

Biodiesel: Today's Agricultural Fuel

K. Shaine Tyson

**BioEnergy: The Future of
Rural America**

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What is Biodiesel

☀️ **A clean burning renewable fuel made from agricultural products**

- ☀️ Soy bean oil
- ☀️ Sunflower oil
- ☀️ Canola and rapeseed oil
- ☀️ Animal fats
- ☀️ Recycled cooking oil



100 lbs oil + 10 lbs methanol + catalyst = 100 lbs biodiesel + 10 lbs glycerol

Biodiesel: Mono alkyl fatty acid esters made from renewable vegetable oils, recycled cooking greases, or animal fats that meets ASTM standards

Benefits of Biodiesel

💧 **It does not cost American lives to produce**

💧 **Produced by US**

💧 **FARMERS**

💧 **RECYCLERS**

💧 **It is not dirty to produce**



USA Today 11-3-03



Benefits of Biodiesel

- 🔹 **Keeps dollars in the US**

- 🔹 Not exporting dollars to foreign countries

- 🔹 **Provides new crop and production opportunities to agricultural industry**



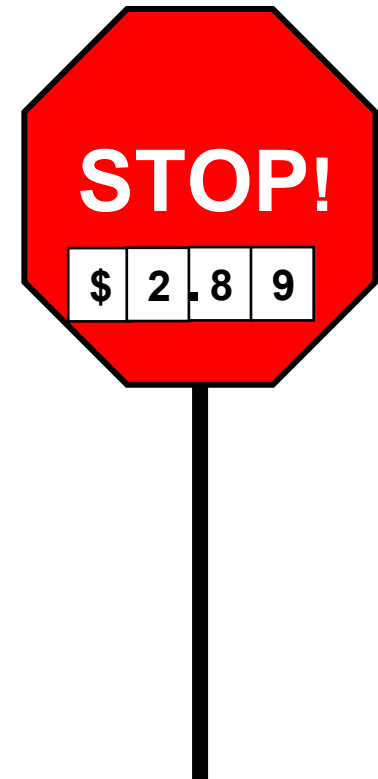
Benefits of Biodiesel

🔥 Diversifying the fuel supply

- 🔥 postpones shortages
- 🔥 stretches the petroleum fuel we have further
- 🔥 increases consumer choices

🔥 Dampen price spikes

- 🔥 Alternatives reduce market power of petroleum
- 🔥 Dampens how much price gouging can occur





Biodiesel Terminology

🔥 Pure biodiesel or 100% Biodiesel (B100)

- 🔥 Also called NEAT Biodiesel
- 🔥 Not recommended for common use

🔥 Biodiesel Blend

- 🔥 BXX for XX% biodiesel
- 🔥 **B20** is 20% biodiesel and 80% petro diesel fuel
 - 🔥 Most common blend in commercial use
- 🔥 **B5** is 5% biodiesel and 95% petro diesel fuel
 - 🔥 offers largest petroleum displacement potential



Benefits of B20

- ☀️ BTU content similar to diesel No. 2
- ☀️ Similar power and fuel efficiency
- ☀️ Used in existing diesel equipment with NO modifications
- ☀️ Safer than diesel fuel (higher flash point)
- ☀️ High lubricity – off the scale
- ☀️ Enhances biodegradability
- ☀️ Reduces CO, PM, NMHC, and Air toxic exhaust emissions

Change Your Fuel,



Not Your Fleet!

