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Ilderton Ontario Canada

Sustainable Family Farming through Innovation

Lawrence National Centre for Policy and Management
Richard Ivey School of Business, UWO
Water Innovation Forum,
Sustainable Water Infrastructure
and Technological Solutions Panel Discussion
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Stanton Farms is a 2000 dairy-cow farm, incorporating state-of-the-art farming practices and sustainable family farming through innovation.

The farm was relocated in 2006 to its current location in Ilderton, Ontario from its former site in Hyde Park (now London) because of urban sprawl encroaching the old farm.

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Closing-the-Loop and Driving Innovation:

From the way we cool milk
using a combination of earth energy
and unique heat-exchange technology,
to converting on-farm organic waste to renewable energy
to power-up the neighbouring community,
Stanton Farms is always looking to
c*lose-the-loop*
in every aspect of our operation.

The need to reduce our clean-water footprint
is equally important
to the need to reduce our carbon footprint.

A tour of Stanton Farms…

Our *Special Needs Facility,*

located adjacent to the milking parlour and offices, provides veterinarian services and an area to deal with springing, calving, fresh, dry or problem cows.

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Our two *Free-Stall Barns*

house 1000 cows each and are 326 metres by 31 metres.

Cows are free to roam their grouping area.

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Cows are fed a *Total Mixed Ration* of corn silage, haylage, cannery by-products (sweet corn husks, carrots, other), soybean meal, corn screenings, dry hay and a concentrate mix containing minerals and vitamins for a complete and balanced diet.

Our unique *Feed Watch* program uses next generation feed management technology and software to monitor feed use, sales, purchasing, animal intakes and cost.

An industrialized mixer scale indicator mounted on a feed truck is controlled by specially designed software and fitted with a keypad that provides the ability to handle various feeding scenarios.

Feed stuffs are stored in five bunker silos and a dry storage area.

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Our Calf Barn
can hold up to 268 calves in individual or grouped pens.

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Our Calf and Cow Management Operation is fully computerized with access readily available in individual offices in each barn to ensure that all health, calving and breeding data can be entered quickly and readily available to staff.

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Our *Electronic Herd Management* System
incorporates the use of electronic cattle ankle transponders and sort-gates to provide efficient cattle flow-management throughout our facility.
Our EHM System is also synchronized with our milking parlour to monitor cow production during the milking process.

cattle ankle transponder

The EHM System also monitors cow movement throughout the course of the day, as part of our *cow activity monitoring program*.

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Our Milking Process…

Cows are milked 3 times/day (every 8 hours) in our 60 stall, computerized **Milking Parlour** that can process 300 cows/hour.

Each cow will produce approximately 35-40 litres of milk per day and consume 4-5 times that volume of water per day.

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Our unique Instant Chilling System
cools the milk to 2C before it enters one of two 30,000 litres storage tanks.

This process reduces our energy consumption and improves milk quality by eliminating temperature fluctuations during milking sessions.

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This two-step process utilizes a combination of *earth-energy* and unique heat-exchange technology:

The milk leaves the cow at 37C and is passed by cool water (10C) taken directly from our deep-well water system. This process decreases the milk temperature and increases the water temperature to approximately 13C.
The water is then stored for both cow drinking water and clean-flushing of the milking system. As a result of this process, the water is a more comfortable temperature for the cows to drink and they consume 10-15% more water.

The milk is subsequently passed through a unique glycol heat-exchange system that further cools the milk to 2C before entering the storage tanks where it is kept at a constant temperature, eliminating milk temperature fluctuations between milkings and ensuring milk quality.

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An innovative heat-exchange process is used for our hot water needs.

Hot water used for clean-flushing our milking equipment and other hot wash-water requirements, is heated through a unique 2-step, closed-loop process:

Thermal heat from the condensers used for cooling milk is recovered to pre-heat the water to 49C.

The water is subsequently heated to 83C, utilizing propane generated heat.

The use of propane gas for the heat requirement in this process is temporary and will be replaced by methane gas generated by our biogas operation.

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Converting Waste to Green Energy
with our unique Biogas System…

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On-Farm Biogas Advantages:

1. *Reliable* Renewable Energy Generation
2. Numerous Environmental Benefits
3. Creating a Rural Green Economy

Our Manure Separating Facility acts like an underground sewer system, collecting the manure from a looped-trough system throughout the cow barns. Areas are either flushed or mechanically or manually scrapped and the manure is deposited into the troughs.

