Factsheet

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On-Farm Biodiesel Production

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INTRODUCTION

The costs of petroleum-based diesel (petro-diesel) and heating fuel are rising, leading some growers to showing an interest in determining if small-scale biodiesel production is a feasible and economical farm-grown replacement for these farm inputs. This factsheet provides background information on biodiesel and guidelines for estimating biodiesel production costs to determine if producing biodiesel for use on your farm is a practical and economical option. In most instances, it is not. Resources are also provided to assist you in evaluating the safety and fuel quality aspects of small-scale biodiesel production.

BACKGROUND

The idea of using plant-based oils (such as soybean or canola oil) to fuel an internal combustion engine is as old as the diesel engine itself. Rudolph Diesel, inventor of the diesel engine, used peanut oil to demonstrate his new creation at the World's Fair in Paris, France, 1900. Throughout the 20th century, petro-diesel was relatively cheap and convenient. As a result, diesel engines were refined through the years to work well with this fuel source.

Petroleum diesel flows more easily (i.e., is less viscous) than either plant or animal-based oils. Using non-petroleum-based oils in today's diesel engines requires either modifying the vehicle's fuel system to accept these slower flowing oils or modifying the oils so that they can be used directly in a diesel engine. The chemical process commonly used to reduce the viscosity of bio-oils and turn them into biodiesel is called "transesterification."

The chemical transesterification of feedstock oils is a relatively straightforward process:

100 kilograms (kg) feedstock oil
+ 10 kg methanol < catalyst > 100 kg FAME
+ 10 kg glycerol

Note:

- A catalyst is a small amount of a compound (typically potassium hydroxide or sodium hydroxide (lye)) that helps to drive the chemical reaction shown.
- FAME refers to "fatty acid methyl esters" or biodiesel.

The FAME, or biodiesel, that results from this reaction is considered raw because it contains numerous contaminants, such as soap and alcohol. For biodiesel produced in this manner to meet the American Society of Testing and Materials (ASTM) D6751 fuel quality standard for biodiesel, additional processing is needed to remove these contaminants. Using biodiesel that does not meet this standard risks damaging the diesel engine and invalidating engine manufacturer warranties. This is a very significant and perhaps the most defining factor in deciding whether the fuel cost savings in producing biodiesel on-farm is even worth the risk of damaging expensive and sensitive modern farm engines.

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The chemical manipulation of vegetable oils to produce biodiesel requires the producer to handle toxic and hazardous chemicals. Seriously consider and account for the health and safety risks, as well as the economic realities, before proceeding with small-scale biodiesel production. More information on small-scale biodiesel production safety and quality is found in *Biodiesel, Basics and Beyond: A Comprehensive Guide to Production and Use for the Home and Farm*, at the University of Guelph's Centre for Agricultural Renewable Energy and Sustainability and the US eXtension Farm Energy.

BIODIESEL VS. STRAIGHT VEGETABLE OIL

It is important to note the difference between using biodiesel and straight vegetable oil (SVO) as a fuel for diesel engines. Biodiesel, as a product of the transesterification process, flows more like petro-diesel. SVOs do not go through transesterification, so must be heated prior to leaving the vehicle's fuel tank to flow more easily through the fuel delivery system. As well, mechanically expelled new oils must be filtered to ensure gums and other resins are removed from the oil prior to their use as a fuel. Filtering used vegetable oils is critical to remove any foreign particulates and other contaminants.

Some groups, particularly in Europe, are experimenting with mixing petro-diesel and SVO in various proportions, often at a 1:1 ratio. This eliminates the need to modify the vehicle's fuel delivery system while avoiding the safety issues of extra processing associated with biodiesel production. More long-term driver experience is required to assess the impact that mixing petro-diesel and SVO has on diesel engine wear and maintenance.

BENEFITS AND DRAWBACKS OF USING BIODIESEL

There are concerns about the net environmental benefit of using biodiesel or SVO for fuel instead of traditional petro-diesel. Many European countries have banned or plan to ban the use of palm oils and even soybean oils for use as feedstock or producing transport fuels due to deforestation concerns. There is also societal concern about the impact biodiesel production could have on the food supply.

