



MILLIGAN BIO-TECH

BIO-DIESEL SOLUTIONS

**“Growing for the
Market: Bio-Fuels”**

Jan. 8, 2007

Flax Growers Association

Saskatoon, Saskatchewan

Bio-Diesel Opportunities

BIG or Small

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Agenda

- **Company History**
- **Bio-Market Potential**
- **Petro-Diesel VS Bio-Diesel**
- **Milligan's Process**
- **Milligan's Technologies**
- **Commercialization (Hub and Spoke)**
- **Milligan's Products**
- **Questions ?????**



Milligan Bio-Tech The Company

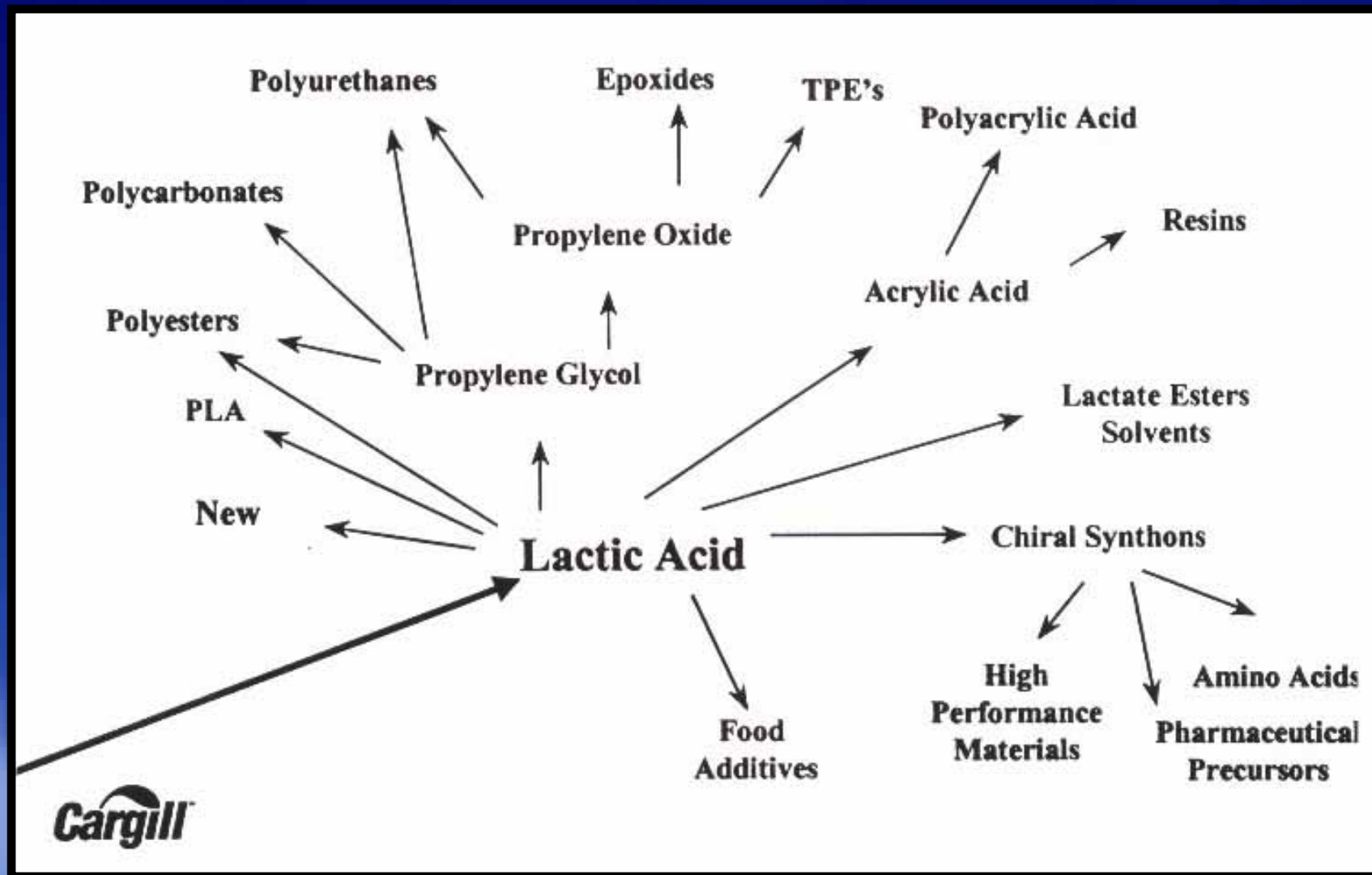
- **Agricultural community initiative (1992)**
- **Incorporation in Saskatchewan (1996)**
- **Affiliation with Agriculture & Agri-Food Canada (AAFC) and University of Saskatchewan (1997)**
- **Pre-pilot oilseed crush (1998)**
- **Test marketing of conditioner (2000)**
- **National product distribution (2002)**
- **AAFC Technology Use Agreement (2002)**

