



Biotechnology Investment





Ideas to Discuss

- Our role as agri-aquaculturalist!
- Genetic and biotechnology solutions required!
- Select Sires investments?
- Importance of cooperating in research and approval process.



Feeding the World is Not Enough

- Double Food Production by 2050.
- Reduce Carbon Emissions
- Reduce pollution and run off
- Lower inputs (i.e. fertilizer, water, land)
- Convert non-useable plants to meat and milk
- Treat animals humanely
- Improve food quality and nutrition
- Communicate food safety to consumers



Are we up to the Challenge?





Methods to Produce More

- Extensification: Use more land
- Intensification: Use more fertilizer, pesticides, water.
- Improved Technology/Genetics:
Improved farming practices & genetics

Dr. David Tillman
Department of Biological Sciences
University of Minnesota



US Dairy Industry Carbon Footprint: 1944 vs 2007

"Compared to 1944, the production of an equal quantity of milk in 2007 requires only 21% of the animals, 23% as much feed, 35% of the water, 10% of the land area and produces only 24% as much animal waste. Particularly impressive is a comparison of the total dairy industry; in 2007 the U.S. dairy industry produced 59% more milk with a total carbon footprint 41% less than the 1944 industry."

Dr. Jude Capper/Dr. Roger Caddy Washington State University Study printed in Journal of Dairy Science



Biotechnology Toolbox

Sex Sorted Semen

Molecular Breeding

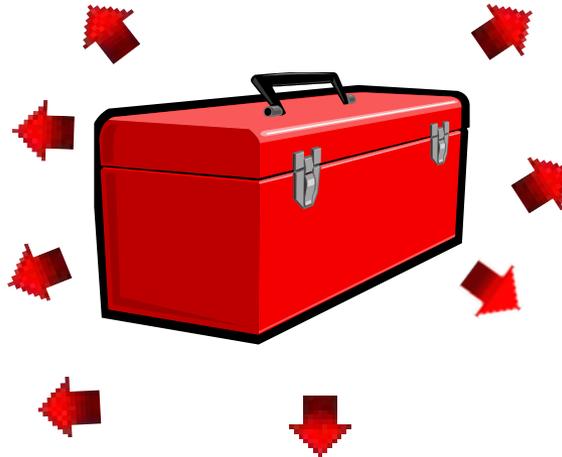
In Vitro Fertilization

Gene Editing

Embryo Transfer

Transgenic

Genomic Testing



Cloning Technology



Precision Dairy Management

- Providing Replacements
- Most valuable animal to sell
- Delivering exactly what the farmer wants!
 - Pregnancy
 - Sex
 - Genetic Improvement



100 Cow Herd

CURRENT

- 51 Holstein Bulls
- 49 Holstein Heifers

- 51 Jersey Heifers
- 49 Jersey Bulls

PRECISION DAIRY MANAGEMENT

IVF Embryos:

- 35 Holstein Heifers from the top 35 cows in your herd
- 65 Pure Angus bulls from the bottom group of your cows.



Real Difference In Performance

Breeding Values for Female Subgroups in US Population			
	Milk	Fat	Protein
Select Sires Herd (60)	3540	178	130
Select Sires Proven Linup Ave	2350	100	72
Average Herd in the US	1013	46	34
BV of Progeny of SS/US Herd	1682	73	53
Differences in Productivity	1859	105	77



Replicate Environmental Superiority

- Allows you to replicate plants and animals that are superior for their environment
 - More efficient utilizes or food and nutrients
 - Carry traits that are preferred.

AVE. LACTATION BRAZILIAN GIR:
1,590KG/LAC.



Valia: 15.151 kg milk in one lactation



Areas for Improvement

- Improved production
- Improved quality of products
- Improved health of the animals
- Improved climate tolerance for animals
- Reduced stress on the animals
 - Increases production
 - Increases the welfare or perceived welfare of the animals.