Potential benefits for biodiesel include:

- **Production yields**
  In general, biodiesel production yields more net energy than petro-diesel. Studies suggest that for every unit of fossil fuel used to produce biodiesel, the biodiesel generated will yield 3.2 units of fuel energy compared to about 0.83 units for petro-diesel. The efficiency ratio for petro-diesel is likely to fall further as world oil reserves become more difficult to extract.

- **Vehicle emissions**
  Fuelling a vehicle with biodiesel can also lower vehicle emissions. For every litre used, biodiesel emits 2.2 kg less carbon dioxide (CO_2) into the atmosphere than fossil fuels. Biodiesel is also naturally low in sulphur. Removing sulphur from petro-diesel, which is a requirement for diesel fuel sold in Canada, requires additional refining. This results in further air pollution emissions.

  Biodiesel can be used in its pure form, or it can be mixed in various proportions with petro-diesel. For example, a B20 biodiesel is a mixture of 20% biodiesel and 80% petro-diesel. The U.S. Environmental Protection Agency concluded in a 2002 report and verified it again in a 2021 follow-up report [1] that, overall, biodiesel combustion does not worsen air quality compared to conventional diesel.

  Figure 1 presents the overall findings on the emissions effect of various biodiesel blends as averaged across the full range of studies they reviewed. This same 2021 investigation also noted that biodiesel blends used in diesel engines equipped with modern injector designs (which would otherwise use ultra low sulfur diesel) could actually deliver more emissions. Whether biodiesel blends meeting ASTM or European fuel quality standards are actually better than new ultra-low sulfur petro-diesel blends fueling modern common-rail injector designs, is therefore debatable.

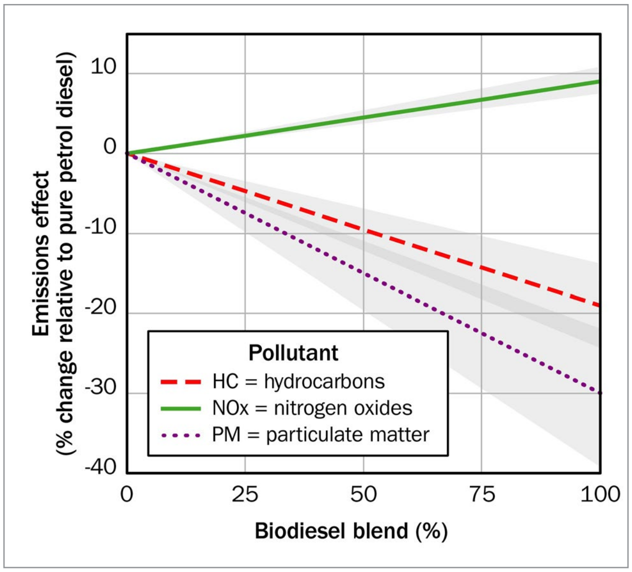

Figure 1. Change in heavy-duty diesel engine emissions for various levels of biodiesel use. [1]

Potential drawbacks for biodiesel include:

- **Cold weather performance**
  As air temperatures drop, waxes in the biodiesel crystallize. The biodiesel will begin to gel, clogging a vehicle's fuel supply lines and filters. Biodiesels made from rendered animal fats will gel at warmer temperatures than those produced from oilseeds such as canola. Gelling is inevitable, regardless of the biodiesel's feedstock oil, given the winter temperatures typical in Ontario. Mixing biodiesel with No. 1 petro-diesel fuel or other diesel fuel conditioners that are on the market can help "winterize" the biodiesel. Regardless, under Ontario climatic conditions, winter mixes in excess of B20 will likely risk fuel problems on colder days.

- **Biodiesel has a slightly lower energy content than No. 2 petro-diesel,** therefore fuel consumption may be marginally higher. Expect up to a 5% increase in fuel consumption with biodiesel for the same energy output.

- **Using biodiesel could risk voiding original manufacturer engine warranties.** Based on long-time use, there is evidence to suggest years of trouble-free operation, but you should determine what your risk tolerance is before using biodiesel in your valuable equipment. Some farm tractor engine manufacturers do identify that their engines are compatible with various levels of biodiesel content. However, they also stipulate that the biodiesel fuels comply with European or ASTM fuel standards. The testing needed to meet these standards is expensive, making it impractical to achieve on a small scale.

