The Renewable Fuels Standard: Impact for Agriculture and Consumers

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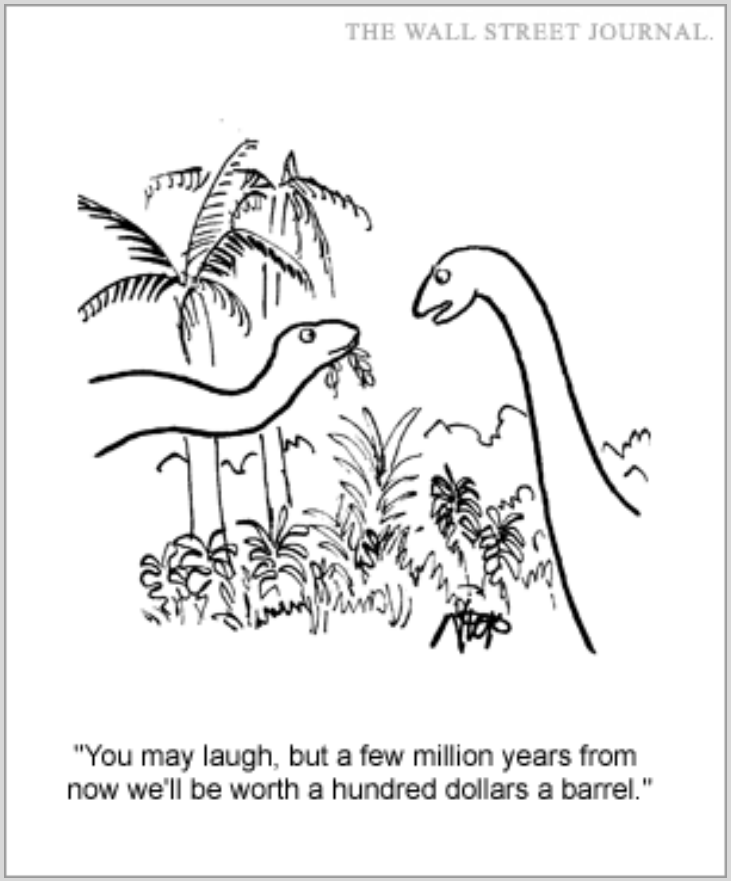
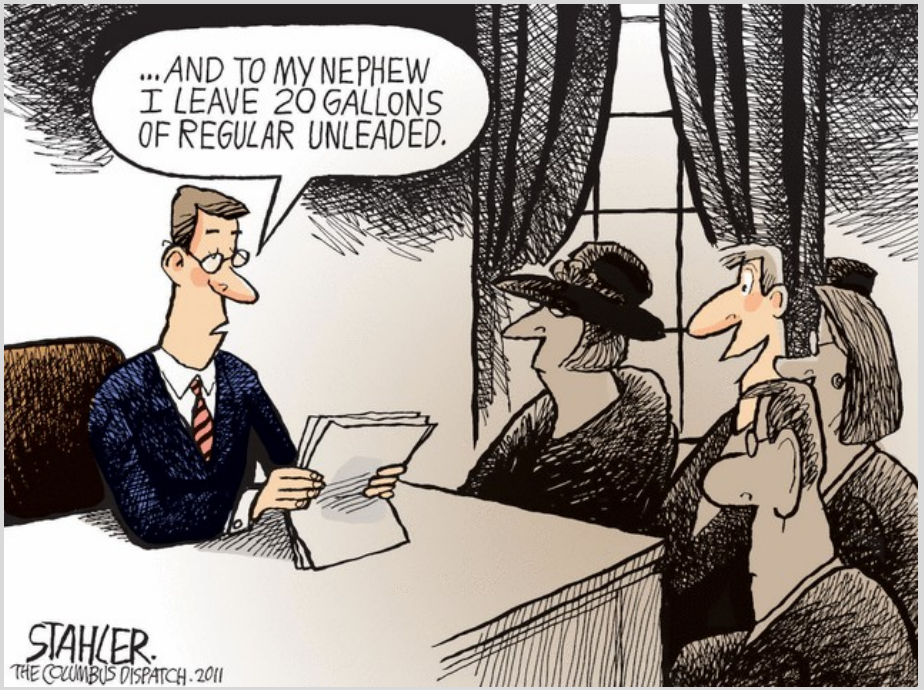
Who are we?

