



# Shellfish Aquaculture as a Business

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# Session Topics

- Income Statements
- Cash Flow Statements
- Balance Sheets
- Financial Efficiency
- Discussion and Questions

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# Assumptions for Examples

## Bottom Culture Of Spat On Shell Oysters

### Production Assumptions

Desired Annual Production	3,750	Bushels
Market Size Oysters Per Bushel	275	#
Lease Size	20	Acres
Percent Of Lease Suitable For Planting	75%	
Number Of Years Until Harvest Size	3	
Area Of Lease Planted Per Year	5.00	Acres
Area Of Lease Harvested Per Year	5.00	Acres
Survival From Planting To Harvest	50%	
Harvest Efficiency	75%	Of Oysters Harvested Per Harvestable Acre
Purchase Price Of Spat	\$ 10.00	\$ Per 1000 Spat
Average Yearly Fuel Cost	\$ 2,000.00	

# Assumptions for Examples

## Marketing Assumptions

Percentage Of Oysters Sold To Half Shell Market	25%	Crop Sold To Half Shell Market
Percentage Of Bushels Sold To Other Markets	75%	Crop Sold By Bushel To Other Markets
Price For Half Shell Market	\$ 0.50	\$ Per Oyster
Price For Bushel	\$ 45.00	\$ Per Bushel
Retail Containers	100	Count Box
Cost Of Retail Containers	\$ 2.00	Per Container
Marketing Expenses	\$ 5,000.00	\$ Per Year

# Assumptions for Examples

## Other Cost Assumptions

Lease Rent	\$ 3.50	\$ Per Acre
General Labor Rate	\$ 7.50	\$ Per Hour
General Labor Hours Per Week	20.0	
General Labor Weeks Per Year	52.0	
Supervisory Labor Rate	\$ 15.00	\$ Per Hour
Supervisory Labor Hours Per Week	40.00	
Supervisory Labor Weeks Per Year	52.00	
Monitoring Cost	\$ 2,000.00	\$ Per Year
Insurance	\$ 1,000.00	\$ Per Year
Yearly Permit Fees	\$ 1,000	
Overhead	5%	
Interest On Operating Funds	7%	
Yearly Loan Payments	\$ 2,300	

# Assumptions for Examples

## Calculated Values

Total Acres Of Lease Suitable For Planting

15

Total Number Of Oysters Harvested Per Year

1,031,250

Total Bushels Harvested Per Year

3,750

Total Oysters Harvested Per Acre

206,250

Total Bushels Harvested Per Acre

750

Annual Planting Rate

550,000

Spat Per Acre

Total Spat Needed

2,750,000

Per Year



**Income Statements &  
Enterprise Budgets**

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# Income Statements

- Also known as “Profit and Loss (or “P&L”) Statement”
- Helps determine the profitability of your farm
- Total **Revenue** – Total **Cost** = **Profitability**
- Normally calculated on a yearly basis
- Contains an itemized list of revenue and costs
- Includes both cash and non-cash expenses
- The results may be positive or negative



# Revenue/Sales

- Anything you sell during the time period

December 31, 2015

<b>Gross Income</b>		
<i>Item</i>		<i>Total \$</i>
Half Shell Market Oysters		\$ 128,906
Bushel Oyster Markets		\$ 126,563
Other		
<b>Total Gross Income</b>		<b>\$ 255,469</b>

# Costs/Expenses

Variable Cost		
<i>Item</i>		<i>Total \$</i>
Spat		\$ 27,500
Labor		
	General Labor	\$ 7,800
	Supervisory Labor	\$ 31,200.00
Fuel		\$ 2,000
Monitoring		\$ 2,000.00
Retail Containers		\$ 5,158
Marketing Expenses		\$ 5,000
Other		
Other		
Other		
Other		
Overhead		\$ 4,033
Interest On Operating Loan		\$ 5,928
<b>Total Variable Costs</b>		<b>\$ 90,619</b>

Fixed Costs		
<i>Item</i>		<i>Total \$</i>
Insurance		\$ 1,000
Lease Fees		\$ 70
Permit Fees		\$ 1,000
Interest On Average Value		\$ 1,988
Repairs		\$ 1,136
Loan Payments		\$ 2,300
Depreciation		\$ 5,908
<b>Total Fixed Cost</b>		<b>\$ 13,402</b>
<b>Total Costs</b>		<b>\$ 104,022</b>



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# Net Farm Income

***Net Farm Income = Total Revenue – Total Cost***

Total oyster farm revenues	\$255,469	<b>Minus</b>
Total expenses	\$104,022	
	<b>Equals</b>	
Net farm income from operations	\$151,447	