Could biodiesel production meet the current demand for petro-diesel? Oil derived from locally grown oilseed crops could never meet the demand for diesel fuel. For example, in Ontario, the 5-year (2015–2020) average soybean production was 3.8 million tonnes. Canola production is much less for the same period at 43,135 tonnes. Even if all the oilseed extracted from these oilseed crops were converted to biodiesel, it would only offset about 14% of Ontario's annual on-road diesel fuel consumption of 5.5 billion litres.

Inedible animal fats and used vegetable oils are another feedstock for biodiesel production. Even if all these Ontario products were dedicated to biodiesel production, they would only add an additional 2% of the supply needed for annual on-road diesel consumption.

Growing crops solely for the purpose of biodiesel production is currently not sustainable. Future technological advances to improve the efficiencies of both diesel engines and oil production from plants could improve this situation.

OPPORTUNITIES FOR ON-FARM BIODIESEL PRODUCTION IN ONTARIO

Waste or used vegetable oils and animal fats are the most economical feedstocks for biodiesel production. However, there is a limited supply of these waste oils. If they are not available, the largest potential on-farm source of feedstock oil in Ontario is soybeans. Pressing soybeans generates not only oil but also soybean meal. Ontario livestock producers often grow soybeans on a portion of their land, sell the harvested beans and subsequently purchase soymeal to include in their livestock feed rations.

Determining how to extract the oil from the oilseed is the first step. Expeller equipment is available for on-farm use. The commercial example shown in Figure 2 is marketed primarily as a means for producing soybean meal on-farm with the extracted oil being the generated byproduct. Oilseed expellers range in terms of oil extraction efficiency. While lower cost units may be more attractive initially, more expensive expellers with a higher oil extraction efficiency and lower maintenance costs often prove more economical.

Figure 2. A stationary soymeal/oil extractor produced and sold in Ontario. *Source:* Energrow Inc.

Table 1 shows the volume of oil and meal to expect from soybean and canola seed. Oil content of the common seed crops will vary, depending on the variety and crop growing conditions.

Table 1. Expected Oil and Meal Yield From Common Oilseeds Through Expeller-Pressing

Oilseed	Expeller-Pressed Oil Yield	Expeller-Pressed Meal Yield
Soybeans	80–112 L/tonne	890–860 kg/tonne
Canola	160–360 L/tonne	810–610 kg/tonne

Table 2 provides guidance on the amount of mechanically pressed soybean meal that could be included in the ration of selected livestock. Estimates for canola meal are also shown. The lower values for canola are due to the generally recognized lower palatability of canola meal as a livestock feed. The amounts assume a higher level of fat (energy) content in the on-farm processed meal than with off-farm (solvent extracted) meal because it is assumed that all on-farm oil extraction is achieved through mechanical pressing. While efficiencies vary among mechanical presses, expeller presses generally leave 45%–50% of the oil contained in the oilseed in the meal. A solvent-type approach, used in industry, leaves about 6% but is very costly and not feasible on-farm.

Table 2. Typical Meal Consumption Expectations of Selected Livestock

Livestock Type	Typical Weight Range	Average Daily Meal Consumption Potential (per 450 kg of livestock weight)	
		Soybean Meal	Canola Meal
Dairy cow	550–700 kg	1.5–2.5 kg	0.63 kg
Beef cow	550–700 kg	0.6 kg	0.29 kg
Beef feeder	180–635 kg	0.40 kg	0.20 kg
Dairy goat	75–95 kg	1.3 kg	0.79 kg
Broiler chicken	0–2.6 kg	4.3 kg [1]	–
Feeder hog	27–118 kg	3–4 kg [1, 2]	–

[1] Assumes meal product is processed sufficiently to destroy trypsin inhibitor.

[2] Range given is due to the base grain used in the hog ration. If corn-based, use the lower value. If wheat-based, use the higher value.

Values shown in columns 3 and 4 in Table 2 are not intended for use in developing detailed feed rations for livestock. They are a guide to estimate the approximate potential for a livestock farm to use the meal byproduct from on-farm oilseed crushing. The same values represent "average" annual amounts and not peak potential consumption rates for the livestock types listed.

