

# Fettfinneklipping og fiskevelferd

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# Overview

- Project overview
- Project aims
- Experimental methods
- Scoring system
- Effect of water temperature on wound closure
- Conclusions

# Project overview

- Control of farm escapees is a priority for the Norwegian Seafood Federation (FHL).
- Potential negative impacts on the environment:
  - Diseases and parasites
  - Pollution and discharges
  - **Escaped fish/genetic interaction**



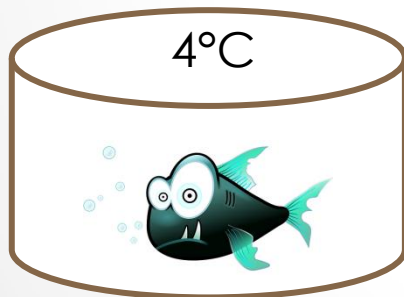
# Project overview

- Is it possible to mark **ALL** farmed fish?
- Which marking method?
  - PIT tagging
  - Floy tagging
  - Panjet tattooing
  - **Fin clipping**
- Document and describe initial wound closure and healing processes following 100% adipose fin clipping.
- Determine what effect water temperature has on the wound closure and healing process.
- Determine the possible welfare aspects of this method.

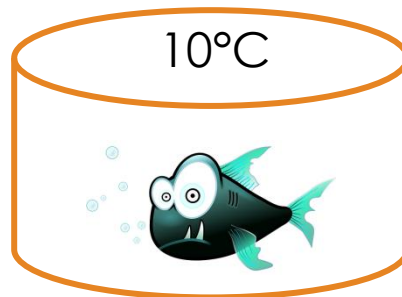


# Experimental methods

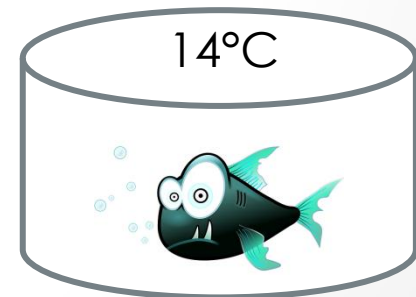
- Transferred 204 Atlantic salmon parr (mean 36g; range 27-45g) into three 450 L tanks.
- Tanks were set at different temperatures (4, 10 and 14°C).
- The experiment commenced following a 1 week acclimation period.



n=66

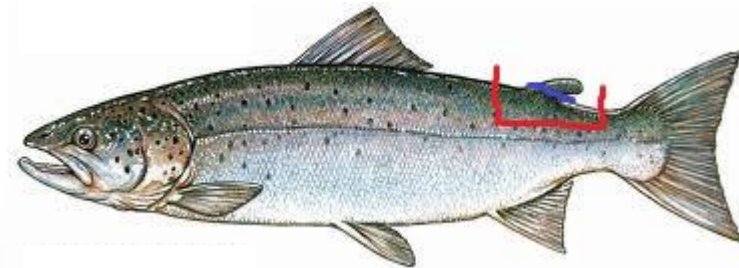


n=72



n=66

- 100% adipose fin clipping was performed using scissors.
- Fish were returned to their respective tanks and observed.
- Sampling occurred at 2, 4, 6, 12, 18, 24, 30, 36, 48, 60 and 72h post-clip; six fish/group/timepoint.
- Samples were immediately placed in 10% formalin.
- And were processed at the University of Bern.
- Histology sections were prepared using H&E staining.
- Sections from each sample were then scored using an adapted scoresheet from a past project.



# Scoring system

- All parameters were scored using a linear scale ranging from 0 (abnormal/no recovery) to 30 (normal structure).

## Epidermis:

#	Parameter	Description
1	Structure	All cell layers present incl. basal cell layer, round cells (w/ mucous cells), superficial cell layer
2	Thickness	'normal' thickness of the epidermis
3	Prismatic basal cells	Basal layer; normal = cuboidal/columnar cells
4	Cuboidal cells	Middle layer; normal = round/cuboidal
5	Superficial cell layer	Uppermost layer; normal = elongated, flattened cells
6	Mucous cells	Mucous cells are usually dispersed throughout the epidermis
7	Infiltration	Presence of granulocytes, lymphocytes & macrophages



