

# INDIANHEAD HOLSTEINS

BARRON, WISCONSIN

## Straight Vegetable Oil— On-site energy self-sufficiency

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*“80% of diesel engines in Europe are burning straight vegetable oil because of the simplicity of production...I think there is a real future in it.”*

*Bob Schauf - Indianhead Holsteins*

### **SUMMARY**

Indianhead Holsteins is located between Barron and Cumberland, in rural northwest Wisconsin. It is owned by Robert and Karyn Schauf and has 100 milking cows. The farm deals in the sale of registered Holsteins and Holstein embryos and sells wood shavings for bedding. In addition, the farm also grows alfalfa, canning beans, corn, and wheat. In 2007, it started purchasing canola seeds and pressing them to make straight vegetable oil (SVO) for on-site fuel; and using the meal as a dietary supplement for the cows. As a result, the farm is in the process of becoming energy self-sufficient. The Schaufs are currently working cooperatively with partners in Germany to create an even more efficient and effective on-site energy system.

### **HISTORY AND BACKGROUND**

Robert and Karyn Schauf have operated Indianhead Holsteins since 1981. The 100 milking cows produce 30,000 pounds of milk a day. During the summer of 2006, due primarily to increasing fuel prices, they first decided to look into how the farm could implement a bioenergy technology to reduce the farm's dependence on fossil fuels while not negatively impacting profits. Initial discussion steered them towards bio-diesel. However, after discussions with a German counterpart, it was decided to focus on straight vegetable oil. They decided to look at vegetable oil, as opposed to bio-diesel, for several reasons. For one, vegetable oil is a less intensive operation, which limits the need for additional staff and for additional chemicals.

**OPERATION**

The farm has had a press to make canola oil and the by-product canola meal since January 2007. Canola was chosen as a feedstock due to its flash point of five degrees Fahrenheit and the quality of the meal by-product that is produced during the press process. Additionally, canola contains approximately 40 percent to 50 percent of its weight in oil. This compares to only 20 percent for soybeans and less for corn. Furthermore, canola has a low percent of saturated fat (seven percent), which makes it a good choice to run vehicles on.

The meal that is produced on the farm consists of 38-42 percent protein and 12-14 percent energy. It also has high levels of beta carotene and protein. Currently, the cows receive three pounds of canola meal a day. The farm has noticed increased milk production (approximately three additional pounds a day) since the introduction of the canola meal into the cows' diet.

**Positives of using canola include a low flashpoint, a high quality meal, and a short growing season.**

Another positive aspect of canola is its short growing season, which runs from April to July. The shorter season reduces risk when compared with planting a more traditional summer crop with a longer growing season. These risks include weather, insects, and other variables. At Indianhead Holsteins, planting canola will

also allow for a winter wheat planting after the canola has been harvested.

Before processing, the canola seeds are stored in a steel bin. They are transported inside by a flex auger to a loft where the seeds are pre-heated. The heating of the seeds increases yield five to six percent when the seeds are pressed. The seeds are then dropped down into the press.

The press is 10 horsepower and has a three phase, variable speed motor. The press grinds the seeds, producing both canola oil and canola meal. The oil is transported via short piping to four 250 gallon tanks located in the adjacent room. A 5,000 gallon tank is used to store the vegetable oil after the filtration process which occurs as the oil passes from the smaller tanks into the 5,000 gallon tank.

One ton of seed is currently producing around 80 gallons of oil. The operation is pressing a ton and half of seeds per day yielding approximately 125 gallons of oil.

CATEGORY  
Vegetable Oil

PROJECT START DATE  
2007

CO2 AND N20 REDUCTIONS  
Not available

FINANCIAL SAVINGS  
Over \$2/gal. of fuel (based on \$4.50/gal. for diesel)

INITIAL INVESTMENTS  
Storage bin = \$20,000  
Press = \$28,000  
Additional = \$50,000

POSSIBLE ADJACENCIES  
Cow feed, alternating crops

PROJECT FUNDING  
Self financing

PROJECT STATUS  
Ongoing

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(left to right) Robert Schauf from Indianhead Holsteins in Barron County. / The fuel tank for one of the two tractors and one semi at Indianhead Holsteins that operate on 100 percent canola oil.





*(clockwise from left) The storage bin and flex auger at Indianhead Holsteins. The bin holds canola seeds and one to one and half tons are processed each day./ The storage container area. The containers are located on the opposite side of the wall of the press. / The four 250 gallon bins. The bins store the oil after the seeds are pressed and before they go through the filtration process (see filter bottom right).*

Working backwards, one acre of canola produces between 1,700 and 2,000 pounds of canola seeds, which yields roughly 70 - 80 gallons of oil.

Thus far, two farm tractors and one semi have been fully converted to run on 100 percent straight vegetable oil. If the oil temperature dips below 50F degrees, the vehicles need to start on diesel. After the vehicle warms up, the vegetable oil processor (VOP) unit kicks in and the engine switches from diesel to straight vegetable oil. This is done by flipping a switch in the cab. The other vehicles on the farm operate on 1/3 canola oil and 2/3 diesel during the summer months (May through September). The temperature needs to be at least 50F degrees to incorporate the 1/3 canola oil. The Schauf's vision is to convert all vehicles to canola oil in the fu-

ture. The goal is to convert an additional two vehicles a year.

