Guidelines for Estimating Aquaculture Production Costs 2018 in Manitoba
Guidelines For Estimating
Aquaculture (20g to 2kg) Production Costs
Based On Marketing 120,050 Kg/Year

Date: January, 2018

This guide is designed to provide you with planning information and a format for calculating costs of production of an aquaculture (20g to 2kg) grow-out enterprise in Manitoba. General Manitoba Agriculture recommendations are assumed in using feed and operating inputs. These figures provide an economic evaluation of the fish stock and estimated prices required to cover all costs. Costs include labour, investment and depreciation, but do not include management costs, nor do they necessarily represent the average cost of production in Manitoba.

These budgets will be more accurate putting in your own figures. As a producer you are encouraged to calculate your own costs of production. The assumptions on which the costs are based are outlined in the supporting pages. These assumptions were arrived at using the fish stock, management practices, and facilities seen in modern, well managed aquaculture operations of comparable size in Manitoba. Productivity and performance assumptions are based on information collected by department specialists, feed companies and other organizations. Where individual productivity and performance levels differ from those listed, adjustments will be required.

This tool is available as an Excel worksheet at: www.manitoba.ca/agriculture or at your local Manitoba Agriculture office.

Note: This budget is only a guide and is not intended as an in-depth study of the cost of production of this industry. Interpretation and use of this information is the responsibility of the user. If you need help with a budget, contact your local Manitoba Agriculture Office.
The following 20 g to 2 kg budget is based on the assumption that the operation is comprised of a well designed and built recirculating aquaculture system (RAS) housed in a building with adequate insulation to maintain a relatively stable environment with close to optimal water temperature for cool water aquaculture throughout the year in Manitoba conditions.

The operation, once constructed - requires a ramp-up period of building fish inventory towards reaching a steady-state of production. The budget includes an assumption that it takes just over 13 months from the first fish stocking to reach steady-state. Steady-state is defined as the operational state where the system biomass remains at a relatively consistent amount: Gains in system biomass are made through fish growth and are offset by regular harvesting of market ready fish. Income and expenses remain relatively stable during steady-state of production.

The budget is based on the assumption that all feed is purchased from leading aquaculture feed manufacturers to ensure predictable growth and efficient feed conversion. The budget includes building, equipment, effluent management and land investment.

The budget includes an assumption that all fish harvested are marketable at the target market price, however, a mortality rate has been applied to inventory numbers to account for normal fish mortality and cull fish (unmarketable fish that are removed at any time in the production cycle).

The budget includes an assumption that the operation is continuous production with 4 distinct size cohorts of fish being present in the system. Stocking densities are in accordance with industry accepted levels and accounted for in system design to ensure appropriate water quality parameters.

The Manitoba aquaculture production industry is small and many external factors must be considered carefully by potential producers. External factors such as procuring inputs and securing markets create business risk. Some feed companies that operate in Manitoba are associated with leading aquaculture feed manufacturers and some companies in Manitoba participate in processing and marketing fish. Producers need to develop these arrangements and accurately calculate their costs before they can properly make a decision.
## Aquaculture (20g to 2kg) Grow-out Summary - Steady State - January, 2018