## Dermis:

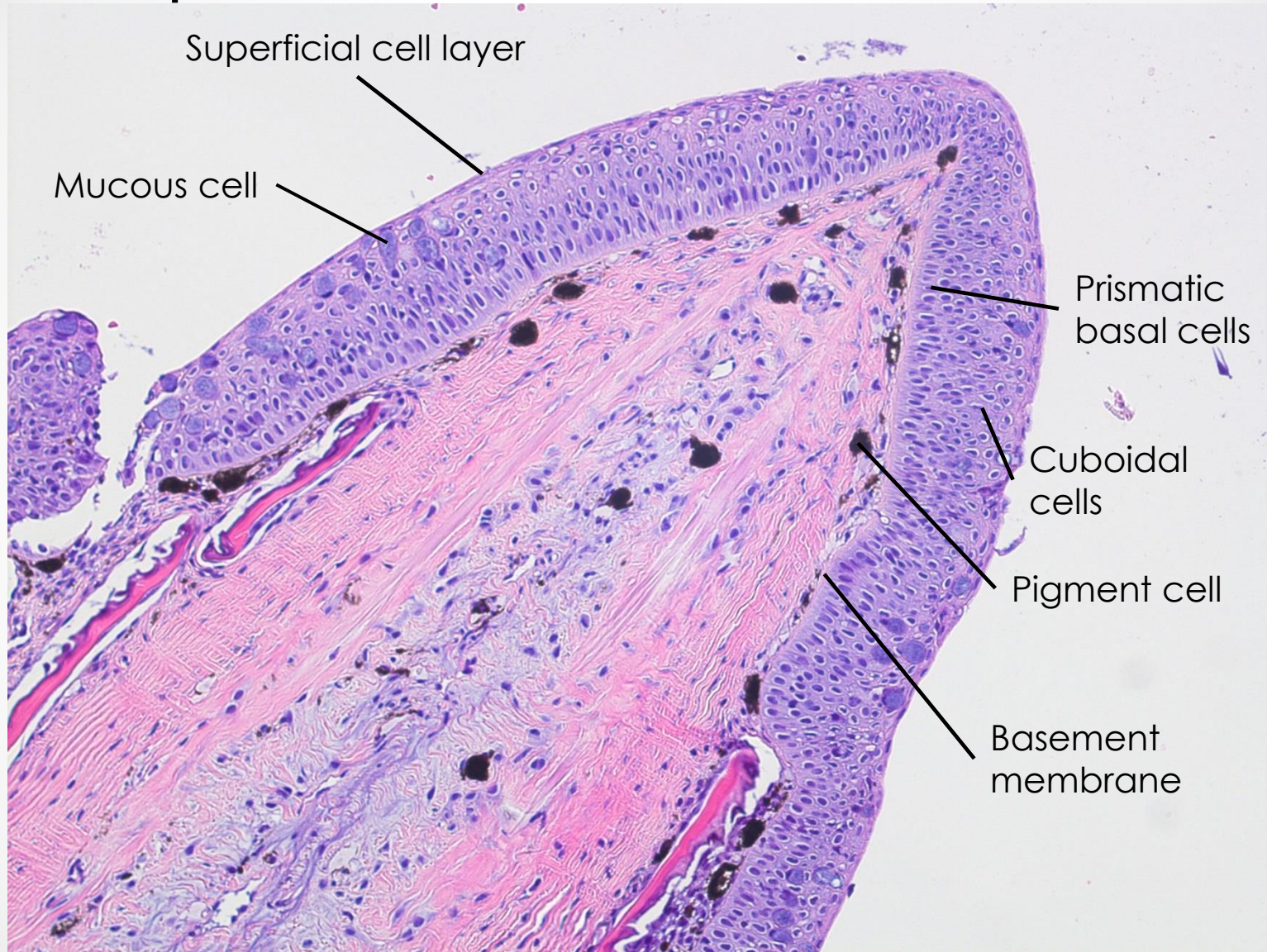
#	Parameter	Description
8	Structure	All cell layers present incl. basement membrane, pigment cell layer, stratum spongiosum (no scales), stratum compactum, hypodermal layer
9	Cell debris	Presence of necrotic cells and cell debris incl. Eosinophilic staining amorphous material
10	Infiltration	Presence of granulocytes, lymphocytes & macrophages

## Tissue:

#	Parameter	Description
11	Pigment cells	These cells are usually numerous throughout the dermis
12	Revascularisation	Blood vessels in dermal layers
13	Fibrous tissue	Normal arrangement of the fibres representing the stratum compactum

