

GMO CROPS

A MISSOURI PERSPECTIVE



Ireland & Missouri

- | | Ireland | Missouri |
|----------|----------------|-----------------|
| Land | 70,280 sq km | 180,516 sq km |
| Counties | 26 (32) | 114 |
| Boundary | 1448 km | 2314 km |

Missouri

Lakes 1948 sq km

N-S 496 km

E-W 457 km

Missouri Agriculture

- Missouri:
- Cattle (cow calf, feeder,)
- Hogs (farrow to finish, feeder pigs)
- Corn, Soybeans, Wheat, Milo, Cotton,
- Hay (alfalfa, grass) , Rice, Tobacco, oats,
- Rye, Apples, Peaches, Grapes,
Watermelon, Wine, Beer (Bud) a lil
Whiskey.

Farm History

- *Kevin Rosenbohm & Michele Rosenbohm*
- 2 sons -- Matt (25) & Nick (22)
- 6th generation in Missouri and 5th generation farming in Nodaway county, Missouri
- Family has history of Livestock, Cow calf, hogs, and raising anything that they could sell at the beginning.

The Rosenbohm's



Farm History

- In 1997 sold off cattle operation.
- 2004 closed down confinement farrow to finish hogs.
- Markets – *Not need...the Rosenbohm's*



Diversify after livestock

- What to do.??



Farm History

Now concentrate on row crops –

- **Corn**

- Waxy traited (non GMO for 10 yrs,) for food starch
- Yellow dent for feed or Ethanol production.

- **Soybean**

- Soy meal and oil–commodity production
- Seed production



Farm History

Seed production-Graham Seed Co

- > Current retail production for US seed companies
 - Contract production with US seed companies
 - We contract acres (ha) with area farmers
 - The farmer delivers to our plant receives premium on each bushel based on quality. Contract genetic production on newest lines.
 - » RR1, RR2Y, LIBERTY LINK, ?
- > Spec production- gamble on usage-fills shortages.

Graham Seed Co



Graham Seed Co



Farm History

Transportation-

RFT- Graham, Mo

Specialized in seed logistics
Delivers for multi companies which
have contracts with GSC:- Vans and
hopper bottom trailers.

Select Carrier Logistics-Carroll Iowa.

Specializes in all aspects of seed
hauling. Favour towards Monsanto-ASI
companies



Think Global ?

- Farm media 2002-2003 ---“***Go South***”
- So, we headed to South America and Brazil

Farm History

Brazil-

2003-2004 to present

North east-Bahia region.

Small project, rent first, learn then grow.

We now have experience in:

- Soybeans
- Cotton
- Dry edible beans
- Millet
- Bananas
- Farm Management-rescue

of failing farms.

- School teaching English to
Brazilian business owners



----- Loosing money.....lots of experience.

GMO Experiences

- **On Rosenbohm Farms-**
- Prior to 1996 – nothing
- 1997 first exposure to GMO soybeans.
- GSC being built- heard of RR1 soybeans.
- Corn nothing
- Now utilizing Bt corn, RR corn, RR-LL corn
- Still some conventional corn.
- RR1 beans
- LL beans
- No conventional -- premiums \$1.50 +/- in some locations
- Brazil GMO free until 2007-2008 ??

GMO--Soybeans

Prior to 1996 costs to the farmer \$0.75 to \$1.50

In 1996 first technology fee imposed for RR1 beans
\$7(inc breeders fee)

2010 Fees:

- | | | |
|---|----------------------|------|
| 1 | Roundup Ready 1----- | \$18 |
| 2 | Roundup Ready 2----- | \$24 |
| 3 | Liberty Link ----- | \$15 |

GMO--Soybeans

- First available in 1996
- Hit 50% market share 4th yr of being offered
- 92% Market share in 2008
- 2010 --- 90% +/-market share
- Balance is for food, (tofu) GMO free for specialty markets or consumer demands
- Economics – Technology of GMO
 - Value of germplasm
 - Value of trait technology.

GMO--Soybeans

First implemented fee structure-
valuation

Farmer 1/3

Trait provider 1/3

Seed company 1/3



GMO--Soybeans

2010 fee valuation

- **Trait provider 50+%**
- Farmer 20-25%
- Seed Co. -- balance ?



GMO--Soybeans

- Under current license language originated by Monsanto
- Pushing to sell a unit of beans consisting of 140,000 seed.
- Instead of the old industry standard of 50 #(22.67 kilo)
- Industry slow to adapt, but over time required to as per license.



GMO--Soybeans

MAJOR PROVIDERS of Technology

- Monsanto (RR and RR2Y)
- Bayer (LL)
- DuPont (Pioneer)
- Syngenta
- Dow



GMO--Soybeans

- New trend emerging
- Cross Licensing- sharing technologies
- Dow & Syngenta
- Monsanto & Dow
- DuPont & Bayer
- Dow & DuPont
- Monsanto & Bayer

GMO--Corn

Current market share:

- **GMO Corn** **85%**
- **Conventional** **15%**
 - Waxy
 - Food
 - White
 - Specialty



GMO—Corn

- History
 - 1988-1990 Bt Corn Borer
 - 1997-1998 Herbicides + Bt
 - 2003 Rootworm + Bt + Herbicides

 - From 1990 to 2010 (20 yrs)
 - » 85 % corn acreage is now GMO



GMO—CORN

- GMO Segments

- Triple → Herbicide, BT (corn borer), Rootworm 25%



- Double → Herbicide, BT 45%



- Herbicide only (RR, LL) 15%



GMO-Corn

- Fee's to the farmer.

