

**Final Report
For
Advanced Manure Management Technologies For
Ontario Project**

A Project Funded
By

Cold Springs Farm
Selves Farms
Ontario Pork
Premium Pork
Ontario Pork Industry Council
Poultry Industry Council
Ontario Ministry of Agriculture and Food
Through
Healthy Futures For Ontario Program

Richard St. Jean
Geomatrix Consultants
AMMTO Project Manager

John Alderman
Cold Springs Farm
Project Chair

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AMMTO

Advanced Manure Management Technologies For Ontario



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APPENDIX 2

AMMTO

“Technology Submission Form”

AMMTO PROJECT ADVANCED MANURE MANAGEMENT TECHNOLOGY REVIEW SUBMISSION FORM

The purpose of this document is to solicit information regarding the operation, and performance capabilities of advanced manure management technologies suitable for adaptation by all sizes of Ontario livestock producers. The information will be used to evaluate the technology and list the technology on the AMMTO data base.

Technology Submissions for evaluation by AMMTO must be submitted using this Submission Form. Requested information is to be entered in the space allotted on the form. Typed submissions should be in 12 font.

Additional information is welcome but must be appended as a separate document.

DISCLAIMER

The submission of this partially or fully completed form, together with any supporting documentation, constitutes a release of the submitted information for distribution to AMMTO parties for evaluation and listing in the AMMTO data-base, and for distribution to the general public.

INFORMATION OF A PROPRIETARY, CONFIDENTIAL OR INTELLECTUAL NATURE SHOULD NOT BE SUBMITTED. AMMTO AND PARTIES INVOLVED WITH THE AMMTO PROJECT WILL TAKE NO RESPONSIBILITY FOR CONFIDENTIALITY OF INFORMATION SUBMITTED.

AMMTO does not make any warranty that all submissions will be evaluated and reserves the right to select, at it's discretion, the submissions that will be evaluated and included in the AMMTO data base.

It is the submitter's responsibility to confirm that AMMTO has received their submission.

Name of
Submitter: _____

Address: _____

Contact Name: _____

Phone Number: _____

Fax Number: _____

E-mail: _____

- 1. Type of Submitter:** Manufacturer
 Consultant
 Government Agency
 Private Researcher
 Manufacturer's Sales Representative
 Farm Operator
 Educational Institution
 Agri-Business Retailer

2. Indicate the type of Manure that the proposed Technology is suitable for:

Solid Manure Liquid Manure Both solid and liquid Manure

Dairy Beef Swine Poultry Sheep

Other Please specify _____

3. What is the development and implementation status of the proposed manure management technology?

- Laboratory studies completed
 Pilot studies completed
 Full scale installations successfully operating
 Technology is patented
 Technology patent is pending

4. If available please provide particulars for up to three installations currently operating.

System 1.

System Model number: _____

System manufacturer: _____

Maximum system capacity: _____

Quantity of manure treated daily: _____

Commercial Operation Pilot Scale Operation Lab Scale

Name & phone number of system owner: _____

Size of livestock operation: _____

Type of livestock operation: _____

Date of installation: _____

System capital cost: _____

Annual operating cost: _____

Problems experienced to date: _____

System 2.

System Model number: _____

System manufacturer: _____

Maximum system capacity: _____

Quantity of manure treated daily: _____

Commercial Operation Pilot Scale Operation Lab Scale

Name & phone number of system owner: _____

Size of livestock operation: _____

Type of livestock operation: _____

Date of installation: _____

System capital cost: _____

Annual operating cost: _____

Problems experienced to date: _____

System 3.

