



# 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](http://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.

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

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	\$/Kg	Total	
1. Feed Costs:	<u>Sold/Year</u>	<u>Cost/Year</u>	<u>Your Cost</u>
1.01 Ration 1	\$0.04	\$4,693	
1.02 Ration 2	\$0.19	\$23,096	
1.03 Ration 3	\$0.31	\$36,805	
1.04 Ration 4	\$0.48	\$57,345	
1.05 Ration 5	<u>\$1.06</u>	<u>\$127,648</u>	
<b>Total Feed Cost</b>	<b>\$2.08</b>	<b>\$249,587</b>	
<b>2. Other Operating Costs:</b>			
2.01 Fingerling Cost	\$0.21	\$25,637	
2.02 Veterinary Services & Supplies	\$0.02	\$2,500	
2.03 Maintenance & Repairs	\$0.10	\$11,737	
2.04 Electricity & Oxygen	\$0.34	\$40,450	
2.05 Telephone & Other Utilities	\$0.01	\$1,440	
2.06 Lease & Machinery Rental	\$0.01	\$1,000	
2.07 General Supplies	\$0.02	\$2,000	
2.08 Insurance	\$0.03	\$3,735	
2.09 Effluent Management Costs	\$0.01	\$1,500	
2.10 Office Supplies	\$0.00	\$500	
2.11 Transportation	\$0.10	\$12,113	
2.12 Property Tax	\$0.06	\$7,394	
Subtotal Operating Costs	\$3.00	\$359,593	
2.13 Interest on Operating Costs	\$0.09	\$11,057	
2.14 Ramp-up Costs (Amortized 15 years)	<u>\$0.23</u>	<u>\$28,055</u>	
<b>Total Operating Costs</b>	<b>\$3.32</b>	<b>\$398,705</b>	
<b>B. Fixed Costs</b>			
<b>3. Depreciation:</b>			
3.01 Buildings & Effluent Management	\$0.19	\$22,320	
3.02 Equipment	<u>\$0.53</u>	<u>\$64,020</u>	
<b>Total Depreciation Cost</b>	<b>\$0.72</b>	<b>\$86,340</b>	
<b>4. Investment:</b>			
4.01 Land	\$0.01	\$1,375	
4.02 Buildings & Effluent Management	\$0.08	\$9,378	
4.03 Equipment	<u>\$0.13</u>	<u>\$16,138</u>	
<b>Total Investment Cost</b>	<b>\$0.22</b>	<b>\$26,891</b>	
<b>Total Fixed Costs</b>	<b>\$0.94</b>	<b>\$113,231</b>	
<b>C. Labour</b>			
Wages and benefits	\$0.35	\$41,600	
<b>Total Cost of Production</b>	<b>\$4.61</b>	<b>\$553,536</b>	

### Profitability and Breakeven Analysis

Estimated Farmgate	<u>Per Kg</u>	<u>Total</u>	
Target Market Price	<b>\$4.95</b>		
Market weight (kg)	2.00		
% of Fish Weight Sold	100		
Market Premium (if any)	\$0.00		
Gross Revenue	<b>\$4.95</b>	<b>\$594,245</b>	
<b>Marginal Returns</b>			
Over Operating Costs	\$1.63	\$195,541	
Over Operating & Labour Costs	\$1.28	\$153,941	
<b>Over Total Costs (Net Profit)</b>	<b>\$0.34</b>	<b>\$40,711</b>	
<b>Operating Expense Ratio</b>	<b>67.1%</b>		
<b>Breakeven Selling Price</b>	<u>\$/kg</u>	<u>Total</u>	
Operating Costs	\$3.32	\$398,704	
Operating & Labour Costs	\$3.67	\$440,304	
<b>Total Costs</b>	<b>\$4.61</b>	<b>\$553,535</b>	
<b>Return On Assets (ROA)</b>		<b>3.22%</b>	
<b>Return On Investment (ROI)</b>		<b>7.35%</b>	

