Combined Strategies for On Farm Nutrient, Pathogen, and Run off Reduction in High Value Watersheds

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INTEGRTIY Ag Systems

Chambersburg, PA

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Introduction to Integrity Ag

- **Engineering, Manufacturing, Construction**
- **Specializing in:**
  - Manure Treatment
  - Food Processing Industry
  - Alternative Use Products

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Considerations in High Value Watersheds

- Pathogens
- Air Emissions
- Odor
- Run off

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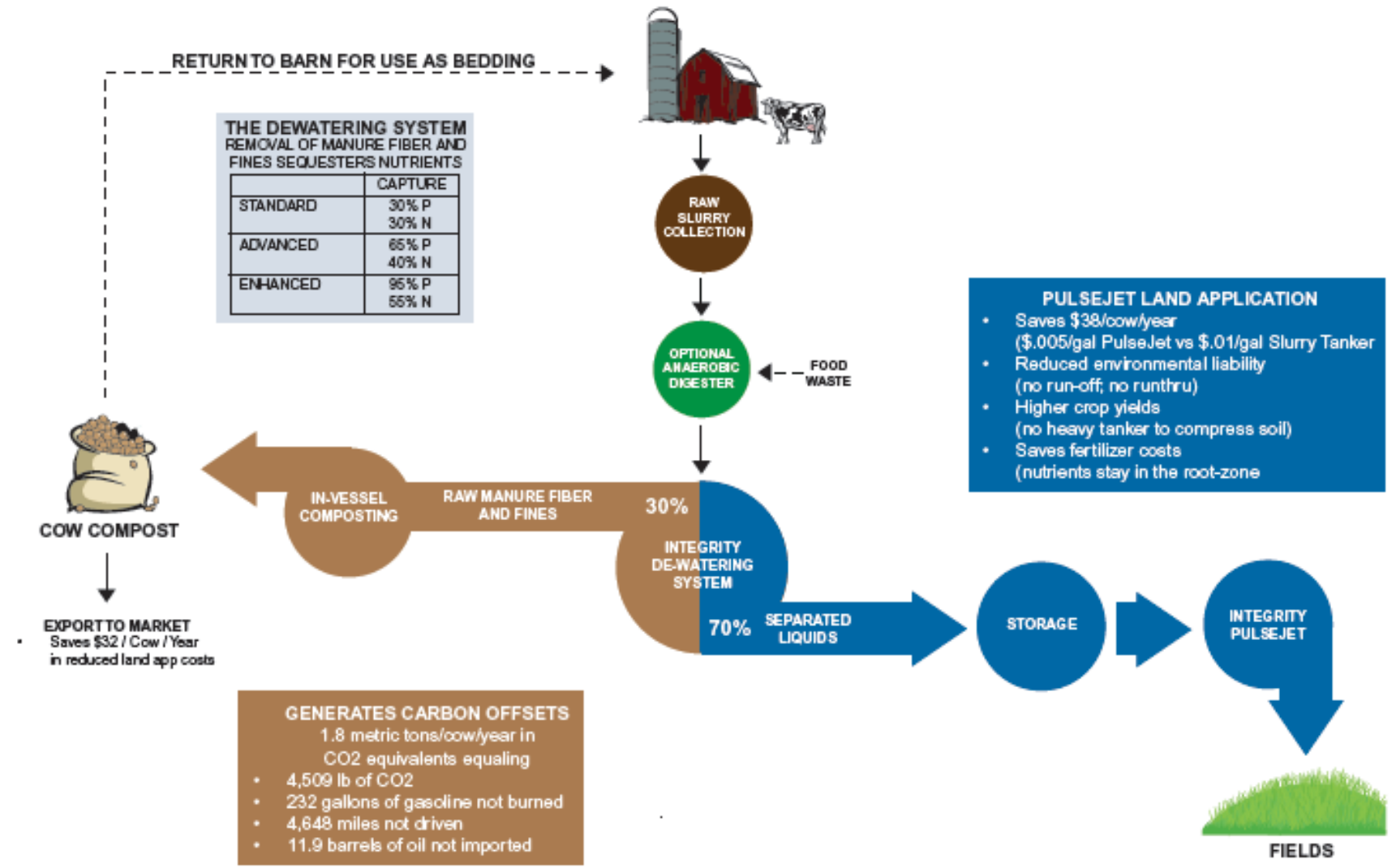
INTEGRITY NUTRIENT CONTROL SYSTEM FOR DAIRY OPERATIONS