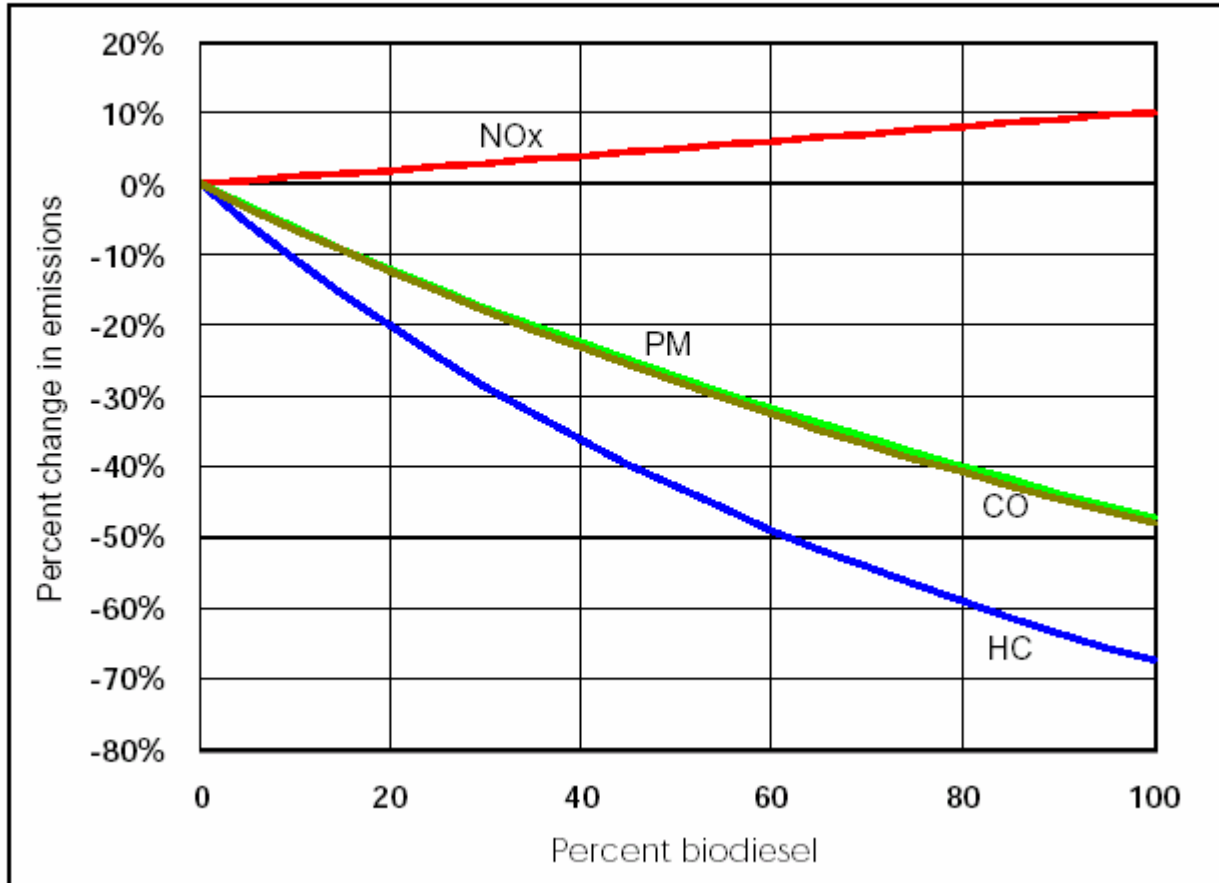
**Griffin
Industries**



EPA Emission Analysis

Figure ES-A

Average emission impacts of biodiesel for heavy-duty highway engines



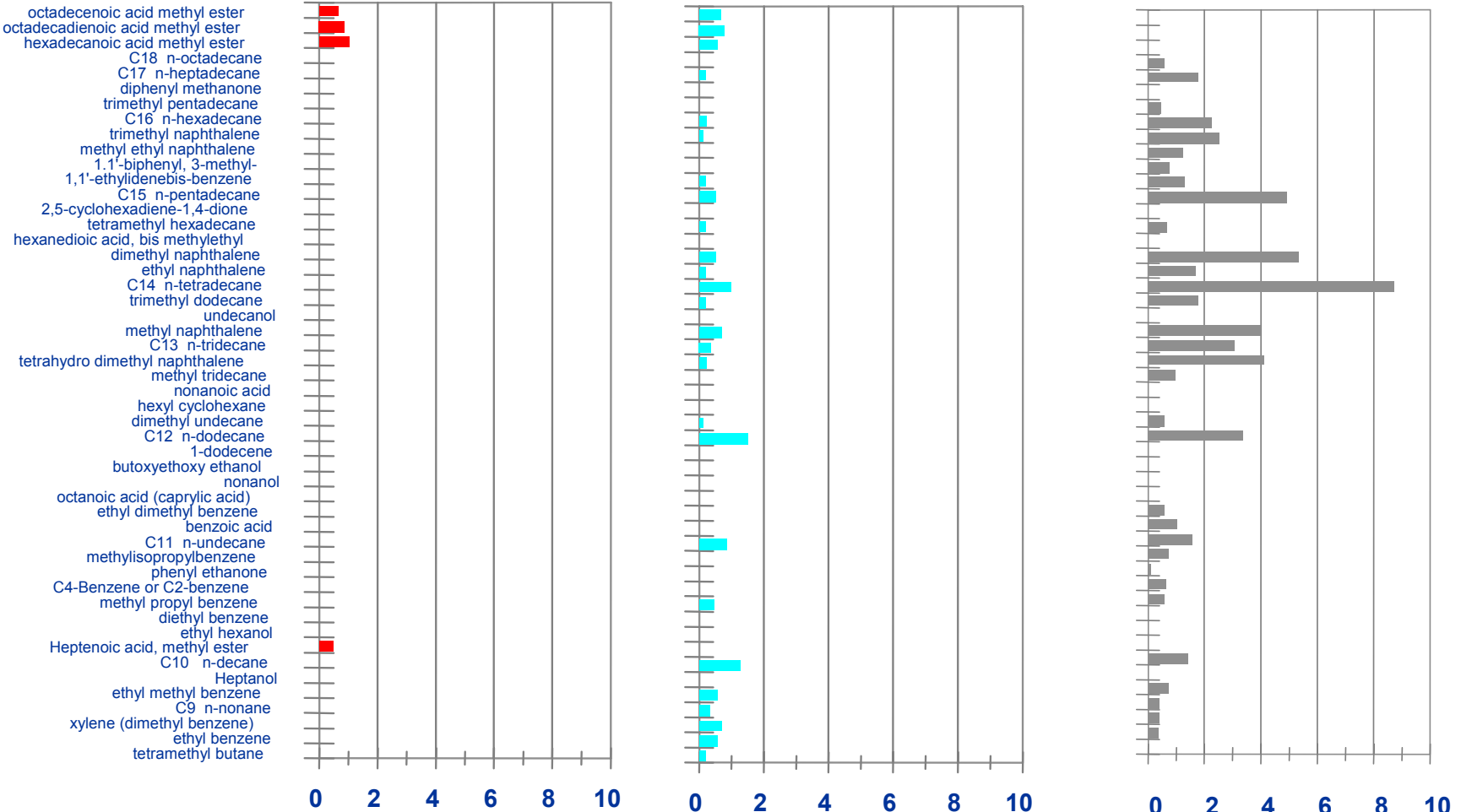