Milligan Bio-Tech The Company

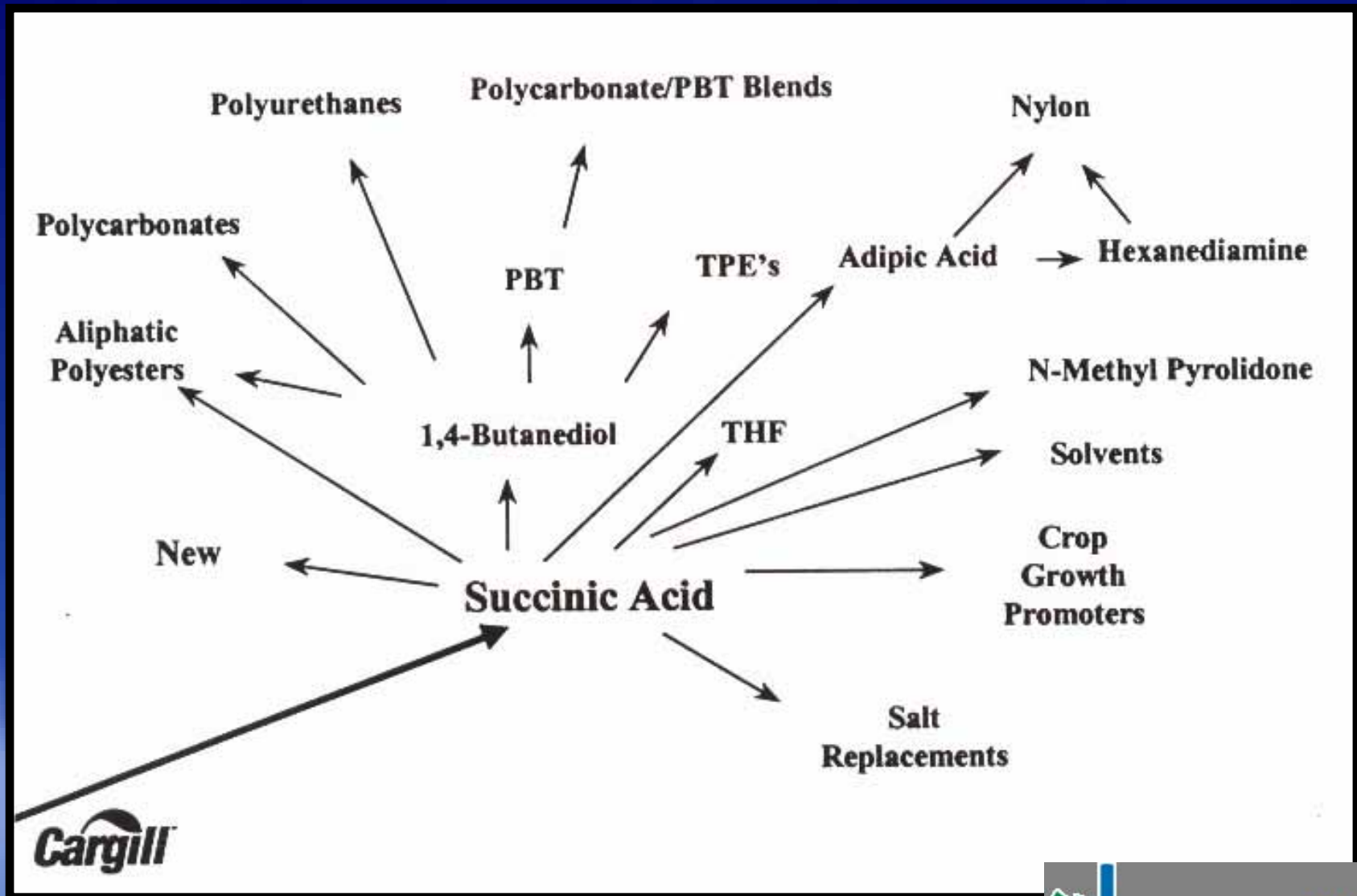
- **Product quality testing: Alberta Research Council, AAFC, NREL, CANMET, ESDC, U of S (2001-Today)**
- **Meet North American (ASTM) and European (EN) quality standards (2001-2005)**
- **Supply of biodiesel to Saskatoon Bio-bus (2003-2005)**
- **Test marketing penetrating oil (2003)**
- **Pilot test of Conditioner tested by Sask. Highway fleet (2003-2004)**
- **Test Marketing dust suppressant (2004)**
- **Community share offering (2005)**
- **Biodiesel for Canada Summer Games buses (2005)**
- **STC to run a Biodiesel Blend in 50% of Fleet (2006-2007)**