Depending on the type of livestock fed, the extra oil left in the meal with expeller pressing could increase the meal's value as a feed supplement. For example, dairy producers may be interested in including additional fat in their cows' diets to increase the fat content of the milk produced. Hog producers may be less interested because additional fat in the animals' diets will encourage "soft fat" in the resulting meat. As well, with monogastric animals (animals with stomachs that have only one compartment, such as hogs and chickens), further heat treatment of mechanically pressed meal may be needed to destroy the trypsin inhibitor that would otherwise lead to poor protein absorption. This will depend on the temperatures the oilseed is subjected to as it passes through the expeller.

Income from the sale of the meal byproduct is critical if oilseeds are to be crushed and the oil used for biodiesel production. Livestock producers may already have the on-farm capacity to use this byproduct as animal feed. Cash crop soybean or canola growers will have to find a reliable market for the meal they generate if they want biodiesel production to approach being economical.

BIODIESEL COST OF PRODUCTION SPREADSHEETS

Three spreadsheets are available to assist in evaluating the cost of production (COP) for specific small-scale biodiesel production situations. They also point out the key factors affecting the cost of producing biodiesel, such as the byproduct meal price. These spreadsheets were originally developed by Roy Arnott, P. Ag., Business Development Specialist with Manitoba Agriculture, Food and Rural Development. They have been modified to reflect Ontario cropping practices and costs.

Inputs into the spreadsheets include:

- plant size (litres of biodiesel production/year)
- plant capital costs (building, oilseed crusher, biodiesel processor, etc.)
- plant operation costs (labour, electricity, administration, insurance, property taxes, etc.)
- process input costs (oilseed cost of production, methanol, catalyst, etc.)
- purchase price of farm diesel fuel
- anticipated diesel/biodiesel blend to be used on-farm (e.g., 20%, 50%, 100%)
- expected oilseed yield (kg/tonne of oilseed)
- expeller oil extraction efficiency

The spreadsheets assume:

- Buildings and equipment used are valued at new cost.
- Soybean or canola seed feedstock is valued at cost of production, excluding land costs, not retail cost. However, if the gross income from an acre of soybeans produced is entered into the spreadsheet as the cost of production value, the opportunity cost associated with processing the soybeans into a biofuel rather than selling them can be considered.
- The meal produced from the crushed soybeans or canola has a potential market value that can be accounted for to arrive at a net feedstock cost.
- All biodiesel produced is for farm use only in non-licensed vehicles (i.e., no fuel tax cost).

The biodiesel COP spreadsheets are:

- COP Soy
- COP Canola
- COP Oil

Select the spreadsheet that matches the oil feedstock you will use (mechanically crushed soybean or canola oil or waste oils). If using a combination of oils, complete a COP spreadsheet for each oil feedstock type and combine the results proportionately. When combining spreadsheet results, be sure to assign capital costs proportionately to the various oil sources.

Remember that effective April 1, 2014, unless otherwise exempted (e.g., coloured diesel) all fuel, including biodiesel, used to generate power in an internal combustion engine is taxable. The tax rate can vary and has been between $0.09 and $0.143/L recently. Therefore, any person or business that manufactures biodiesel in Ontario or imports biodiesel into or from Ontario on or after April 1, 2014, is required to register with the Ontario Ministry of Finance under the *Fuel Tax Act*.

What implications does this have for on-farm biodiesel production costs? If the biodiesel is manufactured solely for personal use in **non-licensed** motor vehicles (e.g., farm tractors or back-up diesel generators), the biodiesel production is tax exempt. If, however, **any** of the biodiesel produced is used in a licensed motor vehicle (e.g., farm truck), the biodiesel is subject to tax, which then affects overall production costs. Also, under these circumstances, the biodiesel producer needs to register as a biodiesel manufacturer with the Ministry of Finance in accordance with the *Fuel Tax Act* and account for any costs associated with this step in their overall cost of production.

The Ministry of Finance provides more information on tax implications from on-farm production of biodiesel and answers frequently asked questions about the Fuel Tax. Contact the Ministry of Finance at 1-866-ONT-TAXS (1-866-668-8297).