HEAVY HC SPECIATION - CUMMINS N14 ENGINE

B100

B20

2D

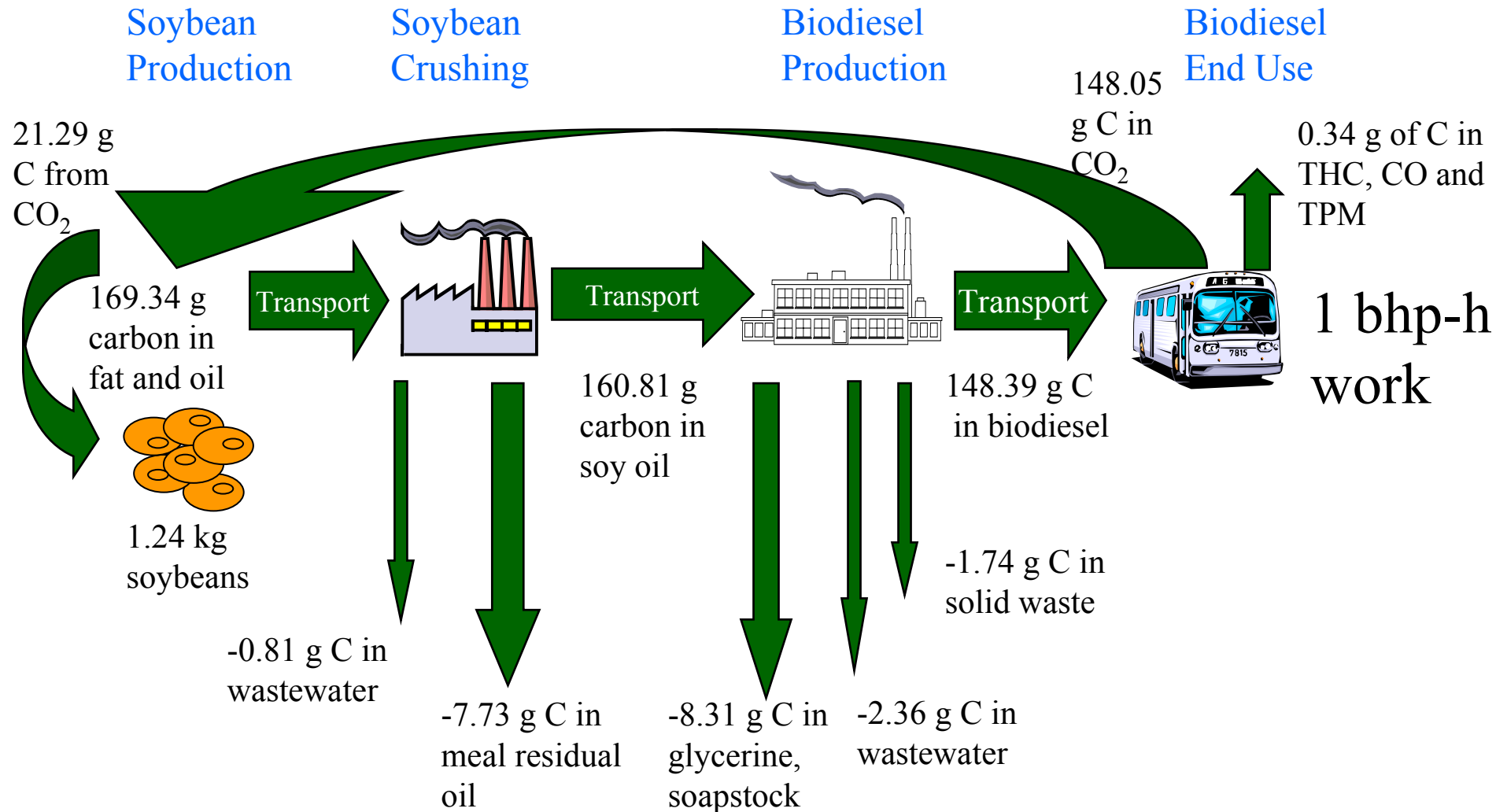


Tier I Health Effects Data
supplied by SWRI, 1997-8

RELATIVE EMISSION RATE (MG/HP-HR)



Biodiesel emits 78.5% less CO₂ than petroleum diesel