### A. Operating Costs

<table>
<thead>
<tr>
<th></th>
<th>$/Kg</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Feed Costs:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.01 Ration 1</td>
<td>$0.04</td>
<td>$4,693</td>
</tr>
<tr>
<td>1.02 Ration 2</td>
<td>$0.19</td>
<td>$23,096</td>
</tr>
<tr>
<td>1.03 Ration 3</td>
<td>$0.31</td>
<td>$36,805</td>
</tr>
<tr>
<td>1.04 Ration 4</td>
<td>$0.48</td>
<td>$57,345</td>
</tr>
<tr>
<td>1.05 Ration 5</td>
<td>$1.06</td>
<td>$127,648</td>
</tr>
<tr>
<td><strong>Total Feed Cost</strong></td>
<td>$2.08</td>
<td>$249,587</td>
</tr>
<tr>
<td><strong>2. Other Operating Costs:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.01 Fingerling Cost</td>
<td>$0.21</td>
<td>$25,637</td>
</tr>
<tr>
<td>2.02 Veterinary Services &amp; Supplies</td>
<td>$0.02</td>
<td>$2,500</td>
</tr>
<tr>
<td>2.03 Maintenance &amp; Repairs</td>
<td>$0.10</td>
<td>$11,737</td>
</tr>
<tr>
<td>2.04 Electricity &amp; Oxygen</td>
<td>$0.34</td>
<td>$40,450</td>
</tr>
<tr>
<td>2.05 Telephone &amp; Other Utilities</td>
<td>$0.01</td>
<td>$1,440</td>
</tr>
<tr>
<td>2.06 Lease &amp; Machinery Rental</td>
<td>$0.01</td>
<td>$1,000</td>
</tr>
<tr>
<td>2.07 General Supplies</td>
<td>$0.02</td>
<td>$2,000</td>
</tr>
<tr>
<td>2.08 Insurance</td>
<td>$0.03</td>
<td>$3,735</td>
</tr>
<tr>
<td>2.09 Effluent Management Costs</td>
<td>$0.01</td>
<td>$1,500</td>
</tr>
<tr>
<td>2.10 Office Supplies</td>
<td>$0.00</td>
<td>$500</td>
</tr>
<tr>
<td>2.11 Transportation</td>
<td>$0.10</td>
<td>$12,113</td>
</tr>
<tr>
<td>2.12 Property Tax</td>
<td>$0.06</td>
<td>$7,394</td>
</tr>
<tr>
<td><strong>Subtotal Operating Costs</strong></td>
<td>$3.00</td>
<td>$359,593</td>
</tr>
<tr>
<td>2.13 Interest on Operating Costs</td>
<td>$0.09</td>
<td>$11,057</td>
</tr>
<tr>
<td><strong>Total Operating Costs</strong></td>
<td>$3.32</td>
<td>$398,705</td>
</tr>
</tbody>
</table>

### B. Fixed Costs

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>3. Depreciation:</strong></td>
<td></td>
</tr>
<tr>
<td>3.01 Buildings &amp; Effluent Management</td>
<td>$0.19</td>
</tr>
<tr>
<td>3.02 Equipment</td>
<td>$0.53</td>
</tr>
<tr>
<td><strong>Total Depreciation Cost</strong></td>
<td>$0.72</td>
</tr>
</tbody>
</table>

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>4. Investment:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.01 Land</td>
<td>$0.01</td>
<td>$1,375</td>
</tr>
<tr>
<td>4.02 Buildings &amp; Effluent Management</td>
<td>$0.08</td>
<td>$9,378</td>
</tr>
<tr>
<td>4.03 Equipment</td>
<td>$0.13</td>
<td>$16,138</td>
</tr>
<tr>
<td><strong>Total Investment Cost</strong></td>
<td>$0.22</td>
<td>$26,891</td>
</tr>
<tr>
<td><strong>Total Fixed Costs</strong></td>
<td>$0.34</td>
<td>$113,231</td>
</tr>
</tbody>
</table>

### C. Labour

- Wages and benefits: $0.35 | $41,600 |

**Total Cost of Production:** $4.61 | $553,536 |

### Profitability and Breakeven Analysis

- **Estimated Farmgate**:
  - Per Kg
  - Total
  - Target Market Price: $4.95 | $594,245
  - Market weight (kg): 2.00
  - % of Fish Weight Sold: 100
  - Market Premium (if any): $0.00 |
- **Marginal Returns**:
  - Over Operating Costs: $1.63 | $195,541
  - Over Operating & Labour Costs: $1.28 | $163,941
  - Over Total Costs (Net Profit): $0.34 | $40,711 |
- **Operating Expense Ratio**: 67.1%
- **Breakeven Selling Price**:
  - $/Kg
  - Total
  - Operating Costs: $3.32 | $398,704
  - Operating & Labour Costs: $3.67 | $440,304
  - **Total Costs**: $4.61 | $553,536
- **Return On Assets (ROA)**: 3.22%
- **Return On Investment (ROI)**: 7.35%

**Note:** This budget is only a guide and is not intended to be an in-depth study of the cost of production of this industry. Interpretation and utilization of this information is the responsibility of the user. No liability for decisions based on this publication is assumed.
# Aquaculture (20g to 2kg) Grow-out Summary - Ramp-up - January, 2018

## A. Operating Costs

1. **Feed Costs:**
   - 1.01 Ration 1: $5,298
   - 1.02 Ration 2: $23,536
   - 1.03 Ration 3: $29,712
   - 1.04 Ration 4: $32,364
   - 1.05 Ration 5: $39,209
   - **Total Feed Cost:** $130,119