DAIRY FARM EXAMPLE

Using the biodiesel cost of production spreadsheet, consider a 350-acre, 70-cow dairy farm that uses 15,000 L of diesel fuel annually in its operation. A dairy farm was chosen because it has the greatest potential to make use of the resulting soybean meal from the oil extraction process in its animal feeding program. Data from Table 1 suggests that approximately 98 L of oil is expelled from a tonne of soybeans. Assuming a 3,025 kg/ha (45 bu/acre) soybean yield, about 50 ha (124 acres) of soybeans are required to satisfy the farm's complete diesel fuel needs. Using Table 2, a rough estimate of the farm's soybean meal requirements is 40 tonnes/year. Crushing 50 ha of soybeans would produce approximately 170 tonnes of soy meal.

If the grower wants to produce just enough meal to meet the farm's needs, only about 12.5 ha (31 acres) of soybeans would have to be processed. However, this means only about 25% of the farm's diesel fuel needs would be met. For this example, assume that 15,000 L of diesel fuel is produced, and the extra meal can be sold to a neighbour at market value. The farm's feed rations could also be reviewed to see if greater use can be made of the meal available.

Tables 3 and 4 summarize the remaining inputs used in the dairy farm's soybean-based biodiesel cost of production spreadsheet.

Table 3. Spreadsheet Inputs To Biodiesel Production Costs for Dairy Farm Example

Input	Value
Biodiesel Plant Production	
Plant size	15 L/1,000
Days of operation	65 days/yr
Hours of operation	8 hr/day
Employees per shift	0.25
Labour rate cost	$20.00/hr
Feedstock oil required	0.99088/L
Methanol required	$6,950/tonne*
Methanol recovered	25%
Catalyst required (e.g., potassium hydroxide)	$12,350/tonne*
Glycerol byproduct	$180/tonne
Purchase cost of petro-diesel (coloured) farm fuel: ultra low sulphur diesel (ULSD)	$1.20/L
On-farm biodiesel blend usage	100%
On-farm fuel efficiency increase with biodiesel usage	1.5%
Soybean Oil Production	
Soybean cost of production: assumes Round-up ready, no-till soybeans but excludes the land value (see the latest OMAFRA *Field Crop Budgets*)	$310/acre
Soybean average yield	45 bu/acre
Soybean meal (48% protein)	$550/tonne
Seed crushing days	155 days/yr
Crushing hours of operation	24 hr/day
Employees per shift — crushing	0.05
Labour rate cost	$20.00/hr
Soybean oil content	17.5%
Residual oil in soybean meal	8.5%
Shrinkage in oilseed processing	3.0%
Extra oil meal premium	0%
Soybean oil bulk density	0.920 kg/L
Other Operating Costs	
Hydro (assumes all processing done at peak or mid-peak times of day)	$0.15/kWh
Maintenance	2.5%
Wastewater/washwater disposal and miscellaneous administration costs	$2,000/year
Ontario Fuel Tax Submission and registration with Ministry of Finance	$0/L
Insurance	0.5%
Property taxes	0.5%
Investment rate	2.5%
Operating interest rate	4.0%

* Canadian retail costs sourced from Ingredient Depot.

Table 4. Spreadsheet Inputs for Capital Costs for Dairy Farm Example

	Original Value	Salvage Value	Useful Life
Capital Costs — Buildings			
Biodiesel plant	$3,000	10%	20 yr
Crushing plant	$5,000	10%	20 yr
Capital Costs — Machinery and Equipment			
Biodiesel plant	$3,000	10%	15 yr
Crushing plant	$36,000	10%	15 yr

Based on the data in Tables 3 and 4, the total land value = $30,500/ha ($12,343/acre)

Table 5 summarizes the biodiesel cost of production estimate for the example dairy farm. This cost of production of approximately $0.350/L was determined by entering the inputs (shown in Tables 3 and 4) into the biodiesel COP (soybean) spreadsheet.

Based on the values and assumptions made in the example, there would be a net farm fuel cost savings of approximately $0.88/L ($13,236/year) to produce and use biodiesel, relative to purchasing petrol diesel requirements of the farm. The availability of land to grow the soybeans and the ability to use the soybean meal as livestock feed contributes to the savings. The land cost was not included in the soybean crop's $766/ha ($310/acre) cost of production value. If a land rental value of $741/ha ($300/acre) is considered, the biodiesel cost of production would rise to an uneconomic $2.84/L. Other input assumptions and their effect on the cost to supply biodiesel for this on-farm example can be explored using the spreadsheets.