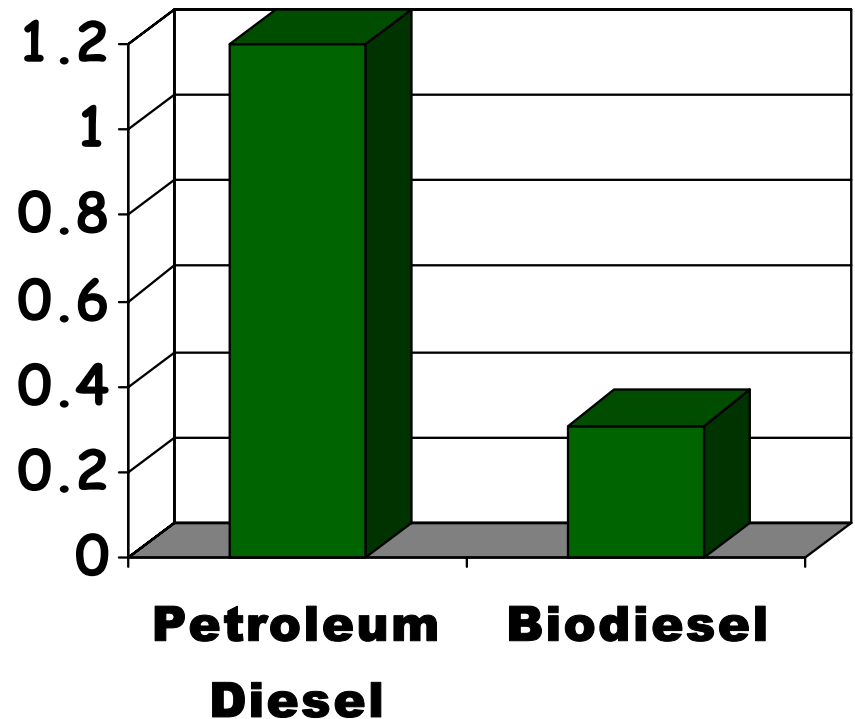


Energy Efficient

🔥 Biodiesel yields 3.2 units of fuel energy for every unit of fossil fuel consumed in its life cycle.

🔥 Petroleum diesel yields 0.83 units of fuel energy per unit of fossil energy consumed.