2. **Other Operating Costs:**
   - 2.01 Fingerling Cost: $28,938
   - 2.02 Veterinary Services & Supplies: $2,822
   - 2.03 Maintenance & Repairs: $13,248
   - 2.04 Electricity & Oxygen: $34,244
   - 2.05 Telephone & Other Utilities: $1,625
   - 2.06 Lease & Machinery Rental: $1,129
   - 2.07 General Supplies: $2,258
   - 2.08 Insurance: $4,215
   - 2.09 Effluent Management Costs: $1,693
   - 2.10 Office Supplies: $564
   - 2.11 Transportation: $13,672
   - 2.12 Property Tax: $8,346
   - **Subtotal Operating Costs:** $242,873

   - 2.13 Interest on Operating Costs: $3,182
   - **Total Operating Costs:** $246,055

## B. Fixed Costs

3. **Depreciation:**
   - 3.01 Buildings & Effluent Management: $25,194
   - 3.02 Equipment: $72,264
   - **Total Depreciation Cost:** $97,458

4. **Investment:**
   - 4.01 Land: $1,552
   - 4.02 Buildings & Effluent Management: $10,585
   - 4.03 Equipment: $18,216
   - **Total Investment Cost:** $30,353
   - **Total Fixed Costs:** $127,811

## C. Labour

   - Wages and benefits: $46,957
   - **Total Ramp-up Costs:** $420,823

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### Aquaculture (20g to 2kg) Grow-out Cost of Production Assumptions

1. This input table outlines the cost of production for a steady state enterprise.
2. Buildings and equipment are valued at new cost.
3. Purchased feed is used.

<table>
<thead>
<tr>
<th>Fingerling Cost based on</th>
<th>$0.390</th>
<th>Fingerling Purchase weight</th>
<th>0.020 Kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target Market Price/kg</td>
<td>$4.95</td>
<td>or:</td>
<td>$2.245/lb</td>
</tr>
<tr>
<td>Premium/kg</td>
<td>$0.00</td>
<td>100 % of Fish Weight Sold</td>
<td></td>
</tr>
</tbody>
</table>

#### Indicators of Productivity

<table>
<thead>
<tr>
<th>Ration 1</th>
<th>Ration 2</th>
<th>Ration 3</th>
<th>Ration 4</th>
<th>Ration 5</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Fingerlings</td>
<td>74,200</td>
<td>72,345</td>
<td>70,898</td>
<td>69,657</td>
<td>68,612</td>
</tr>
<tr>
<td>Average Beginning Weight (kg)</td>
<td>0.020</td>
<td>0.050</td>
<td>0.200</td>
<td>0.500</td>
<td>1.000</td>
</tr>
<tr>
<td>Average Ending Weight (kg)</td>
<td>0.050</td>
<td>0.200</td>
<td>0.500</td>
<td>1.000</td>
<td>2.000</td>
</tr>
<tr>
<td>Percent Mortality</td>
<td>2.50</td>
<td>2.00</td>
<td>1.75</td>
<td>1.50</td>
<td>1.25</td>
</tr>
<tr>
<td>Daily feed rate (% body weight/day)</td>
<td>2.167</td>
<td>1.438</td>
<td>1.142</td>
<td>0.900</td>
<td>0.742</td>
</tr>
<tr>
<td>Days on Feed</td>
<td>38</td>
<td>90</td>
<td>79</td>
<td>82</td>
<td>113</td>
</tr>
<tr>
<td>Feed Conversion Ratio</td>
<td>0.89</td>
<td>0.92</td>
<td>0.98</td>
<td>1.06</td>
<td>1.20</td>
</tr>
<tr>
<td>Number of Fish (Ending)</td>
<td>72,345</td>
<td>70,898</td>
<td>69,657</td>
<td>68,612</td>
<td>67,754</td>
</tr>
<tr>
<td>Weight Gain (kg)/Fish</td>
<td>0.030</td>
<td>0.150</td>
<td>0.2952</td>
<td>0.5310</td>
<td>1.000</td>
</tr>
<tr>
<td>Feed Consumed (kg)/Fish</td>
<td>0.0266</td>
<td>0.1386</td>
<td>0.2952</td>
<td>0.5310</td>
<td>1.200</td>
</tr>
<tr>
<td>Total feed used/ration (tonne)</td>
<td>1.977</td>
<td>10.027</td>
<td>20.929</td>
<td>36.988</td>
<td>82.334</td>
</tr>
</tbody>
</table>