Chemical and Polymers From Lactic Acid



Chemicals & Polymers from Succinic Acid



Fuel Prices



Petro-Diesel Fuel 101

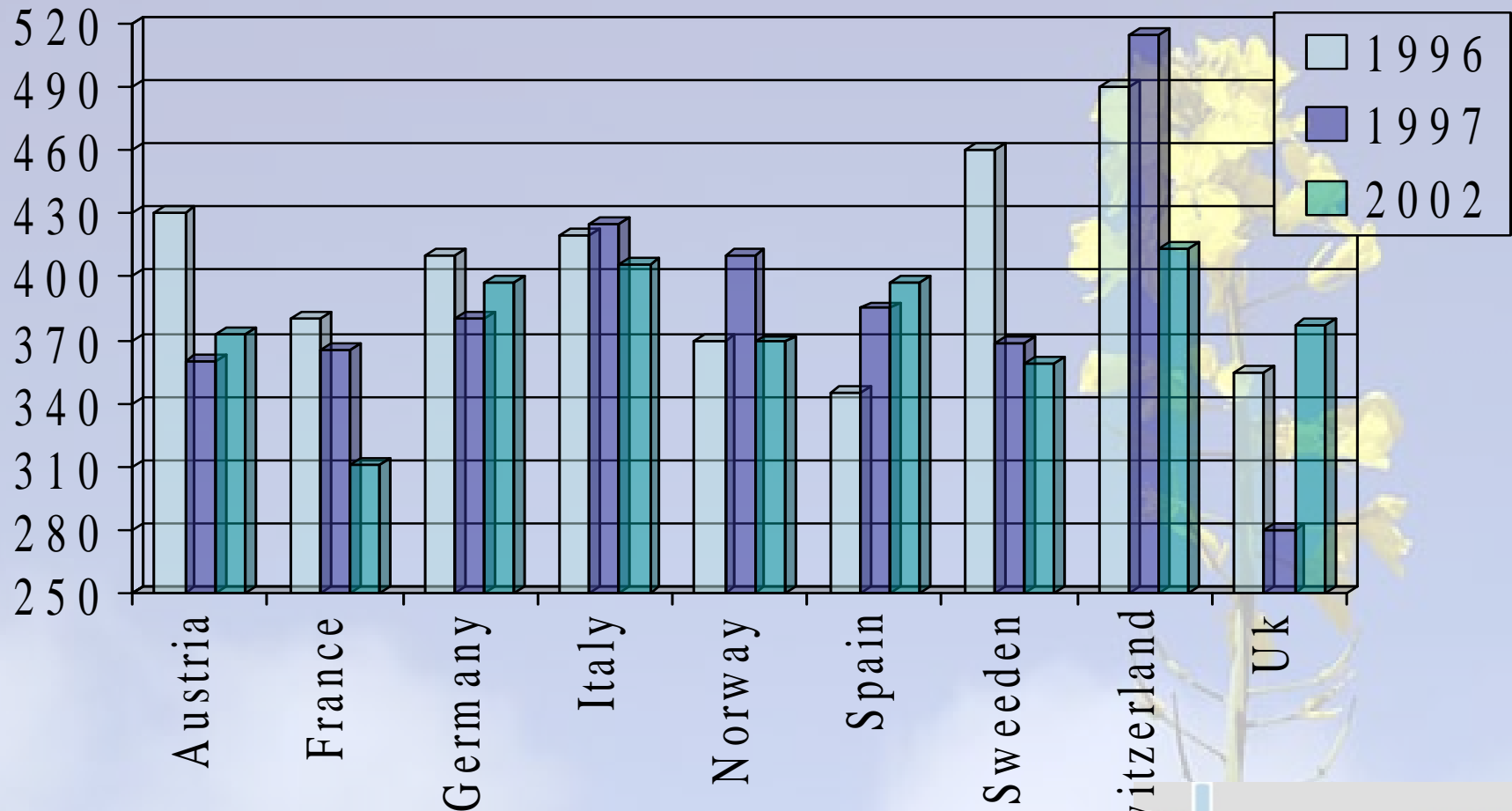
- **Pre-1990 (High Sulfur Diesel)**
 - Sulfur Content 3000ppm
 - Lubricity Non-issue
- **Post 1990 (Low Sulfur Diesel)**
 - Sulfur Content 500ppm
 - Lubricity Concerns Emerge
 - New Additive Packages Developed
- **2006 (Ultra Low Sulfur Diesel)**
 - Sulfur Content 15ppm
 - Very Low Lubricity
 - Additive Packages Struggle to meet Standards



