

# LIQUISTAR™ GT

## TARGETING OILS, GREASE, AND PROTEINS

***A highly-concentrated liquid blend of multiple bacterial spores, specifically selected to function in systems containing food wastes, particularly oils, grease, and proteins.***

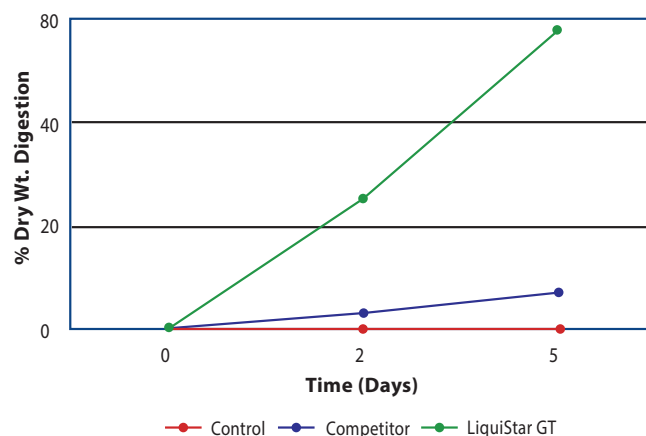
### SUMMARY

Breaking down food waste can be challenging. This bulletin describes the development of LiquiStar GT in terms of the toughest application – grease traps. The synergistic blend of seven bacterial strains in LiquiStar GT was selected for the following complimentary abilities: superior lipase production, the ability to function under low pH, biosurfactant production, organic waste degradation, and odor reduction (specifically volatile fatty acids). This bulletin also describes the methodology and thought process used to develop efficacious products that solve real world problems. By understanding the issues associated with an application and dealing with each issue using a systematic, scientific approach, EBS continues to develop unique biological products that work.

### LOW PH EFFECTIVENESS

One major reason for grease trap failure is the inability of standard grease trap products to function at low pH. By testing grease traps in the field and interviewing our customers and grease trap pumpers, we found the majority of traps to have a pH of 4.5 - 6. With this information, we tested the ability of the bacteria in standard grease trap products to function at a worst-case pH of 4.25. To develop a product that functions in the low pH of a grease trap, bacteria were isolated from low pH environments such as pine forests and cranberry bogs, where nature has already selected strains that function at low pH. The result was the isolation, selection, and development of two *Bacillus* strains that grow, degrade waste, and reduce odors at pH 4.25. These strains are included in LiquiStar GT. As shown in Figure 1, these strains significantly improve the efficacy of LiquiStar GT products over a competitive product.

Figure 1 - Waste Digestion Effectiveness at pH 4.25



### SUPERIOR FAT DIGESTION

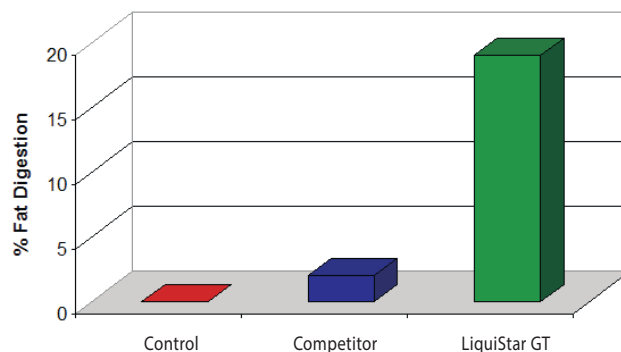
Using a similar bacterial selection system, new bacterial strains capable of digesting high levels of fat, oil, and grease (FOG) were isolated. These superior lipase producers not only degrade short-chain fat molecules commonly degraded by the bacteria in most grease trap products, but also the more difficult to digest long-chain fat molecules that are major contributors to FOG accumulation in the trap. Further testing of these new strains revealed the production of a biosurfactant, which helps to increase the bioavailability of the FOG as a microbial food source. These activities are shown in the pictures below (Figures 2 and 3).



Figures 2 and 3 - Fat degradation capabilities of two LiquiStar GT isolates (left) compared to a commercially available grease trap product.