#### Productivity Profile

<table>
<thead>
<tr>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fish Purchased</td>
</tr>
<tr>
<td>Fish Died</td>
</tr>
<tr>
<td>Fish available for marketing</td>
</tr>
<tr>
<td>Days on Purge</td>
</tr>
<tr>
<td>Total Days to Market</td>
</tr>
<tr>
<td>Turnover (365 / days to market)</td>
</tr>
<tr>
<td>Annual Production (kg/year)</td>
</tr>
</tbody>
</table>

#### Feed Requirements and Costs

<table>
<thead>
<tr>
<th>Ration Cost/tonne</th>
</tr>
</thead>
<tbody>
<tr>
<td>FCR *</td>
</tr>
<tr>
<td>-------</td>
</tr>
<tr>
<td>Ration 1</td>
</tr>
<tr>
<td>Ration 2</td>
</tr>
<tr>
<td>Ration 3</td>
</tr>
<tr>
<td>Ration 4</td>
</tr>
<tr>
<td>Ration 5</td>
</tr>
</tbody>
</table>

* FCR = Feed Conversion Ratio (Feed:Gain)

#### Labour

<table>
<thead>
<tr>
<th>Total Hours per year</th>
<th>40.0 hours/week</th>
<th>2,080 hours/year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wages and benefits</td>
<td>$20.00 /hour</td>
<td></td>
</tr>
</tbody>
</table>
## Capital Investment

### 120,050 Kg/year

<table>
<thead>
<tr>
<th>Buildings</th>
<th>$/sq.ft</th>
<th>Total $</th>
<th>$/Kg Production</th>
<th>Your Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barn</td>
<td>$27.50</td>
<td>$275,000</td>
<td>$2.29</td>
<td></td>
</tr>
<tr>
<td>Office &amp; Loading</td>
<td>$27.50</td>
<td>$55,000</td>
<td>$0.46</td>
<td></td>
</tr>
<tr>
<td>Standby Generator</td>
<td>$25,000.00</td>
<td>$0.21</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Concrete floors and tanks</td>
<td>$200,000</td>
<td>$1.67</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total Building Cost</strong></td>
<td></td>
<td>$555,000</td>
<td>$4.62</td>
<td></td>
</tr>
</tbody>
</table>

| Equipment                          |         |         |                 |           |
| Pumps, plumbing and water reconditioning equipment | $450,000.00 | $3.75 |           |
| Computer system                     | $2,000.00| $0.02   |                 |           |
| Fish Culture Equipment              | $60,000  | $0.50   |                 |           |
| **Total Equipment Cost**            |         | $512,000| $4.26           |           |

| **Total Building and Equipment Cost** |         | $1,067,000| $8.89 |           |

| Land Value                         |         |         |                 |           |
| Land Investment                    | 10 acres @ $2,000 | $20,000 | $0.17 |           |

| Other Costs                        |         |         |                 |           |
| Site preparation                   | $30,000  | $0.25   |                 |           |
| Effluent Management                | $35,000  | $0.29   |                 |           |
| **Total Other Costs**              |         | $65,000 | $0.54           |           |

| **Total Capital Investment**       |         | $1,152,000| $9.60 |           |

---

1 FOOTNOTE: The number of square feet in the building and the cost per square foot for buildings and equipment are approximations only. A certified building plan which is designed according to the average production capacity of an aquaculture farm should be used in order to get the exact dimensions and area for new buildings.

NOTE: 1 sq. ft. = 0.0929 sq.m; 1 sq. m. = 10.764 sq. ft.; 1 ft. = 0.3048 m
**Fixed Costs**

**Depreciation (straight line):**

- **Useful Life:**
  - Buildings: 25 years
  - Equipment: 15 years

- **Salvage Value (% of original cost):**
  - Buildings: 10.00%
  - Equipment: 10.00%

**Investment Interest Rate**

- 2.75%

**Other Operating Costs**

- **Veterinary Costs:**
  - Professional Services: $1,000/year
  - Testing & Supplies: $1,500/year

