

Small Scale Oilseed Processing

Cash Flow and Income/Expense Estimation Tool

Developed by:

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Purpose:

The goal of this tool is to allow potential small scale oilseed processors to forecast the economics small scale oilseed processing. The first page allows users to input data about input costs (seed, equipment and labor) and market prices for the final products (oil and meal). The first page is populated with sample data based on other small scale oilseed producers. Users are encouraged to enter in their own information. The second page displays the cash flow implications and an income/expense type analysis.

Assumptions about this analysis:

- Oilseed crops used for feedstock can be either purchased or raised.

Oilseed Crushing Worksheet

Fill in all information in blue text that applies to this analysis

Help

Unit	Purchased of Raised (P or R)	Price Per Unit	Quantity Oil Seed Crop Used (LBS)	Oil %	Potential Oil (Gallons)	Potential Meal (Tons)	Cost of Production for Raised Crops
Canola	P	\$0.20	110,000	38.0%	5,573	34.1	\$0.00
Camelina	R	\$0.18	36,000	32.0%	1,536	12.2	\$0.10
Flax	R	\$0.21	0	39.5%	0	0.0	\$0.00
Safflower	P	\$0.19	5,000	35.0%	233	1.6	\$0.00
Mustard	P	\$0.26	0	30.0%	0	0.0	\$0.00
Other	P	\$0.00	0	0.0%	0	0.0	\$0.00
Other	R	\$0.00	0	0.0%	0	0.0	\$0.00
			Total Seed Used (lbs)	151,000			
			Total Seed Used (tons)	75.5			
			Gallons of Oil	7,343			
			Tons of Meal	48.0			

Feed Stock	Total Seed Purchase Costs	Total Seed Raised Costs	Market Value Minus Cost Difference
Canola	\$22,000	\$0	\$0
Camelina	\$0	\$3,600	\$2,880
Flax	\$0	\$0	\$0
Safflower	\$950	\$0	\$0
Mustard	\$0	\$0	\$0
Other	\$0	\$0	\$0
Other	\$0	\$0	\$0
Total Purchased and Raised Cash Costs		\$26,550	\$2,880
		Total Market Value	\$29,430

Equipment Capacity and Hours Specifications

Crushing Capacity (tons per day in a 24 hour day)	5
Hours worked per day crushing	8.0
Tons crushed per day based on hours worked	1.7
Total number of days required to crush feedstock	45
Labor hours per ton of oilseed crushed (feedstock)	4.8
Number of presses used	1
Oil Recovery Rate of Press #1	65%
Oil Recovery Rate of Press #2 (if used)	0%
Moisture loss in Meal during processing	5%

Production Summary

Oil Production (gallons recovered)	4,773
Combined Oil Recovery Rate	65%
Average gallons of oil produced per day	105
Total Tons Meal Produced	53.8

Meal Revenue

Enter the percent of the meal sold for cash	100%
Price (Market Value) per ton of meal	\$350.00
Transportation costs per ton of meal	\$40.00
Net Cash Revenue (or Economic Value)	\$310.00

Oil Revenue

Enter the percent of the oil sold for cash	100%
Price (Market Value) per gallon	\$3.75
Transportation costs per gallon of oil	\$0.00
Net Cash Revenue (or Economic Value)	\$3.75

Capital Equipment Costs (Fixed costs)

Seed Storage Bin	\$500
Mechanical Press (for both presses, if two are used)	\$8,000
Power source for press	\$0
Meal Storage Bin(s)	\$500
Oil Storage Tank(s)	\$250
Oil Filtration Equipment	\$200
Valves and plumbing	\$30
Building/Housing	\$0
Facilities hook up costs, electric, water, etc.	\$0
Seed Cleaner	\$20

Other #2	\$0
Other #3	\$0
Total Oilseed Processing Equipment Purchase Costs	\$9,500.00

Interest Rate on Capital Investment	6.0%
Length of Loan (years)	5
Annual Principal Payment	\$1,685.27
Annual Interest Payment	\$570.00
Total Annual Loan Payment (P & I)	\$2,255.27

Depreciation on Equipment (7 year straight line, zero salvage)	\$1,357
Total Annual Taxes on Equipment/Capital Assets	\$0
Added Annual Insurance on Equipment/Farm Coverage	\$0
Other Annual Equipment Costs	\$0.00

Operating Costs (Variable Costs)	
Help Hourly Labor Cost (Wages, Benefits, Payroll Taxes, etc.)	\$8.00
Percent of Labor Costs paid in cash	0.0%
Labor Costs per ton of feedstock crushed	\$38.40
Subtotal Annual Labor Costs for Crushing	\$2,899