**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

	<b>Total</b>	
<b>A. Operating Costs</b>	<b>Cost</b>	<b><u>Your Cost</u></b>
<b>1. Feed Costs:</b>		
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	<u>\$39,209</u>	_____
<b>Total Feed Cost</b>	<b>\$130,119</b>	_____
<b>2. Other Operating Costs:</b>		
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	<u>\$3,182</u>	_____
<b>Total Operating Costs</b>	<b>\$246,055</b>	_____
<b>B. Fixed Costs</b>		
<b>3. Depreciation:</b>		
3.01 Buildings & Effluent Management	\$25,194	_____
3.02 Equipment	<u>\$72,264</u>	_____
<b>Total Depreciation Cost</b>	<b>\$97,458</b>	_____
<b>4. Investment:</b>		
4.01 Land	\$1,552	_____
4.02 Buildings & Effluent Management	\$10,585	_____
4.03 Equipment	<u>\$18,216</u>	_____
<b>Total Investment Cost</b>	<b>\$30,353</b>	_____
<b>Total Fixed Costs</b>	<b>\$127,811</b>	_____
<b>C. Labour</b>		
Wages and benefits	\$46,957	_____
<b>Total Ramp-up Costs</b>	<b>\$420,823</b>	_____

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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.

Fingerling Cost based on	<b>\$0.390</b>	Fingerling Purchase weight	<b>0.020</b> Kg
Target Market Price/kg	<b>\$4.95</b>	or:	\$2.245 /lb
Premium/kg	<b>\$0.00</b>		<b>100</b> % of Fish Weight Sold

### Indicators of Productivity

	<u>Ration 1</u>	<u>Ration 2</u>	<u>Ration 3</u>	<u>Ration 4</u>	<u>Ration 5</u>	<u>Total</u>
Number of Fingerlings	<b>74,200</b>	72,345	70,898	69,657	68,612	
Average Beginning Weight (kg)	0.020	0.050	0.200	0.500	1.000	
Average Ending Weight (kg)	<b>0.050</b>	<b>0.200</b>	<b>0.500</b>	<b>1.000</b>	<b>2.000</b>	
Percent Mortality	<b>2.50</b>	<b>2.00</b>	<b>1.75</b>	<b>1.50</b>	<b>1.25</b>	<b>8.69</b>
Daily feed rate (% body weight/day)	2.167	1.438	1.142	0.900	0.742	
Days on Feed	38	90	79	82	113	<b>402</b>
Feed Conversion Ratio	0.89	0.92	0.98	1.06	1.20	<b>1.11</b>
Number of Fish (Ending)	72,345	70,898	69,657	68,612	67,754	
Weight Gain (kg)/Fish	0.030	0.150	0.300	0.500	1.000	<b>1.980</b>
Feed Consumed (kg)/Fish	0.0266	0.1386	0.2952	0.5310	1.2000	<b>2.191</b>
Total feed used/ration (tonne)	1.977	10.027	20.929	36.988	82.334	<b>152.255</b>

### Productivity Profile

	<u>Total</u>
<b>Fish Purchased</b>	<b>74,200</b>
<b>Fish Died</b>	<b>6,446</b>
	<b>8.7 % mortality</b>
<b>Fish available for marketing</b>	<b>67,754</b>
<b>Days on Purge</b>	<b>10</b>
<b>Total Days to Market</b>	<b>412</b>
<b>Turnover (365 / days to market)</b>	<b>0.89</b>
<b>Annual Production (kg/year)</b>	<b>120,050</b>

### Feed Requirements and Costs

	<u>FCR *</u>	<u>kg/fish</u>	<u>Ration Cost/tonne</u> <u>Purchased</u>
Ration 1	0.89	0.0266	<b>\$2,680.00</b>
Ration 2	0.92	0.1386	<b>\$2,600.00</b>
Ration 3	0.98	0.2952	<b>\$1,985.00</b>
Ration 4	1.06	0.5310	<b>\$1,825.00</b>
Ration 5	1.20	1.2000	<b>\$1,750.00</b>

\* FCR = Feed Conversion Ratio (Feed:Gain)

### Labour

Total Hours per year	<b>40.0</b> hours/week	2,080 hours/year
Wages and benefits	<b>\$20.00</b> /hour	