\* 5 acres harvested per year at 750 bushels avg/ac and selling at \$68.13/bu average during season with a range of \$45 to \$55/bu



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# Enterprise Budgets

- Similar to Income Statement
- Used to estimate projected revenue and expenses
- Shows break-even pricing and cost of production
- Can be used to determine:
  - profitability of current production
  - expansion with additional leases
  - growing additional species such as seaweeds or other shellfish

# Gross Receipts and Variable Costs

<b>Gross Income</b>		
<i>Item</i>	<i>\$ Per Unit</i>	<i>Total \$</i>
Half Shell Market Oysters	\$ 0.500	\$ 128,906
Bushel Oyster Markets	\$ 45.00	\$ 126,563
Other		
<b>Total Gross Income</b>		<b>\$ 255,469</b>

<b>Variable Cost</b>					
<i>Item</i>	<i>\$ Per Unit</i>	<i>Total \$</i>	<i>\$ Per Oyster Harvested</i>	<i>\$ Per Bushel Harvested</i>	<i>Percentage Of Total Cost</i>
Spat	\$ 10.00	\$ 27,500	\$ 0.027	\$ 7.333	26%
Labor					0%
General Labor	\$ 7.50	\$ 7,800	\$ 0.008	\$ 2.080	7%
Supervisory Labor	\$ 15.00	\$ 31,200.00	\$ 0.030	\$ 8.320	30%
Fuel		\$ 2,000	\$ 0.002	\$ 0.533	2%
Monitoring		\$ 2,000.00	\$ 0.002	\$ 0.533	2%
Retail Containers	\$ 2.00	\$ 5,158	\$ 0.005	\$ 1.375	5%
Marketing Expenses		\$ 5,000	\$ 0.005	\$ 1.333	5%
Other			\$ -	\$ -	0%
Other			\$ -	\$ -	0%
Other			\$ -	\$ -	0%
Other			\$ -	\$ -	0%
Overhead		\$ 4,033	\$ 0.004	\$ 1.075	4%
Interest On Operating Loan		\$ 5,928	\$ 0.006	\$ 1.581	6%
<b>Total Variable Costs</b>		<b>\$ 90,619</b>	<b>\$ 0.088</b>	<b>\$ 24.165</b>	<b>87%</b>

# Fixed and Total Costs

<b>Fixed Costs</b>					
<i>Item</i>	<i>\$ Per Unit</i>	<i>Total \$</i>	<i>\$ Per Oyster Harvested</i>	<i>\$ Per Bushel Harvested</i>	
Insurance		\$ 1,000	\$ 0.0010	\$ 0.267	1%
Lease Fees	\$ 3.50	\$ 70	\$ 0.0001	\$ 0.019	0%
Permit Fees		\$ 1,000	\$ 0.001	\$ 0.267	1%
Interest On Average Value		\$ 1,988	\$ 0.0019	\$ 0.530	2%
Repairs		\$ 1,136	\$ 0.0011	\$ 0.303	1%
Loan Payments		\$ 2,300	\$ 0.0022	\$ 0.613	2%
Depreciation		\$ 5,908	\$ 0.0057	\$ 1.576	6%
<b>Total Fixed Cost</b>		<b>\$ 13,402</b>	<b>\$ 0.0130</b>	<b>\$ 3.574</b>	<b>13%</b>
<b>Total Costs</b>		<b>\$ 104,022</b>	<b>\$ 0.1009</b>	<b>\$ 27.739</b>	<b>100%</b>



# Opportunity Cost for Unpaid Labor and Management

Opportunity Costs					
Operator's labor	family	each	1		\$15,000
Operator's management	family	each	1		\$20,000
Total Operator L&M					\$35,000
<i>Total Costs</i>					<i>\$139,022</i>

## Break Even Price & Yield

*Break even price =  
Total cost of production ÷ Total amount produced*

*Example*  
 $\$139,022 \div 3,750 \text{ bushels} = \$37.07 \text{ per bushel}$

*\*Includes the cost of unpaid labor and management*

# Sensitivity Analysis

Weighted Average Price Per Bushel				
	Projected Harvest (Bushels)	Price Per Bushel	Percentage Of Sales	Weighted Average Price Per Bushel
Single Oysters	937.5	\$ 137.50	25%	\$ 68.13
Bushel Oyster	2812.5	\$ 45.00	75%	
<b>TOTAL</b>	<b>3750</b>			