Wastewater is recaptured and reutilized to flush the troughs to bring the manure over to this facility for processing in the digester tanks. A slurry of manure solids is pumped into a mixing tank and combined with off-farm organic waste which is then continuously pumped into the digester tanks for methane gas processing.

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Our flushing system recycles a unit of water10 times before final discharge to storage tanks.

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On-farm biogas is the *reliable renewable*

with the ability to generate power virtually 24/7, unlike other renewables.

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In addition to approximately
40litres/day of milk,
each cow generates
4 kW/day of renewable energy
from the manure
they produce.

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The biogas is burned in a cogeneration system to produce clean, renewable energy for the neighbouring community.

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In our first phase, Stanton Farms will produce 1.3 MW of renewable energy:

- - enough green energy to power-up 800 homes;
- - all the homes in the neighbouring Town of Ilderton
- and more!

We'll also increase our generation capacity by diverting organic waste from landfills and municipal waste-water treatment facilities that is generated by the food service and food processing industries.

We're also looking at gas upgrading (cleaning) for input into the natural gas distribution system to heat homes and hot-water tanks, as a *renewable* natural gas.

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Through our
Cogeneration System,

heat generated from the burning of the methane gas is recaptured through heat exchange technology and utilized to heat:

- our biogas building;
- the waste material for processing;
- hot water for our in-floor radiant hot water system that provides our building heating needs in cooler seasons.

We are also investigating providing heat to a neighbouring school.

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Numerous Environmental Benefits

- Methane gas is 21 times more potent as a greenhouse gas than carbon dioxide (CO_2). Methane created from the traditional disposal of manure on farmland is captured during through the biogas process, decreasing methane gas release into the atmosphere.
- Decreased Odour -- the digester process reduces odour causing compounds from manure by 90%.
- Greater Pathogen Reduction for Ground-Water Protection – pathogens causing Walkerton situations (E-coli and salmonella) are destroyed through the digester process.
- Liquid by-product can be processed as an organic fertilizer and more safely spread on farmland than traditional disposal of manure on farmland.
- Landfill Diversion Opportunities -- using organic waste as *fuel* rather than sending it to landfills.
- Reduction of Disease-Causing Pests -- pest larvae from manure is destroyed through the digester process.
- Reduced On-Farm Herbicide Use -- traditional means of land-applying farm-waste results in weed control problems. Weeds do not survive the anaerobic digester process which decreases on-farm herbicide use.

Once the organisms in the digester tanks consume the organic matter, the left-over fibre and liquid by-products are extracted from the tanks and separated.

These by-products are virtually pathogen and odour-free.

The fibre by-product is utilized as animal bedding in the barns.

Plans also call for it to be marketed as soil replacement product for the greenhouse industry and a peat moss replacement product for the landscape industry.

We’re also involved in biomaterial research investigating the possibility of utilizing the fibre by-product as a fibre additive in plastics manufacturing.

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The nutrient-rich, liquid by-product is land applied on-farm for crop growing. We are also investigating additional uses for it as an organic fertilizer -- providing an alternative to chemical-based fertilizers.

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Creating a Rural Green Economy

Virtually 100% of the Stanton Farms biogas facility was locally sourced.

- Farming Diversity: on-farm biogas development provides alternative on-farm income sources;
- On-going maintenance servicing required: creating a local service industry.
- Developing Value-Added Byproducts:
  - Fibre by-product utilization as animal bedding/soil & landscape product/biomaterial.
  - Liquid by-product utilization as an organic fertilizer.
  - Heat recovery for other uses.
  - Utilization of additional gases (like hydrogen for fuel-cell development).
  - Gas upgrading (cleaning) for input into the natural gas distribution system, heating homes/hot water tanks.

