

Remediation of oil-rich wastewater: managing sewer FOG deposits with the bio-additive products.

Stream

The Industrial Doctorate Centre for the Water Sector

Jawiarczyk N.¹, Bajón Fernández Y.^{1, 2}, Villa R.³, Alibardi L.¹, Maher K², Jefferson B.¹

1. Context:

Effective, targeted strategies of FOG (fat, oil and grease) deposits management using bio-additives require identification and understanding of the processes involved in FOG formation.

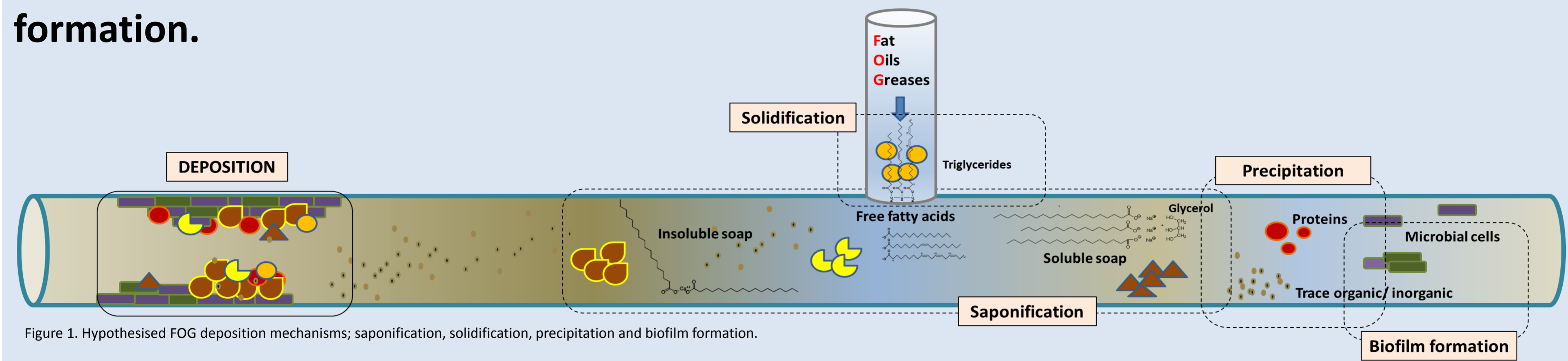


Figure 1. Hypothesised FOG deposition mechanisms; saponification, solidification, precipitation and biofilm formation.

2. Methodology:

Laboratory: Deposition; FOG (real & synthetic) analysis; Bio-additive action: Rehabilitation (deposit degradation), Inhibition (wastewater), Pilot: Bio-additive trials in real conditions, experimental RIG with dosing and control lines.

3. Results:

Deposition mechanisms:

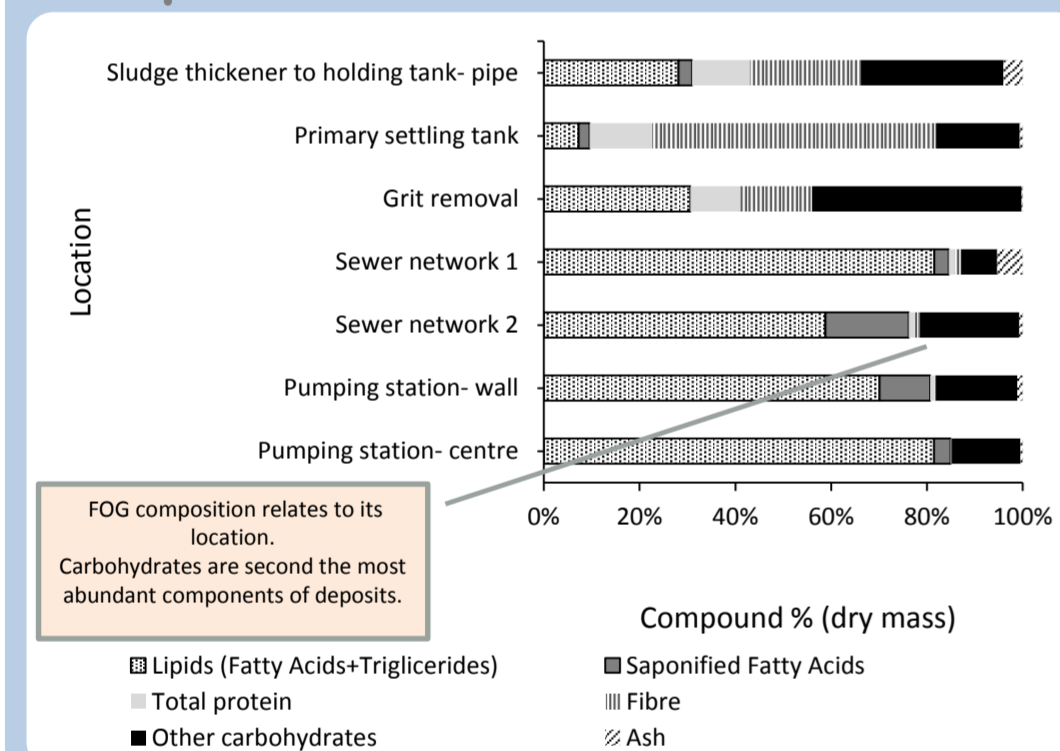


Figure 2. The changes of FOG samples composition through sewer journey.

