U.S. Biodiesel Update– Industry Outlook & Policy Update

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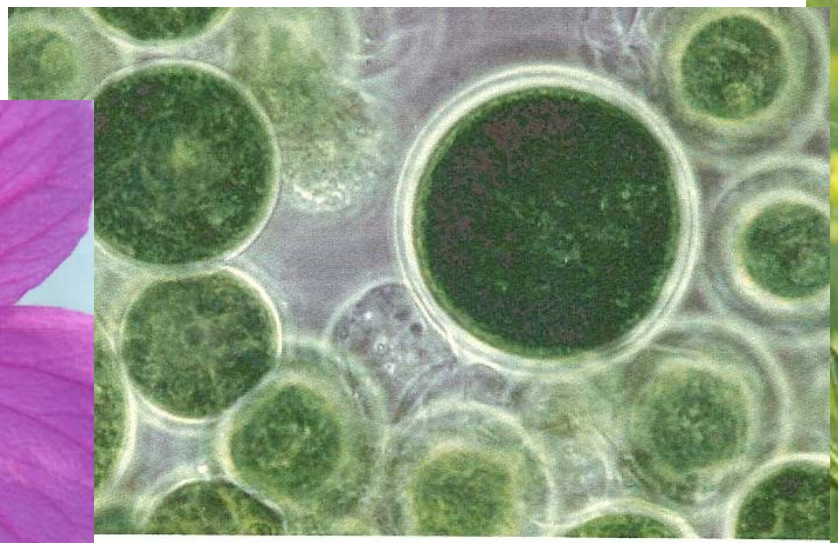
USDA Ag Outlook

February 21-22, 2008

Raw Materials for Biodiesel Production

Potential Sources

Seashore Mallow



Algae

Brassica Juncea

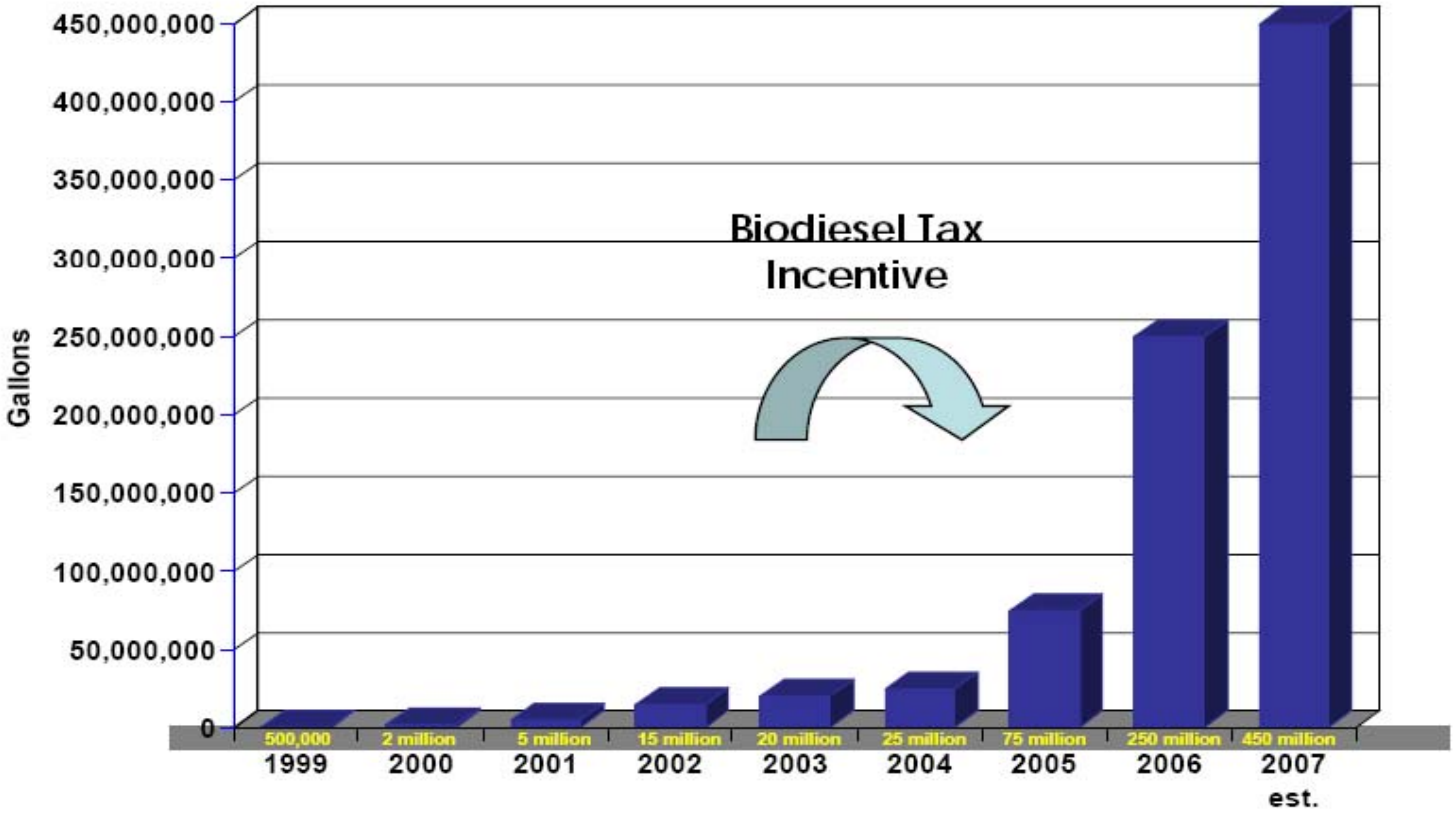
Brown Grease
Chinese Tallow
Etc.