Table 5. 15,000 L/year Biodiesel Production Costs for Dairy Farm Example	**Cost/ Litre**	**Total Cost**
A. OPERATING COSTS		
1. Input Costs		
1.01. Net feedstock cost (soybeans minus soybean meal)	–$2.0261	–$30,392
1.02. Methanol	$1.0454	$15,681
1.03. Catalyst	$0.1825	$2,737
Subtotal Input Cost (1.01 to 1.03)	**–$0.7983**	**$11,974**
2. Other Operating Costs		
2.01. Hydro	$0.2424	$3,635
2.02. Maintenance	$0.0783	$1,175
2.03. Wastewater/washwater disposal	$0.1333	$2,000
2.04. Ontario Fuel Tax Submission (if all biodiesel fuel produced is used in non-licensed vehicles)	$0.000	$0
2.05. Miscellaneous administration	$0.000	$0
2.06. Insurance	$0.0157	$235
2.07. Property taxes	$0.0068	$102
Subtotal Other Operating Costs (2.01 to 2.07)	**$0.4764**	**$7,147**
2.08. Operating interest	$0.0095	$143
TOTAL OPERATING COSTS (1 + 2)	**–$0.3123**	**–$4,684**
B. FIXED COSTS		
3. Depreciation		
3.01. Buildings	$0.0240	$360
3.02. Machinery and equipment	$0.1560	$2,340
4. Investment		
4.01. Buildings	$0.0073	$110
4.02. Machinery and equipment	$0.0358	$536
4.03. Land	$0.0206	$309
TOTAL FIXED COSTS (3 + 4)	**$0.2437**	**$3,655**
TOTAL OPERATING AND FIXED COSTS (A + B)	**–$0.0686**	**–$1,029**
C. LABOUR		
5. Labour	$0.4213	$6,320
TOTAL COST OF PRODUCTION (A + B + C)	**$0.3527**	**$5,291**
D. VALUE OF BIODIESEL PRODUCED		
6. Biodiesel		
6.01. Estimated on-farm biodiesel value	$1.2000	$18,000
6.02. Estimated increased fuel efficiency value	$0.0183	$274
6.03. Glycerol sales	$0.0168	$253
TOTAL VALUE OF BIODIESEL PRODUCED (6.01 TO 6.03)	**$1.2351**	**$18,527**
NET VALUE = TOTAL VALUE – COST OF PRODUCTION (D – A + B + C)	**$0.8824**	**$13,236**

Disclaimer: This budget is only a guide, using point-in-time values for the purpose of illustrating the cost of production spreadsheet output. It 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. No liability for decisions based on this publication is assumed by OMAFRA.

Figure 3 compares the opportunity cost of producing biodiesel on-farm instead of selling the soybeans on the commodity market. The bottom line in Figure 3 represents the average weekly petro-diesel purchase cost in Ontario for the period April 2018 through March 2021. The top line represents the cost of biodiesel production, assuming the soybeans crushed were sold that week for the quoted market price and the soymeal was sold for its quoted market value that same week. The middle line is an adjusted version of the top line as it assumes 5% less than market price is received for the soybeans and the soymeal is consistently sold for $30 more than its weekly quoted average price Figure 3 shows that, for much of 2018 through 2021, purchasing petro-diesel was more economical than producing biodiesel from soybeans that could have been sold at market price. This analysis is quite sensitive to the soybean and soymeal prices, as seen in the difference between the graph's top and middle blue lines. It emphasizes the importance of establishing a solid market for the soymeal produced in on-farm biodiesel production.

