Fetfinneklipping 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:
  o Diseases and parasites
  o Pollution and discharges
  o 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.
• 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:

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

<table>
<thead>
<tr>
<th>#</th>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>Structure</td>
<td>All cell layers present incl. basement membrane, pigment cell layer, stratum spongiosum (no scales), stratum compactum, hypodermal layer</td>
</tr>
<tr>
<td>9</td>
<td>Cell debris</td>
<td>Presence of necrotic cells and cell debris incl. Eosinophilic staining amorphous material</td>
</tr>
<tr>
<td>10</td>
<td>Infiltration</td>
<td>Presence of granulocytes, lymphocytes &amp; macrophages</td>
</tr>
</tbody>
</table>

Tissue:

<table>
<thead>
<tr>
<th>#</th>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>Pigment cells</td>
<td>These cells are usually numerous throughout the dermis</td>
</tr>
<tr>
<td>12</td>
<td>Revascularisation</td>
<td>Blood vessels in dermal layers</td>
</tr>
<tr>
<td>13</td>
<td>Fibrous tissue</td>
<td>Normal arrangement of the fibres representing the stratum compactum</td>
</tr>
</tbody>
</table>
Normal adipose fin:

- Superficial cell layer
- Mucous cell
- Prismatic basal cells
- Cuboidal cells
- Pigment cell
- Basement membrane
0h post-clipping:
4h post-clipping:
6h post-clipping:
12h post-clipping:

- 4°C
- 10°C
- 14°C
24h post-clipping:
36h post-clipping:

- 10°C
- 4°C
- 14°C
48h post-clipping:
72h post-clipping:
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:
  o ↓ time exposed to possible infectious agents.
  o ↓ 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