## Capital Investment<sup>1</sup>

**120,050 Kg/year**

		<u>\$/sq.ft.</u>	<u>Total \$</u>	<u>\$/Kg Production</u>	<u>Your Cost</u>
<b>Buildings</b>					
Barn	10,000 ft. <sup>2</sup>	<b>\$27.50</b>	\$275,000	\$2.29	_____
Office & Loading	2,000 ft. <sup>2</sup>	<b>\$27.50</b>	\$55,000	\$0.46	_____
Standby Generator			<b>\$25,000.00</b>	\$0.21	_____
Concrete floors and tanks			<b>\$200,000</b>	\$1.67	_____
<b>Total Building Cost</b>			<b>\$555,000</b>	<b>\$4.62</b>	_____
<b>Equipment</b>					
Pumps, plumbing and water reconditioning equipment			<b>\$450,000.00</b>	\$3.75	_____
Computer system			<b>\$2,000.00</b>	\$0.02	_____
Fish Culture Equipment			<b>\$60,000</b>	\$0.50	_____
<b>Total Equipment Cost</b>			<b>\$512,000</b>	<b>\$4.26</b>	_____
<b>Total Buildings and Equipment Cost</b>			<b>\$1,067,000</b>	<b>\$8.89</b>	_____
<b>Land Value</b>					
Land Investment	10 acres @	<b>\$ 2,000</b>	<b>\$20,000</b>	<b>\$0.17</b>	_____
<b>Other Costs</b>					
Site preparation			<b>\$30,000</b>	\$0.25	_____
Effluent Management			<b>\$35,000</b>	\$0.29	_____
<b>Total Other Costs</b>			<b>\$65,000</b>	<b>\$0.54</b>	_____
<b>Total Capital Investment</b>			<b>\$1,152,000</b>	<b>\$9.60</b>	_____

<sup>1</sup> 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 &amp; Supplies \$1,500 /year

Maintenance &amp; 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 &amp; 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 &amp; Land \$7,350 /year

Land \$4.35 /acre

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<sup>3</sup> 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

Your Cost

#### 1. Feed Requirements and Costs

##### 1.01 Ration 1

	0.030	kg weight gain/fish	
x	0.89	feed conversion ratio	_____
=	0.027	kg ration/fish	_____
x	\$2,680.00	/tonne ration	_____
÷	1,000	kg/tonne	_____
x	65,735	fingerlings/year	_____
÷	<u>120,050</u>	<u>kg sold/year</u>	_____
=	<b>\$0.04</b>	<b>/kg sold/year</b>	_____

##### 1.02 Ration 2

	0.150	kg weight gain/fish	
x	0.92	feed conversion ratio	_____
=	0.139	kg ration/fish	_____
x	\$2,600.00	/tonne ration	_____
÷	1,000	kg/tonne	_____
x	64,092	fingerlings/year	_____
÷	<u>120,050</u>	<u>kg sold/year</u>	_____
=	<b>\$0.19</b>	<b>/kg sold/year</b>	_____

##### 1.03 Ration 3

	0.300	kg weight gain/fish	
x	0.98	feed conversion ratio	_____
=	0.295	kg ration/fish	_____
x	\$1,985.00	/tonne ration	_____
÷	1,000	kg/tonne	_____
x	62,810	fingerlings/year	_____
÷	<u>120,050</u>	<u>kg sold/year</u>	_____
=	<b>\$0.31</b>	<b>/kg sold/year</b>	_____

##### 1.04 Ration 4

	0.500	kg weight gain/fish	
x	1.06	feed conversion ratio	_____
=	0.531	kg ration/fish	_____
x	\$1,750.00	/tonne ration	_____
÷	1,000	kg/tonne	_____
x	61,711	fingerlings/year	_____
÷	<u>120,050</u>	<u>kg sold/year</u>	_____
=	<b>\$0.48</b>	<b>/kg sold/year</b>	_____

**1.05 Ration 5**

	1.000	kg weight gain/fish	_____
x	1.20	feed conversion ratio	_____
=	1.200	kg ration/fish	_____
x	\$1,750.00	/tonne ration	_____
÷	1,000	kg/tonne	_____
x	60,785	fingerlings/year	_____
÷	<u>120,050</u>	<u>kg sold/year</u>	_____
=	<b>\$1.06</b>	<b>/kg sold/year</b>	_____