Market Value of Feedstock used (Raised + Purchased)	\$29,430
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Other Operating Costs	
Electric Motor Size (rated by Horse Power)	7.0
Help Motor Efficiency Rating	77%
Help Annual Electricity Cost	\$186
	\$/Kwh
	0.0757

Help Annual Repair & Maintenance Cost	\$150
Other Annual Costs #1	\$0
Other Annual Costs #2	\$0
Other Annual Costs #3	\$0
Subtotal Other Annual Operating Costs	\$336

Total Annual Operating Costs for Crushing	\$32,665
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Other Revenue (Grants, Tax Credits, etc.)	
Annual Revenue from other source #1	\$0
Annual Revenue from other source #2	\$0
Subtotal Other Annual Other Revenue	\$0

Summary of Economic Revenue & Costs

Production	
Total tons of oilseed used as feedstock	75.5
Tons of meal produced	53.8
Gallons of oil produced	4,773

Ownership Costs	
Total Equipment Cost (Depreciation, Interest, Taxes, Insurance)	\$1,927

Operating Costs	
Cost of Purchased Feedstock	\$22,950
Cost of Raised Feedstock	\$3,600
Adjustment (Market Value minus Cost)	\$2,880
Annual Feedstock Costs	\$29,430
Other Operating Costs	\$3,235
Operating Costs Subtotal	\$32,665

Total Annual Costs	
Ownership + Operating Cost	\$34,592

Revenue/Value	
Meal Cash Sales	\$16,686
Meal On-Farm Use	\$0
Total Meal Revenue/Market Value	\$16,686
Net Per Ton of Meal	\$310

Revenue from Other Sources	\$0
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Oil Cash Sales	\$17,898
Oil On-Farm Use	\$0
Total Oil Revenue/Market Value	\$17,898
Net Per Gallon of oil	\$3.75

Cash Flow and Income Expense (Net Income) Comparison

Press Size--Tons Per 24 hours
Total Gallons of Oil Produced

5
4,773

5
4,773

Help

Cash Flow Analysis -- Financial Analysis Approach

Cash Inflows	
Meal Cash Sales	16,686
Other Revenue	0
Oil Sales	17,898
Total Inflows	34,584

Cash Outflows	
Seed Cash Costs (purchased + raised)	26,550
Oilseed Processing	
Loan Principal Payment	1,685
Loan Interest Payment	570
Operating Costs (Excluding Labor)	336
Labor Costs	0
Total Operating Cash Outflows	29,141

Help

Depreciation (not a cash expense)	
Total Cash Outflows	29,141
Cash Outflow Per Gallon	\$6.11

Help

Net Cash Flow	\$5,442.88
Net Cash Flow Per Gallon	\$1.14

*Note: uses 7 year straight line depreciation

** This research was supported by Agricultural Marketing Resource Center at Iowa State University Extension

*** The worksheet was developed by Joel Schumacher, Associate Specialist, Montana State University Extension.
Contact: jschumacher@montana.edu or 406-994-6637

Income/Expense Analysis -- Uses Economic Analysis

Income	
Meal Value or Sales	16,686
Other Revenue	0
Oil Sales	17,898
Total Income	34,584

Expenses	
Seed Costs at Market Value	29,430
Oilseed Processing	
Loan Principal Payment	
Loan Interest Payment	570
Operating Costs (Excluding Labor)	336
Labor Costs	2,899
Total Operating Expenses	33,235

Help

Depreciation*	1,357
Total Expenses	34,592
Total Expense Per Gallon	\$7.25

Net Operating Income	-\$8.20
Net Operating Income Per Gallon	(\$0.00)

Help

Small Scale Biodiesel Production

Cash Flow and Income/Expense Estimation Tool

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Purpose:

The goal of this tool is to allow potential small scale biodiesel producers to forecast the economics small scale biodiesel production. The first page allows users to input data about input costs (oil, alcohol, equipment and labor) and market prices for the final products (biodiesel and glycerin). The first page is populated with sample data based on other small scale operations. Users are encouraged to enter in their own information. The second page displays the cash flow implications and an income/expense type analysis.

Biodiesel Production Worksheet

Fill in all information in blue text that applies to this analysis

Common proportions for ingredients in biodiesel are 1 part oil, .18 parts methanol and .005 parts catalyst. These proportions are shown at left in blue text and can be changed to reflect actual proportions used.

Oil
Methanol
Catalyst

Biodiesel Proportions	
Parts in Mix	Percent of Mix
0.8	69.26%
0.175	15.15%
0.005	0.43%
	100.00%

- Help** Processor Size, Gallons Per Batch
Help Gallons of Oil Purchased
 Number of batches required to process oil
 Annual Gallons of Glycerin Produced as a by-product

Year 1	Year 2
80	
1,500	1,500
19	19
263	227

Input Costs

- Help** Cost of Purchased Oil
 Methanol (per gallon)
Help Catalyst (per lbs.)