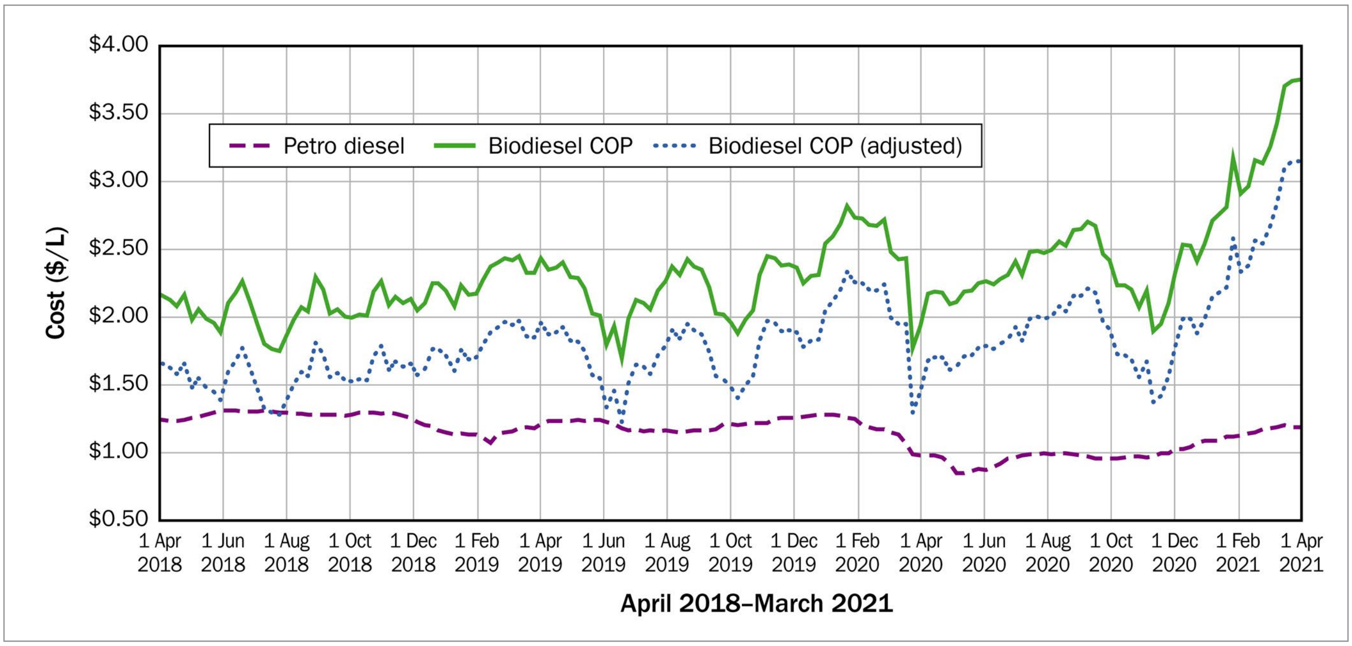

Figure 3. A comparison of farm petro-diesel cost with the cost of production of biodiesel using soybeans purchased at or near (adjusted) market value and selling the soy meal byproduct at or near (adjusted) market value.

