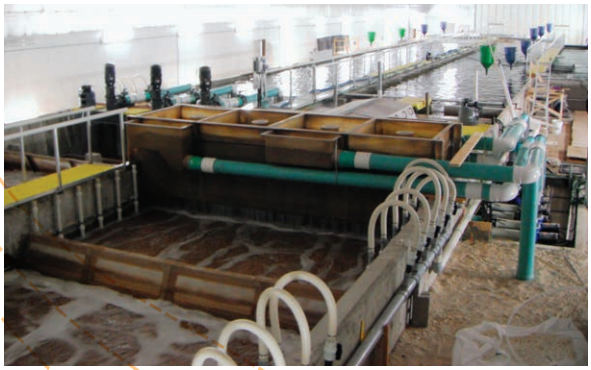

Guidelines for Estimating Aquaculture Production Costs 2018

in Manitoba

Manitoba

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.

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:	**Sold/Year**	**Cost/Year**	**Your Cost**
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	$1.06	$127,648	
Total Feed Cost	**$2.08**	**$249,587**	
2. Other Operating Costs:			
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)	$0.23	$28,055	
Total Operating Costs	**$3.32**	**$398,705**	
B. Fixed Costs			
3. Depreciation:			
3.01 Buildings & Effluent Management	$0.19	$22,320	
3.02 Equipment	$0.53	$64,020	
Total Depreciation Cost	**$0.72**	**$86,340**	
4. Investment:			
4.01 Land	$0.01	$1,375	
4.02 Buildings & Effluent Management	$0.08	$9,378	
4.03 Equipment	$0.13	$16,138	
Total Investment Cost	**$0.22**	**$26,891**	
Total Fixed Costs	**$0.94**	**$113,231**	
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**		
Market weight (kg)	2.00		
% of Fish Weight Sold	100		
Market Premium (if any)	$0.00		
Gross Revenue	**$4.95**	**$594,245**	
Marginal Returns			
Over Operating Costs	$1.63	$195,541	
Over Operating & Labour Costs	$1.28	$153,941	
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**	$553,535	
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	Total Cost	Your Cost
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**	

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 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	**$0.390**	Fingerling Purchase weight	**0.020**	Kg	
Target Market Price/kg	**$4.95**	or:	$2.245	/lb	
Premium/kg	**$0.00**		**100**	% of Fish Weight Sold	

Indicators of Productivity

	Ration 1	Ration 2	Ration 3	Ration 4	Ration 5	Total
Number of Fingerlings	**74,200**	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)	**0.050**	**0.200**	**0.500**	**1.000**	**2.000**	
Percent Mortality	**2.50**	**2.00**	**1.75**	**1.50**	**1.25**	**8.69**
Daily feed rate (% body weight/day)	2.167	1.438	1.142	0.900	0.742	
Days on Feed	38	90	79	82	113	**402**
Feed Conversion Ratio	0.89	0.92	0.98	1.06	1.20	**1.11**
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	**1.980**
Feed Consumed (kg)/Fish	0.0266	0.1386	0.2952	0.5310	1.2000	**2.191**
Total feed used/ration (tonne)	1.977	10.027	20.929	36.988	82.334	**152.255**

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

Feed Requirements and Costs

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

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

Labour

Total Hours per year	**40.0**	hours/week	2,080	hours/year
Wages and benefits	**$20.00**	/hour		

Capital Investment[1]

120,050 Kg/year

		$/sq.ft.	Total $	$/Kg Production	Your Cost
Buildings					
Barn	10,000 ft.^{2}	**$27.50**	$275,000	$2.29	
Office & Loading	2,000 ft.^{2}	**$27.50**	$55,000	$0.46	
Standby Generator			**$25,000.00**	$0.21	
Concrete floors and tanks			**$200,000**	$1.67	
Total Building Cost			**$555,000**	**$4.62**	
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 Buildings 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

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	
÷	120,050	kg sold/year	
=	**$0.04**	**/kg sold/year**	

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	
÷	120,050	kg sold/year	
=	**$0.19**	**/kg sold/year**	

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	
÷	120,050	kg sold/year	
=	**$0.31**	**/kg sold/year**	

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	
÷	120,050	kg sold/year	
=	**$0.48**	**/kg sold/year**	

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
÷	120,050	kg sold/year
=	**$1.06**	**/kg sold/year**