Jatropha

Low Ricin Castor

Capacity Trends

US Biodiesel Demand

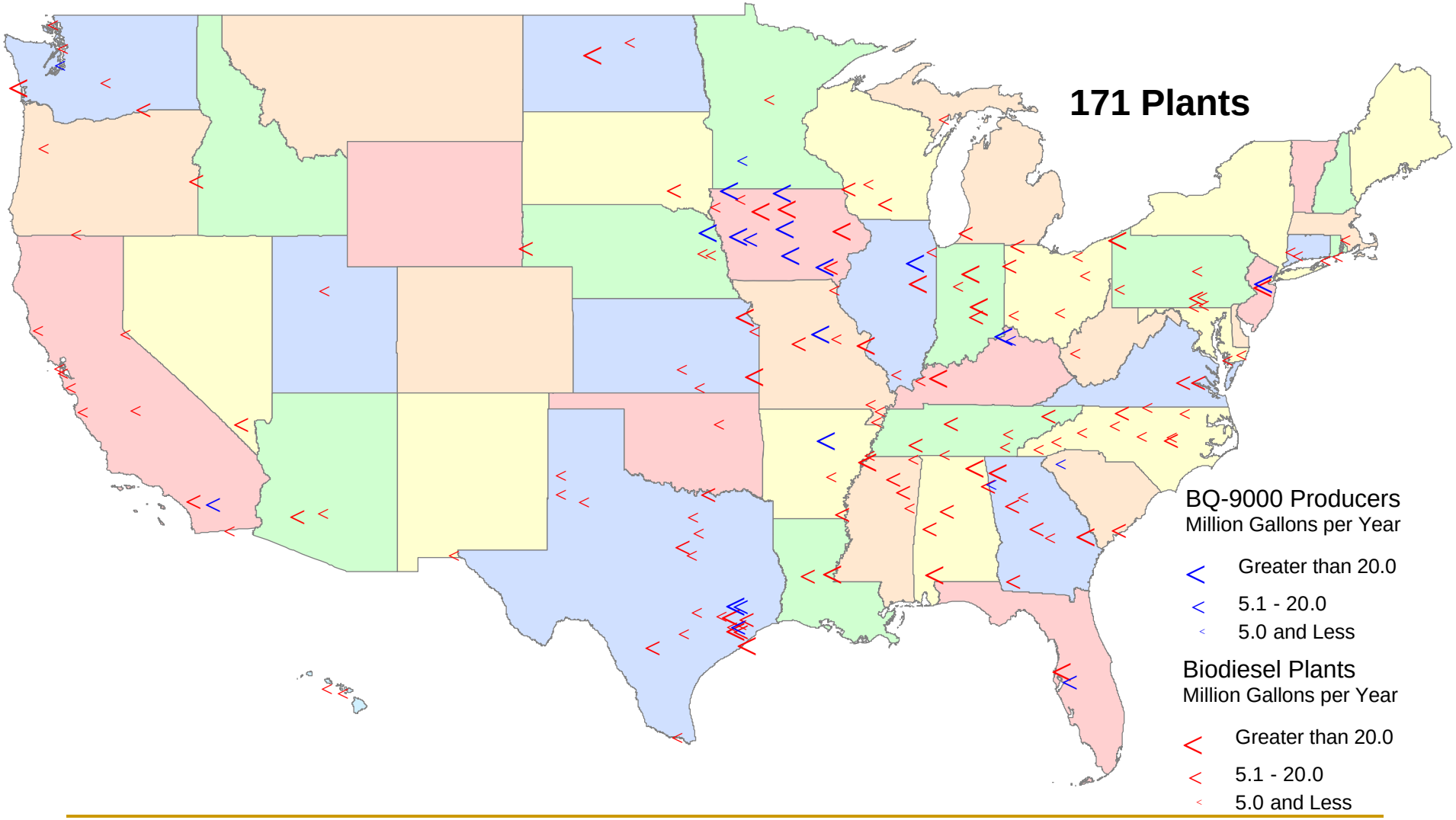


US Production Capacity History