\$3.50	\$3.50
\$5.25	\$5.25
\$1.80	\$1.80

Purchase Cost of Biodiesel Production Equipment (Fixed Costs)

Lab Equipment:

- Help** Lab Scale (accuracy 0.01 grams)
Help Lab Scale (accuracy 1.00 grams)
Help Titration Kit
Help Safety Equipment
Help Fire Safety

Cost
\$0.00
\$0.00
\$0.00
\$0.00
\$0.00

Material Storage Equipment

- Help** Incoming oil filter
 Methanol Storage:
 Catalyst Storage:
 Pump #1 (Pumps unprocessed oil into the processor)
 Valves and plumbing
 Other #1

\$0.00
\$0.00
\$0.00
\$0.00
\$0.00
\$0.00

Processing Equipment

- Help** Ready to Use Processor
Help Re-Action Tank:
Help Methanol recovery system:
Help Biodiesel/Glycerin Separation system
Help Biodiesel washing equipment
Help Biodiesel drying equipment
 Valves and plumbing
Help Oil Storage Tank
 300 Gallon Tank
 All Other Equipment

\$3,300
\$0.00
\$0.00
\$0.00
\$0.00
\$0.00
\$0.00
\$1,600.00
\$300.00
\$900.00

Final Product Storage Equipment

- Biodiesel Storage Tanks
 Glycerin Storage Tanks
Help Biodiesel Fueling Pump
 Other #1

\$75.00
\$25.00
\$0.00
\$0.00

Total Equipment Purchase Cost

\$6,200

- Help** Interest Rate on Capital Investment

5%
5

- Length of Loan (years)
 Annual Principal Payment
 Annual Interest Payment
 Annual Loan Payment

\$1,122	\$1,122
\$310	\$310
\$1,432	\$1,432

- Depreciation on Equipment (7 year straight line, zero salvage)

\$886 \$886

- Total Annual Taxes on Equipment/Capital Assets
 Added Annual Insurance on Equipment/Farm Coverage
 Other Annual Equipment Costs

\$0
\$0
\$0

Operating Costs (Variable Costs)

	Gallons of Oil Purchased	1,500	1,500
	Cost of Purchased Oil	\$3.50	\$3.50
	Purchased Oil Cost (Annual)	\$5,250	\$5,250
	Methanol Cost (Annual)	\$1,378	\$1,378
	Catalyst Cost (Annual)	\$127	\$127
Help	Cost of replacement filter	\$6.50	\$6.50
	Number of gallons processed by each filter	400	400
	Annual Filter Cost	\$24.38	\$24.38
	Lab Chemicals		
Help	Cost of Phenolphthalein (1% Solution)	\$9.50	\$9.50
	Size of Phenolphthalein Bottle (measured in mL)	125	125
	Annual Phenolphthalein Cost	\$2.85	\$2.85
Help	Cost of Titration Syringe (one)	\$1.25	\$1.25
	Annual Syringe Cost	\$3.52	\$3.52
Help	Annual Cost of all other lab supplies	\$2.50	\$2.50
Help	Fuel Additive	\$0.00	\$0.00
	Annual Repair Cost	\$0.00	\$100.00
Help	Hourly Labor Rate (cash paid or value of)	\$8.00	\$8.00
	Labor Hours per batch	3	3
	Percent of labor costs paid as cash wages	100%	100%
	Economic Value of Labor Cost per batch	\$24	\$24
Help	Annual Labor Cost (economic value)	\$450	\$450
	<u>Fuel Quality Testing</u>		
Help	Cost of Test #1	\$5.49	\$5.49
Help	Frequency of Test #1	2	2
	Annual Cost of Test #1	\$51.47	\$51.47
	Cost per gallon of fuel	\$0.03	\$0.03
Help	Cost of Test #2	\$0.00	\$0.00
Help	Frequency of Test #2	0	0
	Annual Cost of Test #2	\$0.00	\$0.00
	Cost per gallon of fuel	\$0.00	\$0.00
	Total Annual Operating Costs for Biodiesel Processing	\$7,289	\$7,389

Government Payments

	Subsidies		
Help	Federal Subsidies Per Gallon	\$0.00	\$0.00
Help	State Subsidies Per Gallon	\$0.10	\$0.10
	Total Per Gallon	\$0.10	\$0.10
Help	Other Federal Program Support (Annual)	\$0.00	\$0.00
Help	Other State Program Support (Annual)	\$0.00	\$0.00
	Other Program Support (Annual)	\$2,000.00	\$0.00
	Total	\$2,000	\$0
	Total Subsidies	\$2,150	\$150
Help	Glycerin Revenue Per Gallon	\$0.00	\$0.00
	Total Glycerin Revenue	\$0	\$0