**2. Other Operating Costs**

**2.01 Fingerling Cost**

	\$0.390	fingerling market price	_____
x	65,735	fingerlings purchased/turnover	_____
÷	<u>120,050</u>	<u>kg sold/year</u>	_____
=	<b>\$0.21</b>	<b>/kg sold/year</b>	_____

**2.02 Veterinary Cost**

	\$1,000.00	professional services	_____
+	\$1,500.00	testing and supplies	_____
÷	<u>120,050</u>	<u>kg sold/year</u>	_____
=	<b>\$0.02</b>	<b>/kg sold/year</b>	_____

**2.03 Maintenance & Repairs**

	1.10	% of total capital investment	_____
x	\$1,067,000	total buildings and equipment cost	_____
÷	<u>120,050</u>	<u>kg sold/year</u>	_____
=	<b>\$0.10</b>	<b>/kg sold/year</b>	_____

**2.04 Electricity & Oxygen**

	\$38,950	electricity	_____
+	\$1,500	oxygen	_____
÷	<u>120,050</u>	<u>kg sold/year</u>	_____
=	<b>\$0.34</b>	<b>/kg sold/year</b>	_____

**2.05 Telephone & Other Utilities**

	\$600.00	telephone	_____
+	\$840.00	internet	_____
÷	<u>120,050</u>	<u>kg sold/year</u>	_____
=	<b>\$0.01</b>	<b>/kg sold/year</b>	_____

**2.06 Lease & Machinery Rental**

	\$500.00	lease	_____
+	\$500.00	rental	_____
÷	<u>120,050</u>	<u>kg sold/year</u>	_____
=	<b>\$0.01</b>	<b>/kg sold/year</b>	_____

**2.07 General Supplies**

	\$2,000.00	general supplies	_____
÷	<u>120,050</u>	<u>kg sold/year</u>	_____
=	<b>\$0.02</b>	<b>/kg sold/year</b>	_____

**2.08 Insurance**

	\$1,067,000	buildings & equipment	_____
x	\$0.35	/\$100	_____
÷	100	/\$100 capital	_____
÷	<u>120,050</u>	<u>kg sold/year</u>	_____
=	<b>\$0.03</b>	<b>/kg sold/year</b>	_____

**2.09 Effluent Management Costs**

x	\$1,500.00	total costs	_____
÷	<u>120,050</u>	<u>kg sold/year</u>	_____
=	<b>\$0.01</b>	<b>/kg sold/year</b>	_____

**2.10 Office Supplies**

	\$500.00	office supplies	_____
÷	<u>120,050</u>	<u>kg sold/year</u>	_____
=	<b>\$0.00</b>	<b>/kg sold/year</b>	_____

**2.11 Marketing & Transportation**

Fish Transportation

	\$4,500.00	total fish transportation	_____
÷	<u>\$120,049.56</u>	<u>kg sold/year</u>	_____
=	\$0.04	<b>/kg sold/year</b>	_____

Feed Transportation

	\$50.00	/tonne of feed	_____
	152.255	tonnes used	_____
÷	<u>\$120,049.56</u>	<u>kg sold/year</u>	_____
=	\$0.06	<b>/kg sold/year</b>	_____

**Total**                      **\$0.10**      **/kg sold/year**      \_\_\_\_\_

**2.12 Property Taxes**

	\$7,350	taxes on barn and land	_____
÷	<u>120,050</u>	<u>kg sold/year</u>	_____
=	\$0.06	<b>/kg sold/year</b>	_____

	\$4.35	taxes on land	_____
x	10	acres	_____
÷	<u>120,050</u>	<u>kg sold/year</u>	_____
=	\$0.00	<b>/kg sold/year</b>	_____