25 yrs ago \$2-\$2.50

Currently:

Conventional \$15-\$20 / unit(80,000 kernels)

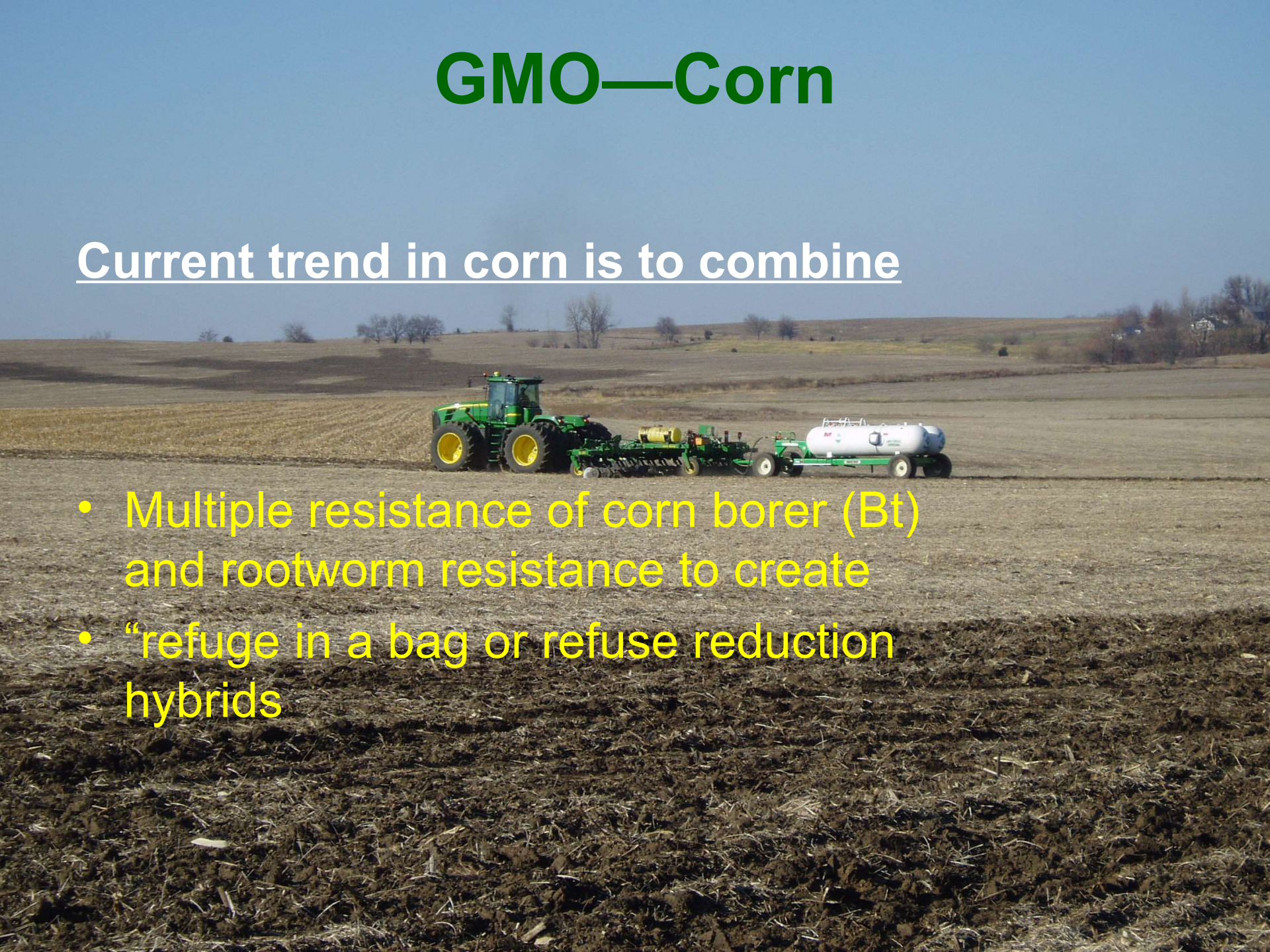
GMO –

| | |
|----------------------------|------------|
| Herbicide | \$60/unit |
| Herbicide + Bt | \$110/unit |
| Herbicide + Bt + Cornborer | \$160/unit |

GMO—Corn

Current trend in corn is to combine

- Multiple resistance of corn borer (Bt) and rootworm resistance to create
- “refuge in a bag or refuse reduction hybrids



Future of GMO corn

- Major technology providers are cross licensing but not to the extent as in soybeans.
- Major players are:
 - Monsanto
 - Syngenta
 - DuPont
 - Dow
 - Bayer and BASF starting to be more involved.