Miscellaneous

Help	Federal Fuel Tax	\$0.244	\$0.244
Help	Montana Fuel Tax	\$0.285	\$0.285
	Total Fuel Taxes	\$794	\$794
	Current Petroleum Diesel Price (including taxes)	\$3.99	\$3.99
	Reduced Petroleum Diesel Expense	\$5,985	\$5,985

Cash Flow and Income Expense (Net Income) Comparison

Batch Size--Gallons Per Batch	80
Total Gallons	1,500

Batch Size--Gallons Per Batch	80
Total Gallons	1,500

Help

Cash Flow Analysis -- Financial Analysis Approach

Cash Inflows	Year	
	Year 1	Year 2
Glycerin Sales	0	0
Government Payments	2,150	150
Diesel Sales (cost reduction)	5,985	5,985
Total Inflows	8,135	6,135
Cash Inflow Per Gallon	\$5.42	\$4.09

Cash Outflows

Biodiesel Processing		
Loan Principal Payment	1,122	1,122
Loan Interest Payment	310	310
Operating Costs (Excluding Labor & Oil)	1,589	1,689
Oil costs	5,250	5,250
Labor Costs	450	450
Fuel Taxes	794	794
Total Operating Cash Outflows	9,515	9,615

Depreciation (not a cash expense)		
Total Cash Outflows	9,515	9,615
Cash Outflow Per Gallon	\$6.34	\$6.41

Help

Income/Expense Analysis -- Uses Economic Analysis

Income	Year	
	Year 1	Year 2
Glycerin Sales	0	0
Government Payments	2,150	150
Diesel Sales (cost reduction)	5,985	5,985
Total Income	8,135	6,135
Cash Inflow Per Gallon	\$5.42	\$4.09

Expenses

Biodiesel Processing		
Loan Principal Payment		
Loan Interest Payment	310	310
Operating Costs (Excluding Labor & Oil)	1,589	1,589
Oil costs	5,250	5,250
Labor Costs	450	450
Fuel Taxes	794	794
Total Operating Expenses	8,393	8,393

Depreciation*	886	886
Total Expenses	9,279	9,279
Total Expense Per Gallon	\$6.19	\$6.19

Net Operating Income	(1,144)	(3,144)
Net Operating Income Per Gallon	(\$0.76)	(\$2.10)

*Note: uses 7 year straight line depreciation

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Small Scale Oilseed Processing & Biodiesel Production

Cash Flow and Income/Expense Estimation Tool

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Overview:

This spreadsheet is designed for producers considering small scale oilseed processing and biodiesel production. The spreadsheet allows producers to enter crop prices, equipment (and other capital) costs, and operating costs that are specific to their operation. The spreadsheet then transfers this information to a cash flow

The spreadsheet has default data entered for a sample oilseed press and a biodiesel processor. The sample data can be analyzed without any additional information from the user. A second column is provided for users to enter data for another oilseed press and biodiesel processor. The sample data can also be changed by the user

Instructions:

Cells with Blue text indicate cells that are designed for information provided by the user of the spreadsheet. Many of these cells have default values already entered, you may want to change this information to reflect your specific operation. Cells that do not have blue text should not be changed. This information applies to all

If you would like to customize the spreadsheet to your specific operation, begin with the "Oilseed Processing" worksheet (Oilseed Crushing Tab). The first portion allows users to enter price, quantity and oil content of several different oilseed crops commonly grown in Montana. The second portion allows users to enter oilseed processing equipment specifications and prices. (Please note that the worksheet allows two different processors to be compared at one time, if you are only considering one processor ignore the second column). The third portion allows users to enter information about financing the oilseed processing equipment. The final section allows users to input operating costs. Once the "Oilseed Processing" worksheet is complete, move on the

The second portion allows users to enter biodiesel processing equipment specifications and costs. The third section allows user to input operating costs. The final section allows users to enter federal and state subsidy information as well as the price per gallon of glycerin and petroleum diesel fuel. The data entry should be complete at this point. Summary information is provided at the bottom of both the "Oilseed Processing" and the "Biodiesel Production" worksheets. The "Cash Flow" and "Income Statement" worksheet (IncomeExp_CashFlow

Note: If you find any errors or have any suggestions for improvements please email them to