HFRR High Frequency Reciprocating Rig

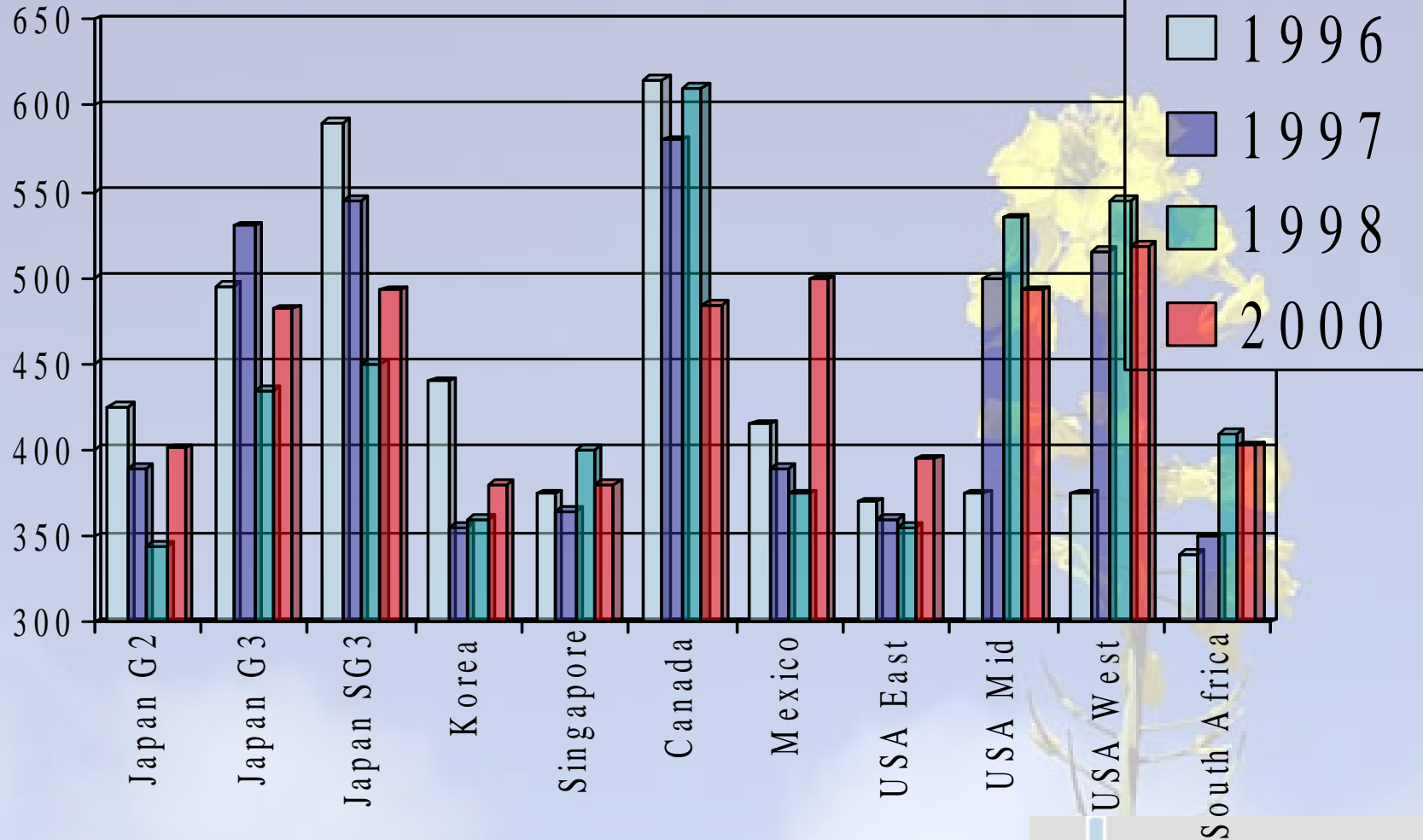
(Infineum)