GMO—Corn & Soybeans

- Where I see the future value ???
- It appears that the area of nutrient management is next.
 - **Nitrogen usage - corn & other crops**
 - **Big expectations in water utilization - Drought resistant corn varieties.**
 - 15% increase in tests so far under drought conditions
 - **Dicamba trait in beans.... + RR from 2014+**
 - **2,4-D + Glytrol in beans 2014+**
 - **Other combinations...**

Concerns with GMO usage

- Obligations-

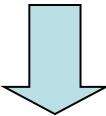
- Not to keep the seeds back –Soybeans (patented)
 - Pinkerton usage - Monsanto
 - Farmer reporting farmer
 - Seed salesman reporting
 - EXTREME deep paper trail and tracking...
 - Going to get even more detailed tracking
- **Corn—Refuge management!!**
- **Market clearance**



Concerns with GMO usage

- Cross contamination-
 - Never heard of a farmer getting “busted” for someone else's usage of GMO crop or pollen drifting into their non-GMO crop
 - Buffer areas on production of seed corn usually solves the contamination risks.
 - **Starlink in the 90's** – Got into export cargos before it was EU approved.
 - **We experienced the fallout of that on our farm.....**

Concerns with GMO usage

- Crop margins to the farmer using GMO
 - Over time 
 - As the tech providers want more of the value the farmer pays more ..
 - Soybeans :
 - Conventional beans herbicide-----→ \$35-\$40
 - RR beans herbicide -----→ \$10-\$12
 - Liberty Link beans -----→ \$13-\$15
- NEED TO ADD IN TECH FEE'S OF TRAITS TO GET FINAL COMPARISONS

Concerns with GMO usage

- Terminator gene:
- Heard a lot of chatter.... Last few years but not convinced it is viable at this time.
- Used on more valuable properties
- Cool technology in some ways. But concerns with the farmers... Consumers?

Corn Production-Terminator?

- Talk about “new genetics in corn hybrids”
- The female plant will be sterile, done inside in the plant, and the male rows will work as designed.



Concerns with GMO usage

- **Weed resistance** –
 - Increases in northern and southern areas
 - Midwest, not so much
 - Rotate traits (RR-LL)
 - Management !!
- **“Getting in unapproved markets”**



Where are we going?

- Who knows.....
 - EU
 - Costs
 - Other customers (China, Japan, others)
 - World competition (Brazil)
 - Environmental position.
 - Economy of the consumer



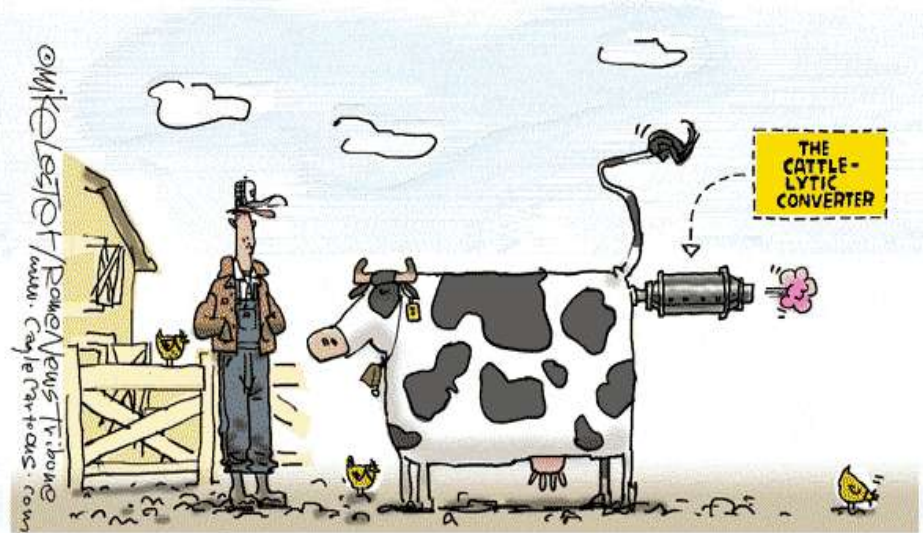
Rosenbohm Farms



Worries of GMO usage



U-N REPORT IDENTIFIES "COW EMISSIONS" ARE MORE DAMAGING TO PLANET THAN CO₂ FROM CARS... SOLUTION?



- Environmental position
- Well funded
- Don't understand the food production world
- Profit topic.... Agric.

View of European attitude

- Trade partner of the US farmer.
- Have more experience with Environmental issues, a little different perspective.
- Food security, abundance, costs
- Government program position
- Politicians !!, Environmentalists,

trends

Concerns of the US farmer

- *Our own congress !!*
- **GMO Cost effectiveness of traited seeds**
- **EU & other country's position on GMO**
- **Resistant weeds**
- **Consumer lack of knowledge on agriculture**
- **Young not returning, etc**



Questions?



***Thank You from Kevin &
Michele***

***Happy Holidays..... The
Rosenbohm's***