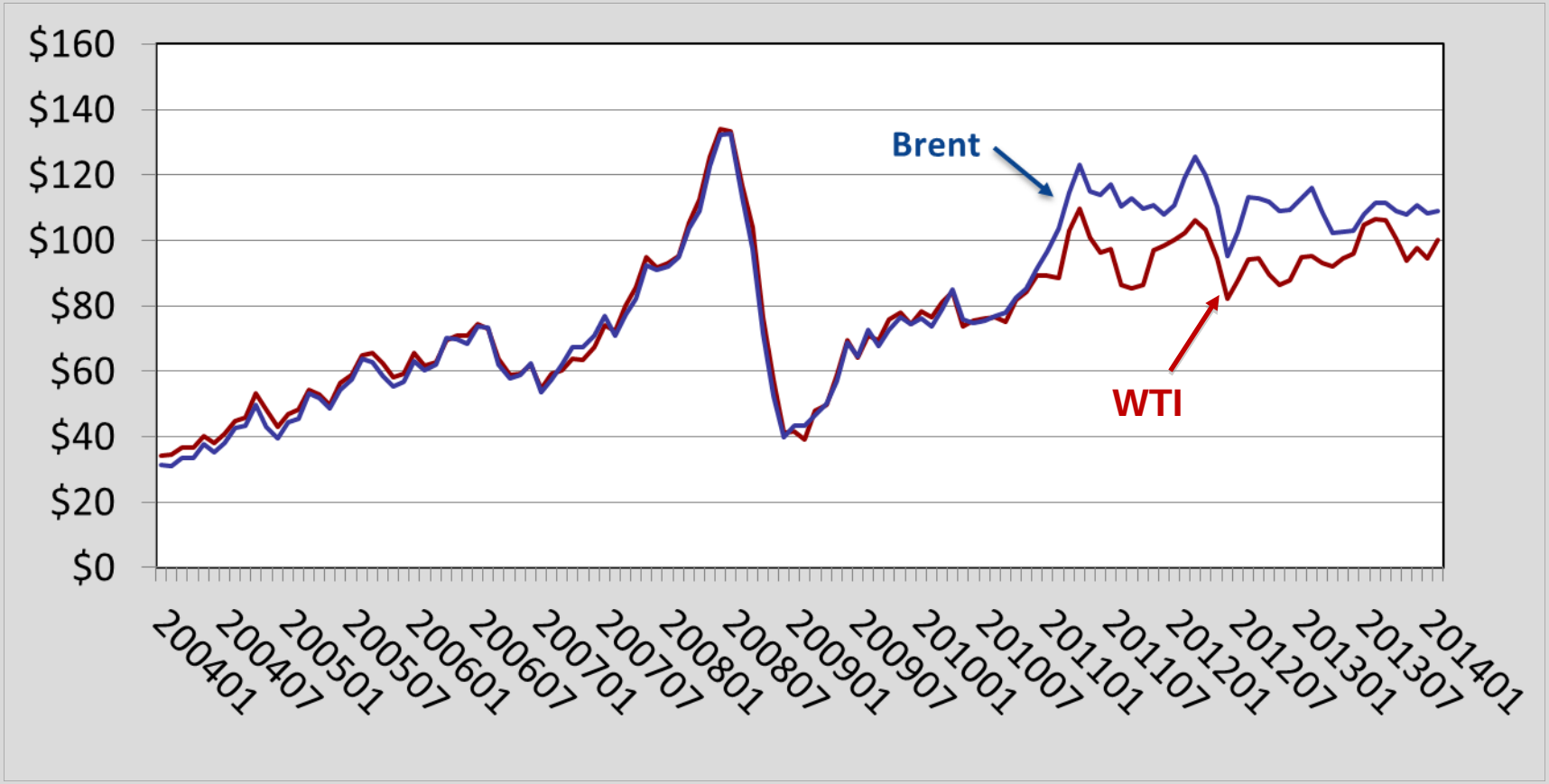
- ABF Economics is a small, privately owned independent consulting firm providing tailored consulting services to those involved in production agriculture, biofuels, agricultural inputs, and the food industry.
- Our services include policy analysis, economic impact analysis, preparation of economic feasibility studies and business plans, strategic planning, commodity analysis, econometric modeling and forecasting, and expert testimony for litigation support.

Why Biofuels?