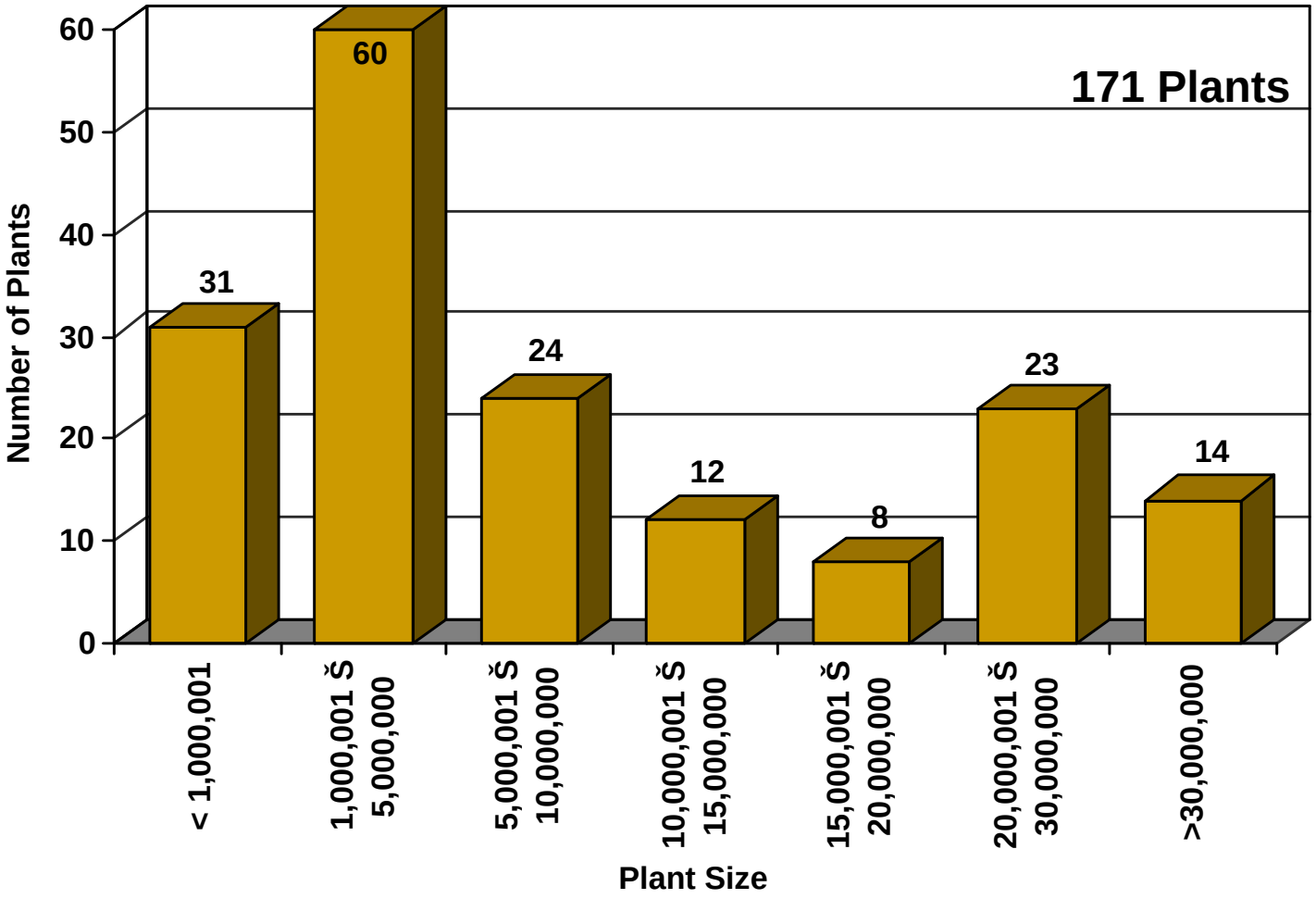
	2001	2002	2003	2004	2005	2006	2007	2008
Plants	9	11	16	22	45	86	165	171
Capacity (millions)	50	54	85	157	290	580	1,850	2,243