2. Other Operating Costs

2.01 Fingerling Cost

	$0.390	fingerling market price
x	65,735	fingerlings purchased/turnover
÷	120,050	kg sold/year
=	**$0.21**	**/kg sold/year**

2.02 Veterinary Cost

	$1,000.00	professional services
+	$1,500.00	testing and supplies
÷	120,050	kg sold/year
=	**$0.02**	**/kg sold/year**

2.03 Maintenance & Repairs

	1.10	% of total capital investment
x	$1,067,000	total buildings and equipment cost
÷	120,050	kg sold/year
=	**$0.10**	**/kg sold/year**

2.04 Electricity & Oxygen

	$38,950	electricity
+	$1,500	oxygen
÷	120,050	kg sold/year
=	**$0.34**	**/kg sold/year**

2.05 Telephone & Other Utilities

	$600.00	telephone
+	$840.00	internet
÷	120,050	kg sold/year
=	**$0.01**	**/kg sold/year**

2.06 Lease & Machinery Rental

	$500.00	lease
+	$500.00	rental
÷	120,050	kg sold/year
=	**$0.01**	**/kg sold/year**

2.07 General Supplies

	$2,000.00	general supplies	
÷	120,050	kg sold/year	
=	**$0.02**	**/kg sold/year**	

2.08 Insurance

	$1,067,000	buildings & equipment	
x	$0.35	/$100	
÷	100	/$100 capital	
÷	120,050	kg sold/year	
=	**$0.03**	**/kg sold/year**	

2.09 Effluent Management Costs

x	$1,500.00	total costs	
÷	120,050	kg sold/year	
=	**$0.01**	**/kg sold/year**	

2.10 Office Supplies

	$500.00	office supplies	
÷	120,050	kg sold/year	
=	**$0.00**	**/kg sold/year**	

2.11 Marketing & Transportation

Fish Transportation

	$4,500.00	total fish transportation	
÷	$120,049.56	kg sold/year	
=	$0.04	**/kg sold/year**	

Feed Transportation

	$50.00	/tonne of feed	
	152.255	tonnes used	
÷	$120,049.56	kg sold/year	
=	$0.06	**/kg sold/year**	

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

2.12 Property Taxes

	$7,350	taxes on barn and land	
÷	120,050	kg sold/year	
=	$0.06	**/kg sold/year**	
	$4.35	taxes on land	
x	10	acres	
÷	120,050	kg sold/year	
=	$0.00	**/kg sold/year**	

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	
÷	120,050	kg sold/year	
=	$0.01	**/kg sold/year**	
	$3.00	subtotal operating cost	
÷	2	average	
x	412	total days to market	
÷	365	days/year	
x	5.0	% operating rate	
=	$0.08	**/kg sold/year**	
=	**$0.09**	**/kg sold/year**	

2.14 Ramp-up costs

	$420,822.79	Total Ramp-up Costs	
÷	15	Years of Steady State Production	
÷	120,050	kg sold/year	
=	**$0.23**	**/kg sold/year**	

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	
÷	120,050	kg sold/year	
=	**0.19**	**/kg sold/year**	

3.02 Equipment

	$1,067,000	total equipment cost	
-	$106,700	salvage value	
÷	15	years useful life	
÷	120,050	kg sold/year	
=	**0.53**	**/kg sold/year**	

4. Investment Cost

(Original Cost + Salvage Value) X Investment Rate
2

4.01 Land for Barn Site

	$20,000	land investment	
+	$30,000	site preparation	
x	2.8	% investment rate	
÷	120,050	kg sold/year	
=	0.01	**/kg sold/year**	

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	
÷	120,050	kg sold/year	
=	**0.08**	**/kg sold/year**	

4.03 Equipment

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

5. Labour Cost

	2080	total hours/year	
x	$20.00	/hour	
÷	120,050	kg sold/year	
=	**0.35**	**/kg sold/year**	

Return on Assets (ROA) Net Income + Operating Interest + Investment Interest - Value of Unpaid Family and Operator Labour / Total Assets

Return on Investment (ROI) Gross Income - Total Costs / 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 **January, 2018**

For more information, contact your local Manitoba Agriculture Office **or:**

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For more information

- Contact your local Manitoba Agriculture Office.
- Visit us at **manitoba.ca/agriculture**.

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