## Effects of Weighted Average Price and Annual Yield\* on Pre-tax Income

		Annual Production (Bushels)				
		1750	2750	3750	4750	5750
Weighted Average Price Per Bushel	\$ 48.13	\$ (19,803)	\$ 28,322	\$ 76,447	\$ 124,572	\$ 172,697
	\$ 53.13	\$ (11,053)	\$ 42,072	\$ 95,197	\$ 148,322	\$ 201,447
	\$ 58.13	\$ (2,303)	\$ 55,822	\$ 113,947	\$ 172,072	\$ 230,197
	\$ 63.13	\$ 6,447	\$ 69,572	\$ 132,697	\$ 195,822	\$ 258,947
	\$ 68.13	\$ 15,197	\$ 83,322	\$ 151,447	\$ 219,572	\$ 287,697
	\$ 73.13	\$ 23,947	\$ 97,072	\$ 170,197	\$ 243,322	\$ 316,447
	\$ 78.13	\$ 32,697	\$ 110,822	\$ 188,947	\$ 267,072	\$ 345,197
	\$ 83.13	\$ 41,447	\$ 124,572	\$ 207,697	\$ 290,822	\$ 373,947
	\$ 88.13	\$ 50,197	\$ 138,322	\$ 226,447	\$ 314,572	\$ 402,697


# Income Statement and Enterprise Budgets

## Income Statement


- Shows profitability of whole farm operation
- Calculated at least once per year

## Enterprise Budget

- Shows profitability of one enterprise or species
- Calculated at least once per year
- More detailed than Income Statement
- Shows break even pricing and effects of non-cash expenses



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# Cash Flow Statements

- Similar to enterprise budget
- Tracked over time
- Does not include non-cash expenditures
  - *Examples:* Unpaid labor; depreciation
- *Important:* It helps you with planning purchases to show when you are likely to have the funds available for payment, especially for significant purchases
- Does NOT show profitability

**Table 12.1. Monthly Cash Flow Budget for a 256-acre Catfish Farm without Financing.**

Item	January	February	March	April	May	June	July	August	September	October	November	December	Total
<i>Beginning cash</i>	578,834	596,150	577,548	557,823	664,921	713,614	727,089	704,967	702,063	698,544	790,834	824,538	
Pounds of catfish sold, lb	46,080	46,080	46,080	207,360	115,200	115,200	69,120	115,200	115,200	195,840	80,640	0	1,152,000
<i>Receipts from catfish sold, \$</i>	32,256	32,256	32,256	145,152	80,640	80,640	48,384	80,640	80,640	137,088	56,448	0	806,400
<i>Total cash inflow</i>	611,090	628,406	609,804	702,975	745,561	794,254	775,473	785,607	782,703	835,632	847,282	824,538	8,943,325
<i>Operating cash expenses</i>													
Feed	2,783	5,565	5,565	19,479	13,913	44,522	44,522	55,653	55,653	16,696	8,348	5,565	278,264
Fingerlings	0	36,416	36,416	0	0	0	0	0	0	0	0	0	72,832
Labor													0
Year-round, full-time	3,245	3,245	3,245	3,245	3,245	3,245	3,650	3,245	3,650	3,245	3,650	3,650	40,560
Seasonal, full-time	0	0	0	0	1,521	2,535	2,535	2,535	1,014	0	0	0	10,140
Plankton control	0	0	0	0	922	0	922	0	1,843	0	0	0	3,687
Gas, diesel fuel, and oil	1,137	568	568	568	947	1,516	2,463	2,463	3,031	3,031	1,326	1,326	18,944
Electricity	1,137	1,137	1,705	2,273	2,842	5,683	8,525	9,661	9,661	9,661	2,842	1,705	56,832
Repairs and maintenance	2,980	497	993	993	1,242	2,483	3,228	3,228	2,483	1,242	1,242	4,221	24,832
Bird depredation	240	240	240	160	80	0	0	0	0	160	240	240	1,600
Seining and hauling	2,304	2,304	2,304	10,368	5,760	5,760	3,456	5,760	5,760	9,792	4,032	0	57,600
Telephone	215	215	161	269	269	215	215	215	215	215	215	269	2,688
Office supplies	225	28	141	56	563	563	282	141	141	113	141	422	2,816
Farm insurance	518	518	518	518	518	518	583	518	583	518	583	583	6,476
Legal/ accounting	156	125	125	125	125	125	125	125	125	125	125	156	1,562
<i>Total operating expenses</i>	14,940	50,858	51,981	38,054	31,947	67,165	70,506	83,544	84,159	44,798	22,744	18,137	578,833