System Model number: _____

System manufacturer: _____

Maximum system capacity: _____

Quantity of manure treated daily: _____

Commercial Operation Pilot Scale Operation Lab Scale

Name & phone number of system owner: _____

Size of livestock operation: _____

Type of livestock operation: _____

Date of installation: _____

System capital cost: _____

Annual operating cost: _____

Problems experienced to date: _____

5. List any scientific papers and/or articles that have been published on the technology proposed.

Author's Name and Phone Number	Title of Published Paper/Article	Name of Journal, Magazine or Newspaper and date published

Author's Name and Phone Number	Title of Published Paper/Article	Name of Journal, Magazine or Newspaper and date published

6. State the names of any Regulatory Agencies (Municipal, Provincial, Federal, Foreign Countries) that have accepted the technology for management of manures or other organic by-product materials and list the regulatory conditions the technology meets.

Name of Regulatory Agency	Regulatory Conditions Technology Satisfies

7. What type of processes are involved with the Manure Management Technology?

- Advanced land application techniques using soil injection methods
 - Advanced land application using surface application methods
 - Aerobic biological treatment
 - Anaerobic biological treatment
 - Advanced livestock housing technology to reduce volume of manure
 - Physical treatment (e.g. centrifuging, screening, clarifier settling, heat drying, compression drying etc.)
- Please state the physical processes involved : _____

- Chemical treatment (eg. acid leaching, caustic leaching, chemical oxidation etc.)
- Please state the chemical processes involved: _____

8. List the quantifiable and qualitative benefits of the proposed technology on the basis of change in manure characteristics and on the basis of quantity treated (eg. methane released to the atmosphere by manure will be reduced by 250 mg / tonne of manure treated, potential nitrate loading to groundwater from land

application of manure will be reduced by 500 mg per m³ of manure treated, odour from manure will be reduced by 75 %, manure will be managed by waste management experts, manure volume will be reduced by 50% etc.)

9. Indicate how the quantifiable benefits of the technology presented above were acquired.

Independent research/tests.

Manufacturer/inventor conducted own research/tests

Estimate based on scientific principles

List people who can be contacted to discuss research/test conditions and results and verify performance claims:

Agency/Company and Contact Name	Phone/Fax/e-mail

10. Indicate influent manure characteristics and the characteristics of the manure or resulting organic material after implementation of the proposed technology.

Manure Characteristic (where applicable)	Influent Characteristics	Effluent Characteristics
5 Day Biochemical Oxygen demand (BOD ₅)		
Chemical Oxygen Demand (COD)		
% Organic Matter		
Ammoniacle Nitrogen		
Nitrate Nitrogen		
Nitrite Nitrogen		

Manure Characteristic (where applicable)	Influent Characteristics	Effluent Characteristics
Organic Nitrogen		
Total Phosphorus		
Organic Phosphorus		
Plant Available Phosphorus		
% Dry Matter		
% Moisture		
Bacteria		
Trace metals		
Dry Matter (unit weight in versus unit weight out)		
Volume (unit volume in versus unit volume out)		
Others (Specify)		

11. If the technology is proposed for odour control indicate the anticipated concentration of odour causing compounds before and after treatment.

Odour Characteristics (Specify types of odourous compounds removed and concentration)	Concentration Before Treatment	Concentration After Treatment

12. If the technology is proposed for reducing green house gas emissions indicate the anticipated emissions before and after treatment.

Greenhouse gas (specify gases)	Emissions Without Treatment (mg/tonne or mg/m ³ of manure)	Emissions With Treatment (mg/tonne or mg/m ³ of manure)

13. List the economic benefits to the farm operator (eg. 25 % reduction in manure

land application costs, 50 % reduction in land base required, elimination of time required to address odour complaints, 25% less manure storage capacity required, 10 % reduction in manure management labour requirements, eliminate costly public opposition to livestock operation expansion, 0.75 tonnes of horticultural potting soil produced per tonne of manure treated etc.)