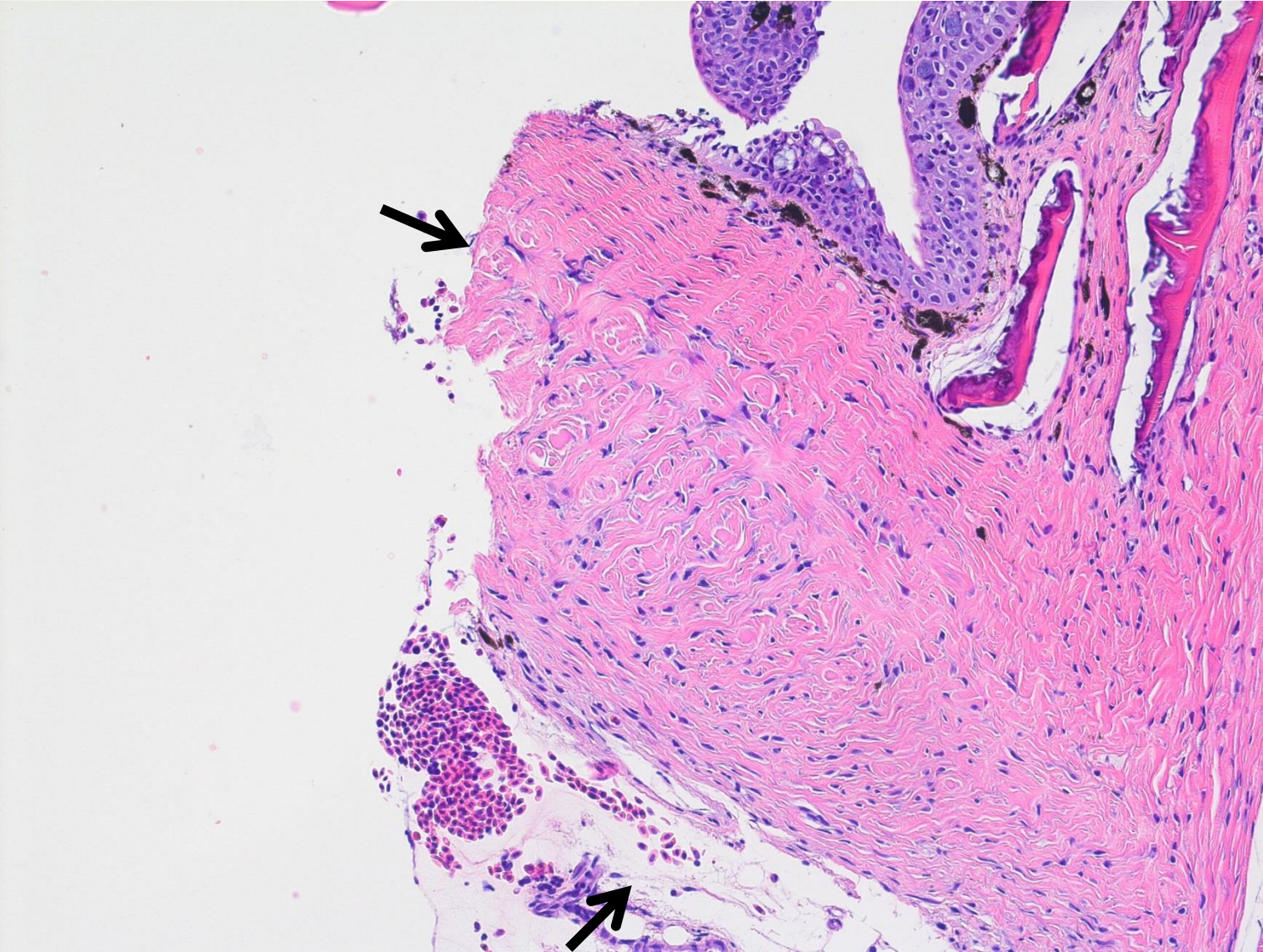


## Normal adipose fin:



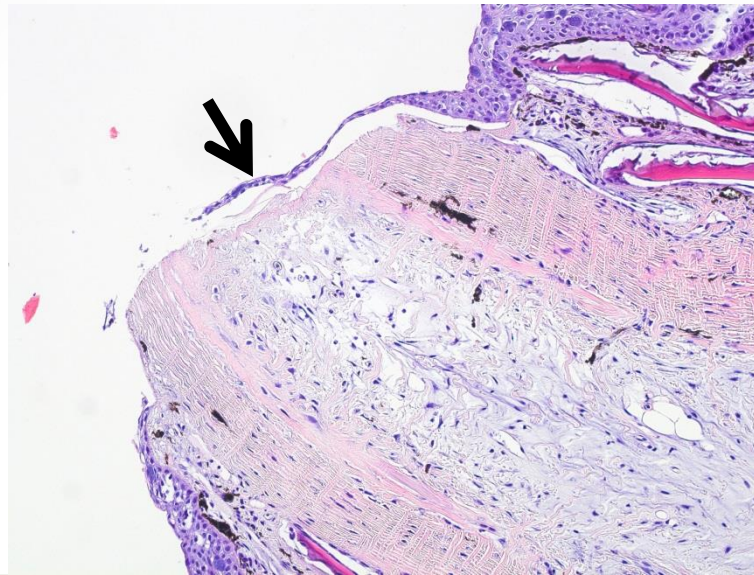


0h post-clipping:

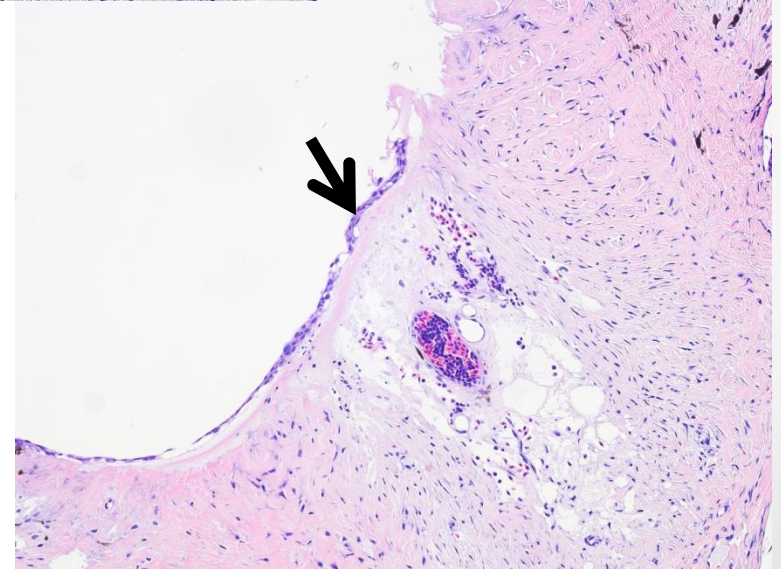
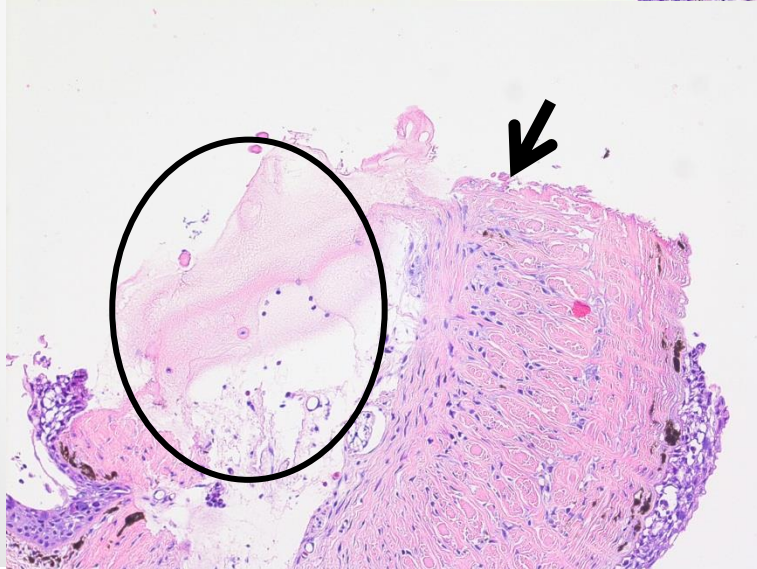




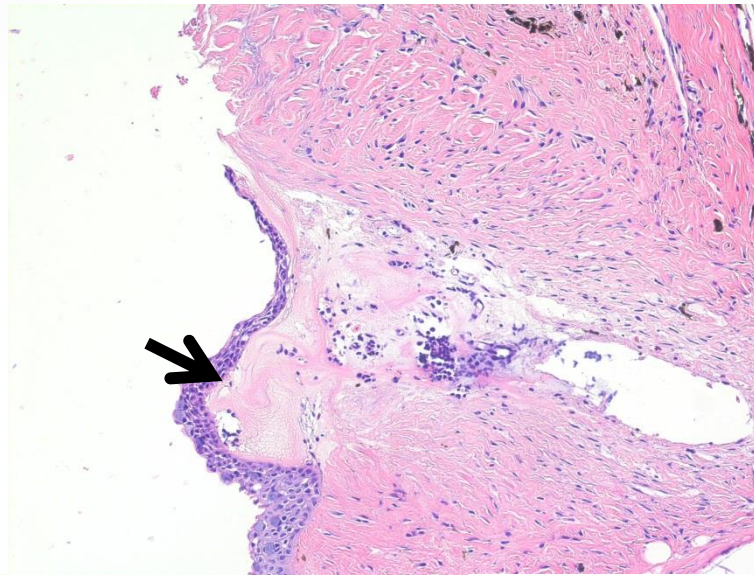
# 4h post-clipping:



4°C

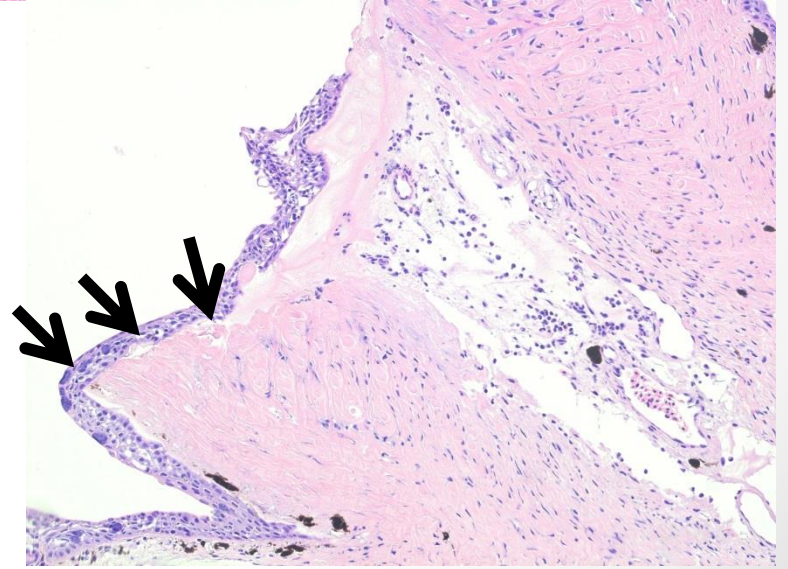
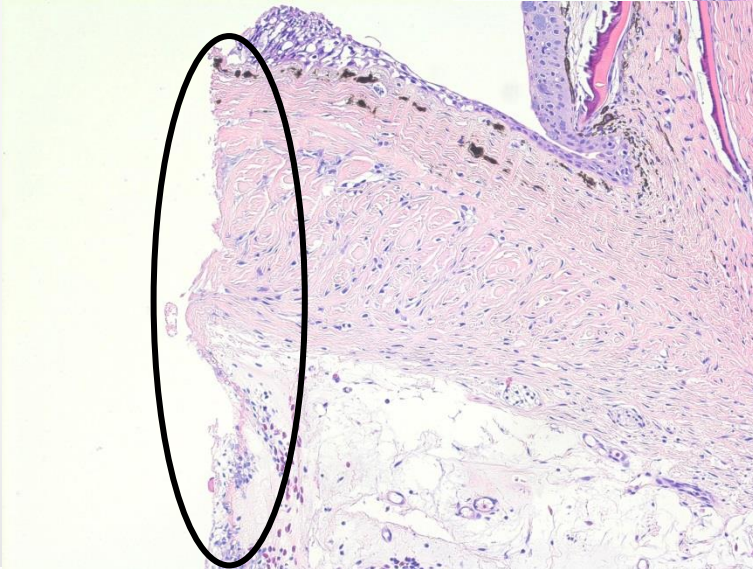


6h post-clipping:



10°C

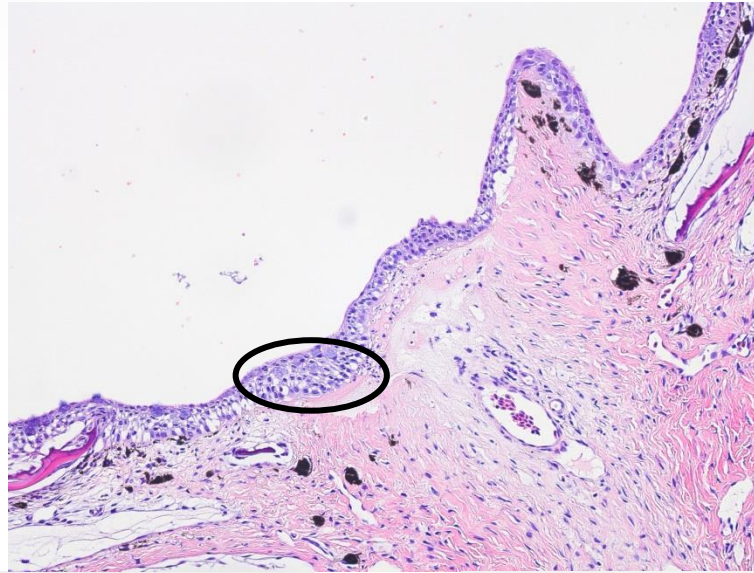
4°C



14°C

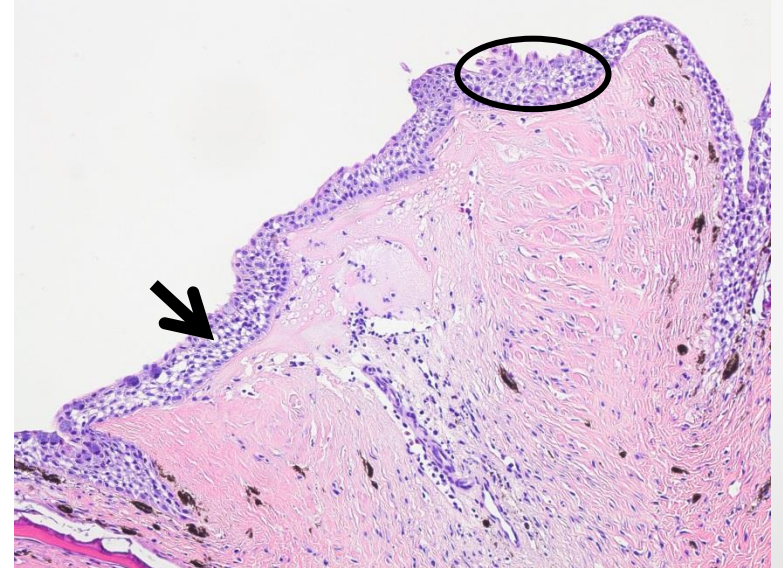
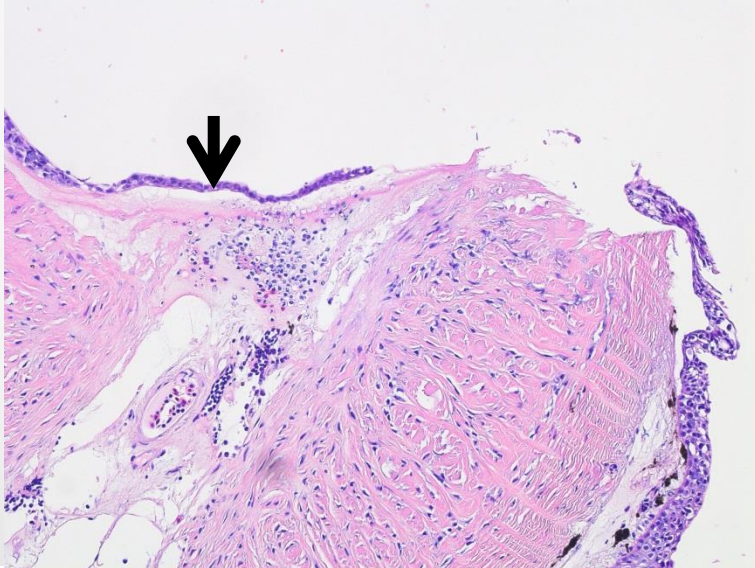