- **Maintenance & Repair**: 1.10% of total capital investment

- **Electricity**
  - Electricity rate: $0.082 per kwhr
  - Electricity usage: 475,000 kwhr/year

- **Oxygen**
  - Oxygen rate: $0.50 per cubic meter
  - Oxygen usage: 3,000 cubic meters/year

- **Telephone**: $600/year
- **Internet**: $840/year
- **Equipment Lease**: $500/year
- **Machinery Rental**: $500/year
- **General Supplies**: $2,000/year
- **Annual Insurance Cost**
  - Buildings and equipment: $0.35/$100 Capital Invested
- **Effluent Management Cost**: $1,500 total costs/year
- **Marketing & Transport.**
  - Fish Transportation: $4,500 total costs/year
  - Feed Transportation: $50.00/tonne of feed
- **Office Supplies**: $500/year
- **Operating Loan Interest %**: 5.00%
- **Ramp-up - years of steady state production**: 15 years
- **Property Tax:**
  - Barn & Land: $7,350/year
  - Land: $4.35/acre

³ FOOTNOTE: 1 cubic metre = 1000 litres
1 cubic metre = 35.314 cubic feet
1 cubic metre = 219.97 imperial gallons
### Aquaculture (20g to 2kg) Grow-out Cost of Production Worksheet

#### A. Operating Costs

1. **Feed Requirements and Costs**

   **1.01 Ration 1**
   
   \[
   \begin{align*}
   &0.030 \text{ kg weight gain/fish} \\
   &\times 0.89 \text{ feed conversion ratio} \\
   &= 0.027 \text{ kg ration/fish} \\
   &\times 2,680.00 \text{ /tonne ration} \\
   &+ 1,000 \text{ kg/tonne} \\
   &\times 65,735 \text{ fingerlings/year} \\
   &+ 120,050 \text{ kg sold/year} \\
   &= \$0.04 \text{ /kg sold/year}
   \end{align*}
   \]

   **1.02 Ration 2**
   
   \[
   \begin{align*}
   &0.150 \text{ kg weight gain/fish} \\
   &\times 0.92 \text{ feed conversion ratio} \\
   &= 0.139 \text{ kg ration/fish} \\
   &\times 2,600.00 \text{ /tonne ration} \\
   &+ 1,000 \text{ kg/tonne} \\
   &\times 64,092 \text{ fingerlings/year} \\
   &+ 120,050 \text{ kg sold/year} \\
   &= \$0.19 \text{ /kg sold/year}
   \end{align*}
   \]

   **1.03 Ration 3**
   
   \[
   \begin{align*}
   &0.300 \text{ kg weight gain/fish} \\
   &\times 0.98 \text{ feed conversion ratio} \\
   &= 0.295 \text{ kg ration/fish} \\
   &\times 1,985.00 \text{ /tonne ration} \\
   &+ 1,000 \text{ kg/tonne} \\
   &\times 62,810 \text{ fingerlings/year} \\
   &+ 120,050 \text{ kg sold/year} \\
   &= \$0.31 \text{ /kg sold/year}
   \end{align*}
   \]

   **1.04 Ration 4**
   
   \[
   \begin{align*}
   &0.500 \text{ kg weight gain/fish} \\
   &\times 1.06 \text{ feed conversion ratio} \\
   &= 0.531 \text{ kg ration/fish} \\
   &\times 1,750.00 \text{ /tonne ration} \\
   &+ 1,000 \text{ kg/tonne} \\
   &\times 61,711 \text{ fingerlings/year} \\
   &+ 120,050 \text{ kg sold/year} \\
   &= \$0.48 \text{ /kg sold/year}
   \end{align*}
   \]
1.05 Ration 5

\[
\begin{align*}
1.000 & \text{ kg weight gain/fish} \\
\times & \quad 1.20 \quad \text{feed conversion ratio} \\
= & \quad 1.200 \quad \text{kg ration/fish} \\
\div & \quad $1,750.00 \quad \text{/tonne ration} \\
\times & \quad 1,000 \quad \text{kg/tonne} \\
\div & \quad 60,785 \quad \text{fingerlings/year} \\
\times & \quad 120,050 \quad \text{kg sold/year} \\
= & \quad $1.06 \quad /\text{kg sold/year}
\end{align*}
\]