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Oilseed Crushing Worksheet

Fill in all information in blue text that applies to this analysis

Feed Stock Input	Unit	Purchased of Raised (P or R)	Price Per Unit	Quantity Oil Seed Crop Used (LBS)	Oil %	Potential Oil (Gallons)	Potential Meal (Tons)	Help	
								Cost of Production for Raised Crops	Market Value Minus Cost Difference
Canola	lbs.	P	\$0.20	110,000	38.0%	5,573	34.1	\$0.10	\$0
Camelina	lbs.	R	\$0.18	75,000	39.0%	3,900	22.9	\$0.08	\$7,500
Flax	lbs.	R	\$0.21	0	39.5%	0	0.0	\$0.10	\$0
Safflower	lbs.	P	\$0.19	0	35.0%	0	0.0	\$0.12	\$0
Mustard	lbs.	P	\$0.26	0	30.0%	0	0.0	\$0.10	\$0
Other	lbs.	P	\$0.00	0	0.0%	0	0.0	\$0.00	\$0
		R	\$0.00	0	0.0%	0	0.0	\$0.00	\$0
Total Seed Used (lbs)				185,000					
Total Seed Used (tons)				92.5					
Gallons of Oil				9,473					
Tons of Meal				57.0					

Total Seed Purchase Costs	\$22,000	Total Seed Raised Costs	\$6,000	Subtotals	\$22,000	\$6,000	\$7,500
				Total Purchased and Raised Cash Costs	\$28,000		
				Total Market Value			\$35,500

Equipment Capacity and Hours Specifications

Crushing Capacity (tons per day in a 24 hour day)	Press #1	Press #2
Hours worked per day crushing	5	10
Tons crushed per day based on hours worked	8.0	8.0
Total number of days required to crush feedstock	1.7	3.3
Labor hours per ton of oilseed crushed (feedstock)	56	28
Oil Recovery Rate	4.8	2.4
Moisture loss in Meal during processing	72%	76%
	5%	5%

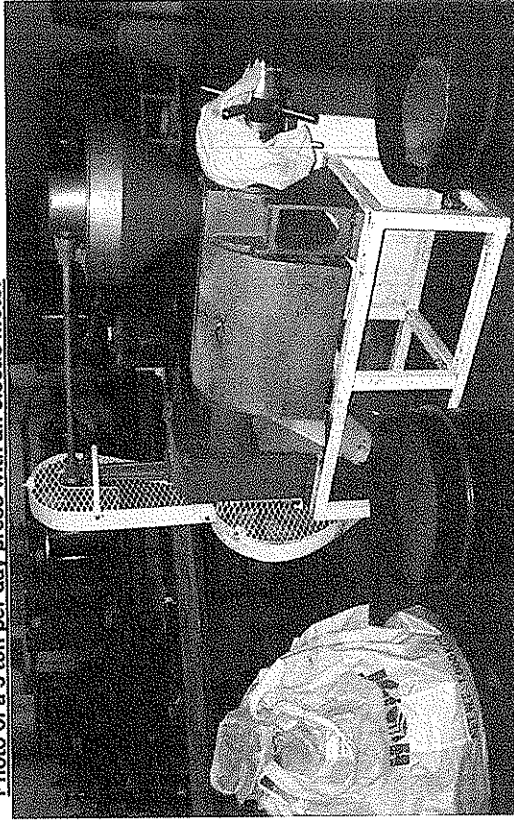
Production Summary

Oil Production (gallons recovered)	6,821	7,200
Average gallons of oil produced per day	123	259
Total Tons Meal Produced	62.3	60.9

Meal Revenue

Enter the percent of the meal sold for cash	80%	80%
Price (Market Value) per ton of meal	\$320.00	\$320.00
Transportation costs per ton of meal	\$20.00	\$20.00
Net Cash Revenue (or Economic Value)	\$300.00	\$300.00

Photo of a 5 ton per day press with an electric motor



Capital Equipment Costs (Fixed costs)		
Seed Storage Bin	\$400	\$600
Mechanical Press	\$6,000	\$10,500
Power source for press	\$0	\$0
Meal Storage Bin(s)	\$500	\$800
Oil Storage Tank(s)	\$300	\$500
Oil Filtration Equipment	\$200	\$200
Valves and plumbing	\$35	\$75
Building/Housing	\$0	\$0
Facilities hook up costs, electric, water, etc.	\$0	\$0
Other #1	\$0	\$0
Other #2	\$0	\$0
Other #3	\$0	\$0
Total Oilseed Processing Equipment Purchase Costs	\$7,435.00	\$12,675.00

Interest Rate on Capital Investment	7.5%	7.5%
Length of Loan (years)	5	5
Annual Principal Payment	\$1,280.04	\$2,182.19
Annual Interest Payment	\$557.63	\$950.63
Total Annual Loan Payment (P & I)	\$1,837.67	\$3,132.81

Depreciation on Equipment (7 year straight line, zero salvage) \$1,062 \$1,811

Total Annual Taxes on Equipment/Capital Assets	\$0	\$0
Added Annual Insurance on Equipment/Farm Coverage	\$0	\$0
Other Annual Equipment Costs	\$0.00	\$0.00