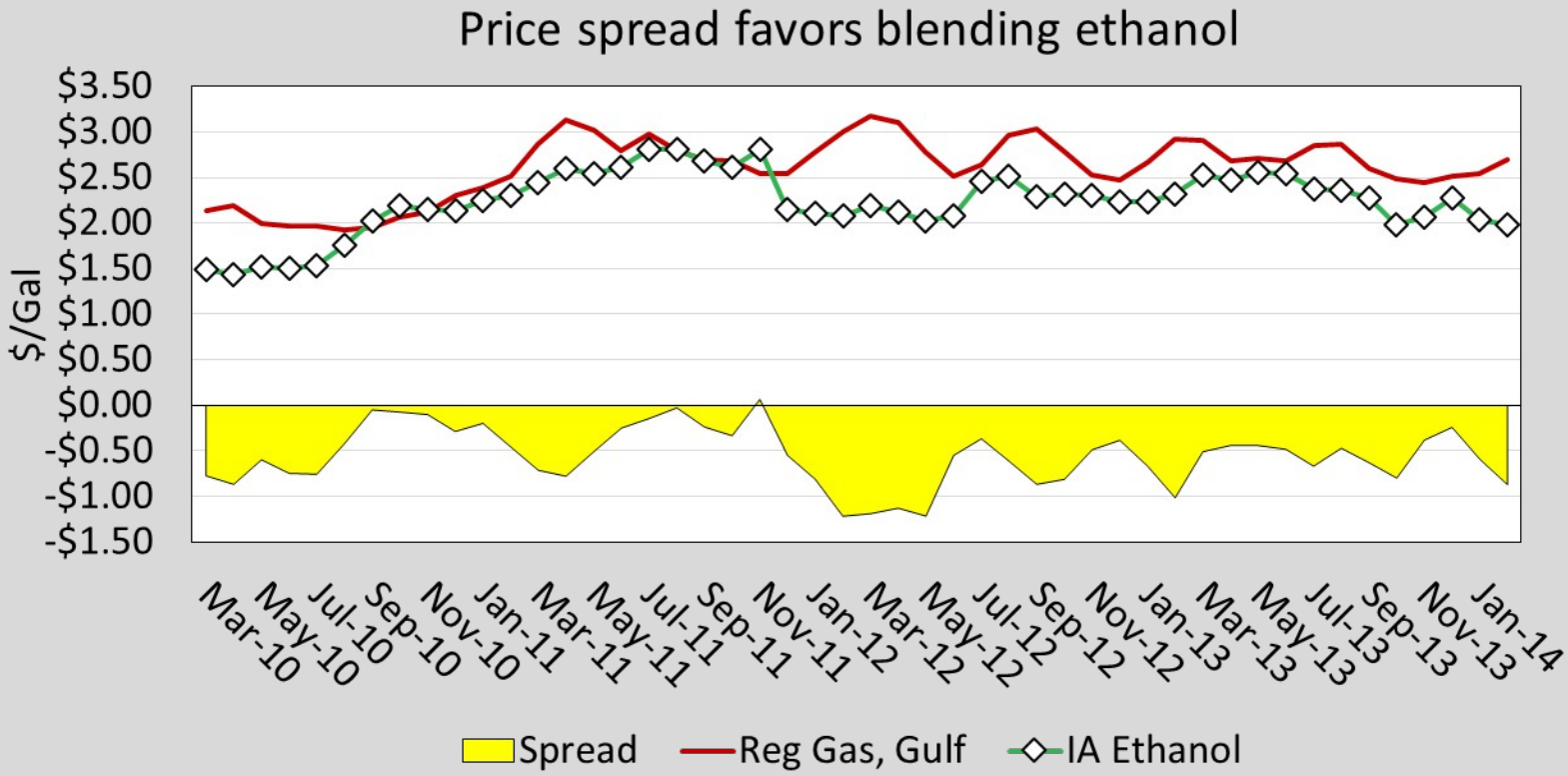




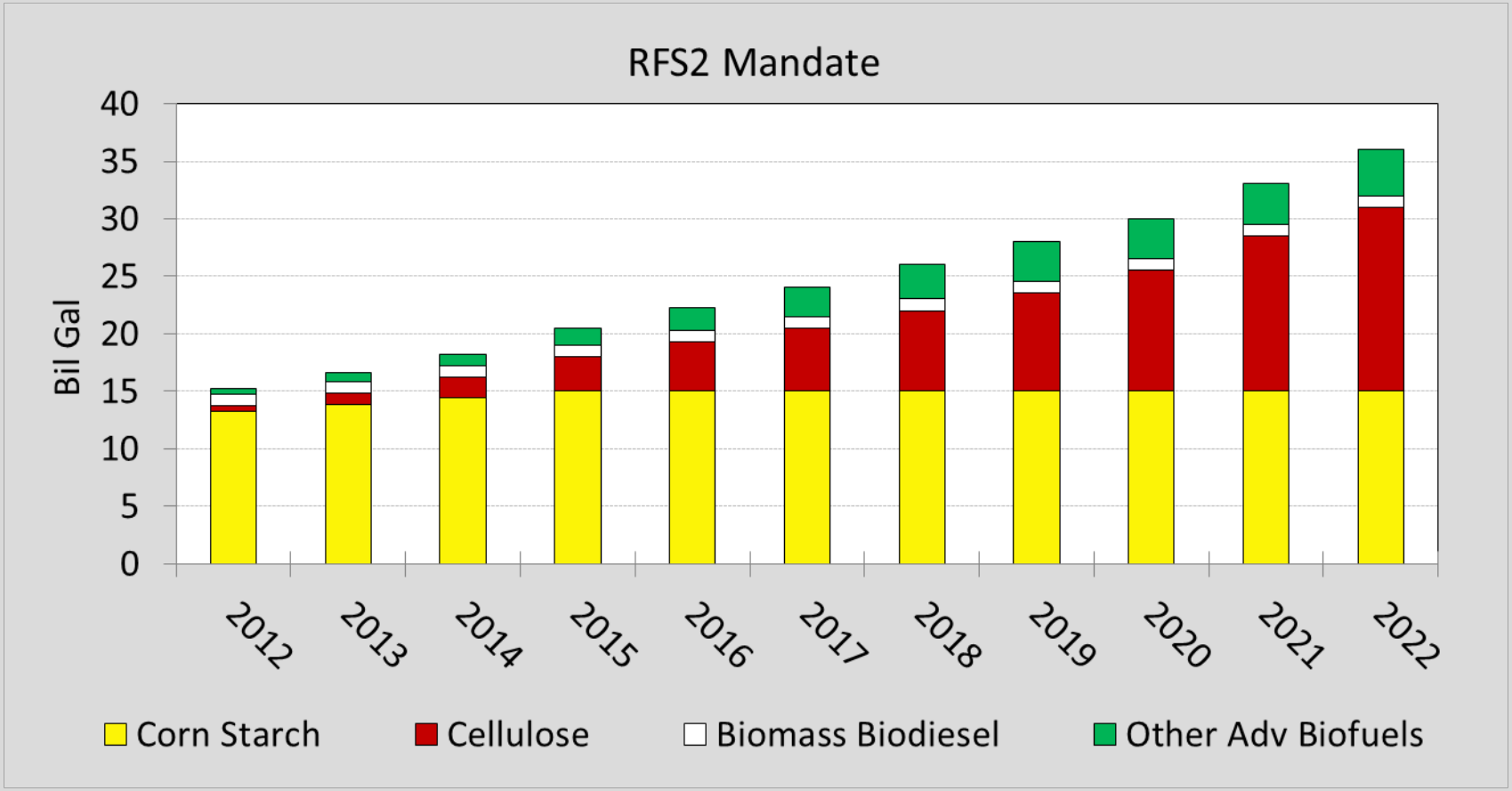
World oil prices remain relatively stable.