(µm) ~ Wear Scar Diameters for Winter Diesel Fuels

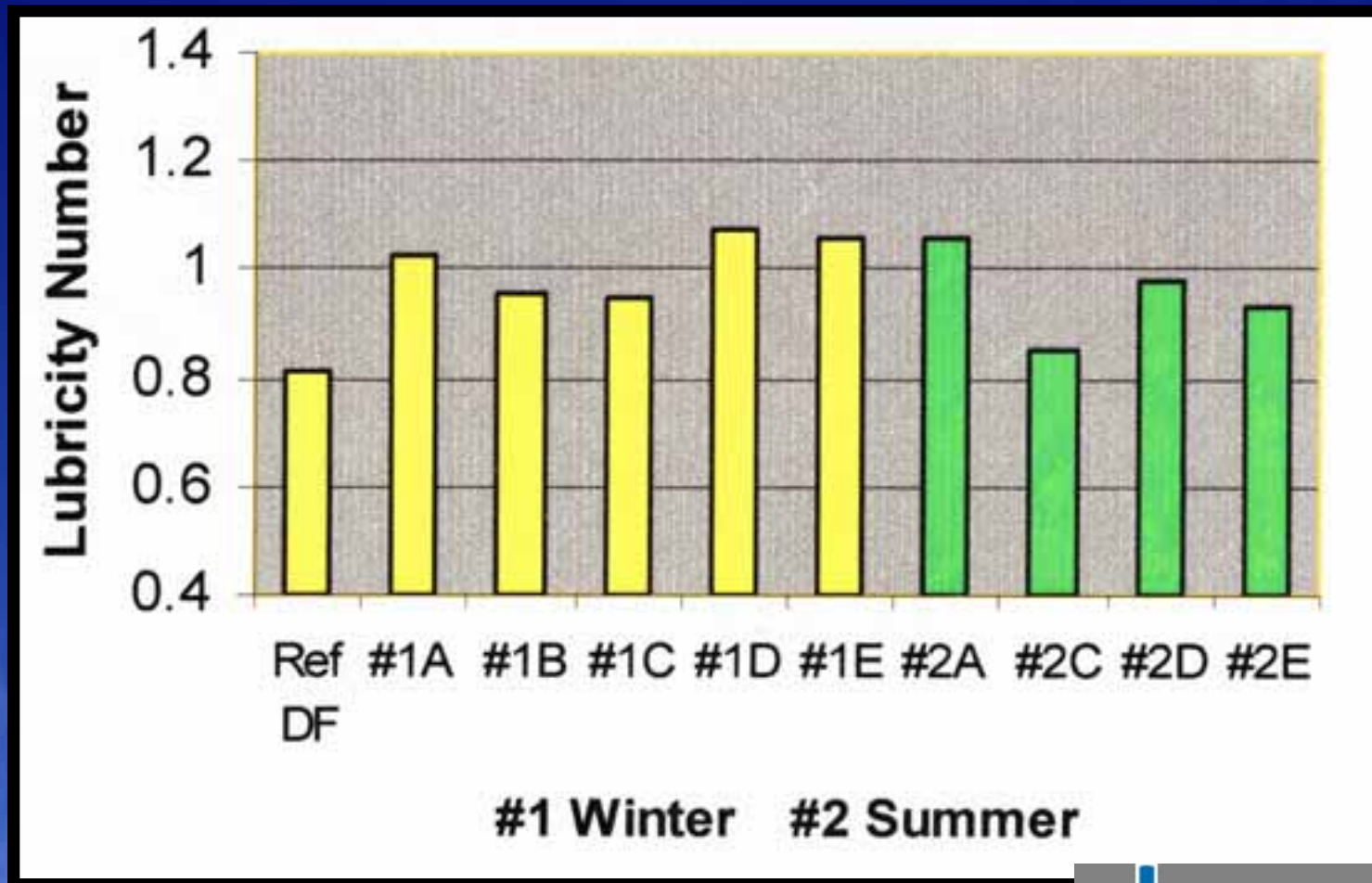