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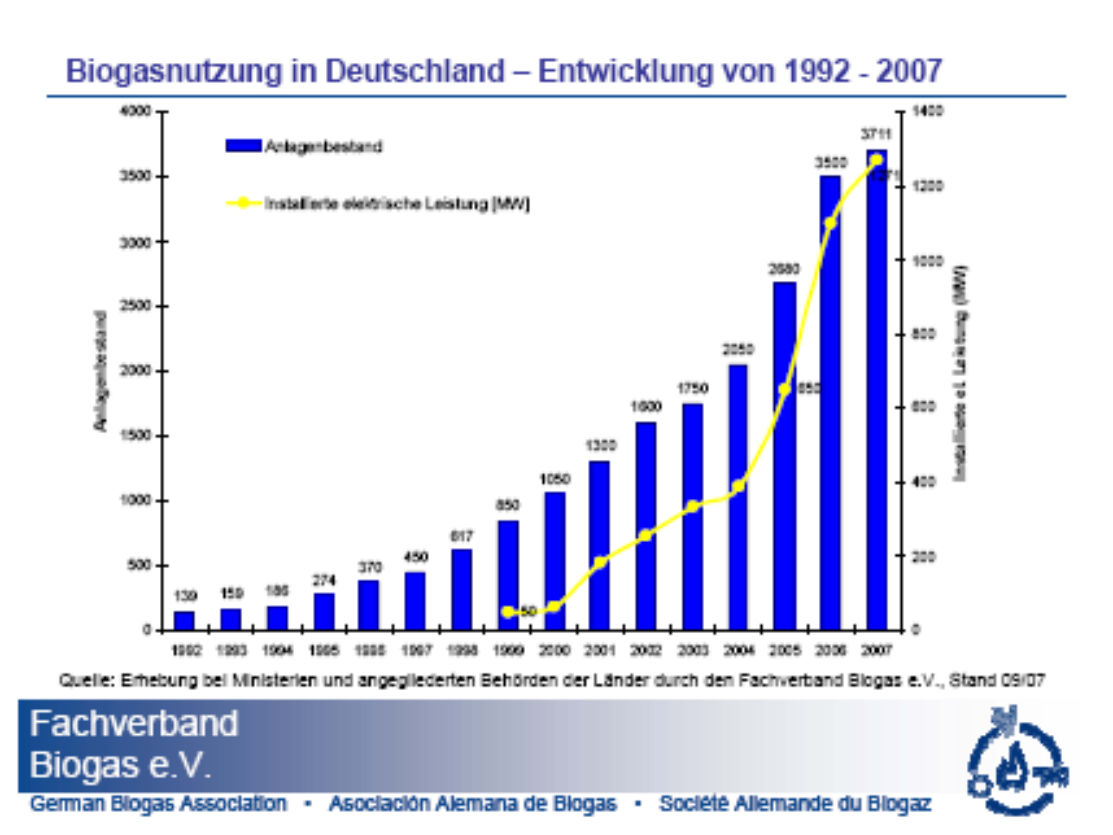
A key goal of Stanton Farms is the ability to clean all its waste-water and biogas (liquid) effluent
and recycle that clean water back on-farm.

In collaboration with the University of Western Ontario, we are investigating opportunities from the production of microalgae using anaerobic biogas process effluent and stack gas (CO2).

On-farm Biogas Potential in Ontario:



Today in Germany:

+4,000 biogas facilities.

+1,400 MW of renewable energy.

By comparison, the average nuclear reactor generates 500 MW.

Today in Ontario:

5 agricultural biogas facilities generating approximately 900 kws.

Note:1000kws = 1MW.

Germany by 2020:

Targeting 17% of Germany's electricity supply from agricultural biogas alone.

Ontario by 2025:

Targeting 12% of Ontario's electricity supply from all renewables.

Today in Germany: $1.5 B invested.

+ 10,000 jobs.

By 2020 : Expect $10.5 B invested.

+ 85,000 jobs.

German Program:

- provides access to the grid;
- attractive base-rate incentive;
- additional incentives for:
  - heat recovery
  - using agri-product (energy crops & manure).
  - byproduct processing

Our Collaborative Research Partnerships:

Stanton Farms has developed collaborative research partnerships with the Universities of Guelph, Toronto, Waterloo, Western Ontario and Windsor involving various animal science and biotechnology research initiatives:

- Creating training opportunities for highly qualified personnel;

- Helping students develop highly specialized skills needed in the new and growing green economy.

The biotechnology industry contributes approximately $78.3 billion to Canada's economy every year.

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Thanks for visiting

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