PRI BIO

Tissue Digester Systems

Highest Efficiency, Flexibility & Efficacy for Infectious Tissue Treatment - Including Prions

The Best Solution for Carcass Sterilization

Carcass sterilization is an important biosafety requirement for facilities using animals in the research of infectious diseases. Once infectious waste tissue is developed, how will it leave the facility in a sterile manner that protects the environment, the general public, and the research personnel? Digester technology sterilizes infectious waste tissue - including prions - in a manner that is more efficient, reliable, and safer than any others.

1. **Inactivates BSL-4 Select Agents & Prions:** temperature, pressure, agitation and caustic break down and inactivate bacteria, viruses and prions, based on published treatment guidelines.
2. **Easy to Use:** large hatch opening for whole carcass loading; no manual removal of discharge or internal vessel cleaning required.
3. **Flexible Discharge Options:** solves challenges with material handling, offering both liquid discharge to sewer and dry solid discharge for landfill.
4. **Biological Validation by Design:** the implementation of a biowell and electronic monitoring allows routine validation.
5. **Designed for Containment:** offers sterile vent filtration systems, and can be designed with a containment bioseal.
6. **Low Environmental Impact:** utilizes steam and pressure to break down material - there is no smokestack, no carbon emissions, and no applicable EPA air quality regulations.

	Caustic Digester™		Thermal Tissue Digester™	
Facility Applications:	**Small / Medium**	**Large**	**Horizontal**	**Vertical**
Animal Health / Vaccine Facility		✔	✔	✔
Veterinary Medical Research	✔	✔	✔	✔
Prion Research Center	✔	✔	✔	✔
Primate Research Centers	✔		✔	✔
Zoonosis Research Center	✔		✔	✔
Infectious Disease Research Institute	✔		✔	✔
Veterinary Medical Hospital		✔	✔	✔
Veterinary Diagnostic Laboratory		✔		✔
Pharmaceutical Vaccine Validation Facility			✔	✔
Customs / Animal Quarantine			✔	✔
Commercial Livestock Farm				✔

Gen. 2 Caustic Digester Unit™ (CDU)

Alkaline Hydrolysis: The CDU utilizes alkaline hydrolysis, relying on heat and caustic chemicals to break down tissue and proteins, while bone remnants and objects are collected in a basket and disposed of following the sterilization cycle. Sterilized liquid discharged to sewer.

Features:

- Inactivates prions based on published guidelines
- Includes bone remnant collection basket
- Small volume, low pressure configurations

Applications:

- Carcasses with implants, tags, or foreign objects that require collection after processing
- Users who collect the bones for keepsake

Large CDU™

Medium CDU™

Small Atmospheric CDU™

Gen. 3 Thermal Tissue Digester™ (TTD)

Thermal & Physical Degradation w/Alkaline Hydrolysis: The TTD utilizes a patented* process where heat, mechanical agitation, and pressure break down and sterilize tissue, while caustic is used for final protein breakdown. Available in liquid or solid discharge.

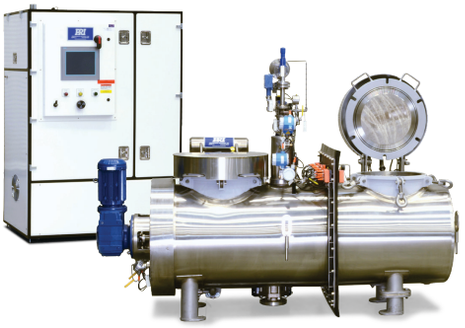
Features:

- High efficiency, regulatory approved biokill process
- Inactivates prions based on published guidelines
- Vertical or horizontal configurations
- Lowest water and caustic consumption

Applications:

- Designed for all users, utilizing less caustic, water and energy than other digesters
- No remnant basket, whole carcass dissolved
- Facilities who need flexible discharge options