HFRR Wear Scar Test- *(Infineum)*

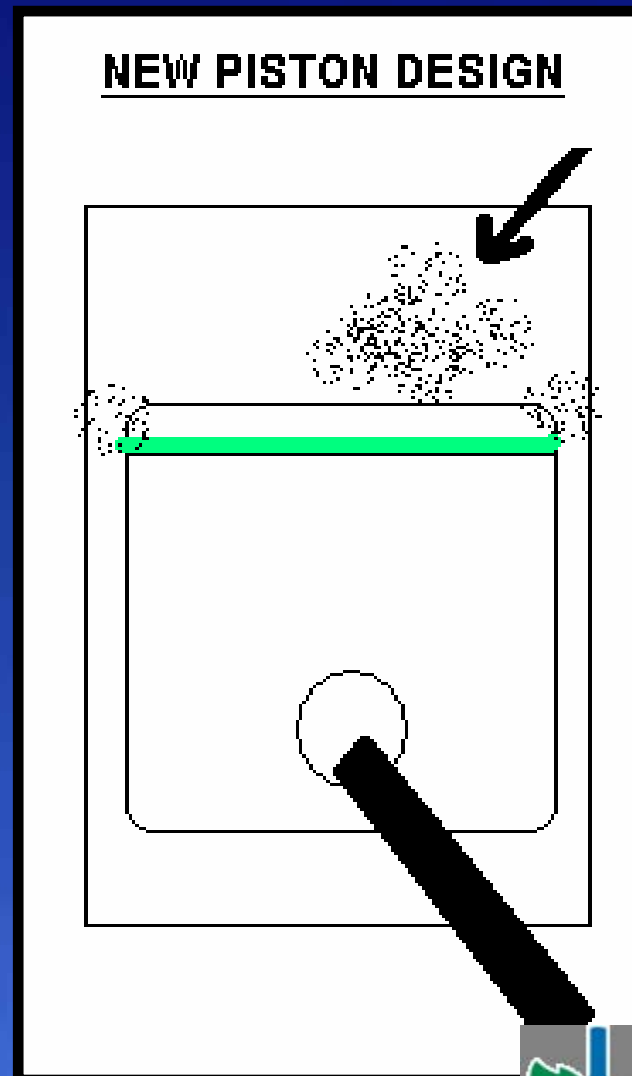
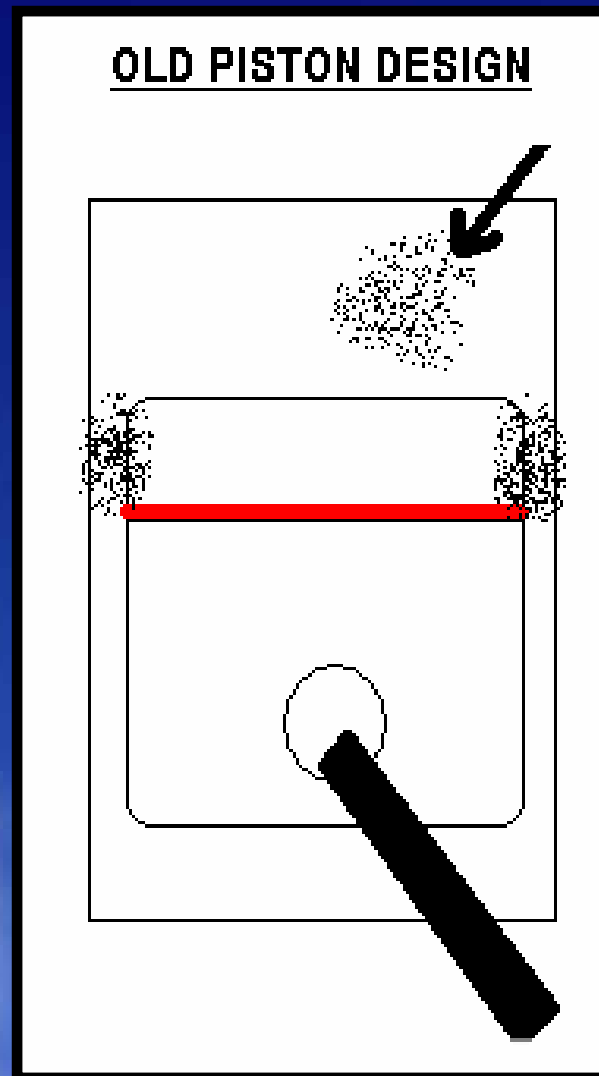
(μm)