2. Other Operating Costs

2.01 Fingerling Cost

\[
\begin{align*}
$0.390 & \quad \text{fingerling market price} \\
\times & \quad 65,735 \quad \text{fingerlings purchased/turnover} \\
\div & \quad 120,050 \quad \text{kg sold/year} \\
= & \quad $0.21 \quad /\text{kg sold/year}
\end{align*}
\]

2.02 Veterinary Cost

\[
\begin{align*}
$1,000.00 & \quad \text{professional services} \\
+ & \quad $1,500.00 \quad \text{testing and supplies} \\
\div & \quad 120,050 \quad \text{kg sold/year} \\
= & \quad $0.02 \quad /\text{kg sold/year}
\end{align*}
\]

2.03 Maintenance & Repairs

\[
\begin{align*}
1.10 & \quad \% \text{ of total capital investment} \\
\times & \quad $1,067,000 \quad \text{total buildings and equipment cost} \\
\div & \quad 120,050 \quad \text{kg sold/year} \\
= & \quad $0.10 \quad /\text{kg sold/year}
\end{align*}
\]

2.04 Electricity & Oxygen

\[
\begin{align*}
$38,950 & \quad \text{electricity} \\
\div & \quad $1,500 \quad \text{oxygen} \\
\times & \quad 120,050 \quad \text{kg sold/year} \\
= & \quad $0.34 \quad /\text{kg sold/year}
\end{align*}
\]

2.05 Telephone & Other Utilities

\[
\begin{align*}
$600.00 & \quad \text{telephone} \\
\div & \quad $840.00 \quad \text{internet} \\
\times & \quad 120,050 \quad \text{kg sold/year} \\
= & \quad $0.01 \quad /\text{kg sold/year}
\end{align*}
\]

2.06 Lease & Machinery Rental

\[
\begin{align*}
$500.00 & \quad \text{lease} \\
\div & \quad $500.00 \quad \text{rental} \\
\times & \quad 120,050 \quad \text{kg sold/year} \\
= & \quad $0.01 \quad /\text{kg sold/year}
\end{align*}
\]
2.07 General Supplies
$2,000.00 \text{ general supplies} + 120,050 \text{ kg sold/year} = 0.02 \text{ /kg sold/year}

2.08 Insurance
$1,067,000 \text{ buildings & equipment} \times 0.35 \text{ /$100 capital} + 120,050 \text{ kg sold/year} = 0.03 \text{ /kg sold/year}

2.09 Effluent Management Costs
$1,500.00 \text{ total costs} + 120,050 \text{ kg sold/year} = 0.01 \text{ /kg sold/year}

2.10 Office Supplies
$500.00 \text{ office supplies} + 120,050 \text{ kg sold/year} = 0.00 \text{ /kg sold/year}

2.11 Marketing & Transportation
Fish Transportation
$4,500.00 \text{ total fish transportation} + 120,049.56 \text{ kg sold/year} = 0.04 \text{ /kg sold/year}

Feed Transportation
$50.00 \text{ /tonne of feed} \times 152.255 \text{ tonnes used} = 0.06 \text{ /kg sold/year}

Total
$0.10 \text{ /kg sold/year}

2.12 Property Taxes
$7,350 \text{ taxes on barn and land} + 120,050 \text{ kg sold/year} = 0.06 \text{ /kg sold/year}

$4.35 \text{ taxes on land} \times 10 \text{ acres} + 120,050 \text{ kg sold/year} = 0.00 \text{ /kg sold/year}

Total
$0.06 \text{ /kg sold/year}
2.13 Interest on Operating Cost

\[
\text{Interest on Operating Cost} = \frac{\text{fingerling cost} \times \text{fingerlings purchased} \times \text{total days to market} \times \% \text{ operating rate}}{\text{days/year}}
\]

\[
= \frac{0.39 \times 74,200 \times 412 \times 5.0}{365 \times 120,050} = 0.01 \text{ /kg sold/year}
\]

\[
= \frac{3.00 \text{ subtotal operating cost}}{2} \times \text{average} \times \text{total days to market} \times \% \text{ operating rate}
\]

\[
= \frac{0.08 \text{ /kg sold/year}}
\]

2.14 Ramp-up costs

\[
\text{Total Ramp-up Costs} = \frac{420,822.79}{15 \text{ Years of Steady State Production}}
\]

\[
= \frac{120,050}{0.23 \text{ /kg sold/year}}
\]