- Capacity Information was based on information available in or around the month of September for each year.
- However, the 2008 information is based on data available on 1/25/08

Production Locations (1/25/08)

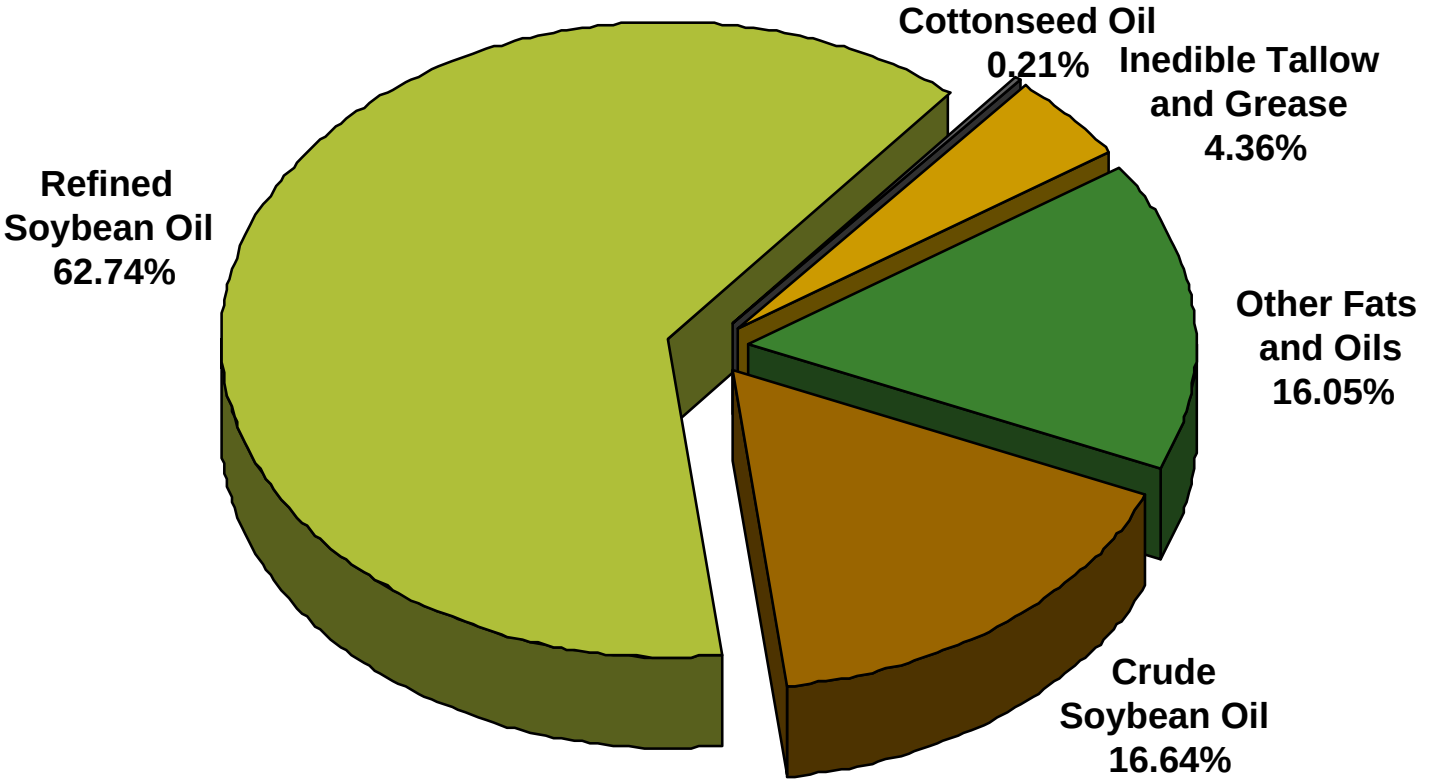


Industry Plant Size



Production Capacity 2.24 billion gallons per year
Average Plant Size 13.1 million gallons per year

Raw Material Use (2007)



Raw Material Availability

- To date, soybean oil has been the predominant feedstock.
- Supply Response will happen…
  - Grow more beans
  - Raise the means
  - Change the genes
- Additional Sources
  - Ethanol plants
  - High percentage oilseeds such as canola
  - Imports
  - Reduction of exports
  - Mustard
