



# simplified.

#### **ALSO IN THIS ISSUE**

- Making sense of what you see at the pump
- Are we really using food to make fuel?
- Energy balance of ethanol production
- Cost per mile vs. miles per gallon

# **Ethanol Simplified**

# Straight answers to key questions about Nebraska's clean air fuel.

# Nebraska's ethanol industry is a major economic driver for the state:

- Nebraska is the nation's second largest ethanol producer with **2.18 billion** gallons annually
- Nebraska's 25 ethanol plants employ 1,300+ people
- Nebraska's ethanol plants consume
  750 million bushels of corn each year
- Nebraska's ethanol plants produce
  6.4 million tons of distillers grains (livestock feed) annually
- Nebraska's ethanol plants produce 515 million lbs. of corn oil annually

Ethanol has become a major player in America's fuel supply—and in Nebraska's economy. In Nebraska, ethanol production has become a significant contributor to the success of agriculture adding value to the corn we produce and generating jobs and tax revenue all across the state.

Billions of miles have been driven on ethanol-blended fuels in the past 30+ years alone. NASCAR has been using 15% American Ethanol (E15) under the Sunoco Green 15 brand—driving a total of 6 million trouble-free racing miles since 2011. And that says something about the reliability and performance of American Ethanol.

Originally blended at 10% with gasoline (E10), higher blends of American Ethanol are becoming even more prevalent and more available. Still, many consumers have questions about ethanol—its benefits, its performance and its environmental impact.

In this issue of *CornsTALK*, you'll discover straight and simple answers to those questions so you can be even better informed when you pull up to the pump.

# Are we really using food to make fuel?

NO. The corn used to make ethanol is not the sweet corn humans typically eat.

Some 99% of the corn grown in Nebraska is field corn, which is used primarily for livestock feed and ethanol production. Field corn is rarely used for human food, but through processing it is transformed into fuel, meat, milk, eggs and food ingredients.

#### **ONE BUSHEL OF FIELD CORN CREATES** FUEL, FEED, FOOD AND MORE!

An ethanol plant produces much more than ethanol.



of clean-burning, high octane ethanol. Some ethanol plants are also producing renewable diesel fuel for trucks and heavy equipment.

kernel are used to make high-quality animal feed. This feed goes to beef cattle, dairy cows, pigs and poultry to create nutritious meat, milk and eggs.

dioxide used in bottling and carbonated beverages.

#### **GREEN CHEMICALS**

FACT:

79% of America's field corn crop is

not irrigated, but

depends solely

on rainfall.

Ethanol plants are developing technology to create environmentally-friendly chemicals that replace petroleum-based products.

### How much water does it take to make ethanol?

An ethanol plant uses about three gallons of water to produce one gallon of ethanol. And that water is used with incredible—and increasing—efficiency.



Most of the water in an ethanol plant is recycled and reused within the plant for additional production, cooling and other processes.

A significant percentage of the water leaves the ethanol plant in the form of distillers grains (livestock feed). That water is taken up by the animals, supplementing their water requirements.

The rest of the water re-enters the atmosphere in the form of steam from the boilers and other equipment.

#### How much water does it take to make other products?

Compare the water used to make ethanol with

that required for other items you use every day.

**GALLONS OF** WATER TO PRODUCE

2 to 2.5

9.3

13

14

24

150

- 1 gal. of ethanol
- 1 can of fruit

1 gal. of gasoline

- 1 gal. of paint 1 lb. of sugar
  - 1 lb. of plastic

1 lb. of cotton

**1** Sunday newspaper

SOURCE: U.S. Grains Council/U.S. Environmental Protection Agency

# More choices at the pump: It's

hen you pull up to a flex fuel pump, there are a lot of options—and American Ethanol is responsible for providing most of them.

The result is a wide range of choices—and a lot of numbers. Here's a quick way to decipher what you see:

#### What is a flex fuel pump?

A flex fuel pump offers several American Ethanol blends. While higher blends of American Ethanol (E20 and above) are approved for use in flex fuel vehicles only, flex fuel pumps also offer E10, E15 and may offer ordinary unleaded gasoline and "premium" gasoline. "Blender pump" is another term used to describe this type of dispenser.

## Where can you find higher blends of American Ethanol?

A list of flex fuel locations across Nebraska can be found by visiting **ethanol.nebraska.gov** and clicking on "Fueling Your Vehicle."

#### €20 €30 €40 (20%/30%/40% American Ethanol blends)

Some retailers carry one or more of these higher blends, which are approved for year-round use in flex fuel vehicles (FFVs). If you own a FFV, try all the blends to see what works best for you.

## Those numbers on the fuel selection buttons indicate the octane rating of the fuel.

Octane is a measure of the ignition quality of gasoline. The higher the octane number, the less susceptible the fuel is to "knocking." Knocking



occurs when the fuel prematurely burns in the engine's combustion chamber due to compression—instead of being ignited by the spark as the engine is designed. The higher the octane number, the more compression the fuel can withstand before igniting.