MJ Fossil Used per MJ Fuel





Biodiesel Challenges

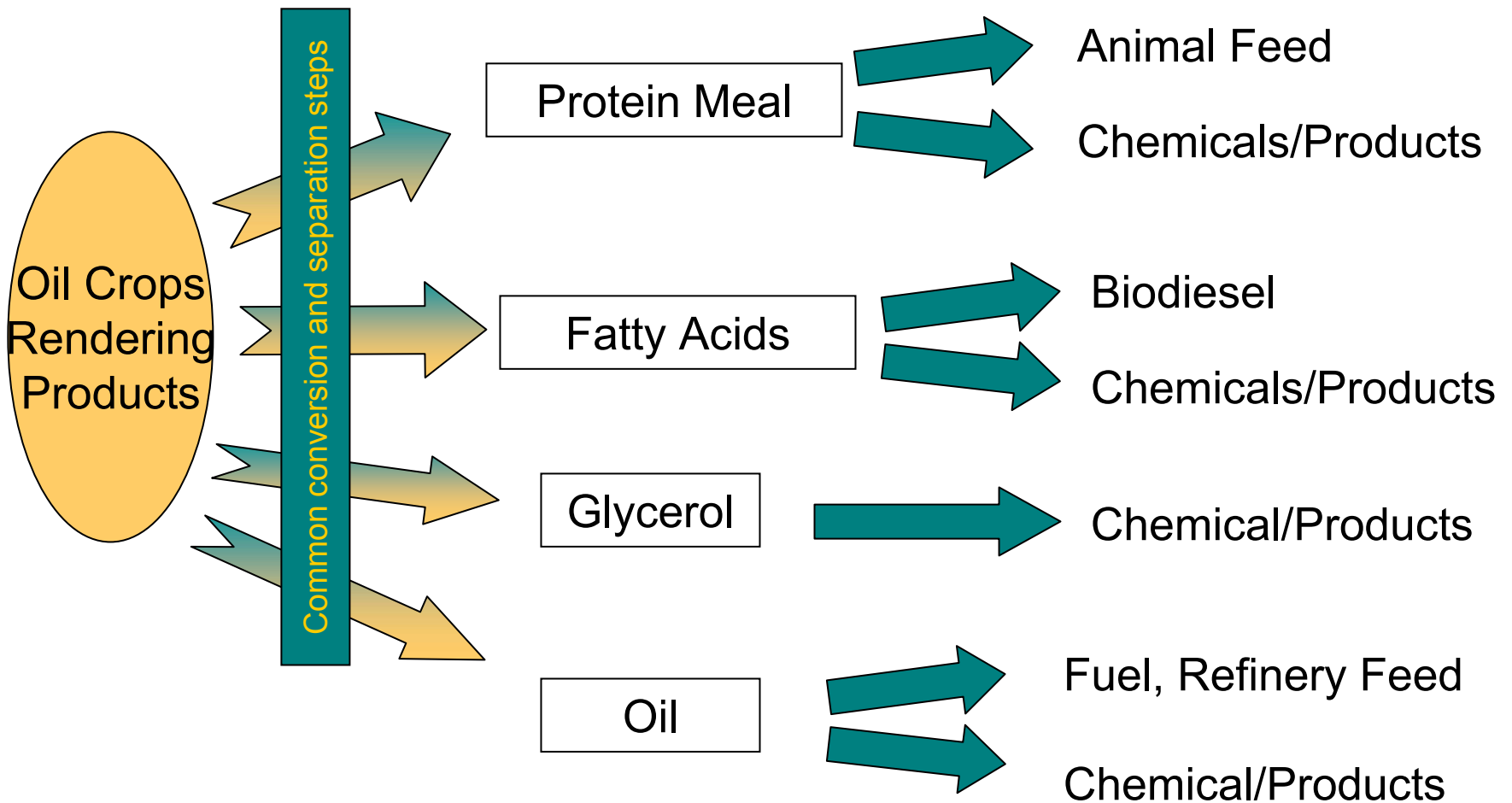
- 🔥 **Expensive to produce because of expensive feedstocks**
 - 🔥 \$1.30 to \$2.50/gal of B100
 - 🔥 B20 can cost 20 cents/gal more than diesel fuel
- 🔥 **By product glycerol is flooding the market**
- 🔥 **Storage stability and cold weather performance affected by type of feedstocks**
- 🔥 **Greases and some animal fats need pretreatment technology**
- 🔥 **Feedstock supply is limited to 10% of diesel needs (or less)**
- 🔥 **Solutions for supply need to include byproduct oilseed meals**



NREL Research Projects

- 🔥 **Developing new products from glycerol**
- 🔥 **Evaluating technology to change feedstock chemistry**
 - 🔥 Improve stability and cold flow
- 🔥 **Developing biorefinery models**
- 🔥 **Testing various pretreatment configurations**
- 🔥 **Advanced emission testing on new diesel engines**

A Biodiesel Biorefinery





For More Info

🔥 **National Biodiesel Board**

🔥 www.biodiesel.org

🔥 1-800-841-5849

🔥 **K. Shaine Tyson and Robert McCormick**

🔥 www.ott.doe.gov/biofuels

🔥 303-275-4616 Tyson

🔥 202-275-4432 McCormick