Lubricity Numbers of Seasonal Diesel Fuel



Engine Design Changes



Ultra Low Sulfur Diesel

- **15ppm Sulfur Content**
 - Reduced Lubricity in Fuel
 - Canadian Standard for Lubricity HFRR of 460
 - European Standard HFRR of 380
- **Lubricity Impact on New Engine Design**
 - Increased Engine Wear
 - Higher Maintenance Costs
 - Impact on Fuel Economy



What is Biodiesel

- **Feed Stock Vegetable Oil and Animal Fat**
- **Environmentally Friendly**
- **Renewable**
- **Usual Blends at 1%, 2%, 5%, or 20%.**
 - **B1, B2, B5, and B20**
- **Standards of Biodiesel**
 - **US – ASTM D6751**
 - **European – EN 14214**



Bio-Diesel

- **Partners**
 - Agriculture and Agri-Food Canada (AAFC)
 - University of Saskatchewan
- **Low Cost Oil**
 - Quality
- **Production**
 - Efficiency
- **Quality, Quality**
 - ASTM/ European (EN)
- **Co-Product Application**
 - Quality, Quality, Quality



Milligan Technology

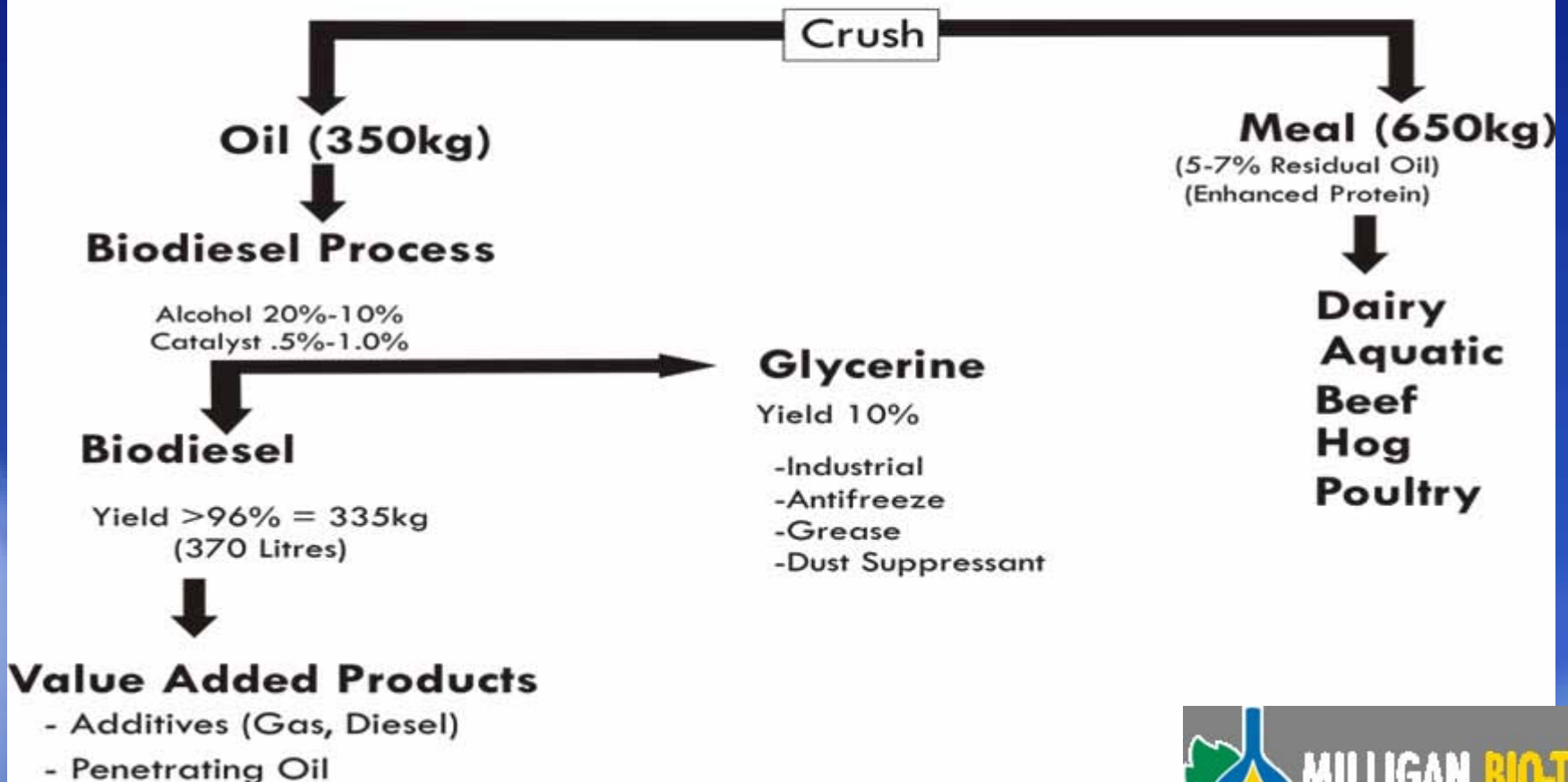
- **Crushing**
- **Bio-Diesel**



Flow of Milligan's Process



Biodiesel Production
One Tonne of Seed



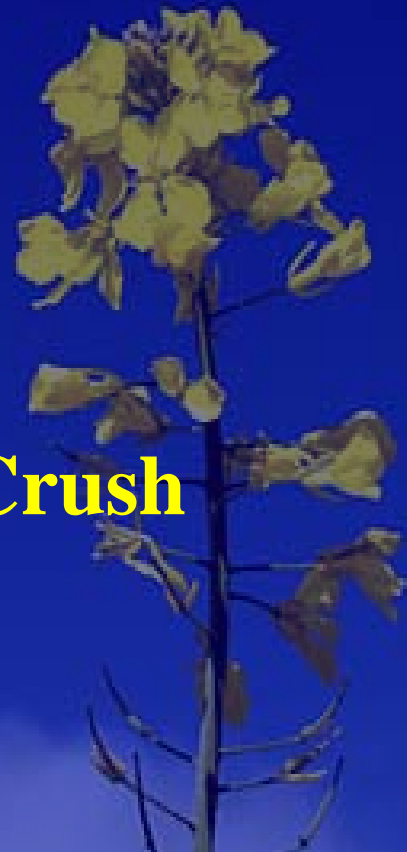
Crushing

- **Partners**
 - Agriculture and Agri-Food Canada (AAFC)
 - University of Saskatchewan
- **Oilseed Feedstock (Distressed)**
 - Environmental
 - Storage
 - Contamination
 - Inseparable



Crushing

- **Crushing Technologies**
 - **Solvent Extraction**
 - Very Low Residual Oil Meal
 - High Capital Cost
 - **Traditional Cold Crush**
 - High Residual Oil in Meal
 - Difficult To Handle
 - **Milligan's Enhanced Cold Crush**
 - Low Residual Oil
 - Enhanced Meal
 - High Value Market Opportunities
 - Affordable Capital Cost



Milligan Biodiesel

- **Canola Oil Feed stock**
- **High Quality**
 - Many years of testing and development
 - Meeting or exceeding all standards
- **Highest Cold Flow Properties**
 - Animal Fat **+20 C**
 - Soy Oil **0 C**
 - Canola Oil **-14 C**
- **Enhanced Lubricity Compounds**