Ethanol follows gasoline prices but spread has widened and economics continue to favor ethanol



Primary U.S. Federal biofuels policy is the Renewable Fuel Standard



Biofuels Policy

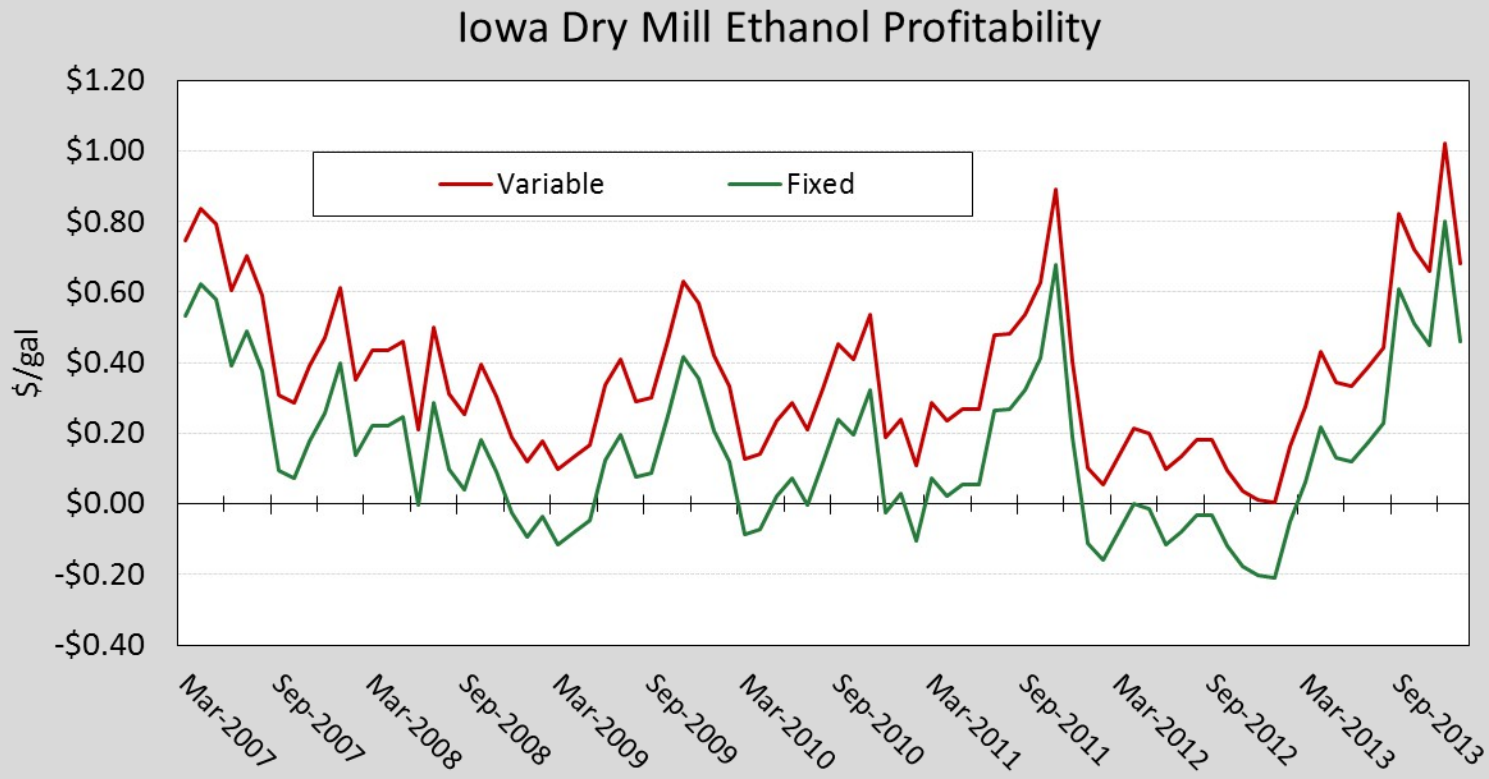
- Biodiesel and Cellulosic ethanol tax credits expired on 12/31/2013
- EPA is required to determine and publish annual standards for RFS compliance.
  - Preliminary 2014 RVO was announced in Nov 2013.
  - Reasons cited for reductions were “blend wall” and lack of supply for cellulosic and advanced biofuels.

	Statutory	Proposed
Cellulosic biofuel	1.75 BG	17.0 mil gal
Biomass-based Biodiesel	>1.0 BG	1.28 BG
Advanced biofuel	3.75 BG	2.20 BG
Renewable Fuel	18.2 BG	15.2 BG

Compliance with RFS2 mandates is determined through a Renewable Identif cation Number (RIN) system.

- EPA determines biofuels that qualify for RINs
- Qualifying biofuel must meet GHG threshold standards. Lifecycle emissions must be at least 20% less than 2005 baseline average of petroleum fuel it replaces.
  - Existing corn ethanol is grandfathered; new plants must meet 50% target; advanced biofuels and biomass-biodiesel must meet a 50% reduction; cellulosic biofuel must meet a 60% reduction.
- RINS are tradable and, with limits, can be carried over from year to year.