Operating Costs (Variable Costs)

Hourly Labor Cost (Wages, Benefits, Payroll Taxes, etc.)	\$8.00	\$8.00
Percent of Labor Costs paid in cash	0.0%	0.0%
Labor Costs per ton of feedstock crushed	\$38.40	\$19.20
Subtotal Annual Labor Costs for Crushing	\$3,552	\$1,776

Market Value of Feedstock used (Raised + Purchased) \$35,500 \$35,500

Other Operating Costs

Electric Motor Size (rated by Horse Power)	7.0	17.5
Motor Efficiency Rating	77%	81%
Annual Electricity Cost	\$/Kwh 0.0757	\$228 \$271

Annual Repair & Maintenance Cost

Other Annual Costs #1	\$100	\$150
Other Annual Costs #2	\$0	\$0
Other Annual Costs #3	\$0	\$0
Subtotal Other Annual Operating Costs	\$328	\$421

Total Annual Operating Costs for Crushing \$39,380 \$37,697

Summary of Economic Revenue & Costs (See IncomeExp-CashFlow tab for Financial Summary)

<u>Production</u>		
Total tons of oilseed used as feedstock	92.5	
Tons of meal produced	62.3	60.9
Gallons of oil produced	6,821	7,200
<u>Ownership Costs</u>		
Total Equipment Cost (Depreciation, Interest, Taxes, Insurance)	\$1,620	\$2,761
Per ton of feedstock	\$17.51	\$29.85
Per Gallon of Oil Produced	\$0.24	\$0.38
<u>Operating Costs</u>		
Cost of Purchased Feedstock	\$22,000	\$22,000
Cost of Raised Feedstock	\$6,000	\$6,000
Adjustment (Market Value minus Cost)	\$7,500	\$7,500
Annual Feedstock Costs	\$35,500	\$35,500
Other Operating Costs	\$3,880	\$2,197
	<u>Subtotal Operating Costs</u>	<u>\$39,380</u>
Per ton of oilseed feedstock crushed	\$425.73	\$407.53
Per Gallon of Oil Produced	\$5.77	\$5.24
<u>Total Annual Costs</u>		
Ownership + Operating Cost	\$41,000	\$40,458
Per ton of oilseed feedstock crushed	\$443.24	\$437.39
Per Gallon of Oil Produced	\$6.01	\$5.62
<u>Revenue/Value</u>		
Meal Cash Sales	\$14,951.28	\$14,610.24
Meal On-Farm Use	\$3,987	\$3,896
Total Meal Revenue/Market Value	\$18,938	\$18,506
Net Per Ton of Meal	\$304.00	\$304.00
<u>Cost of Oil Production</u>		
Total Annual Cost Less Meal Revenue/Value	\$22,061	\$21,952
Cost to Produce Oil as Input to Processing (per gallon)	\$3.23	\$3.05

Biodiesel Production Worksheet

Fill in all information in blue text that applies to this analysis

Common proportions for ingredients in biodiesel are 1 part oil, .18 parts methanol and .005 parts catalyst. These proportions are shown at left in blue text and can be changed to reflect actual proportions used.

Oil
Methanol
Catalyst

Biodiesel Proportions	
Parts in Mix	Percent of Mix
1	86.58%
0.18	15.58%
0.005	0.43%
	100.00%

Processor Size, Gallons Per Batch
Gallons of Oil Purchased
Cost of Purchased Oil
Annual Gallons of Oil to Process (Purchased + Produced)
Number of batches required to process oil
Annual Gallons of Glycerin Produced as a by-product

Processor #1	Processor #2
40	80
50	50
\$1.25	\$1.25
6,871	7,250
172	91
1,237	1,305

Input Costs

Cost of Raw Oil (from Oilseed Crushing Tab)	\$3.23	\$3.05
Average Cost of Oil (per gallon)	\$3.22	\$3.04
Methanol (per gallon)	\$5.25	\$5.25
Catalyst (per lbs.)	\$1.85	\$1.85

Purchase Cost of Biodiesel Production Equipment (Fixed Costs)

Lab Equipment:	Cost	Cost
Lab Scale (accuracy 0.01 grams)	\$0.00	\$0.00
Lab Scale (accuracy 1.00 grams)	\$35.00	\$35.00
Titration Kit	\$40.00	\$40.00
Safety Equipment	\$50.00	\$50.00
Fire Safety	\$100.00	\$100.00
Other #1	\$0.00	\$0.00
Other #2	\$0.00	\$0.00
Other #3	\$0.00	\$0.00