  - Camelina
  - Algae

Near Term Potential - Oilseeds

-Soybeans

-Camelina

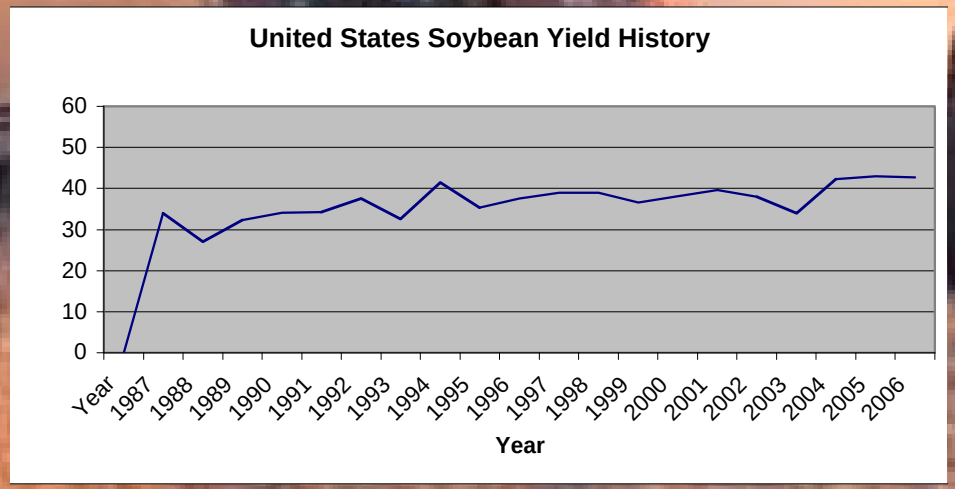
-Canola

Expansion of Soybean Oil Supplies

- In 2007, approximately 80% of U.S. produced biodiesel was from soybean oil.
- Future Expansion of Supplies….
  - Acreage
    - In 2007, U.S. soybean acreage decreased by more than 11 million acres (more than 700 million gallons worth of biodiesel)
    - USDA expect 8-10 million acres to be replanted in 2008
  - Yield
    - Can we significantly increase?
    - Increasing yields by 10% on 60 million acres potentially equates to more than 250 million additional bushels of soybeans (the equivalent of nearly 400 million gallons of biodiesel).
  - Oil Content