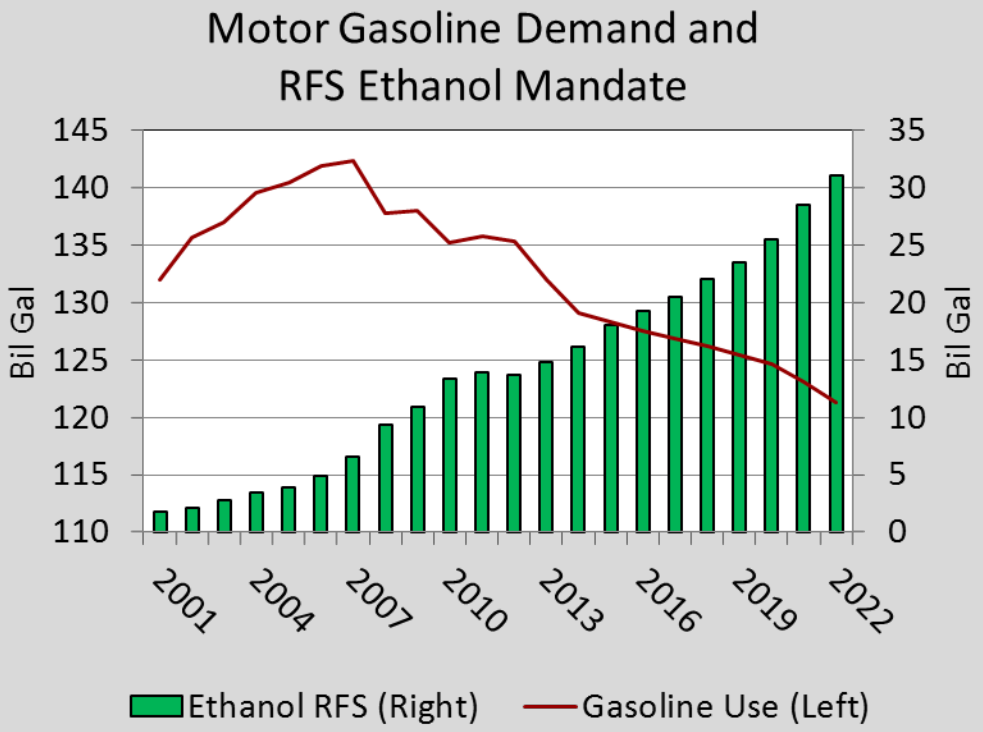
Lower feedstock prices have improved ethanol prof tability



Source: ISU Ag Decision Maker D1-10 Ethanol Profitability

Ethanol has hit the “blend wall”. In order to meet RFS targets blend levels must grow.

- Current default blend level is 10% ethanol.
- EPA has approved E15 blends in autos produced after 2001
- However as gasoline consumption declines higher blends will be needed
  - A average blend of 26% would be needed to meet the 2022 RFS2 ethanol target of 31 bil gal.



