- When early symptoms appeared fish were divided in treatment groups
- Three antibiotics tested: Oxytetracycline, oxolinic acid, florfenicol
- Fed antibiotics-coated pellets for 10 days
- RMS lesions evaluated weekly
- Terminated after 20 days
- RMS lesions evaluated and MLO in skin quantified at termination

# Effect of antibiotics on RMS and MLO



- **Results:**
  - All three types of antibiotics significantly reduced MLO load measured by qPCR and reduced skin pathology.

# Are brown trout (*Salmo trutta*) susceptible?

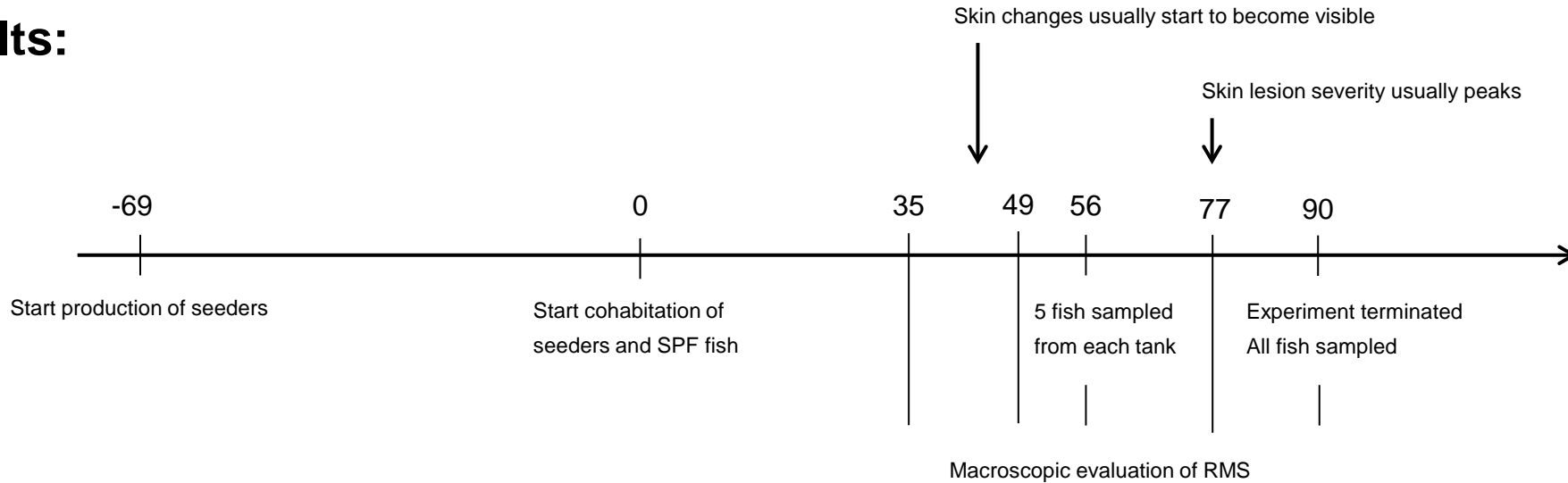


- **Methodology:**

- **Brown trout cohabited with rainbow trout seeder fish**
- **Controls:**
  - **Negative: Brown trout cohabited with SPF fish**
  - **Positive: Rainbow trout cohabited with seeder fish.**
- **Fish evaluated visually for skin changes day 35-91 post-start of cohabitation.**
- **5 fish from each tank sampled 56 days post-start of cohabitation for histology and qPCR.**
- **Terminated and all fish sampled after 90 days of cohabitation.**