14. List benefits to society (eg. decrease in anxiety over livestock operations, protection of groundwater resources, reduction in greenhouse gas emissions, viable livestock industry for Ontario, improved farm/neighbor relations, manure being managed by organic resource management experts etc.) _____

15. Indicate the range in daily manure quantities that the technology can be adapted to treat or manage, based on economics and technology limitations:

Minimum daily quantity required (m^3 /day and/or tonnes/day): _____

Maximum daily quantity that can be treated or managed (m^3 /day, tonnes/day) _____

What are the treatment capacity sizing increments for the technology (eg. increments of $1,000 m^3$, increments of 100 tonnes etc)? _____

16. List acceptable manure characteristics for the proposed technology.

a) Acceptable % moisture range (for solid manure): _____

b) Acceptable % solids range (for liquid manure): _____

c) Acceptable C: N ratio (solid manure): _____

d) Acceptable C: N ratio (Liquid manure): _____

e) Will technology treat manure of any age? Yes No

17. If answer to e) above was no state acceptable storage period prior to treatment (months)_____.

18. Indicate acceptable range of N:P:K ratios in the manure for the technology.

Minimum acceptable N:P:K ratio _____

Maximum acceptable N:P:K ratio _____

19. Can trace minerals, metals, medications or antibiotic concentrations negatively impact the technology?

Yes No Undetermined

20. If the answer to 16. above is yes please indicate the maximum concentration acceptable or minimum concentration required in the manure being treated (eg. Copper < 1 mg/kg of manure dry solids or antibiotics < 0.5 mg/kg of dry manure solids).

21. If the answer to 16 above was undetermined list any suspected concentration limitations associated with the technology. _____

22. For manure treatment processes please provide a 1 page schematic showing the process steps, any process inputs including energy, chemicals, nutrients, organic raw materials etc. and process outputs including solids, liquids and discharges to the air (gaseous and particulate).

23. For advanced land application technologies and advanced livestock housing technologies that reduce manure volume and/or odours, please provide diagrams that illustrate the features of the technology.

24. Provide a brief description of the proposed technology. _____

26. List the costs for all process inputs on the basis of manure treated (eg. \$0.24 for electricity per m³ of manure treated, \$0.55 for chlorine per m³ of manure treated, \$1.05 for sawdust per tonne of manure treated, \$.05 for lubricating oils per tonne of manure treated)

Process Input	Cost for Input \$/unit qty. of manure treated

27. List the daily operating functions including equipment maintenance required to operate the proposed manure management system and the daily time commitment required for each function.

Description of Operational Function Requiring Human Attention	Daily Time Commitment (hours)

28. List the process operating parameters that require control (eg. moisture, dissolved oxygen concentration, temperature, C:N ratio etc.) and the target operating range (eg. 35-37 deg. C, 55-65 % moisture).

Operating Parameter Controlled	Target Control Range

Operating Parameter Controlled	Target Control Range

29. List the pieces of equipment that are incorporated into the manure management system, the types of annual maintenance required for each piece of equipment and anticipated cost per maintenance activity.

Name of Equipment	Annual Maintenance Activity	Cost for Maintenance

30. List the System models available along with treatment or handling capacity, capital costs and estimated annual operating costs.

Model Number	Treatment Capacity (tonnes/day or m ³ /day)	Capital Cost	Annual Operating Cost

31. What special skills are required by the personnel responsible for operating the manure management system? _____

32. Provide a summary of annual operating costs and revenues.

Operating Parameter	Annual Quantity of Parameter Used or Generated	Annual Costs and Revenues
What manure treatment capacity are operating costs based on?		
Energy (List type)		
Operating labour (Indicate hours required annually)		
Maintenance and repair (Include labour costs)		
Chemical inputs (provide type and quantity)		
Organic inputs (provide type and quantity)		
Revenues (provide source and annual quantity of item generating revenue)		

33. Indicate end markets available for any revenue generating resources that result from the technology.

End Markets	Estimated Marketable Quantity/Unit of Manure	Unit Value of Resource (\$/tonne or \$/m ³)

34. Additional system information is welcome but must be submitted under separate cover and appended to the Technology Review Form.