Source: EIA 2013 AEO, EPA

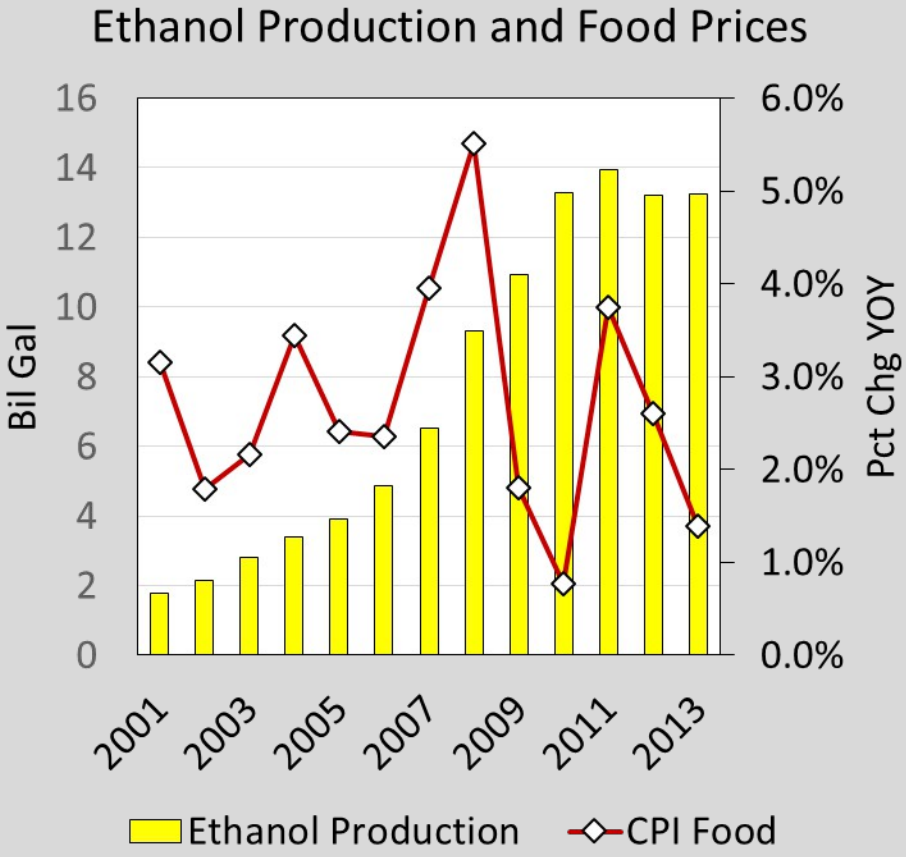
Penetration of higher ethanol blends

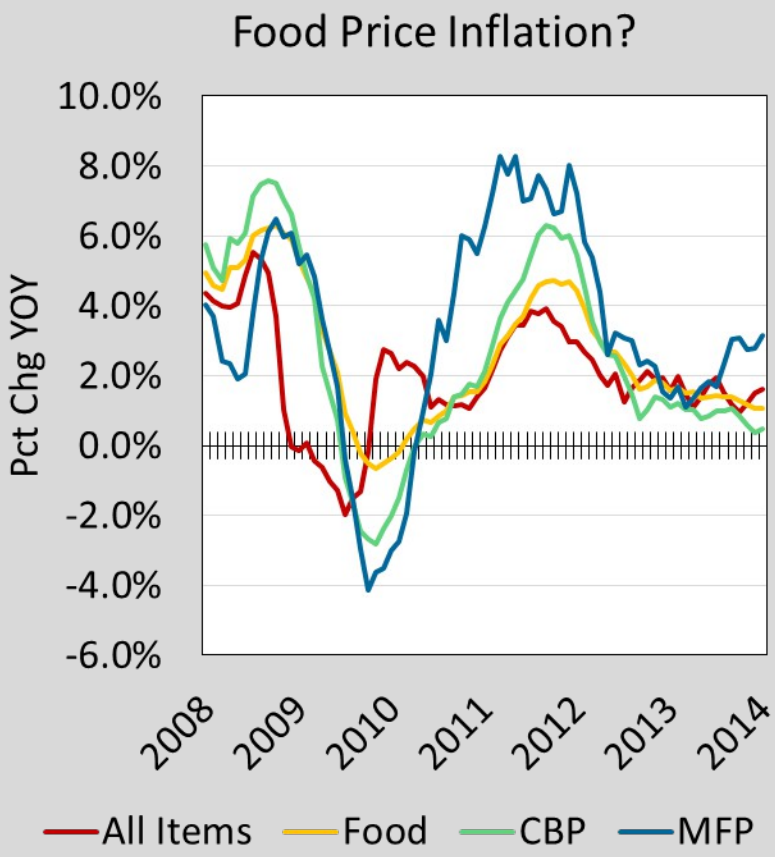
- Virtually all gasoline (97%) currently contains 10% ethanol
- E-15 is approved for motor vehicles manufactured after 2001
- E-85 is approved for Flex-Fuel vehicles
- Industry sources indicate that currently there are:
  - 59 E-15 stations in 12 states (RFA)
  - 2,616 E-85 stations with more than half concentrated in 9 states (AFDC)

Why the fight over higher blends?

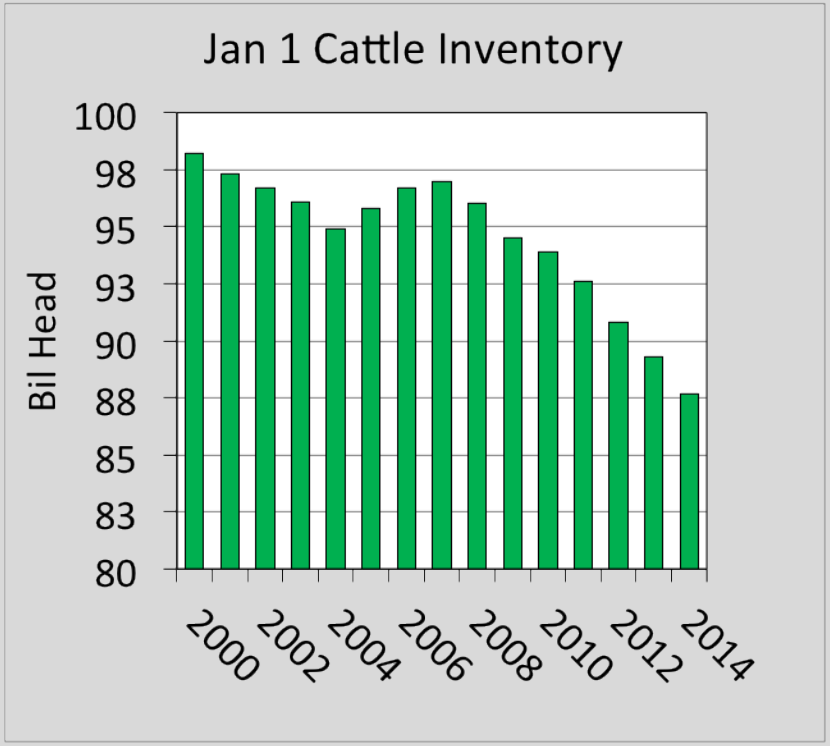
- Concerns over effects of higher blends on engines
- Protests by livestock and food industry over impacts on feed costs and food prices
  - Highly emotional issue but no empirical evidence that increased biofuels use had led to higher food prices
  - Will dissolve as biofuels use second-generation (non-food) feedstocks
- Costs to improve/build infrastructure
- Anger over loss of market share by oil companies
  - OK, who wouldn't complain about losing 30% market share to a mandated product?

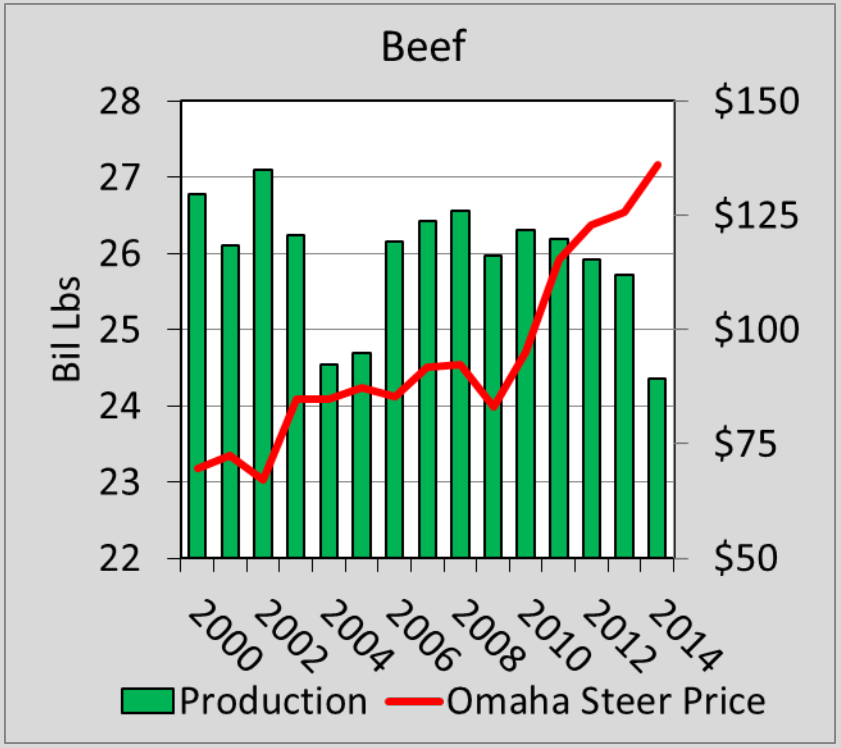
Food vs Fuel is a highly emotional issue but not supported by the data