**Total**                      **\$0.06**      **/kg sold/year**      \_\_\_\_\_

**2.13 Interest on Operating Cost**

	\$0.39	fingerling cost	_____
x	74,200	fingerlings purchased	_____
x	412	total days to market	_____
x	5.0	% operating rate	_____
÷	365	days/year	_____
÷	<u>120,050</u>	<u>kg sold/year</u>	_____
=	\$0.01	<b>/kg sold/year</b>	_____
	\$3.00	subtotal operating cost	_____
÷	2	average	_____
x	412	total days to market	_____
÷	365	days/year	_____
x	<u>5.0</u>	<u>% operating rate</u>	_____
=	\$0.08	<b>/kg sold/year</b>	_____
<b>=</b>	<b>\$0.09</b>	<b>/kg sold/year</b>	_____

**2.14 Ramp-up costs**

	\$420,822.79	Total Ramp-up Costs	_____
÷	15	Years of Steady State Production	_____
÷	<u>120,050</u>	<u>kg sold/year</u>	_____
=	<b>\$0.23</b>	<b>/kg sold/year</b>	_____

**B. Fixed Costs**

**3. Depreciation**

$$\frac{\text{Original cost - Salvage Value}}{\text{Useful Life}}$$

**3.01 Buildings**

	\$620,000	total building cost (including effluent management structures)	_____
-	\$62,000	salvage value (building only)	_____
÷	25	years useful life	_____
÷	<u>120,050</u>	<u>kg sold/year</u>	_____
=	<b>0.19</b>	<b>/kg sold/year</b>	_____

**3.02 Equipment**

	\$1,067,000	total equipment cost	_____
-	\$106,700	salvage value	_____
÷	15	years useful life	_____
÷	<u>120,050</u>	<u>kg sold/year</u>	_____
=	<b>0.53</b>	<b>/kg sold/year</b>	_____

**4. Investment Cost**

$$\frac{(\text{Original Cost} + \text{Salvage Value}) \times \text{Investment Rate}}{2}$$

**4.01 Land for Barn Site**

	\$20,000	land investment	_____
+	\$30,000	site preparation	_____
x	2.8	% investment rate	_____
÷	<u>120,050</u>	kg sold/year	_____
=	0.01	<b>/kg sold/year</b>	_____

**4.02 Buildings**

	\$620,000	total building cost (including effluent management structures)	_____
+	\$62,000	salvage value (building only)	_____
÷	2	average	_____
x	2.8	% investment rate	_____
÷	<u>120,050</u>	kg sold/year	_____
=	<b>0.08</b>	<b>/kg sold/year</b>	_____

**4.03 Equipment**

	\$1,067,000	total equipment cost	_____
+	\$106,700	salvage value	_____
÷	2	average	_____
x	2.8	% investment rate	_____
÷	<u>120,050</u>	kg sold/year	_____
=	<b>0.13</b>	<b>/kg sold/year</b>	_____

**5. Labour Cost**

	2080	total hours/year	_____
x	\$20.00	/hour	_____
÷	<u>120,050</u>	kg sold/year	_____
=	<b>0.35</b>	<b>/kg sold/year</b>	_____

**Return on Assets (ROA)**  $\frac{\text{Net Income} + \text{Operating Interest} + \text{Investment Interest} - \text{Value of Unpaid Family and Operator Labour}}{\text{Total Assets}}$

**Return on Investment (ROI)**  $\frac{\text{Gross Income} - \text{Total Costs}}{\text{Total Costs}}$

**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 are 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.

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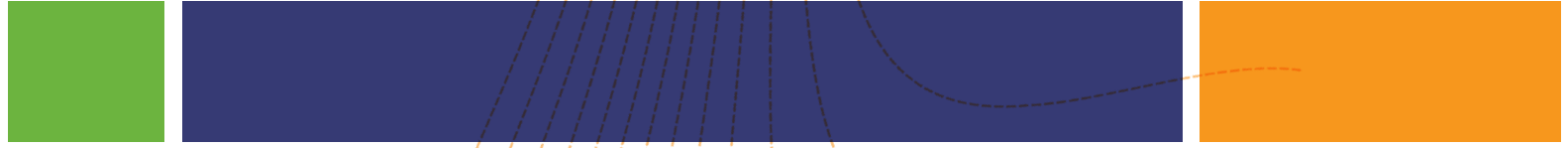
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**For more information**

- Contact your local Manitoba Agriculture Office.
- Visit us at [manitoba.ca/agriculture](http://manitoba.ca/agriculture).