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Anaerobic Digestion/ Aerobic Systems

- Containment and Optimization Substrate
- Gas Collection
- Gas Conversion
- Electricity Generation
- Heat Production

- Positive Dissolved Oxygen
  - Mechanical
  - Chemical

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Benefits – Swap Anaerobic for Aerobic

- Change the D.O. of the Depleted Environment to + D.O.
- Inhibit the formation and abundance of methanogens
- Inhibit formation of H_2S (Hydrogen Sulfide = rotten egg odor)
  - H_2S results from the bacterial break down of organic matter in the absence of oxygen, such as in swamps and sewers (anaerobic digestion).

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Pre-Treatment

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Centrifuge Operation

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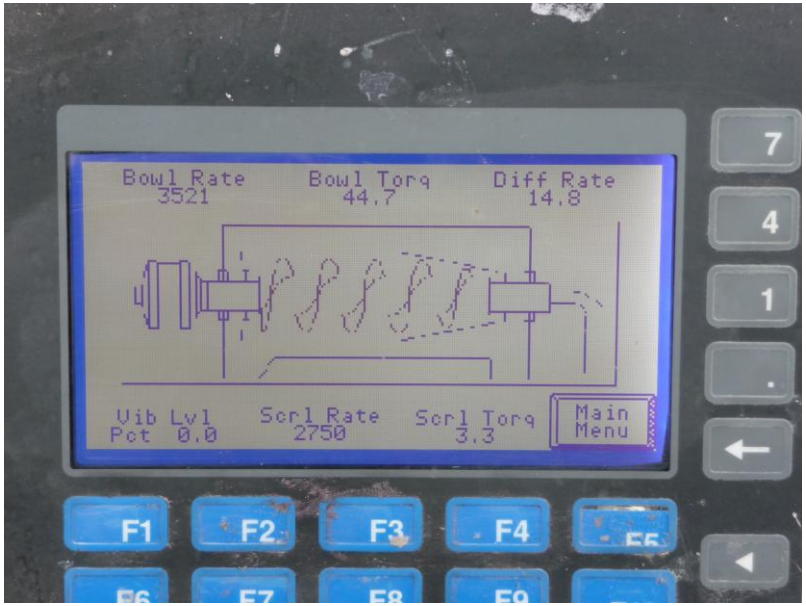
Centrifuge Operation (Con't)



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Performance Results – Centrifuge

- Total N Removal – 30 to 70%
- Total P Removal – 50 to 95%
- Can run with or without polymer
- Flow rate impacts performance
- Dry cake with sand bedding or organic bedding
- Pre-treatment prior to centrifuge is very important

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Composting Operations

EPA PFRPs

-Row
-Aerated Static Pile
-Drum
-Lime

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Run off Control

- Nutrients to solids
- The element of time must be given more consideration with liquid land application
- Storages must become better managed
- Removing solids from slurries changes liquid land application techniques

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Our Experience in the Field

- The technologies required to better protect our environment and our watersheds exist
- The technologies are reliable and proven
- On-farm management styles are critical for success and may be the largest obstacle
- Energy production is not nutrient management
- Polymers can be a challenge and should be used to augment the process, the process should not be fully dependent upon it
- Enforcement or economic incentive is critical

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Areas of Opportunity

- Public / Private Partnerships
- Private equity dollars
- Carbon credits as a method to pay for technologies
- Nutrient credits
- Value added revenues are key
- **The technologies exist – We must as a group figure out how to drive the implementation**

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Carbon from Cows

NOTES AND ASSUMPTIONS

- A single dairy cow generates approximately 30 gallons of manure waste/day.
- A single dairy cow produces approximately 1.2 cubic yards of separated manure fiber/month.
- Most manure is delivered to fields via a slurry tanker.
- Tanking manure costs between $.01 and $.02 per gallon.
- 1,000 dairy cows produce the waste equivalent of a town of 20,000 people.
- The separation of manure fibers and fines is how nutrients are sequestered.
- Separation of manure generates Carbon Offsets (Credits).
- Carbon Offsets can be monetized on the voluntary market.
- A 500 cow dairy with a basic separation system generates 9000 Metric Tons of Carbon Offsets over 10 years. This is equivalent to removing 19,845,000 lbs of carbon from the atmosphere, or the same as NOT BURNING 1,022,938 GALLONS OF GASOLINE, OR NOT IMPORTING 52,458 BARRELS OF OIL. Enhanced and Advanced separation systems generate more carbon offsets.