B. Fixed Costs
3. Depreciation

\[
\text{Depreciation} = \frac{\text{Original cost} - \text{Salvage Value}}{\text{Useful Life}}
\]

3.01 Buildings

\[
\text{Building cost} = \frac{620,000 \text{ total building cost (including effluent management structures)}}{-62,000 \text{ salvage value (building only)}} + 25 \text{ years useful life} + 120,050 \text{ kg sold/year}
\]

\[
= 0.19 \text{ /kg sold/year}
\]

3.02 Equipment

\[
\text{Equipment cost} = \frac{1,067,000 \text{ total equipment cost}}{-106,700 \text{ salvage value}} + 15 \text{ years useful life} + 120,050 \text{ kg sold/year}
\]

\[
= 0.53 \text{ /kg sold/year}
\]
4. Investment Cost

\[(\text{Original Cost} + \text{Salvage Value}) \times \text{Investment Rate} \div 2\]

4.01 Land for Barn Site

\[
\begin{align*}
\text{\$20,000} & \quad \text{land investment} \\
\text{\$30,000} & \quad \text{site preparation} \\
\times & \quad 2.8 \quad \% \text{ investment rate} \\
\div & \quad 120,050 \quad \text{kg sold/year} \\
\text{= 0.01} & \quad /\text{kg sold/year}
\end{align*}
\]

4.02 Buildings

\[
\begin{align*}
\text{\$620,000} & \quad \text{total building cost (including effluent management structures)} \\
\text{\$62,000} & \quad \text{salvage value (building only)} \\
\div & \quad 2 \quad \text{average} \\
\times & \quad 2.8 \quad \% \text{ investment rate} \\
\div & \quad 120,050 \quad \text{kg sold/year} \\
\text{= 0.08} & \quad /\text{kg sold/year}
\end{align*}
\]

4.03 Equipment

\[
\begin{align*}
\text{\$1,067,000} & \quad \text{total equipment cost} \\
\text{\$106,700} & \quad \text{salvage value} \\
\div & \quad 2 \quad \text{average} \\
\times & \quad 2.8 \quad \% \text{ investment rate} \\
\div & \quad 120,050 \quad \text{kg sold/year} \\
\text{= 0.13} & \quad /\text{kg sold/year}
\end{align*}
\]

5. Labour Cost

\[
\begin{align*}
2080 & \quad \text{total hours/year} \\
\times & \quad \$20.00 \quad /\text{hour} \\
\div & \quad 120,050 \quad \text{kg sold/year} \\
\text{= 0.35} & \quad /\text{kg sold/year}
\end{align*}
\]

Return on Assets (ROA)

\[
\text{Net Income} + \text{Operating Interest} + \text{Investment Interest} - \text{Value of Unpaid Family and Operator Labour} \div \text{Total Assets}
\]

Return on Investment (ROI)

\[
\text{Gross Income} - \text{Total Costs} \div \text{Total Costs}
\]

Total Assets Definition: Total Assets includes the buildings, equipment, land, and effluent management structures valued at replacement cost, plus the value of fingerlings.
Other Assumptions

Production assumptions:
The model has been developed to reflect production of rainbow trout (a.k.a. steelhead) sourced from a genetic base commonly used in the aquaculture industry or is of comparable performance. Growth is modelled based on water temperature between 14-15 degrees Celsius.

Marketing:
It is assumed that fish are marketed as whole fish (100% of fish weight sold). In the event of processing, % of fish weight sold will decrease as more of the fish is removed and it is generally assumed that a higher target market price would be sought for processed fish. Any additional costs associated with processing are not included in the model.

Oxygen:
The model includes an assumption that the majority of the oxygen required for the operation is provided by on-site oxygen generation equipment. Incorporating bulk oxygen usage in the system design will result in a lower capital investment and affect operating costs. Lower capital investment is due to reduced equipment costs. Operating costs are affected by reducing electricity usage and increasing purchased oxygen usage.

Veterinary Costs:
The assumed veterinary costs include veterinary consultation, routine testing and fish health supplies but DO NOT include any fish health treatment products as these as uncommonly used in recirculation aquaculture. Adherence to robust biosecurity protocols is important to help maintain good fish health.

Effluent Management Costs:
Costs include annual pumping costs and solids containing effluent pond maintenance costs which may occur less than annually.

Created and maintained by Manitoba Agriculture Farm Management

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