Ethanol adds octane to gasoline—and does so with a renewable, clean-burning octane source. The higher the ethanol blend, the higher the octane rating.



# NO ETHANOL" mean?

Some retailers offer fuel containing no ethanol at all—and, as result, it is typically priced higher than E10.

"Ethanol-free" fuel is one more choice offered by retailers. But if you believe in the clean-air, renewable, domestically-made benefits and decades of proven performance of American Ethanol, then choosing ethanol blends makes sense.

# <del>e</del>85

(Up to 85% American Ethanol bler Minimum 70% American Ethanol The highest American Ethanol blend available at retailers, E85 is approved for year-round use in fle fuel vehicles (FFVs). E85 is typicall identified with a yellow hose and/or nozzle handle.

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# a good thing.



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#### RU cool to flex fuel?

About 1 in 7 Nebraskans is driving a flex fuel vehicle (FFV)—and you might be one of them!

- Check your owner's manual.
- Look for a flex fuel badge on your vehicle, usually on the trunk lid, tailgate or rear quarter panel.
- You might also have a yellow gas cap or a decal inside your fuel door.



#### FLEXFUEL E85 ETHANOL

With a flex fuel vehicle, you have the ultimate choice at the pump. You can fill up with any blend of American Ethanol from E10 to E85—in any amount at any time. A computer in the engine automatically adjusts for the varying percentage of ethanol in the fuel. So you can fill up with E15—and top off later with a quarter-tank of E85 with no problem at all.

With a flex fuel vehicle, you can take advantage of fluctuating fuel prices by choosing the American Ethanol blend that makes economic sense in terms of cost per mile.



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#### (15% American Ethanol blend) E15 is approved for use in all standard nicles from September 16 through May

vehicles from September 16 through May 31. If you drive a flex fuel vehicle (FFV), you can fill up with E15 throughout the entire year. Thanks to the higher percentage of ethanol, E15 should be priced less than E10 and significantly less than fuel containing no ethanol.

E15 is frequently identified with a blue hose on the dispenser.

# e10

(10% American Ethanol blend) The most widely available ethanol blend and warranted by all automakers. E10 can be used in any standard vehicle as well as in motorcycles, lawnmowers, boats and other engines.

#### What's in our gas is killing us.

GASOLINE

**PLUS** 

BENZEN

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> Toxic carcinogens (cancer-causing substances) including benzene, toluene and xylene (BTX) are added to gasoline to boost octane.

GASOLINE

**PLUS** 

TOLUENE

> These toxic substances do not burn completely during combustion. What doesn't burn in your engine leaves the exhaust as fine and ultrafine particles.

GASOLINE

PLUS

XYLENE

- When we breathe in these particles, they enter our lungs and bloodstream.
- > BTX has been linked to asthma, lung cancer, brain cancer and heart disease.
- Toxic particles are especially harmful to infants, young children, the elderly and people who suffer from cardiopulmonary disease.

# American Ethanol: A cleaner, healthier octane source.

- Ethanol is a cost-effective, clean-burning, renewable fuel that adds one to two points of octane to gasoline.
- Adding ethanol to gasoline provides octane while replacing corresponding levels of toxic components in the base gasoline.
- Higher levels of ethanol in fuel further reduce the levels of toxic components in gasoline-and thus reduce harmful exhaust emissions.



### Is the ethanol industry subsidized?



#### There are no federal or state programs that provide direct payments or subsidies to ethanol producers.

Congress passed the Renewable Fuels Standard (RFS) in 2005 and 2007 requiring a specific volume of transportation fuel in the United States fuel supply to contain renewable fuels such as

corn ethanol, biodiesel, and ethanol made from cellulosic sources such as cornstalks, switchgrass and wood waste.

The RFS was passed in order to provide market access for domestically produced renewable fuels in a fossil fuel-dominated marketplace, reduce our reliance on imported oil and spur economic development-especially in rural areas of the United States. All of those goals continue to be achieved through the RFS.



### **Does ethanol improve** air quality?

When the American Lung Association recommends the use of renewable fuel such as American Ethanol, you can be pretty sure that improved air quality is part of the equation.

Toxic emissions and particulate matter from vehicle exhaust are a huge threat to human health—and the use of clean-burning American Ethanol has a significant positive effect on air quality.

"Every time you pull up to the pump, you have the opportunity to make a choice for cleaner air," said Angela Tin, vice president for environmental health for the American Lung Association. "Choosing fuel with American Ethanol is a simple and easy way to help reduce pollution and make the air safer and healthier for you and your family."

According to a 2017 report released by the U.S. Department of Agriculture, greenhouse gas emissions (GHG) associated with corn-based ethanol are about 43% lower than gasoline when measured on an energy equivalent basis.



