**Selection Guidance for Manure Management Technologies**

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**INTRODUCTION**

Manure is an inevitable by-product of livestock production. Traditionally, manure has been land applied for the nutrient value in crop production and improved soil quality. With livestock operations growing larger and, in many cases, concentrating in certain areas of the country, it is becoming more difficult to balance manure applications to plant uptake needs. In many places, this imbalance has led to over application of nutrients with increased potential for surface water, ground water and air quality impairments.

The purpose of this poster is to provide an overview of several manure management technologies, outlining strengths and limitations for each process.

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**TECHNOLOGY SELECTION PROCESS**

Several variables need to be evaluated before a decision is made on the selection of manure management technologies. Some of the major items of consideration include:

- Landowner Goals and Objectives
- Resource Concerns
- Regulatory Requirements
- Operational Size and Type
- Available/Required Application Area
- Marketable Product
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**TECHNOLOGY PROCESSES**

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**WHAT CAN BE DONE?**

- Encourage landowners to install conservation practices to avoid water and air quality issues.
- Encourage the use of innovative technologies that will reduce excess manure volume and nutrients and provide value added products.
- Encourage the use of cover crops and rotational cropping systems to uptake nutrients at a rate more closely related to those applied to annualized animal manures.
- Encourage the use of local manure to provide nutrients for locally grown crops, and, where possible, discourage the importation of externally produced feed products.
- Where excess manure can no longer be locally land applied, encourage options that make the transport of nutrients to regions where needed feasible.
- Ensure that landowners understand the benefits and limitations of the various manure management technologies.

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**CONCLUSIONS**

- There are several options for addressing manure distribution and application management issues.
- Each livestock operation will need to be evaluated separately, because there is no single alternative which will address all manure management issues.
- Option selections are dependent on a number of factors such as: objectives, land availability, nutrient costs, and available markets.
- Several alternatives may need to be combined to meet the desired outcome.
- Water and air quality concerns also need to be addressed when dealing with manure management issues.
- Most options require significant financial investment.

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Any products shown are for illustration purposes and do not indicate endorsement of that product.
Nutrients are retained through the biological treatment processes.

A portion of the N & P is converted into other forms.

Enhancement of separation of suspended and dissolved solids.

Large number of chemicals and polymers are available.

Testing needed to reduce nitrogen and phosphorus levels in solutions.

Phytase to broiler diets has decreased manure phosphorus levels by 20 percent or more.

Current Perdue AgriRecycle plant technology that minimized environmental degradation or help to improve a degraded condition. Practices are available for the land treatment area and for the animal production area.

Agronomic Practices Associated with the Land Application of Manure

Appropriate application of manure to agricultural land to grow crops

Potential air emissions (N2)

B) Bio-oil may not be transportable energy source or as a fertilizer source

C) Syngas used for energy production (biogas, fuel, electricity)

D) The effects of greenhouse gases and inorganic pollutants on land and water.

E) Animal manure and other biomass under anaerobic digestion (wet or liquid manure systems)

F) Manure brokers are very competitive for land application.

G) Reducing nutrient losses from piggery wastewater systems.

H) Small animals produce more manure.

I) Valuable reactants are required with surface water.

J) Pathogens can be reduced if applied or properly managed.

K) Nutrient losses by non-point sources.

L) Cannot be applied to most saturated fields.

Contact astral combines with surface water.

Nutrient Management planning tools are available to help producers apply nutrients in accordance with EPA and USDA requirements (e.g., NRC-930 grain management plan).

A number of commercial and experimental tools are available to provide guidance for installation of science-based technologies that minimize environmental degradation or help to improve a degraded condition. Practices are available for the land treatment area and for the animal production area.

A) Many States subsidize the intra-state transfer of manure to off-site farms or facilities.

B) Many individual farm operations enter into contracts for transfer of manure to off-site farms or facilities.

C) Manure brokering is very competitive for land application.

D) Multiple waste streams can provide feed, fuel, and fertilizer.

E) Pathogens destroyed.

F) The health of animal manure can be improved by anaerobic digestion.

G) Enhanced separation of suspended and dissolved solids.

H) Improved partitioning of nutrients, especially phosphorus.

I) Nutrients are reduced through the biological treatment processes.

J) No reduction of ammonia emissions.

K) Enhanced partitioning of nutrients, especially phosphorus.

L) Nutrients are reduced through the biological treatment processes.

M) Separated solids are lighter and more transportable.

N) Reduces odors.

O) Reduces the effects of greenhouse gases and inorganic pollutants on land and water.

P) Reduced manure volume.

Q) Feed additives that increase the nutrient content of the manure.

R) Reduced methane and NOx production.

S) Pathogens destroyed.

T) Reduces the effects of greenhouse gases and inorganic pollutants on land and water.

U) Nitrogen loss through air emissions.

V) Syngas used for energy production (biogas, fuel, electricity)

W) Small animals produce more manure.

X) Valuable reactants are required with surface water.

Y) Pathogens can be reduced if applied or properly managed.

Z) Nutrient losses by non-point sources.

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