# Are brown trout (*Salmo trutta*) susceptible?

- Results:**

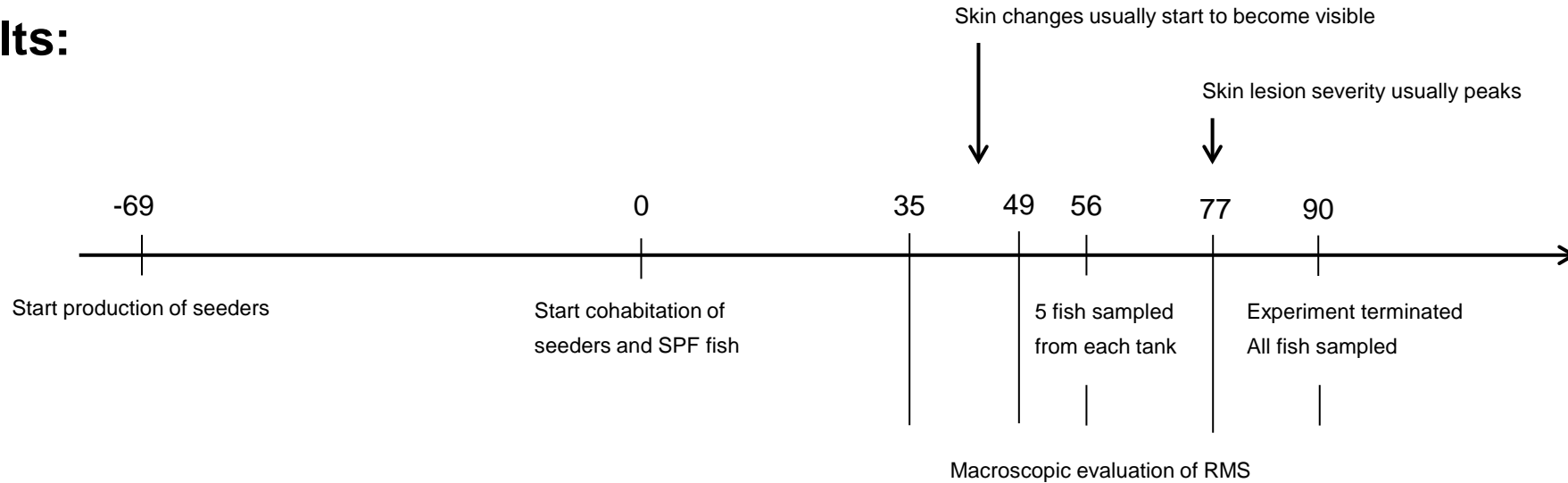


Tank	35	49	56	77	91
Neg. con ( <i>S.t.</i> )	0/20	0/20	0/20	0/15	0/15
Pos. con ( <i>O.m.</i> )	0/20	7/20	7/20	7/15	7/15
Exp ( <i>S.t.</i> )	2/20	6/20	8/20	1/15	1/15
Exp ( <i>S.t.</i> )	1/20	6/20	9/20	0/15	0/15



# Are brown trout (*Salmo trutta*) susceptible?

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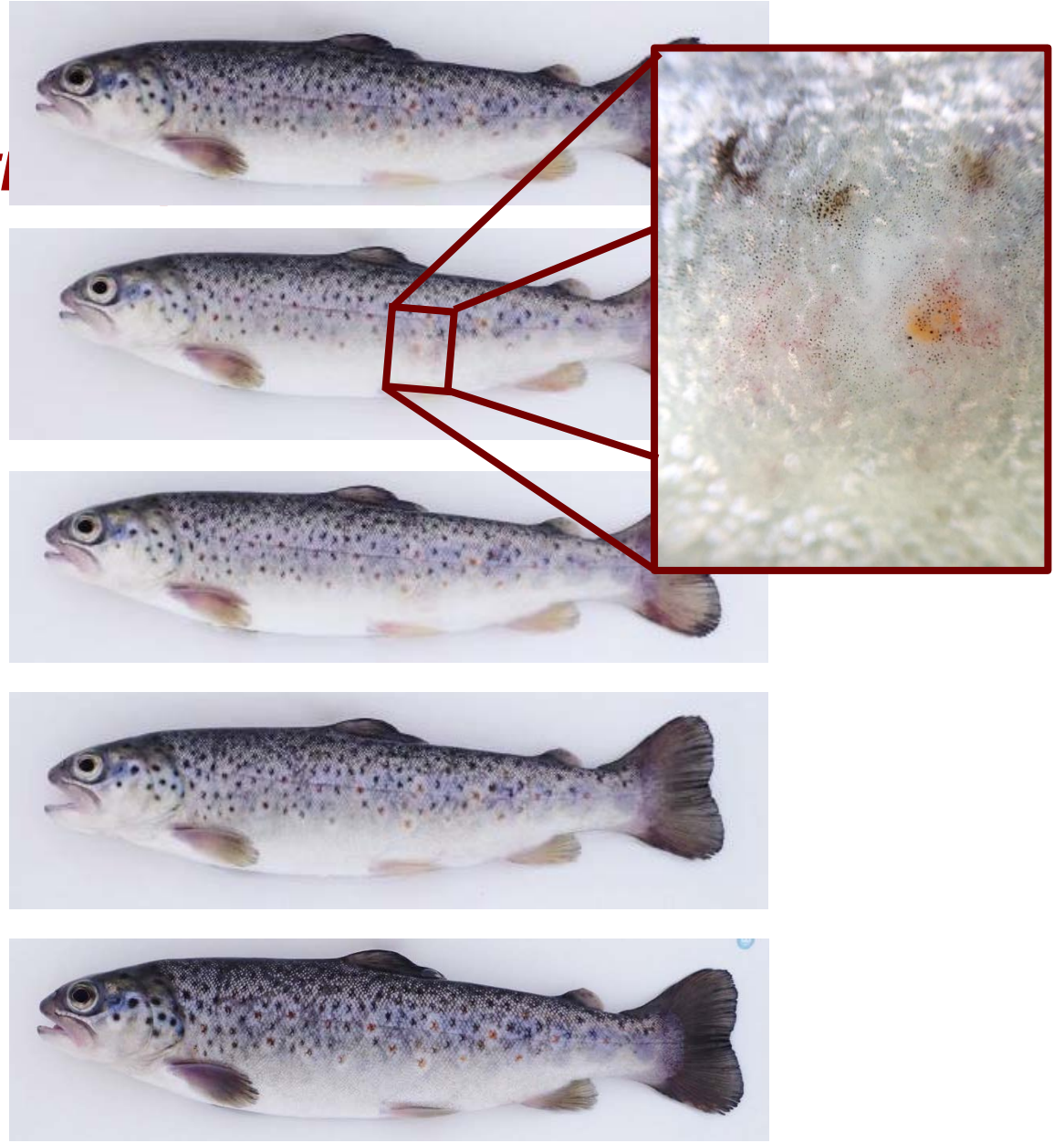