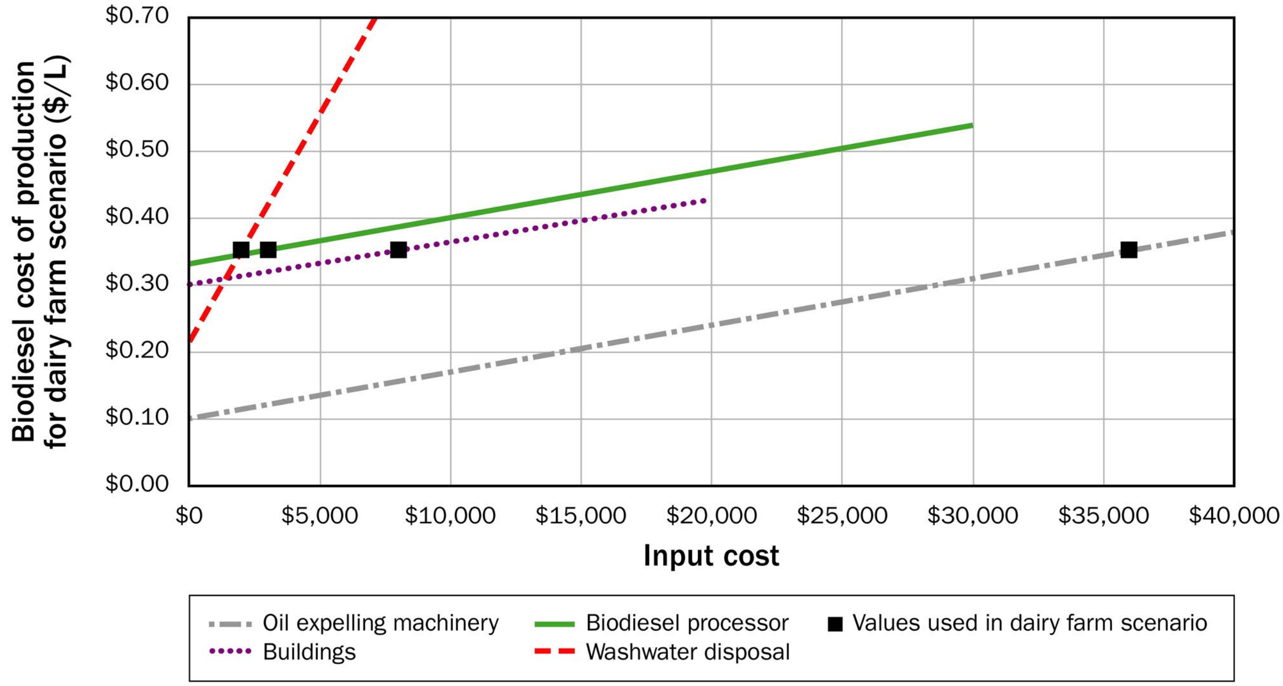

Figure 4. Sensitivity of biodiesel cost of production to selected input costs.

Building, machinery and wastewater disposal costs are also expected when establishing and operating a biodiesel facility. Figure 4 shows that the cost to produce on-farm biodiesel is not nearly as sensitive to the cost of building and machinery needs as it is to the cost of supplying the oilseed or the market price of the resulting soymeal. The cost of properly disposing of the washwater generated by the biodiesel washing process can have a significant impact on the profitability of the biodiesel production. Washing is necessary, as it helps the biodiesel to meet fuel quality standards. This reinforces that water treatment systems also have to be cost effective.

The final two inputs that can have a significant influence on the cost of production of biodiesel include the facility's annual production capacity as well as labour costs to operate and maintain the operation. Table 6 summarizes the effect of these two variables as they relate to the dairy farm example. Increasing production to make full use of the purchased equipment's capacity and concurrently reducing labour costs both help reduce the cost of producing a litre of biodiesel.

Table 6. Production Capacity and Labour Cost Influence on Biodiesel Production

Production Capacity	Labour Cost (@ $20/hr)	Cost of Biodiesel Production
2,000 L/year	$864/year	$2.61/L
5,000 L/year	$2,128/year	$1.05/L
10,000 L/year	$4,192/year	$0.52/L
15,000 L/year (dairy example)	$6,320/year	$0.35/L
25,000 L/year	$10,512/year	$0.21/L
35,000 L/year	$14,768/year	$0.16/L

Every farm situation is different, making the economics of oil extraction and on-farm meal production unique to the operation. The dairy farm example shows how the cost of production spreadsheet can help you determine if producing your own biodiesel is economically beneficial. Safety considerations and their associated costs also have to be accounted for and are not part of this example.

CONCLUSION

There are many factors to assess when considering producing and using on-farm biodiesel:

- whether to produce straight vegetable oil (SVO) and meal only or further process into biodiesel
- safety and environmental concerns related to the handling and disposal of chemicals and waste streams associated with biodiesel production
- engine warranties
- tax implications, especially if using biodiesel in on-road vehicles
- the source of oil (waste oil vs. expelled new oil) and the cost to supply or grow and expel the oilseed
- the potential to sell, or feed any meal that is produced in the expelling process

The answers to these questions will have a strong influence on the final cost to produce on-farm biodiesel. Safety measures must also be assessed and implemented. A cost analysis is recommended, using information specific to the planned facility, to assess the feasibility of growing and producing your own fuel. The cost of production spreadsheets will help in assessing your specific biodiesel production costs. In most circumstances, the production benefits do not outweigh the production costs and safety considerations.

REFERENCES

1. O'Malley, Jane, and Stephanie Searle. 2021. *Air Quality Impacts of Biodiesel in the United States (White Paper)*. The International Council on Clean Transportation. Washington DC.

This factsheet and the associated spreadsheets were written by Kevin McKague, P.Eng., Engineer, Water Quality, OMAFRA, and Richard Brunke, P.Eng., Engineer, Nutrient Management, OMAFRA.

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