Material Storage Equipment

Incoming oil filter	\$16.50	\$16.50
Methanol Storage:	\$0.00	\$0.00
Catalyst Storage:	\$0.00	\$0.00
Pump #1 (Pumps unprocessed oil into the processor)	\$49.00	\$49.00
Valves and plumbing	\$25.00	\$25.00
Other #1	\$0.00	\$0.00

Processing Equipment

Ready to Use Processor	\$2,495	\$4,745
Re-Action Tank:	\$0.00	\$0.00
Methanol recovery system:	\$0.00	\$0.00
Biodiesel/Glycerin Separation system	\$0.00	\$0.00
Biodiesel washing equipment	\$0.00	\$0.00
Biodiesel drying equipment	\$325.00	\$325.00
Valves and plumbing	\$35.00	\$35.00
Optional Tank Heater	\$36.00	\$80.00
Other #2	\$0.00	\$0.00
Other #3	\$0.00	\$0.00

Final Product Storage Equipment

Biodiesel Storage Tanks	\$50.00	\$200.00
Glycerin Storage Tanks	\$50.00	\$100.00
Biodiesel Fueling Pump	\$149.00	\$149.00
Other #1	\$0.00	\$0.00

Total Equipment Purchase Cost

\$3,455 \$5,950

Interest Rate on Capital Investment	7.5%	7.5%
Length of Loan (years)	5	5
Annual Principal Payment	\$595	\$1,024
Annual Interest Payment	\$259	\$446
Annual Loan Payment	\$854	\$1,471

Depreciation on Equipment (7 year straight line, zero salvage) \$494 \$850

Total Annual Taxes on Equipment/Capital Assets	\$0	\$0
Added Annual Insurance on Equipment/Farm Coverage	\$0	\$0
Other Annual Equipment Costs	\$0	\$0

Operating Costs (Variable Costs) - Biodiesel Production Only		
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Gallons of Oil Purchased	50	50
Cost of Purchased Oil	\$1.25	\$1.25
Purchased Oil Cost (Annual)	\$63	\$63
Methanol Cost (Annual)	\$6,493	\$6,851
Catalyst Cost (Annual)	\$477	\$503

Cost of replacement filter	\$6.50	\$7.25
Number of gallons processed by each filter	400	500
Annual Filter Cost	\$111.65	\$105.12

Lab Chemicals		
Cost of Phenolphthalein (1% Solution)	\$9.50	\$9.50
Size of Phenolphthalein Bottle (measured in mL)	125	125
Annual Phenolphthalein Cost	\$26.11	\$13.77

Cost of Titration Syringe (one)	\$1.25	\$1.25
Annual Syringe Cost	\$32.21	\$16.99
Annual Cost of all other lab supplies	\$2.50	\$2.50
Fuel Additive	\$0.00	\$0.00
Other Annual Cost #1	\$0.00	\$0.00
Other Annual Cost #2	\$0.00	\$0.00
Other Annual Cost #3	\$0.00	\$0.00

Hourly Labor Rate (cash paid or value of)	\$8.00	\$8.00
Labor Hours per batch	3	4
Percent of labor costs paid as cash wages	0%	0%
Economic Value of Labor Cost per batch	\$24	\$32
Annual Labor Cost (economic value)	\$4,122	\$2,900

Fuel Quality Testing		
Cost of Test #1	\$5.49	\$5.49
Frequency of Test #1	2	2
Annual Cost of Test #1	\$471.51	\$248.76
Cost per gallon of fuel	\$0.07	\$0.03

Cost of Test #2	\$800.00	\$800.00
Frequency of Test #2	173	91
Annual Cost of Test #2	\$794.31	\$796.67
Cost per gallon of fuel	\$0.12	\$0.11

Total Annual Operating Costs for Biodiesel Processing	\$12,593	\$11,500
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Government Payments		
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Subsidies		
Federal Subsidies Per Gallon	\$0.00	\$0.00
State Subsidies Per Gallon	\$0.10	\$0.10
Total Per Gallon	\$0.10	\$0.10

Other Federal Subsidies (Annual)	\$0.00	\$0.00
Other State Subsidies (Annual)	\$0.00	\$0.00
Total Other Subsidies (Annual)	\$0.00	\$0.00

Total Subsidies	\$687.08	\$724.97
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Glycerin Revenue Per Gallon	\$0.05	\$0.05
Total Glycerin Revenue	\$62	\$65