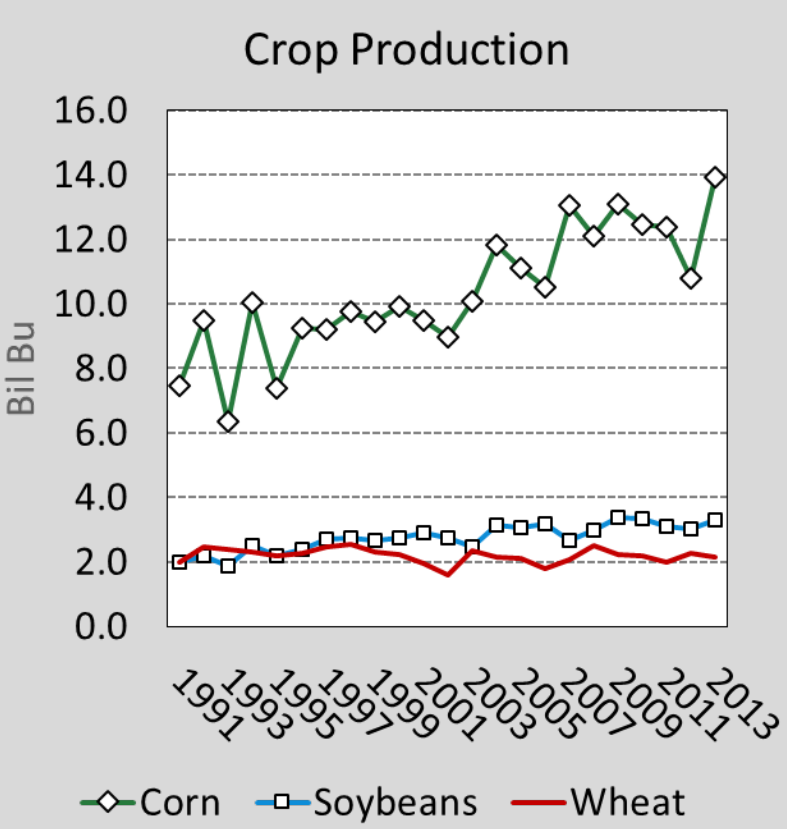


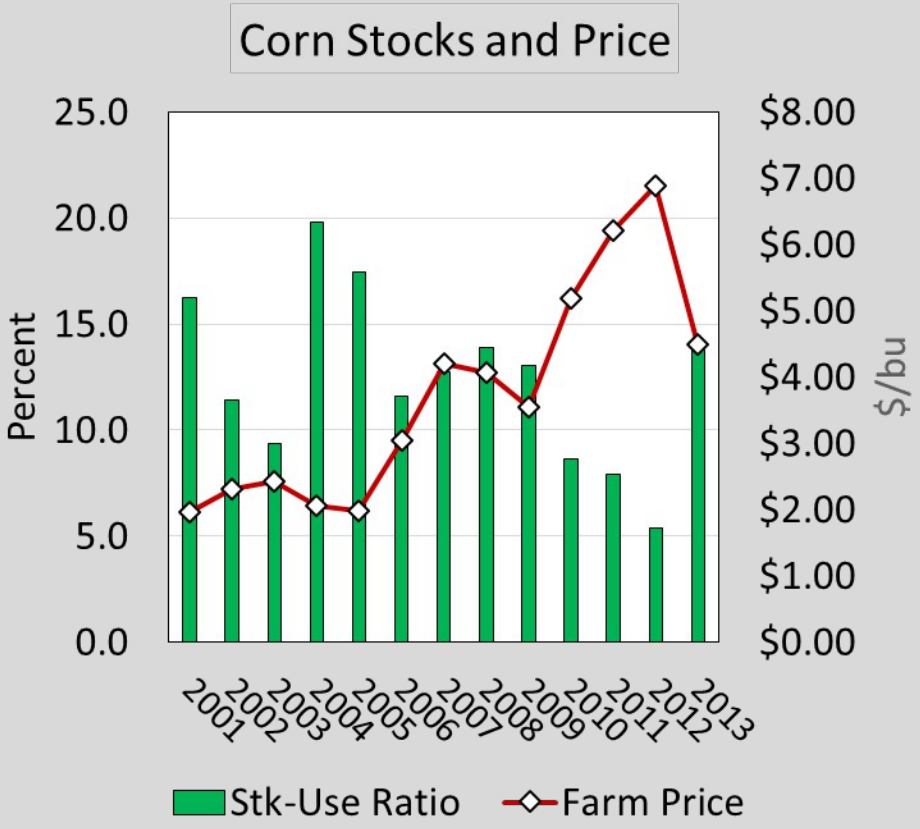
Livestock sector is suffering from drought and extreme weather.