The meal that is produced during the process is used in two ways. It is used on site and it is also sold. The farm sells 50 percent of the meal that is produced for approximately \$325/ton. Currently, the farm produces 400 pounds of meal a day. Indianhead Holsteins is also saving money and being more resource conscious by using the waste oil from the farm's shop, along with occasional canola oil to heat the farm's shop and parts of the

**Two tractors and one semi have been fully converted to 100% canola oil.**

house.

(clockwise from top left) Two drill bits that grind the canola seeds. / A close-up of three of the operating drills located at the rear of the press. / The canola seed press. The 10 horsepower press can operate at varying speeds.



The Schaufs are planting 60 acres of canola on their farm this year. In addition to growing their first crop of canola, they will be purchasing canola seeds from a nearby farm. This will allow the farm to have more control over the quality of the canola seeds that they use in the process and help ensure a steady supply of feedstock.

#### GOVERNMENT AND COMMUNITY RELATIONS

There was no opposition to the bio-fuel project at Indianhead Holsteins. Compared with bio-diesel, there are fewer requirements to operate a SVO operation. A bio-diesel operation would have required significantly more governmental oversight and regulation.

#### ENERGY AND GHG REDUCTION

The farm produces approx. 125 gallons of bio-fuel a day. The growing and transporting of the canola seeds to Indianhead Holsteins takes significantly less energy than acquiring and transporting fossil fuel to the farm. The Schaufs hope to conduct research in 2008 to determine the level of CO<sub>2</sub> and other emissions they are generating using SVO compared with those levels prior to utilizing SVO on the farm.

#### COSTS AND FUNDING

The cost of the project was approximately \$100,000. This includes the seed storage bin, the flex auger, press, heater for the seeds, and storage equipment for the oil. All of the equipment was purchased by the Schauf family. The Schaufs are looking into possible grants, which would help them expand their SVO operation by helping them pay for an additional press and oil storage equipment.

Due to the initial capital investments, there was not a significant increase in profits during 2007

**The farm is producing 125 gallons of bio-fuel a day. The short term goal is to double production.**

due to the SVO operation. The Schaufs do anticipate an increase in profitability as they begin to grow more canola on-site and as energy prices rise over time. The Schaufs hope to increase their net profit per cow through their use of straight vegetable oil. The cost for Indianhead Holsteins to produce a gallon of canola oil is currently just under \$2.50/gallon. The current savings for fuel between vegetable oil and diesel

is \$2.00/gallon. Of course the profitability of SVO will change over time as the price of both SVO inputs and the price of petroleum fluctuate.

Another challenge involved the purchase of seeds with excessive residue on them.

## Indianhead Holsteins produces straight vegetable oil for under \$2.50/gallon.

### CHALLENGES AND BARRIERS

The challenges and barriers existed mostly with lack of available funding in helping the farm set up the project. The majority of bio-fuel funding opportunities seem to be targeted at bio-diesel currently. According to Robert Schauf, there is a lack of interest and availability of resources to help fund straight vegetable oil projects.

### RECOMMENDATIONS AND THE FUTURE

The next step for the Schaufs is to grow canola onsite. Indianhead Holsteins will grow 20 percent of the seeds it will press in 2008. In addition, the Schaufs would like to install an additional press that would increase the oil and meal production. This will enable the Schaufs to increase the number of vehicles that operate on vegetable oil. An increase in oil production will also allow the farm to enter the food grade market. They plan to analyze the feasibility of bottling the canola oil on farm.

*(clockwise from top left) Robert Schauf demonstrating the final product of the canola seed to canola oil process. / Indianhead Holsteins have three semis that deliver wood shavings and other products. One of the three operate with 100 percent canola oil. / The press is one of a kind in Wisconsin. The opportunities for onsite bio-fuel creation are abundant. / Filter system used to filter the pressed canola oil.*





*\*Canola or “rapeseed” is grown throughout the world. In 2005, China led the world in production of rapeseed with 13.0 million metric tons. It was followed by Canada (8.4), India (6.4), Germany(4.7), and France(4.4). Europe produces just over 15 million tons of rapeseed in total.*

*\*An internationally regulated definition of canola differentiates it from rapeseed, based upon its having less than two percent erucic acid and less than 30 umoles glucosinolates. Oilseed products that do not meet this standard cannot use the trademarked term canola.*

A key recommendation to potential SVO producers is making sure that the canola seeds are clean and do not have any residue on them. Producers should start their process with clean seeds, which will eliminate any need

**Indianhead Holsteins is an example of how a farm operation that is not significantly large can quickly address reducing their dependence on fossil fuel.**

to switch seed providers and associated costs that go along with the switch. Also, a quality filter should be used that can ensure a quality feedstock.

A goal of Indianhead Holsteins is to be self dependent in regards to fuel. Part of this process involves increasing the amount of canola seeds that are pressed into oil. At this time, the desire is to double the amount of oil produced. The Schaufs do not plan to make their own bio-diesel. The methanol and lye inputs; and the additional maintenance and observation that bio-diesel requires make it less attractive to them than straight vegetable oil production.

SVO production at Indianhead Holsteins is an example of how a smaller farm operation can quickly reduce their dependence on fossil fuel. The Schaufs have successfully transitioned a portion of their fleet to run on blended SVO/diesel and 100% straight vegetable oil.