# 12h post-clipping:



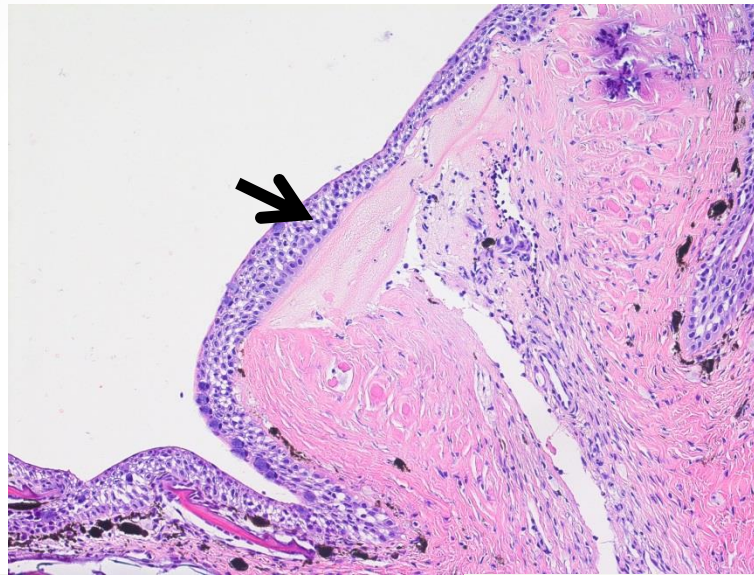
10°C

4°C



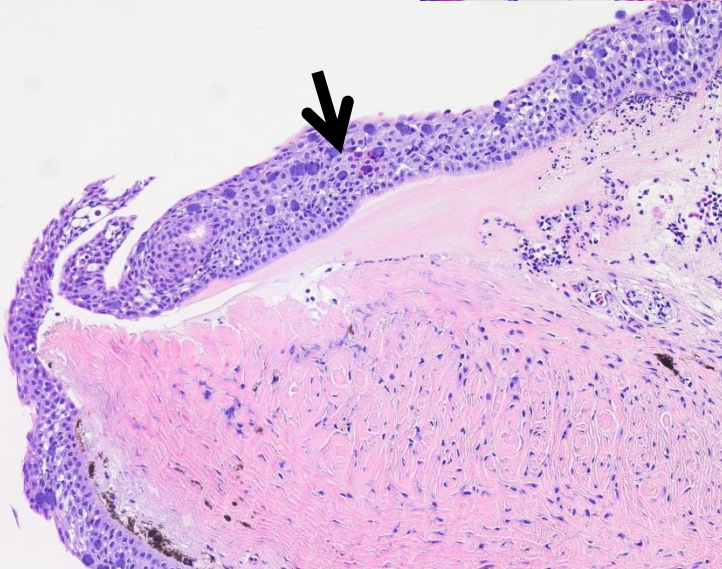
14°C

# 24h post-clipping:



10°C

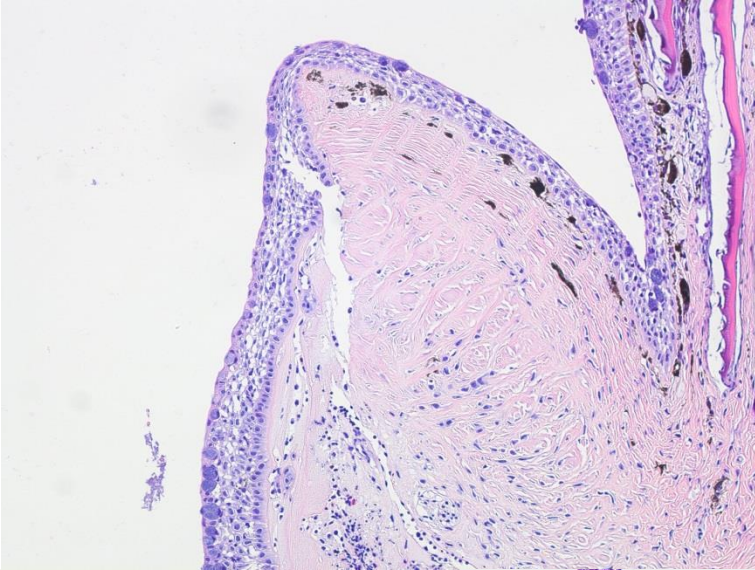
4°C



14°C

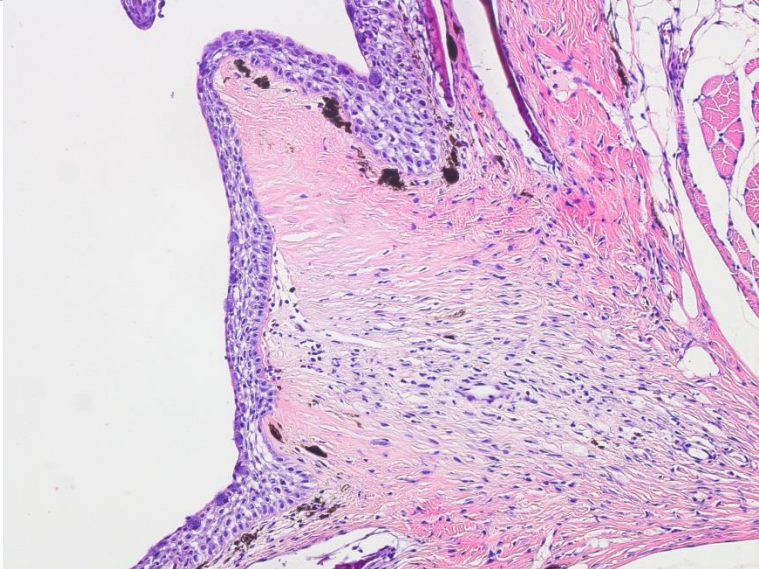
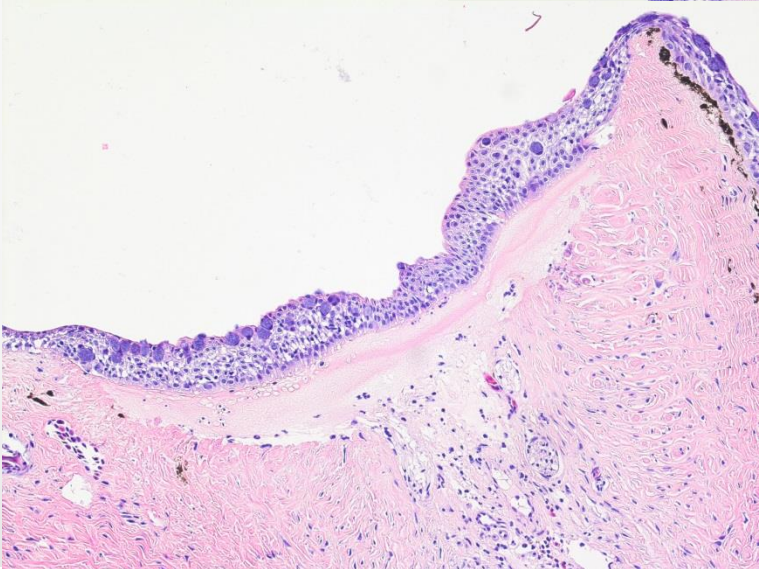


**36h post-clipping:**



10°C

4°C

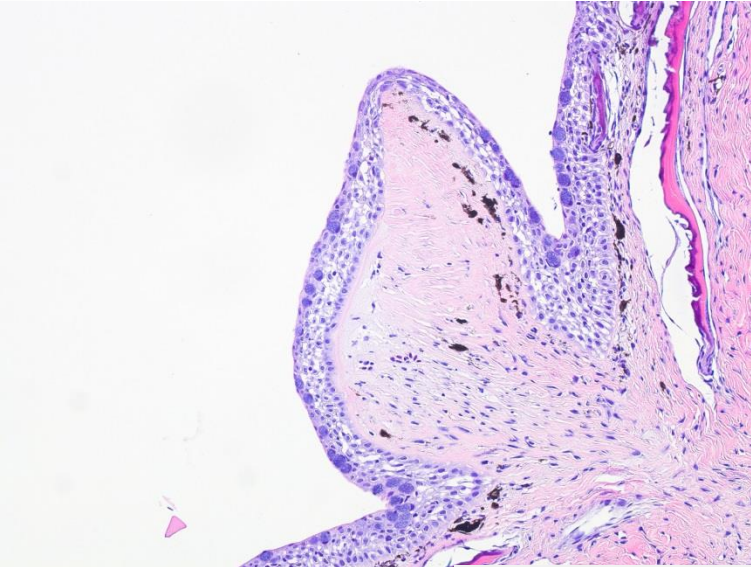


14°C



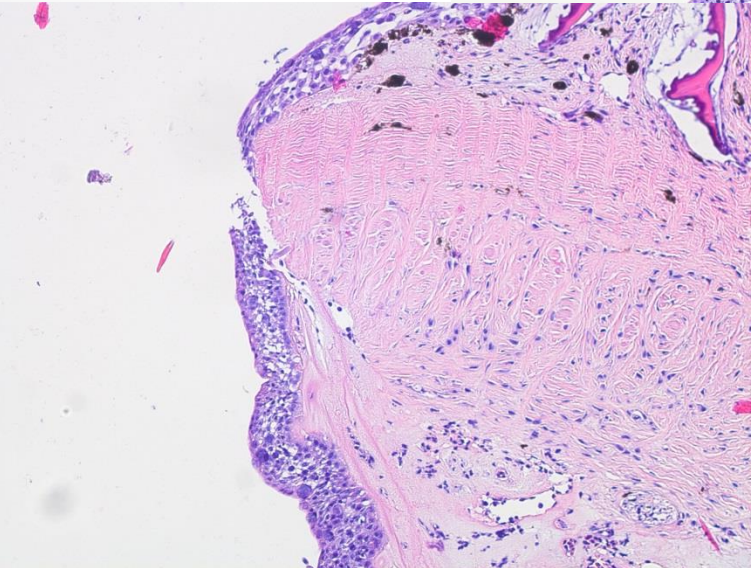
200x

48h post-clipping:

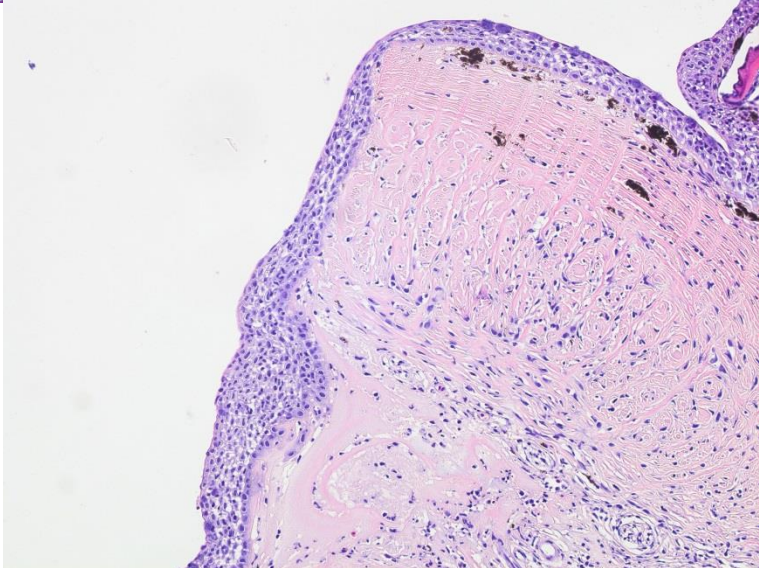


10°C

4°C



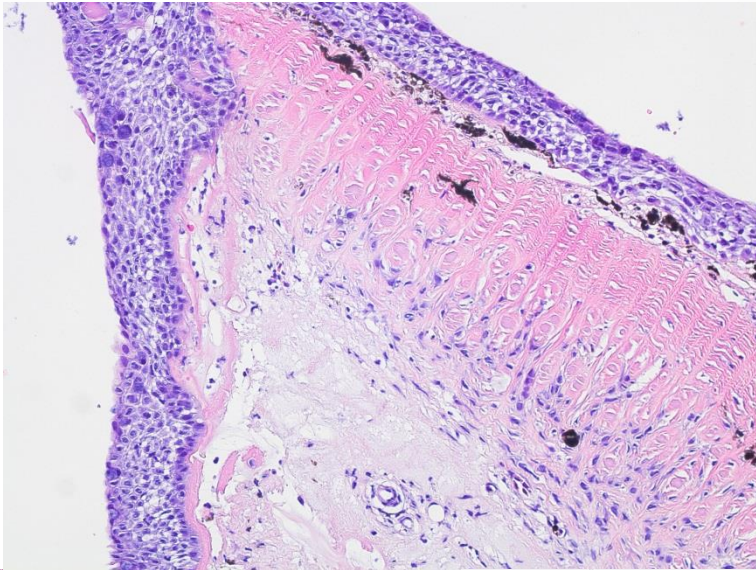
14°C



200x

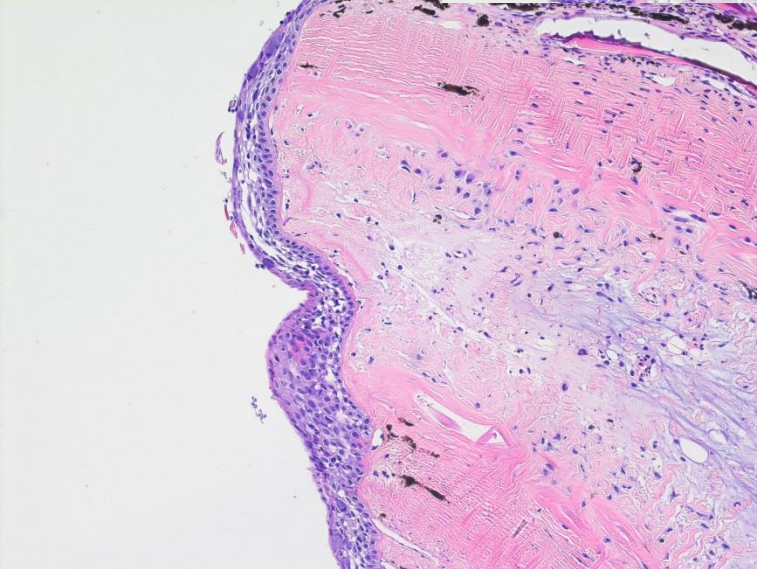


72h post-clipping:

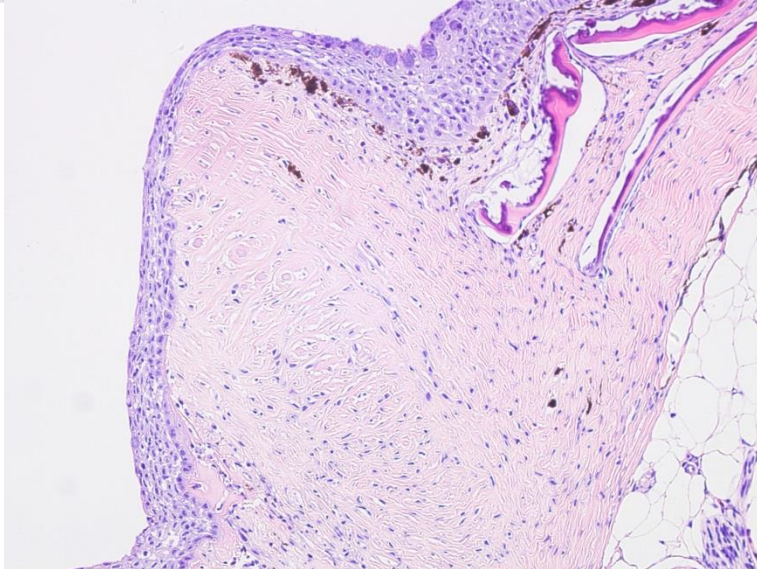


10°C

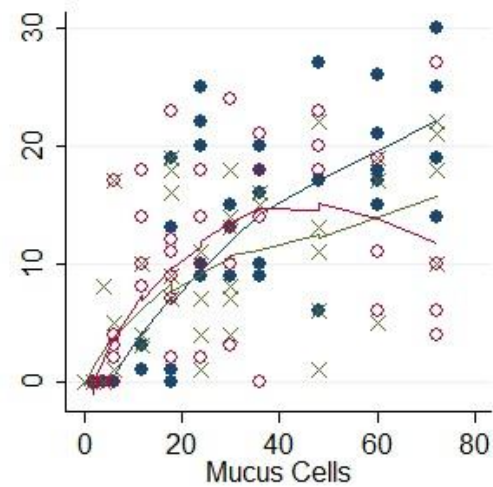
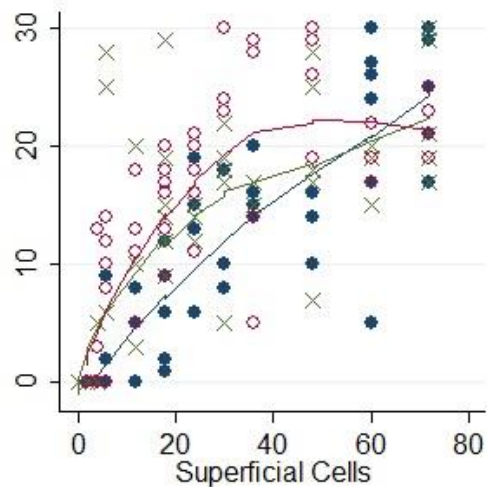
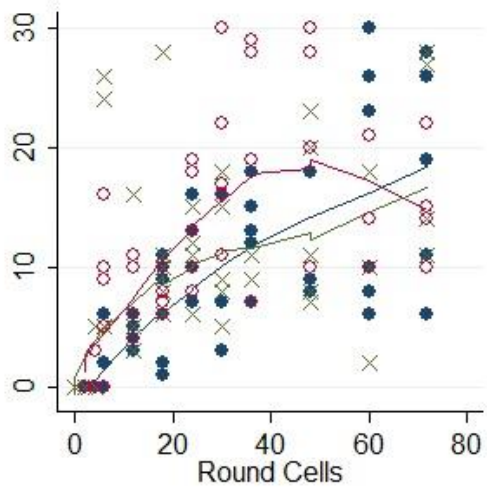
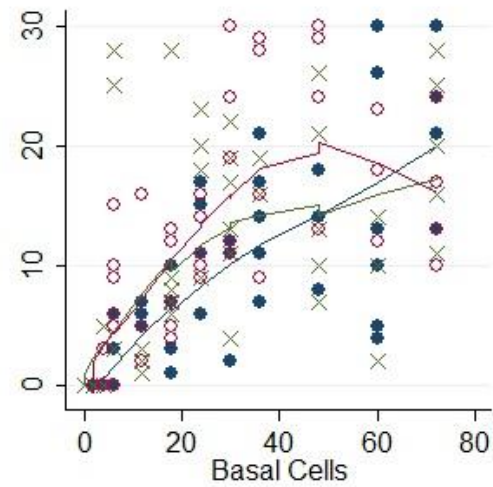
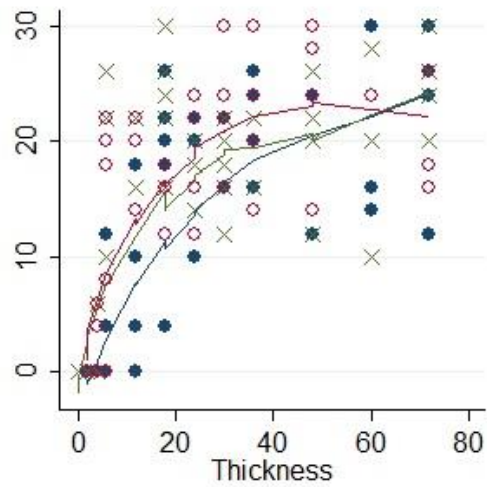
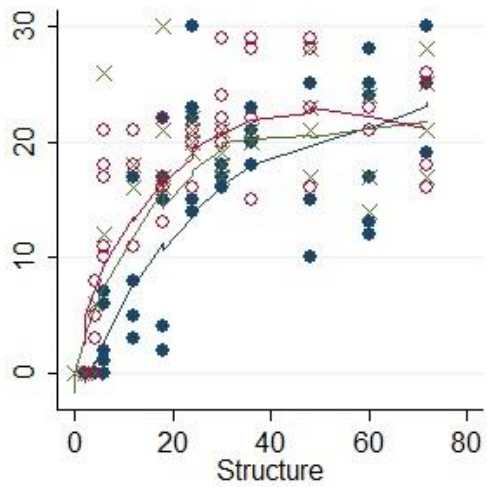
4°C



14°C



200x



● — 4°C

× — 10°C

○ — 14°C



# Conclusions

## Wound closure and healing

- *By 72h post clipping:*
  - All temperature groups had fully closed wounds.
  - Non-uniformity throughout most epidermal and dermal layers.
  - Uneven thickness of the epidermal layer.
  - Low numbers of mucous cells.
  - Lack of pigment cells.

- Time until wound closure was shorter than expected
- The scoring system showed uniformity within groups.
- Decreased wound closure rates at lower temperatures.
- Longer exposure of the wound area results in large oedematous areas.

## Fish welfare

- No behavioural changes were observed.
- Combining a number of routine procedures with fin clipping may reduce overall stress.
  
- Rapid wound closure may result in:
  - ↓ time exposed to possible infectious agents.
  - ↓ period of challenge to the osmotic balance.



# Further research

- Determine what effect lower quality water may have on the wound closure and healing rates.
- Conduct tagging in combination with vaccine trials to see if this alters the wound closure and healing rates.



Thank you