The Alternative Fuels Data Center at the U.S.

Department of Energy states: "Using ethanol as a vehicle fuel has measurable greenhouse gas (GHG) emissions benefits compared with using gasoline. Carbon dioxide (CO<sub>2</sub>) released when ethanol is used in vehicles is offset by the CO<sub>2</sub> captured when 📥 AMERICAN CLEAN AIR CHOICE ASSOCIATION. crops used to make the ethanol are grown."



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A 2015 study by the U.S. Department of Agriculture focused on calculating the "energy balance" of ethanol production—the amount of energy required to produce ethanol compared to the amount of energy that results when that ethanol is produced.

The study found, on average, ethanol production resulted in 2.1 BTU to 2.3 BTU of ethanol for every 1 BTU of energy input. In some areas, the energy balance ratio was 4:1!

This study took into account the entire cycle of ethanol production—from the energy used to plant, fertilize and harvest corn; transport the corn to the ethanol plant; and process the corn into ethanol.



Importantly, the study also provided an energy credit for the distillers grains (livestock feed) produced during the ethanol process. Only the starch in the kernel is used to make ethanol, so it makes sense that ethanol plants get credit for creating more than one product from the corn they use.

Ethanol plants are continually squeezing even more ethanol out of each kernel, reducing water and energy use, and creating more products from a bushel of corn. And corn farmers are continuing to grow more corn per acre, with less water and less fertilizer.

So we can surmise that the energy balance of ethanol production will only continue to improve.

#### Does ethanol save money at the pump?

**Ethanol is priced lower than gasoline.** The more ethanol in the fuel blend, the lower the per-gallon price. E10 should cost less than ordinary unleaded. E15 should be priced less than E10—and E85 should be priced significantly less. If that's not the case at your retailer, you might want to shop around.

#### Will ethanol damage my engine?

#### NO. E10 is approved for use by every major automaker in the world.

E15 is approved for use in all vehicles 2001 or newer—and that covers most vehicles on the road today. Higher ethanol blends are approved for use in all flex fuel vehicles. Ethanol burns cool and clean, which promotes engine life.



#### Does ethanol reduce my miles per gallon?

Ethanol contains less energy (BTUs) than petroleum-based gasoline. That difference is negligible in lower ethanol blends such as E10 or E15. (Many consumers actually report improved gas mileage and performance with ethanol blends above E10, especially with E15 and E30.)

Because of the lower energy value, you may see a slight drop in your gas mileage when you use even higher blends such as E85. However, the price advantage of higher ethanol blends needs to be taken into account when you make your fuel choice.

### In other words, it's not just about miles per gallon. It's also about cost per mile.

This is especially true if you drive a flex fuel vehicle that can use the entire range of American Ethanol blends.

Here's how the math works:

- Assume that using E85 may result in a miles-per-gallon reduction of up to 12%.
- If E85 costs 12% less (or greater) than E10, you're miles and money—ahead.
- So, if E10 costs \$2.00 per gallon, E85 would need to cost 24¢ less (\$1.76) in order for you to "break even." And every penny discount above 24¢ reduces your cost per mile even further.

In truth, E85 should always be priced at a much greater discount than 12% compared to E10. If it's not, then you need to find another retailer!

#### GASPUMPR.COM

An online calculator that allows you to quickly determine the price advantage of ethanol blends vs. fuel that contains no ethanol.

CORNSTALK

## HuskerFuel.com

#### Your connection to Nebraskans' favorite team—and to E15.

The Nebraska Corn Board and Nebraska Ethanol Board are partnering with Renewable Fuels Nebraska and retailers across the state to sponsor HuskerFuel.com — a high-profile consumer awareness campaign in conjunction with IMG and Husker football.

HuskerFuel.com is your connection to E15 with 15% ethanol made right here in Nebraska. You can also register for great Husker-related prizes and giveaways during the Husker football season.

# E15 The higher American Ethanol blend almost anyone can use!

E15 is rapidly becoming available at pumps across Nebraska.

- A high-octane, clean-burning fuel with 15% American Ethanol
- Approved for use in all vehicles model year 2001 or newer from September 16 through May 31
- Approved year-round for all flex fuel vehicles
- Saves you money at the pump
- Reduces harmful toxic emissions
- A renewable, clean source of octane made right here in Nebraska

Watch for E15 at a pump near you—and then give it a try!









District 2 John Greer Edgar, NE District 7 David Merrell St. Edward, NE

District 3 **Brandon Hunnicutt** Giltner, NE



District 8 Jon Holzfaster Paxton, NE

District 4 **Debbie Borg** Allen, NE



At-large **Jay Reiners** Juniata, NE

District 5 **Tim Scheer** St. Paul, NE

Nebraska Corn Board members represent the eight districts indicated on the map and are appointed by the Governor. One at-large member is elected by the other Board members.

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