Summary

Average Cost of Oil (Including Seed and Crushing Costs)	\$3.22	\$3.04
Biodiesel Processing Costs Per Gallon	\$1.94	\$1.77
Total Costs Per Gallon	\$5.16	\$4.80
Minus Glycerin Revenue & Subsidies	\$0.11	\$0.11
Net Cost Per Gallon (before fuel taxes)	\$5.05	\$4.69
Federal Fuel Tax	\$0.244	\$0.244
Montana Fuel Tax	\$0.285	\$0.285
Biodiesel Production Cost (including fuel taxes)	\$5.58	\$5.22
Capital Costs per Gallon (Depreciation, Interest, Tax & Insurance)	\$0.11	\$0.18
Variable Costs per Gallon	\$5.05	\$4.62
Total Costs per Gallon (estimate is not cash flow adjusted)	\$5.16	\$4.80
Total Subsidies per Gallon	\$0.10	\$0.10
Costs offset by Glycerin Revenue per Gallon	\$0.01	\$0.01
Biodiesel Production Cost Before Tax	\$5.05	\$4.69
Current Petroleum Diesel Price (including taxes)	\$3.99	\$3.99
Reduced Petroleum Diesel Expense	\$27,414	\$28,926
Net Profit or Loss Per Gallon	(\$1.59)	(\$1.23)

Cash Flow and Income Expense (Net Income) Comparison

	Option A:	Option B:
Press Size--Tons Per 24 hours	5	10
Batch Size--Gallons Per Batch	40	80
Gallons of Oil Purchased	50	50
Gallons of Oil Produced	6,821	7,200
Total Gallons of Biodiesel Produced	6,871	7,250

	Option A:	Option B:
Press Size--Tons Per 24 hours	5	10
Batch Size--Gallons Per Batch	40	80
Gallons of Oil Purchased	50	50
Gallons of Oil Produced	6,821	7,200
Total Gallons of Biodiesel Produced	6,871	7,250

Cash Flow Analysis -- Financial Analysis Approach

	Option A	Option B
Process seed with Press #1 & Biodiesel Processor #1	14,951	14,610
Process seed with Press #2 & Biodiesel Processor #2	62	65
Government Payments	687	725
Diesel Sales (cost reduction)	27,414	28,926
Total Inflows	43,115	44,327
Cash Inflow Per Gallon	\$6.32	\$6.16

	Option A	Option B
Cash Inflows		
Meal Cash Sales	14,951	14,610
Glycerin Sales	62	65
Government Payments	687	725
Diesel Sales (cost reduction)	27,414	28,926
Total Inflows	43,115	44,327
Cash Inflow Per Gallon	\$6.32	\$6.16

Income/Expense Analysis -- Uses Economic Analysis

	Option A	Option B
Process seed with Press #1 & Biodiesel Processor #1	18,938	18,506
Process seed with Press #2 & Biodiesel Processor #2	62	65
Government Payments	687	725
Diesel Sales (cost reduction)	27,414	28,926
Total Income	47,102	48,223
Cash Inflow Per Gallon	\$6.86	\$6.65

	Option A	Option B
Income		
Meal Value or Sales	18,938	18,506
Glycerin Sales	62	65
Government Payments	687	725
Diesel Sales (cost reduction)	27,414	28,926
Total Income	47,102	48,223
Cash Inflow Per Gallon	\$6.86	\$6.65

Cash Outflows

Seed Cash Costs (purchased + raised)	28,000	28,000
Oilseed Processing		
Loan Principal Payment	1,280	2,182
Loan Interest Payment	558	951
Operating Costs (Excluding Labor)	328	421
Labor Costs	0	0
Biodiesel Processing		
Loan Principal Payment	595	1,024
Loan Interest Payment	259	446
Operating Costs (Excluding Labor)	8,470	8,600
Labor Costs	0	0
Fuel Taxes	3,608	3,809
Total Operating Cash Outflows	43,098	45,433

Depreciation (not a cash expense)	43,098	45,433
Total Cash Outflows	\$6.27	\$6.27

Net Cash Flow	16	(1,106)
Net Cash Flow Per Gallon	\$0.00	-\$0.15

Expenses

Seed Costs at Market Value	35,500	35,500
Oilseed Processing		
Loan Principal Payment	558	951
Loan Interest Payment	328	421
Operating Costs (Excluding Labor)	3,552	1,776
Labor Costs	0	0
Biodiesel Processing		
Loan Principal Payment	259	446
Loan Interest Payment	8,470	8,600
Operating Costs (Excluding Labor)	4,122	2,900
Labor Costs	3,608	3,809
Fuel Taxes	56,398	54,403
Total Operating Expenses	56,398	54,403

Depreciation*	1,556	2,661
Total Expenses	57,954	57,063
Total Expense Per Gallon	\$8.43	\$7.87

Net Operating Income	(10,852)	(8,840)
Net Operating Income Per Gallon	(\$1.58)	(\$1.22)

This Worksheet is available at:

www.ampc.montana.edu/energyinformation.html

*Note: uses 7 year straight line depreciation