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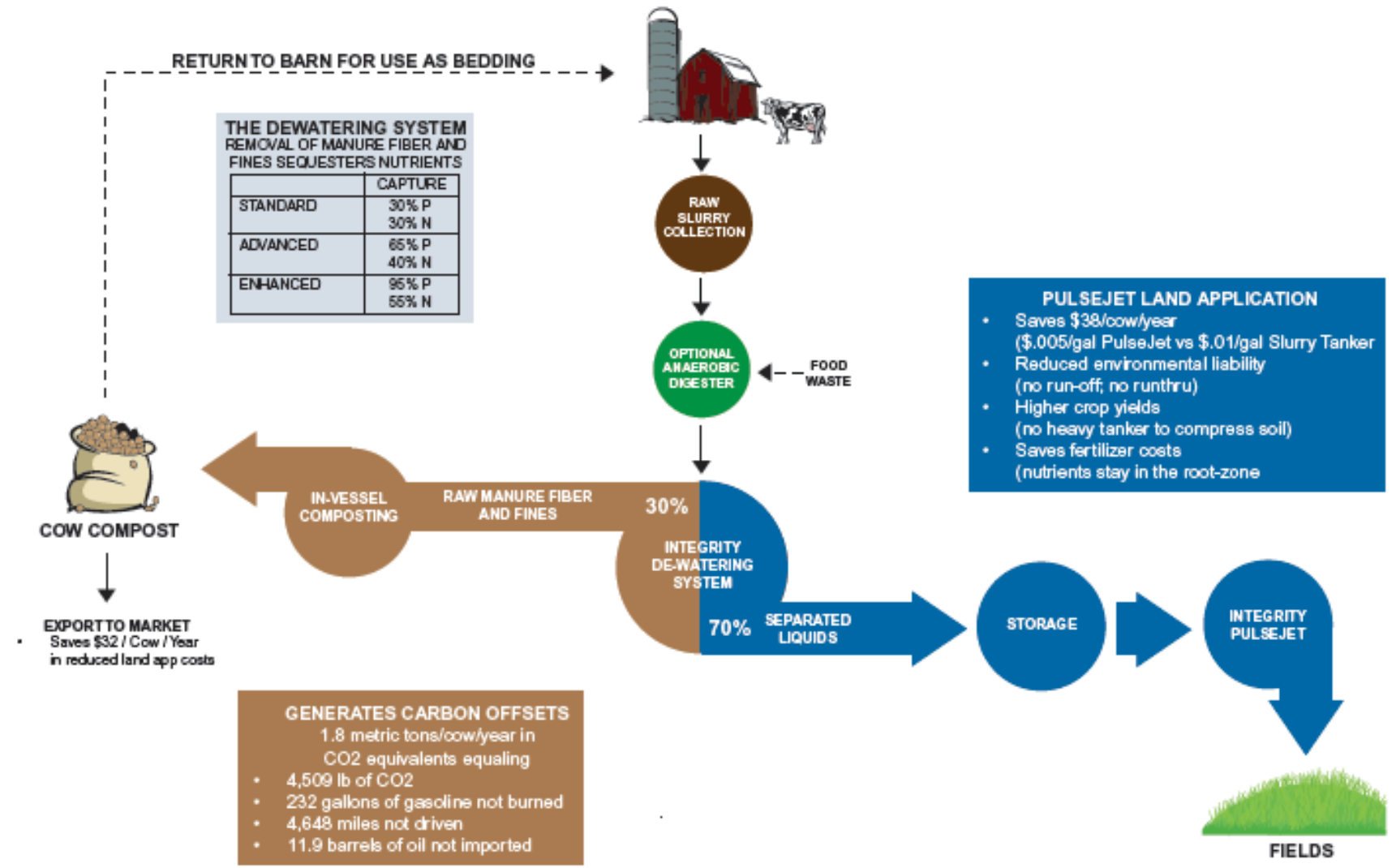

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Thank you

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