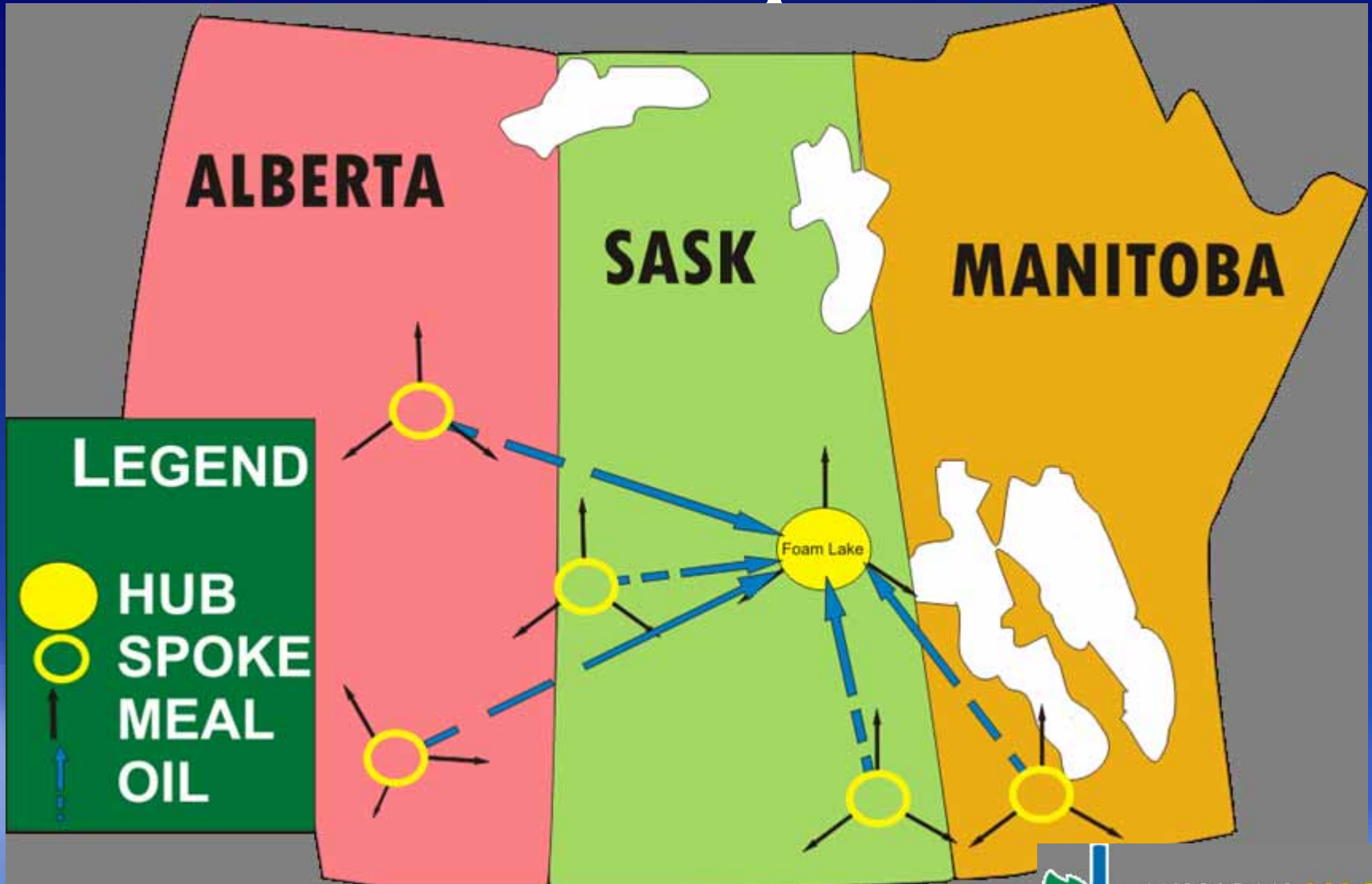


Commercialization

- **Hub And Spoke Strategy**
 - **Rural Revitalization**
 - **Local Access**
 - **Feedstock**
 - **Meal Market**
 - **Centralization – Bio-Diesel**
 - **Quality Control**



Hub & Spoke



Our Products



Milligan's Diesel Fuel Conditioner

- Proven up to 50% reduction in engine wear
- Increase in fuel economy
 - Up to 20% Average of 6-8%
- Environmentally Friendly
- Increases Cetane
- Cleans Injectors
- Supports Saskatchewan Industry



The DFC Difference

- **12+ years on Development**
- **Made from a Very High Quality Bio-Diesel**
- **Made from a Renewable Resource**



BIOTEC Penetrating Oil

- **New Penetrating Oil**
- **Available in Aerosol**
- **Also Available in Polly container**
- **Biodegradable**
- **Canola Oil Based**
- **Environmentally Friendly**



How BIOTEC Works

- **Cuts through;**
 - Rust
 - Dirt
 - Grime
- **Lubricates**
- **Penetrates**



Then... The BIG ONE

Political Climate
80-90% of the issue on
“Renewables”

But... After All This...

Exciting Times for Alternate Energy

Because of Government Interest
Bright Future

Why?

- **2 Billion People in the World Do Not Have Electricity**
- **World Energy Usage will TRIPLE in 30 Years**
- **Climate Change – real or not – Ice Caps are Melting, Since 1979 – reduced by 20%**
- **USA – Higher Dependence on Imported Oil**
- **China Demanding More**
- **No Single Solution**

Remember

“High Prices Cause Higher Prices”

And

“Low Prices Cause Lower Prices”

Also Remember the Saying

“If you give it to a farmer,
they will run it until it
doesn’t make anymore
‘cents’.”



There's room for **BIG!**

And.....



and
Opportunity...for
“*BIGGER*”





How Big is **BIG**???

An aerial photograph of a vast agricultural field, likely a cornfield, during harvest. A long, single-file line of green combine harvesters is moving across the field, leaving a trail of harvested grain. Several large white trucks are positioned behind the harvesters, ready to receive the grain. The field is divided into neat rows, and the overall scene conveys a sense of large-scale industrial farming.

Really BIG!!!



MILLIGAN BIO-TECH

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Some see a farm...
We see an industry!



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**Thank You For
Your Time**



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