Improve Production

- Increase the rate of improvement in the production of fat, protein, and meat production per animal genetically.
 - Molecular breeding concepts
- Precision dairy management.
 - Cloned embryos



Genetic Engineering Agricultural Applications

- Heat tolerant high producing cattle
- Tick resistant high producing cattle
- Improved lactose tolerant milk
- Sexed semen producing animals
- Lactoferrin, Lysozyme Dairy Cattle (Mastitis Resistance, Nutraceutical)
- Polled
- Prion KO cattle, BSE Resistance
- Johnnes dease resistant cattle
- Influenza resistant swine



For Me to Invest

- Categorize technologies properly
- Develop clear and understood path of approval.
- Work together as regulators
 - Reduce cost of testing
 - Strength in numbers
 - Improves trade
- Base governance on science
- Defend science publicly



Biotechnology Reactions

- Each new step in the continuum of reproductive technology has brought questions about:
 - Is it natural? Is it fair? Will it hurt small farmers?
- "It is unknown what long term health consequences may unfold. The studies are not adequate. Furthermore, this will likely not be available or cost effective for small farmers, it will decrease product acceptance and consumption, and will be catastrophic to small farming operations".
(Quote from the introduction of the Pasteurized Milk Ordinance in 1924)

- "We are talking about the possibility of human-animal hybrids, monstrous babies and reproductive engineering" "Children conceived this way will have no soul."
(Quotes in 1978 following the birth of baby Louise Brown....and proceeding the birth of over 2M IVF babies)



Government Doing It's Job!!!

FEAR ADVERTISING



The FDA states that no significant difference has been shown between milk derived from rbST treated cows and non-rbST treated cows.

FDA REGULATION





Summary

- Our role is not just to feed the world!
- Technology is needed to feed the world, reduce pollution and improve environmental stewardship.
- We can improve the quality, quality, and healthfulness of food through technology.

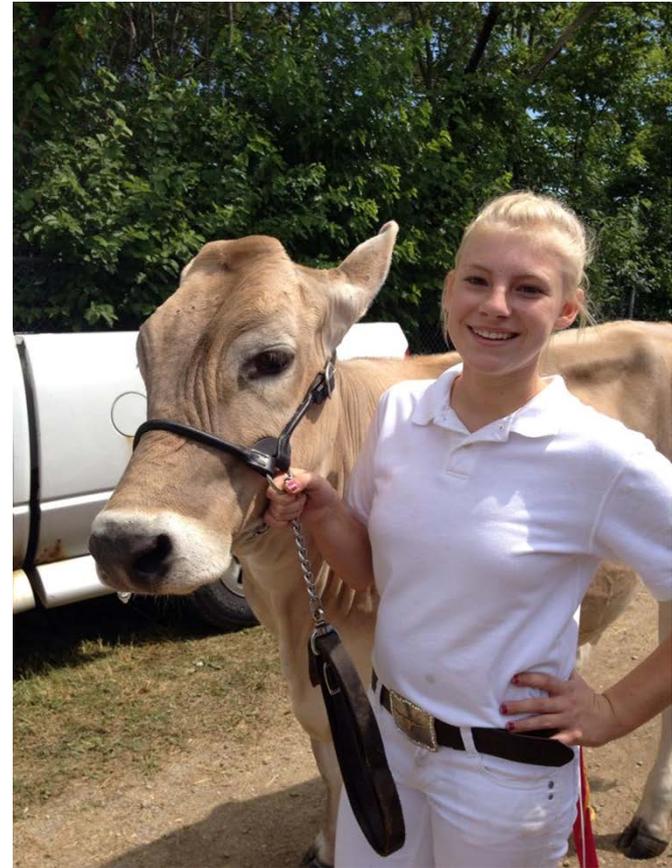


Summary

- There is reduced investment in these technologies unless there is:
 - Proper categorizing of technology
 - Use science based safety!
 - Countries working together with defined pathways of approval.
 - Federal regulators need to support decisions and science.



Our Future Depends Upon it!



Thank you!!!



YOUR SUCCESS *Our Passion.*