QUALITY OF ALASKAN MARICULTURED OYSTERS (Crassostrea gigas) A ONE-YEAR SUMMARY

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TO Financial Management Workshop
November 1-2, 2007

WHY STUDY QUALITY?
¾ There is inconsistent quality in Alaska Grown oysters
¾ Shellfish farming is a growing rural based enterprise
¾ The market requires quality for a premium price
¾ Cooperative marketing requires:
  o Product definition
  o Standards
  o Best management practices

THE PROJECT
• Project objectives
  o Intrinsic quality
  o Regional sampling
  o Monthly basis
• Sampled from the best farmers at the wholesale level

REGIONAL VARIABILITY
Meat, shell and whole weights of Alaska oysters

INTRINSIC QUALITY
• Physical measurements
  o Shell dimensions (length x width x thickness)
  o Whole, shell and meat weights
• Condition index
  o Designate quality through economical and ecophysiological point of view
• Proximate Composition
  o Moisture, ash, protein, lipid, glycogen and total solids
• Microbial content and identification

VARIABLE QUALITY

FITC photos

Valor

Condition

Meat

Length

0 50 100 150 200
1 2 3 4 5 6 7 8 9 10 11 12

Different letters represent significant differences at p<0.05
REGIONAL VARIABILITY
Glycogen, lipids, protein and ash content of Alaskan oysters

Different letters represent significant differences at p<0.05

<table>
<thead>
<tr>
<th>Glycogen</th>
<th>Lipids</th>
<th>Protein</th>
<th>Ash</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kachemak Bay</td>
<td>Prince William Sound</td>
<td>Southeast Alaska</td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>a</td>
<td>ab</td>
<td></td>
</tr>
<tr>
<td>b</td>
<td>c</td>
<td>c</td>
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</tbody>
</table>

REGIONAL VARIABILITY
Shell fullness (Cavity volume)

<table>
<thead>
<tr>
<th>Size class</th>
<th>Southeast Alaska</th>
<th>Prince William Sound</th>
<th>Kachemak Bay</th>
</tr>
</thead>
<tbody>
<tr>
<td>75-80</td>
<td>23.80 (3.89)</td>
<td>20.70 (0.01)</td>
<td></td>
</tr>
<tr>
<td>80-85</td>
<td>23.13 (4.44)</td>
<td>21.09 (5.85)</td>
<td></td>
</tr>
<tr>
<td>85-90</td>
<td>19.11 (4.41)</td>
<td>32.41 (2.84)</td>
<td>23.32 (6.69)</td>
</tr>
<tr>
<td>90-95</td>
<td>24.89 (6.08)</td>
<td>31.84 (5.12)</td>
<td>29.32 (7.21)</td>
</tr>
<tr>
<td>95-100</td>
<td>24.47 (6.45)</td>
<td>38.28 (10.82)</td>
<td>32.46 (10.89)</td>
</tr>
<tr>
<td>100-105</td>
<td>28.66 (5.26)</td>
<td>35.85 (4.26)</td>
<td>30.69 (6.97)</td>
</tr>
</tbody>
</table>

CONDITION INDICES

- Imai and Sakai (1961)
  \[ CI_E = \text{Shell Thickness} \times \left(0.5 (\text{Shell Length} + \text{Shell Width})\right)^{-1} \]

- Hand and Nell (1999)
  \[ CI_{HN} = \frac{\text{Dry Meat Weight (g)}}{\text{Cavity Volume}} \times 1000 \]
  \[ \text{Cavity Volume} = \text{Whole Weight (g)} - \text{Shell Weight (g)} \]

SEASONAL RELATIONSHIPS

<table>
<thead>
<tr>
<th>Condition Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>90-100</td>
</tr>
<tr>
<td>100-110</td>
</tr>
<tr>
<td>110-120</td>
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<tr>
<td>120-130</td>
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<tr>
<td>130-140</td>
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<tr>
<td>140-150</td>
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</tbody>
</table>

MEASURING CONDITION INDEX

- Clean shell, blot dry and weigh (grams)
- Open shell (leave shell on), drain fluid
- Place in oven at 175°C for 12 hrs
- Cool, remove meat and weigh (grams)
- Weight the shells
- Compute index
  \[ CI = \frac{\text{dry meat wt}}{1000} \times \left(\frac{\text{whole weight}}{\text{dry shell weight}}\right) \]
MEASURING CONDITION INDEX EXAMPLE

DATA

<table>
<thead>
<tr>
<th>Whole Weight</th>
<th>Dry Shell Weight</th>
<th>Dry Meat Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>94.29</td>
<td>45.32</td>
<td>4.53</td>
</tr>
</tbody>
</table>

CALCULATIONS

CI = (4.53 X 1,000) / (94.29 – 45.32)
CI = 4,530 / 48.96 = 92.53

CONCLUSIONS

- High quality compared to international standards
- Regional quality differences
- Seasonal quality differences
- Regional oceanographic influences on quality
- Regional and interregional variability in quality
- High variability even within a single farm and oyster size classes
- Handling practices
- Beginning of BMP program

FUTURE RESEARCH

- Controlled spoilage studies to investigate variables such as packaging conditions and shipping temperatures for extending shelf life
- Sensory especially organoleptic taste comparisons between AK oysters and those from other states
- Link actual farm practices and site characteristic with quality
- Value added process and quality changes
- Look for broodstock differences in quality

ACKNOWLEDGEMENTS

This project was funded by the Cooperative State Research, Education, and Extension Service of the United States Department of Agriculture.