# Cash Flow Statements

- Help show how your projected budget differs from actual expenses
- Helps with planning large purchases
- Helps determine bill payments

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# Balance Sheets

- Show all the **assets** of the farm
- Show all the **debts** of the farm
- Calculates the “**Net Worth**” of the farm
- Identifies financial **strengths and weaknesses**
- A “snapshot” of your farm that provides important information on how it’s doing and is very useful in making business decisions

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# Assets

## Current Assets

- Converted to cash in the coming year
  - Bank accounts
  - Value of oyster **to be sold** in the coming year

## Non-current Assets

- Used for more than a year and will not be sold in the coming year
  - Land
  - Vessel(s)
  - Buildings
  - Equipment

# Debts /Liabilities

## Current Debt

- Bills and loan **payments** that you will make in the coming year

## Non-current Debt

- **Principle** remaining on loans in subsequent years

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# Sample Balance Sheet

Table 1. Balance sheet for a 256-acre catfish farm, December 31.

Item	Total value		
<b>Assets</b>		<b>Liabilities</b>	
<b>1. Current assets</b>		<b>4. Current liabilities</b>	
Cash on deposit	\$15,000	Payments on debt due and payable over next year	
Checking account balance	849	Equipment	\$72,368
Accounts receivable	0	Real estate (pond construction)	\$38,216
Fish inventory <sup>a</sup>	\$266,112	<b>Total current liabilities</b>	<b>\$110,584</b>
<b>Total current assets</b>	<b>\$281,961</b>	<b>5. Non-current liabilities</b>	
<b>2. Non-current assets</b>		Equipment loan	\$168,858
Equipment	\$387,570	Real estate loan	\$254,772
Ponds	\$357,888	<b>Total non-current liabilities</b>	<b>\$423,630</b>
Wells	\$48,000	<b>6. Total liabilities</b>	
Land	\$210,432		<b>\$534,214</b>
<b>Total non-current assets</b>	<b>\$1,003,890</b>	<b>7. Net worth (3-6)</b>	
<b>3. Total assets</b>	<b>\$1,285,851</b>		<b>\$751,637</b>

<sup>a</sup>4,500 sub-marketable fish per acre at 0.33 pound each at \$0.70 per pound.

$$\text{Net worth} = \text{Total Assets} - \text{Total Liabilities}$$

# Information from the Balance Sheet

## Solvency

- A business is solvent if the value of all assets is higher than all liabilities
- Indicated by positive net worth
- Measured by ratios

## Liquidity

- Ability of a business to meet its cash flow obligations
  - Current Ratio
  - Working capital

# Measuring Solvency

Measure	Calculation	Calculations	Farm value
Change in net worth	Net worth (Year 2) – net worth (Year 1)	\$505,643 – \$751,637	–\$245,994
Net capital ratio	Total assets ÷ total liabilities	\$1,285,851 ÷ \$534,214	2.41
Debt/asset ratio	Total liabilities ÷ total assets	\$534,214 ÷ \$1,285,851	0.42
Equity/asset ratio	Net worth ÷ total assets	\$751,214 ÷ \$1,285,851	0.58
Debt/equity ratio	Total liabilities ÷ net worth	\$534,214 ÷ \$751,214	0.71
Debt structure ratio	Current liabilities ÷ total liabilities	\$110,584 ÷ \$534,214	0.21
Interest coverage ratio	Returns on assets ÷ interest payments	\$21,294 ÷ \$150,579	0.14



# Measuring Liquidity

**Table 4.5.** Liquidity Measures, 256-acre Catfish Farm.

Measure	Calculation	Calculations	Farm value
Current ratio*	Current assets ÷ current liabilities	\$281,961 ÷ \$110,584	2.55
Working capital†	Current assets – current liabilities	\$281,961 – \$110,584	\$171,377

# Comparing Values Over Time

**Table 4.8.** Practical Application of Use of Financial Indicators, 256-acre Catfish Farm. Values Taken From Table 11.1 in This Volume.

Balance sheet category	Year 1	Year 2	Year 3
<b>Assets</b>			
Current	\$281,961	\$228,096	\$228,096
Noncurrent	\$1,003,890	\$889,170	\$889,170
Total	\$1,285,851	\$1,117,266	\$1,117,266
<b>Liabilities</b>			
Current	\$110,584	\$187,993	\$319,588
Noncurrent	\$423,630	\$423,630	\$423,630
Total	\$534,214	\$611,623	\$743,218
Net worth	\$751,637	505,643	\$374,048
Debt/asset ratio	0.42	0.55	0.67
Current ratio	2.55	1.21	0.71