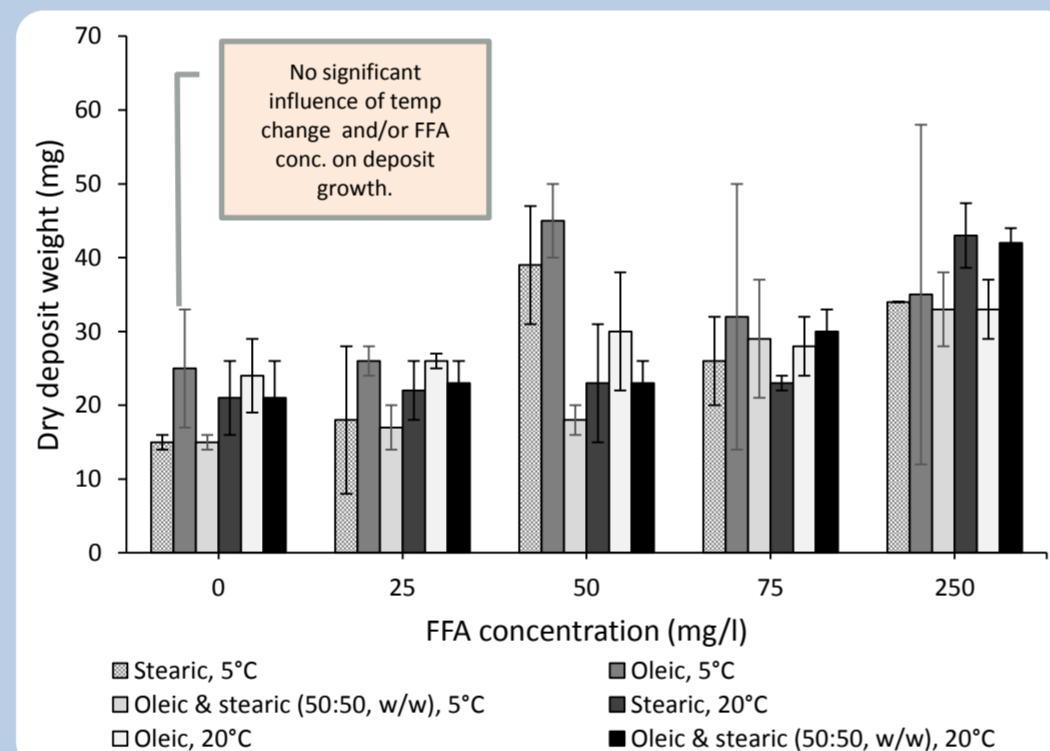


Figure 3. The effect of temperature and type, and concentration of free fatty acid (FFA) on synthetic sewage FOG deposit formation.

Bio-addition trials in synthetic sewage:

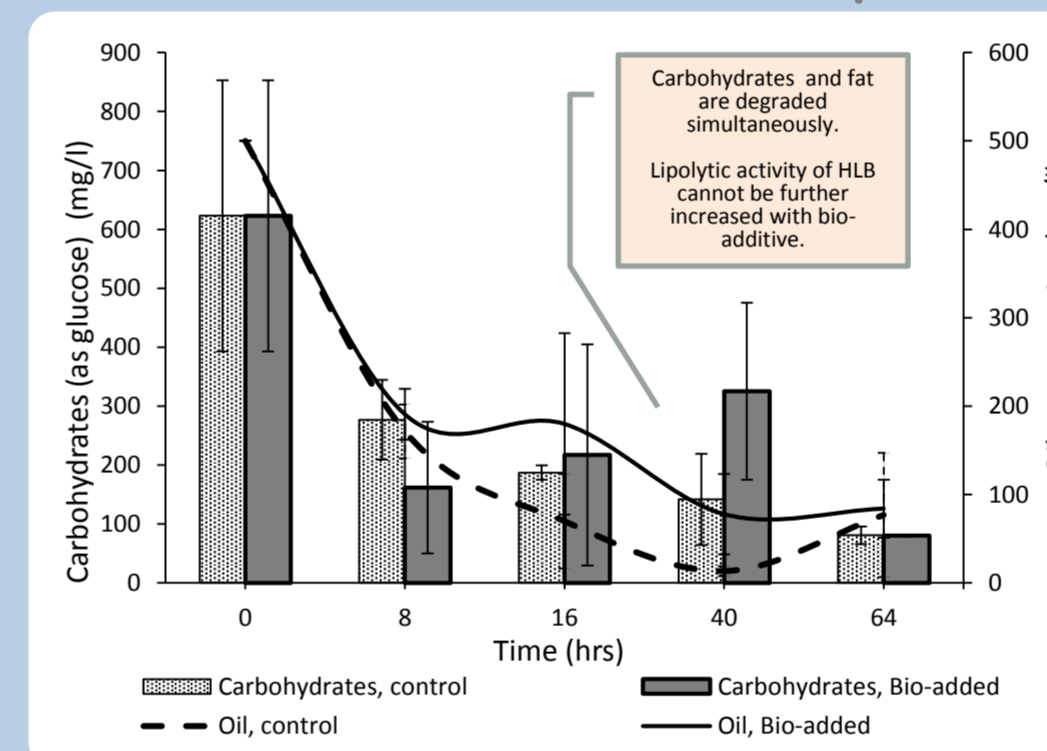


Figure 4. The effect of bio-addition coupled with highly lipolytic bacterium (HLB) consortium on carbohydrates and oil degradation in synthetic sewage. Control: HLB

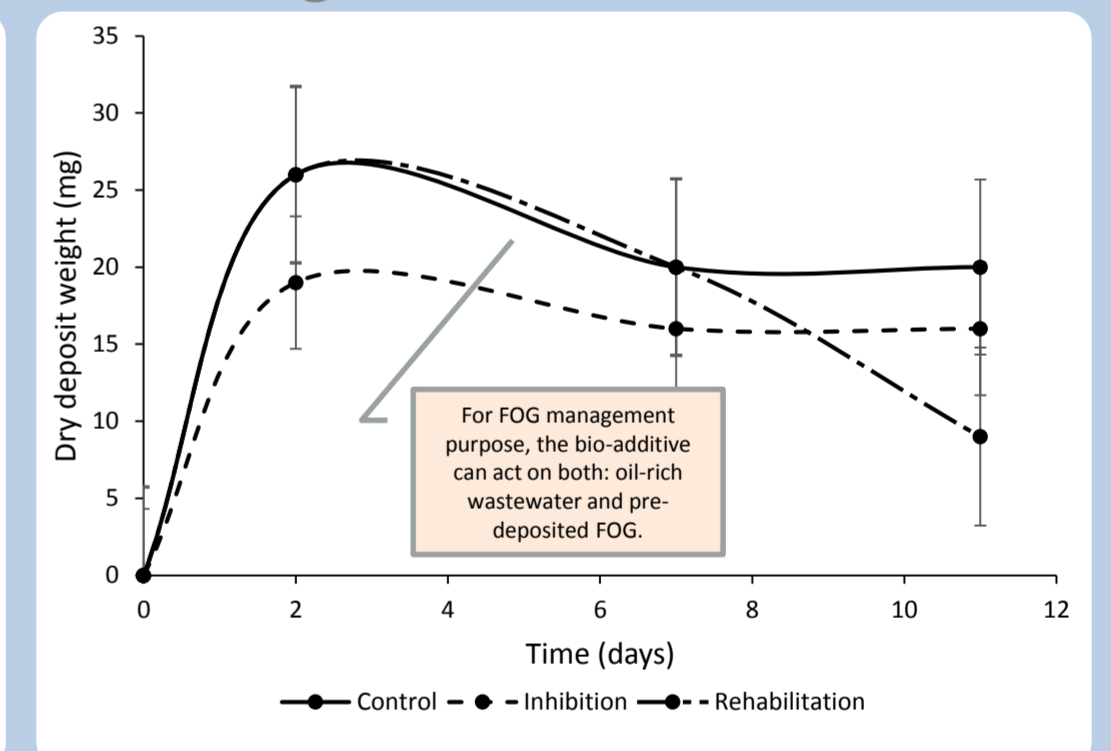


Figure 5. The effect of bio-addition to oil-rich synthetic wastewater (inhibition) and pre-deposited synthetic FOG (rehabilitation).

4. Conclusions:

- Characterization of FOG samples, both real and synthetic, is a good tool to identify deposition mechanism. The compound analysis is crucial to recognize if the problem is fat-related.
- The constituents of wastewater, retention time and location, determine the composition of FOG deposits. Targeting the treatment on wastewater components; rather than fat, could result in higher FOG removal yields.
- Overall efficiency of bio-additive will be influenced by the native microbiota and nutrients levels in treated wastewater.

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For further information: n.jawiarczyk@cranfield.ac.uk

Postal Address: ¹Cranfield University, College Road, Bedford MK43 0AL

²Severn Trent, 2 St. Johns Street, Coventry CV1 2LZ

³De Montfort University, Gateway House, Leicester LE1 9BH