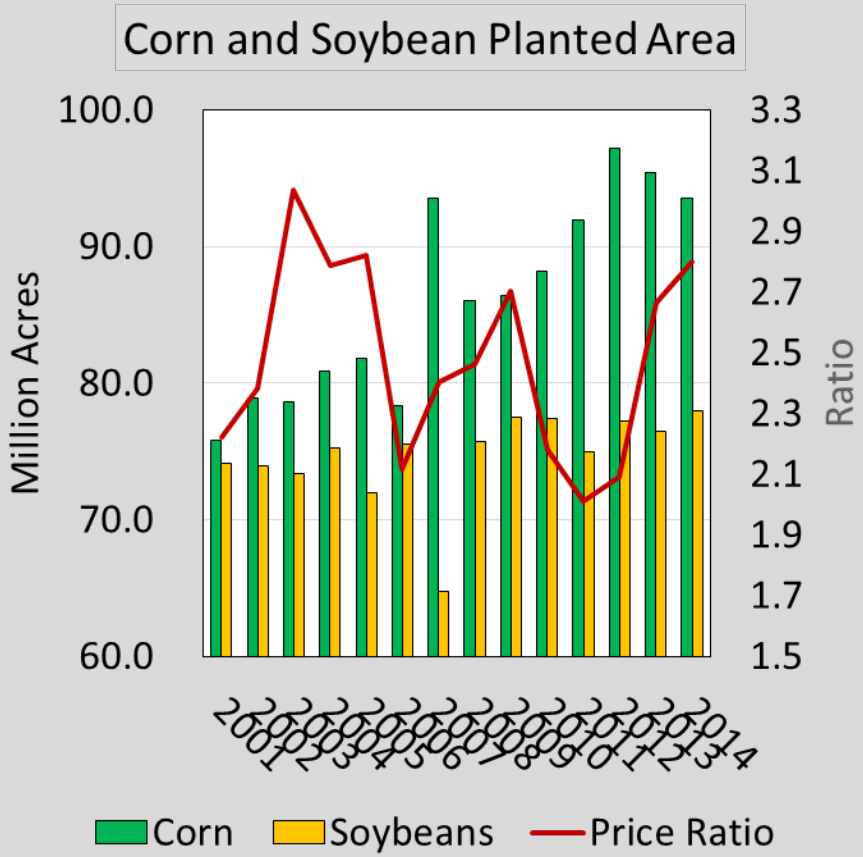
Crop sector is improving due to record corn crop. Prices declining as stocks rebuild





2014 will be an interesting year!

- Lower crop prices will reduce farm revenue and incentive to plant.
- Soybean Corn price ratio favors more soybeans and less corn this spring.
- RVO decision puts growth in corn ethanol in question.
- Expect 93 mil acres of corn and 78 mil acres of soybeans.
- Production will depend on yields!



Infrastructure is a limiting factor for Flex Fuel adoption

- Many stations do not have the storage tanks and other equipment to accommodate the variety of fuels: E10, E15, a premium fuel and diesel.
- If equipment is not compatible with higher ethanol blends there are considerable costs involved with replacing dispensers and underground storage tanks, pipes, gaskets, glues, and seals.
  - Price of a new fuel dispenser is about $20,000; cost for an average store with 5 pumps could exceed $100,000.
  - Underground equipment, permitting and related costs also are signif cant.

The rate of industry expansion needed to meet RFS targets is a concern

- Producing 15 billion gallons of corn starch ethanol is no problem.
- Capacity is in place to produce more than 1.5 billion gallons of biomass biodiesel.
- Assuming a 50 MGY capacity, as many as 400 new plants will be needed to be built by 2022 to meet RFS2 target at a capital cost of nearly $90 billion!

But there are other challenges as well

- Commercially successful conversion technology is uncertain and will require consistent R&D investments.
  - Biochemical (enzyme fermentation)
  - Chemical (acid hydrolysis)
  - Thermochemical gasification or pyrolysis
  - Algae
- Capital availability and financing are uncertain.
- Permitting and sustainability will be issues for new biorefineries

Other advanced biofuels can fill the gap quickly and offer a near-term opportunity

- Crops that have been historically produced but are languishing due to lack of a market.
- Crops that can be cultivated on marginal lands or can replace existing “endangered” crops.
- Crops that can extend the production season of companion crops.

Current Approved EPA Advanced Biofuel Pathways

Fuel Type	Feedstock	Production Process
Ethanol	Sugarcane	Fermentation
Ethanol	Non-cellulosic portion of separated food waste	Any
Ethanol	Grain Sorghum	Dry mill process using only biogas from landfills, waste treatment plants, and/or waste digesters for process energy.

Source: www/epa.gov/otaq/fuels/renewablefuels/new-pathways/rfs2-pathways-determinations.htm accessed 1/20/14

Advanced Biofuel (Ethanol) Pathways Under EPA Review

Company	Feedstock	Process
Conestoga Energy Partners	Grain Sorghum	New (proprietary)
EdinQ, Inc.	Corn kernel fiber	Any
Green Vision Group	Energy Beets	Fermentation
Growing Partner Hairy Hill	Wheat straw	New (proprietary)
Iogen	Grain Sorghum	New (proprietary)
National Sorghum Producers	Biomass and sweet sorghum	Any
Osage Bio Energy	Barley	Fermentation
Montana Advanced Biofuels	Barley, wheat straw	Fermentation
Poet Biorefining-Chancellor	Grain Sorghum	New (proprietary)
Tracy Renewable Energy	Sugar Beets	New (proprietary)

Source: www/epa.gov/otaq/fuels/renewablefuels/new-pathways/rfs2-pathways-determinations.htm accessed 1/20/14

Expanding biofuels production typically provides positive economic benefits

- Building and operating biofuel capacity increases demand for crops, puts money in farmer's pockets, expands local economies, and supports new jobs.
- Average 70 MGY ethanol plant:
  - Adds $59 million of value added to local economy
  - Supports nearly 70 direct jobs and 480 additional jobs in all other sectors
  - Generates $37 million in household income

In Conclusion

- Biofuels production will expand both in the U.S. and globally but significant challenges remain.
  - Threats to RFS2 and regulatory uncertainty
  - Feedstock and technology choices
  - Financing and capital availability
  - Permitting and sustainability
  - Rate of expansion and availability of resources
- Biofuels will continue to benefit agriculture and will not impose undue costs on consumers.

Thank You!

Questions?