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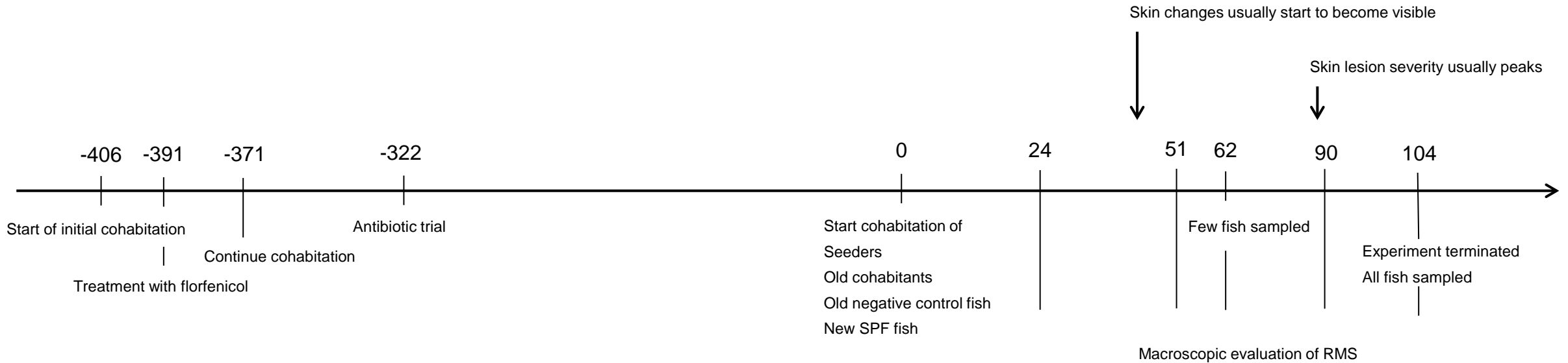
35				49				56				77				91			
20	0	0	0	20	0	0	0	20	0	0	0	20	0	0	0	20	0	0	0
20	0	0	0	13	7	0	0	13	7	0	0	8	4	3	0	6	2	4	3
18	2	0	0	14	6	0	0	12	4	3	1	8	1	0	6	8	0	1	6
19	1	0	0	14	6	0	0	11	5	4	0	9	0	0	6	9	0	0	6



*Salmo trutta*



# MLO infection is protective



- **Methodology:**

- Fish derived from old antibiotic treatment experiment
- Cohabitation in one large tank
- Visual inspections and two sampling points for MLO by qPCR.

# MLO infection is protective

- **Results:**
  - One out of 29 old cohabitants had any detectable skin changes (and only slight)
  - All naïve fish (old negative control fish, new SPF fish) developed serious RMS.
  - qPCR samples not yet processed



# MLO infection is protective

- Results:

**Control**



**Old cohabitant**



## Financing



Henrik Henriksens Fond



European Maritime and Fisheries Foundation

Also a range of people have been involved especially in the establishment of the cohabitation model, which has laid the foundation for the presented research:

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