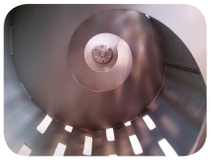
Vertical TTD™



Horizontal TTD™

sample of dry discharge - sterile for landfill

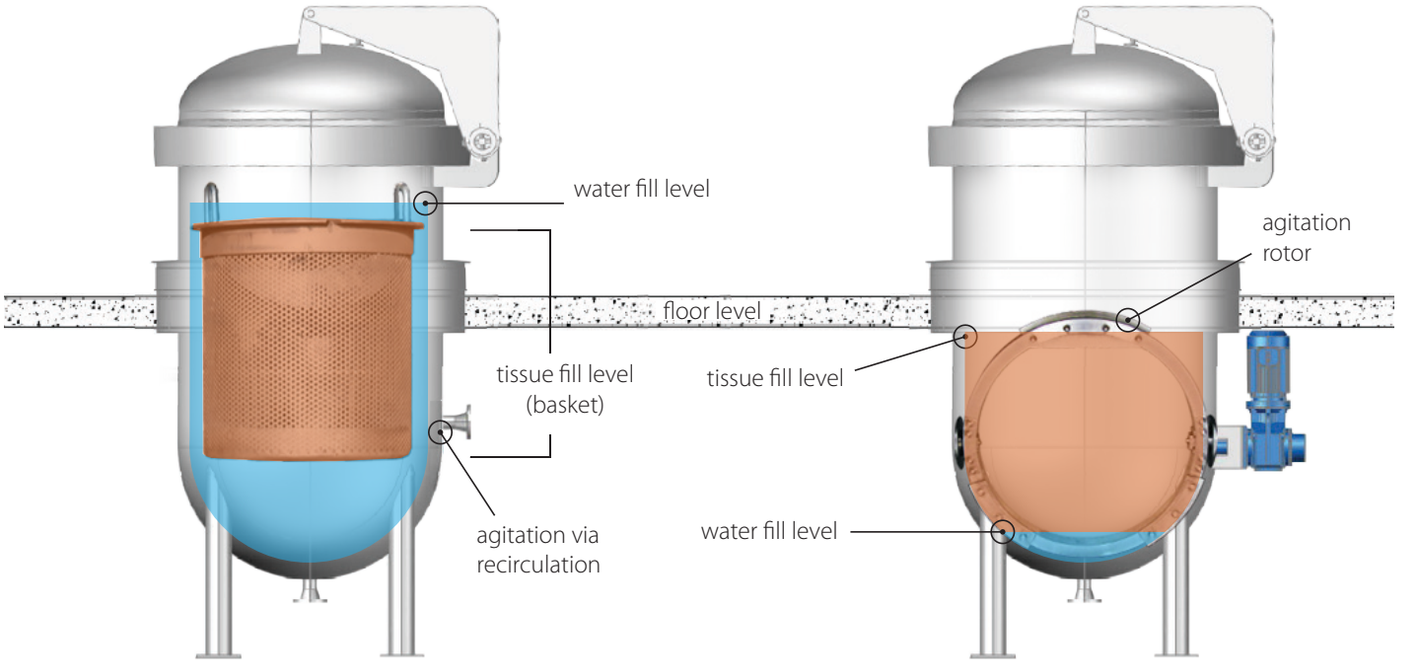
internal agitator (Vertical TTD)



internal agitator (Horizontal TTD)

Compare Digester Technologies

Gen. 2 Caustic Digester™ (CDU) vs. Gen. 3 Thermal Tissue Digester™ (TTD)



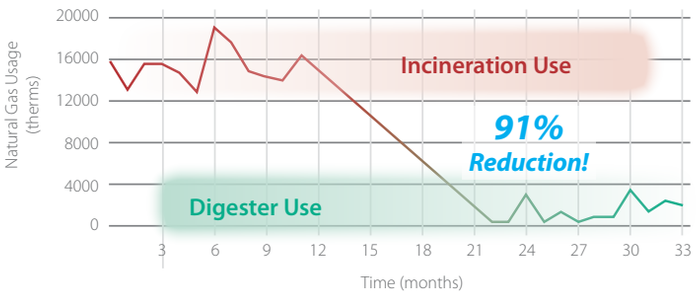
Evaluation of Carcass Treatment Methods:

Digester technology meets all the criteria for treatment systems, including the **efficacy of the process**, the **ease of use, costs**, and **any risks** associated with it.

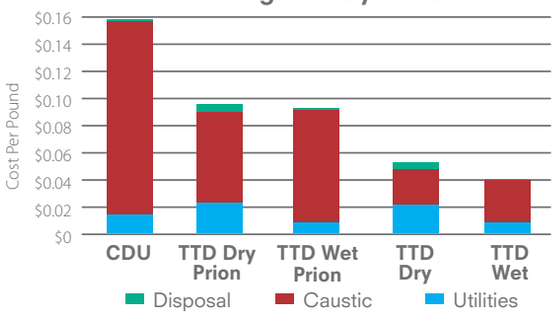
	System Attributes:	Renderer	Incinerator (onsite)	3rd Gen Digester
Biosafety	Operating Temperature	121 - 135 °C	> 800 °C	135 - 150 °C
	Mechanical Agitation	✔	no	✔
	Prion Treatment Compliant	no	✔	✔
	Fully Sealed Treatment Zone	✔	un-treated double door	✔
	Vapors Vented Post-Treatment	venting concerns	✔	✔
Ease of Use	Load Whole Carcasses	no, small hatch opening	✔	✔
	Flexible Discharge Options	no	no	✔
	Automatic Discharge	manual scraping of material	manual handling of ash	✔
Costs/Environment	Equipment Acquisition Cost	$	$$	$$$
	Energy/Resource Usage	low	high gas use	low
	No Carbon Emissions	✔	high	✔
	No EPA Air Quality Regulations	✔	complex	✔
	Summary	Despite the lower acquisition cost, renderers cannot treat prions and are not designed for containment environments. The small hatch openings prevent whole carcass loading, and horizontal discharge requires manual removal of material.	While incinerators can treat prions, they require a double-door design which leaves an un-treated zone potentially exposed outside containment. Couple this with inefficient energy use, high carbon emissions and tight EPA regulations.	The 3rd generation digester system has been designed for containment with bioseal, sterile vent filtration, and mechanical agitation. Approved for prion destruction, the system has large hatch opening and offers both liquid and dry discharge options, with low energy use and zero emissions.

Total Cost of Ownership

Transition from Incineration to PRI Digester
(Natural Gas Usage Over Time)



Operating Cost Comparison of PRI Digester Systems



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