Differences in fish feed composition influence protein expression in the pyloric caeca in rainbow trout

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Differences in fish feed composition influence protein expression in the pyloric caeca in rainbow trout

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Aim

To investigate protein expression changes in fish gut (pyloric caeca) due to differences in feed composition.

<table>
<thead>
<tr>
<th>Spot no.</th>
<th>Protein name</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-11</td>
<td>Serum albumin</td>
<td>Blood plasma</td>
</tr>
<tr>
<td>12-13</td>
<td>Albumin</td>
<td>Blood plasma</td>
</tr>
<tr>
<td>14</td>
<td>Carboxylester hydrolase</td>
<td>Enzyme</td>
</tr>
<tr>
<td>19</td>
<td>Selenium-binding protein 1</td>
<td>Protein transport</td>
</tr>
<tr>
<td>20</td>
<td>Flavodoxin</td>
<td>Electron transport</td>
</tr>
<tr>
<td>21</td>
<td>α-1-antiproteinase-like protein</td>
<td>Enzyme inhibitor</td>
</tr>
<tr>
<td>24</td>
<td>Aminocyclase-3</td>
<td>Hydrolysis</td>
</tr>
<tr>
<td>25-26</td>
<td>Glyceraldehyde-3-phosphate dehydrogenase</td>
<td>Glycolysis</td>
</tr>
<tr>
<td>27</td>
<td>Probable aminopeptidase</td>
<td>Digestive enzyme</td>
</tr>
<tr>
<td>28</td>
<td>Carboxypeptidase A1</td>
<td>Protein cleavage</td>
</tr>
<tr>
<td>29, 30-36</td>
<td>Unnamed Protein</td>
<td></td>
</tr>
<tr>
<td>31</td>
<td>Transferrin</td>
<td>Iron Binding</td>
</tr>
<tr>
<td>32</td>
<td>Trypsinogen</td>
<td>Digestive enzyme</td>
</tr>
<tr>
<td>33-33</td>
<td>Superoxide dismutase, mitochondrial precursor</td>
<td>Oxidative stress</td>
</tr>
<tr>
<td>34</td>
<td>Cystathionine gamma lyase</td>
<td>Enzyme regulation</td>
</tr>
<tr>
<td>35-36</td>
<td>Cu/Zn-superoxide dismutase</td>
<td></td>
</tr>
<tr>
<td>37</td>
<td>Complement C3</td>
<td>Complement system</td>
</tr>
<tr>
<td>38</td>
<td>Fatty acid binding protein</td>
<td>Fatty acid transport</td>
</tr>
</tbody>
</table>

Table 1: The main protein source in percentage of feed in the five types of fish feed.

<table>
<thead>
<tr>
<th>Feed A</th>
<th>Feed B</th>
<th>Feed C</th>
<th>Feed D</th>
<th>Feed E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fish meal</td>
<td>61%</td>
<td>36%</td>
<td>36%</td>
<td>18%</td>
</tr>
<tr>
<td>Pea protein</td>
<td>18%</td>
<td>18%</td>
<td>18%</td>
<td>18%</td>
</tr>
<tr>
<td>Blood meal</td>
<td>8%</td>
<td>8%</td>
<td>8%</td>
<td>8%</td>
</tr>
</tbody>
</table>

Figure 1: Principal component analysis of all 440 spots. The five different groups A, B, C, D and E are each represented by 3 samples. The first two principal components account for 33% of the variation within the samples.

Figure 2: Representative 2-DE gel of proteins from the pyloric caeca from rainbow trout. Proteins of interest based on ANOVA and PLS analysis are indicated by arrows. White arrows designate that the protein has been identified with LC-MS/MS while black arrow designates that the protein have not been identified.

Conclusion

Fish feed influences protein abundance in the pyloric caeca. A number of digestive enzymes were among the affected proteins.

Differences in fish feed composition affects gastrointestinal blood flow, as indicated by differences in plasma proteins.