Soybean Yields

- Technology exists for stepwise change in yields
  - Monsanto and Pioneer/Dupont set to introduce new varieties
    - 10% yield increases
    - Full introduction in 2010



Increasing Vegetable Oil Content of Oilseeds - "Changing the Genes"

- Previous breeding efforts to increase oil content in vegetable oils has been at the expense of protein quality.
- Leveraging federal funds, the biodiesel industry is funding a program at the Danforth Center to address this issue.
  - Initial work with soybeans, but applicable to all oilseeds.

Camelina

- Relatively low input crop
- Relatively high in linolenic acid (38%)
  - 30 to 40% oil
  - Will existing processing techniques be adequate?
- Increasing acreage in Montana
  - Acres under contract in 2007
  - At least two companies contracting acres in 2008
    - Seeking to contract 2 million acres

Winter Canola

- Opportunity to increase acres as a raw material for biodiesel
- Pacific NW
- Midwest
- Price premium of canola vs. soybean oil

Longer Term

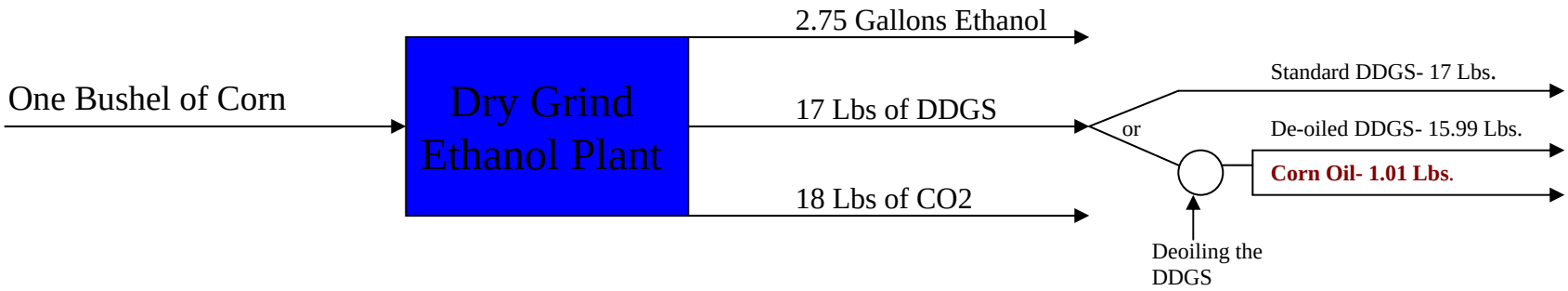
-Corn Oil

-Other Sources

Dry Grind

Co-Product Descriptions

- **DDGS**
  - **Standard-** 29% protein, 7% fiber, and 11% fat
  - **Deoiled-** 35% protein, 9% fiber, and 4% fat
- **Corn Oil-** Non edible oil
- **Ethanol**
- **CO2**