The isolation of these superior fat-degrading strains prompted a study to investigate the ability of the bacteria in LiquiStar GT to degrade Crisco (vegetable shortening). The study was performed utilizing a minimal medium with Crisco as the carbon source. The study was performed at pH 4.3 to mimic the conditions in a grease trap. A competitor's fully-formulated product (surfactant containing) was included in the study for comparison. The LiquiStar GT treatment did not contain surfactant. As demonstrated in Figure 4, LiquiStar GT showed a significant improvement over the competitor's commercially available grease traps products even without the addition of surfactant.

**Figure 4 - Crisco Digestion - pH 4.3**



## ODOR REDUCTION

Having addressed low pH activity and FOG degradation, the next task was odor reduction. The odors associated with grease traps are often caused by volatile fatty acids (VFAs). As shown in Table 1, the seven-strain blend in LiquiStar GT has the ability to degrade all grease trap associated VFAs that were tested. This includes the difficult to degrade branched VFAs, isobutyric and isovaleric acid.

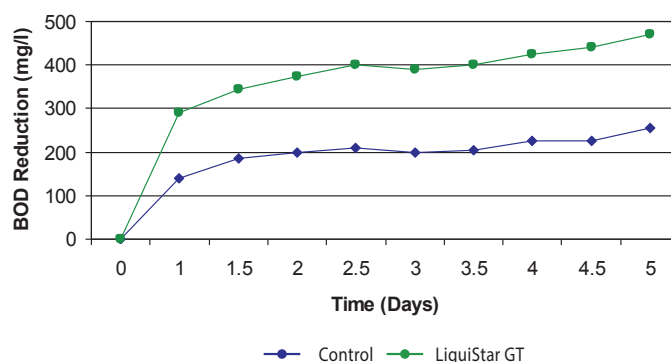
Strain #	Acetic	Propionic	Lactic	Butyric	Isobutyric	Isovaleric
1	+	-	+	-	+	+
2	+	-	+	-	+	+
3	+	+	+	+	-	+
4	+	-	+	+	-	+
5	+	-	+	+	-	-
6	+	-	-	-	-	+
7	+	-	+	+	-	+

Table 1 – VFA Degradation Analysis of 7 Strains in LiquiStar GT

## BOD REDUCTION

The final step in the product development process was to test the ability of LiquiStar GT to reduce biochemical oxygen demand (BOD) in actual grease trap waste. To perform this study, waste was collected from a grease trap and divided into two sub-samples. One sub-sample was treated with LiquiStar GT, and the other sample was left untreated. These two sub-samples were then monitored over a five-day period for changes in BOD. As demonstrated in Figure 5, LiquiStar GT showed a significant reduction in BOD during the five-day study.

**Figure 5 - BOD Reduction in Grease Trap Material**



# LIQUISTAR SPECIFICATIONS

## PRODUCT PROFILE

### *Applications*

- Food processing wastewater
- Municipal or domestic wastewater
- Grease traps

### *Multiple Bacillus Species*

- Naturally occurring, non-engineered
- Aerobes and facultative anaerobes
- Highly motile
- Positive chemotaxis
- 100% stabilized bacterial spores

### *Bacterial Enzyme Production*

Amylase, Protease, Lipase, Esterase,  
Urease, Cellulase, Xylanase

### *Appearance*

Amber liquid

### *Effective pH Range*

4.25 - 10.0

### *Effective Temperature Range*

40°F - 130°F (5°C - 55°C)

### *Shelf Life*

One year at 70°F (21°C)

## STANDARD PACKAGING

Available in 5 gallon pails and 55 gallon drums

## STORAGE AND HANDLING

- Product may separate slightly upon standing. Should be mixed prior to application.
- Store in a cool, dry location.
- Do not freeze.
- Wash thoroughly with water if exposed to skin or eyes.

## RECOMMENDED DOSAGES (RTU)

1 - 2 gallon per day per 100,000 gpd of wastewater

## BACTERIAL CONCENTRATION SPECIFICATION

1.0 – 1.5 billion CFU/ml

**To learn more about LiquiStar™ GT or any of the biological products developed by EBS, contact us at 985-674-0660 or [info@ebsbiowizard.com](mailto:info@ebsbiowizard.com) today.**

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