

## **Ethanol Unit Objectives: by the end of this unit, students will be able to...**

- In an essay, summarize the origins, history, and purpose of the Energy Independence and Security Act of 2007, including the impacts of OPEC, 1973 Oil Embargo, Arab-Israeli War, 1990 Clean Air Act Amendments, 9/11 Terrorist Attacks, Brazilian ethanol, and the Renewable Fuel Standard.
- Summarize how ethanol is produced.
- Compare the primary sources of ethanol in the US vs. Brazil.
- Explain why Brazil has successfully implemented ethanol use throughout the country.
- Summarize the goal of the Renewable Fuel Standard component of EISA.
- Explain what is meant by the terms E10, E15, and E85.
- Define each of the following: a. Feedstock b. Biomass c. Distillers Dried Grains d. Octane Number e. Fodder
- Summarize the history of ethanol use in the US beginning with the American Civil War through WWII.
- Describe the relationship between octane rating and engine knocking, and explain the impact that ethanol use has on the octane rating of a fuel.
- Compare and contrast the energy balance of ethanol vs. gasoline.
- Compare and contrast the benefits and drawbacks of ethanol made from corn vs. cellulosic ethanol.
- Summarize the benefits of ethanol use, specifically in regards to octane rating, energy balance, carbon neutrality, economic benefits, likelihood of complete combustion, and in regards to creating additional markets for American agriculture.
- Explain the kinds of vehicles in which E10, E15, and E85 can be used.