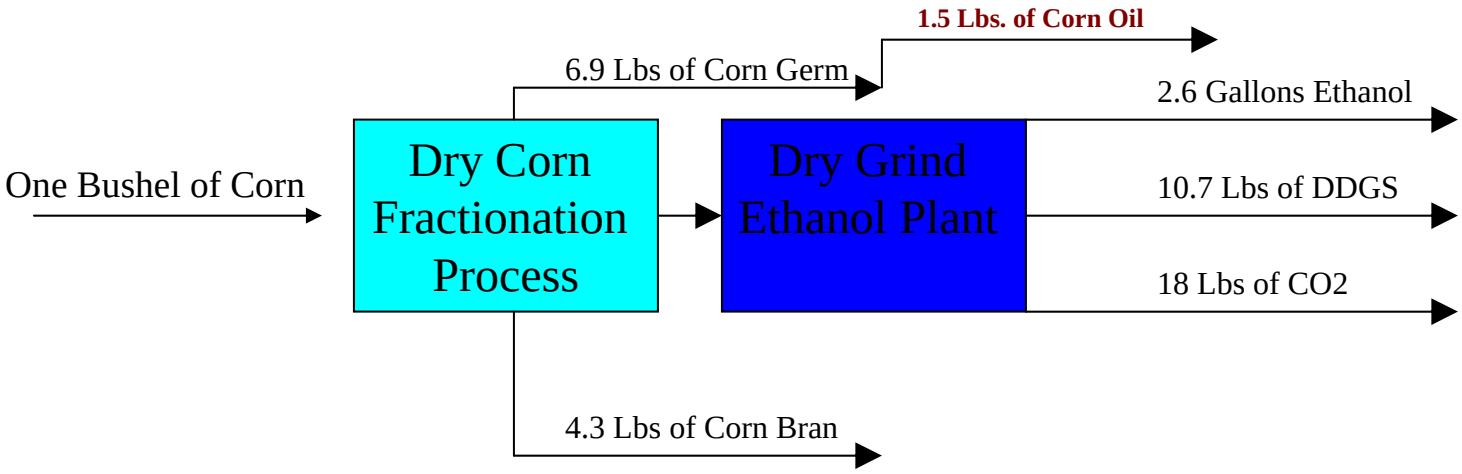


Source- UGA Study

Corn Fractionation

Co-Product Descriptions

- **Corn Oil-** Food grade oil or feed ingredient for poultry, dairy, and swine
- **Fractionated DDGS-** 43% protein, 10% fiber, and 5% fat
- **Ethanol**
- **CO2**
- **Corn Bran-** Can be used as a fuel source if the plant is capable to burn it or it also can be sold as a feed ingredient
- **Corn Germ-** Can be sold as an oil feedstock to a crusher or used as a feed ingredient



Source- UGA Study

Oil from Ethanol Plants

- Market Impact
  - Achieving a 15 billion gallon per year corn based ethanol industry would result in a potential of 5 to 7.5 billion pounds (that is, *up to 1 billion gallons worth of biodiesel*) if all ethanol dry grinds plants employed either fractionation or DDGS oil recovery technologies.
  - Questions
    - Will corn oil from fractionation be utilized for biodiesel production?
    - Oil quality from de-oiled DDGS?
    - Adoption rates by ethanol plants?
- What role could high oil corn play for the biodiesel industry?

Potential Sources

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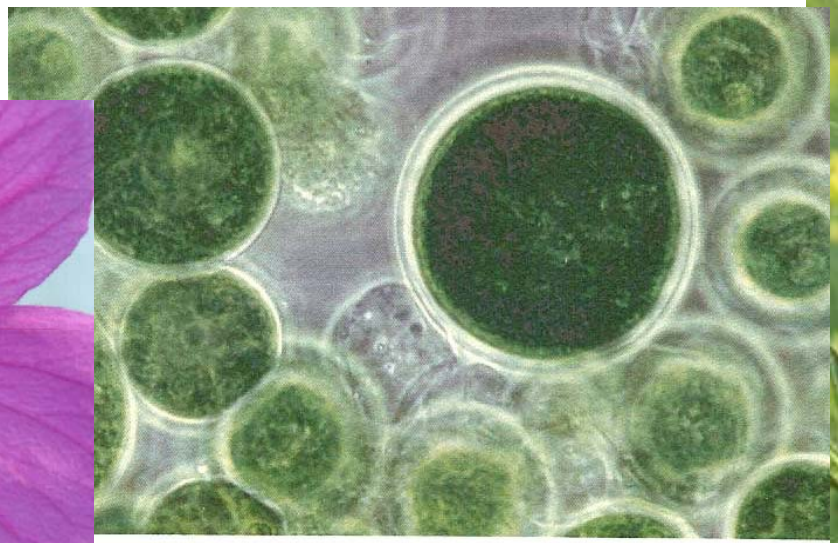

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