

Upgrading the Conventional Ethanol Plant With Corn Dry Fractionation

Fuel Ethanol Workshop
June 28, 2007

Cereal Process Technologies

The Basics of Corn Dry Fractionation

- Fractionation separates the corn kernel into three different fractions
 - Starch fraction (DDC*)
 - Germ fraction
 - Bran fraction
- Why is this important???

* degermed debranned, corn

Let's Start With The Ethanol Plant

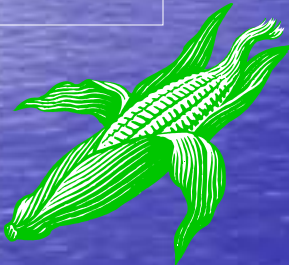
- Fractionation Improves the Ethanol Plant
 - Operationally
 - Economically

Conventional Ethanol Plant

Energy,
Water,
Chemicals,
enzymes,
yeast

+

All the
From the
hammermill



Fuel Grade Ethanol



To
motor
fuel

Distillers Grains & Syrup
wet and/or dry



Contains all fat & Fiber



to Cattle
Feed



CO₂ Recovery
or vent

Ethanol Plant Without Corn Dry Fractionation

Inputs

Corn

Natural gas

Products

Ethanol

Low Protein DDG/WDG
or DDGS/WDGS

To an Ethanol Plant – Fractionation throws out the trash or nonfermentables



These items do not help the fermentation process

Assume you are the Operations Manager

- You want to feed more starch – why?
- You want to feed less fat and fiber – why?

Feeding DDC provides these advantages

Purity of Feed to The Ethanol Plant

Wouldn't you prefer to feed this degermed, debranned, corn to your Ethanol Plant?



- High starch
- Low Fat
- Low Fiber
- Low Non-Fermentables

Let's Move on to the Coproducts

- You produce more valuable coproducts
 - Germ – Contains corn oil
 - Bran – feed or fuel
 - Hi Protein DDG/WDG or DDGS/WDGS
 - Can go to new markets – poultry & swine
 - Hominy Feed

Combine Better Operations and More Valuable Coproducts

Inputs

DDC from corn
Less Natural Gas
(per gallon)

Products

15% – 20% More Ethanol
High Protein DDGS/WDGS
Germ – corn oil and feed
Bran – bio boiler or feed

More products and more choices

Corn Feed



**80%
DDC**

Germ



Deoiling

Bran



Fuel or feed

DDC



Better fermentation, better DDGS

Starch

Revenue

Starch

Revenue

Starch

Revenue

“How Much Starch Recovery?” is not the Right Question

- Fractionation Value to the Ethanol Owner
 - Ethanol Plant Improvement
 - Higher Value Coproducts
 - Energy savings

Revenue

Starch

Revenue

Starch

Revenue

Starch

Think Differently!

- The Ethanol Plant of the Future must have the ability to survive under all pricing scenarios
 - High corn prices
 - Low Ethanol prices
 - High Natural Gas prices

New Plant Designed for Fractionation

- Save capital investment in the Ethanol Plant
 - No Hammermill
 - Smaller Dryer
 - Other Equipment
- Higher capacity
- Design with fractionation in mind

Retrofit Existing Plant

- Fractionation debottlenecks your Ethanol Plant
- Increase production by 15% – 20% with minor plant revisions in most cases
- Higher value coproducts

Recap: Better Plant Operations

- More fermentable starch per pound of dry material
- Less fat and fiber to interfere with fermentation
- Higher alcohol content in the fermenter
- Less DDGS to dry
- **Brewers have used similar feedstock for more than a Century!**

Recap: More Profits!

- The plant can process more corn and produce more ethanol.
- Make High Protein – Low Fat/Low Fiber DDG at 40% price increase
- Make oil rich germ – corn oil
- Make fiber rich bran – feed or fuel
- Save energy in Distillation and Drying

Return on Investment

- Fractionation usually shows a payback of less than 2 years
- The plant can be operational in 12 months after signing a contract

Thank You!

Further Information 314-344-3299
Cereal Process Technologies

