Influent pathogenic bacteria may go straight into effluent in full scale wastewater treatment plants

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Influent pathogenic bacteria may go straight into effluent in full scale wastewater treatment plants

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Methods

Introduction

Microorganisms from wastewater are usually considered to be adsorbed onto the activated sludge flocs in wastewater treatment plants (WWTPs), consumed by protozoa or to die off. Therefore, the effluent is assumed to comprise primarily of those microorganisms that grow in the plant.

Standard techniques for detecting bacteria, particularly pathogens, in the effluent are based on culture-dependent methods, which may underestimate potential pathogenic bacteria escaping WWTPs in the effluent. Culture-independent DNA sequencing methods may resolve that.

Objective

➢ To determine if microorganisms from the incoming wastewater are being incorporated in the activated sludge community, die off, or whether they stay dispersed in the water phase, and thus are discharged from the WWTPs along with the effluent.

Results

Community composition

The figure shows the relationship between all samples analyzed from 14 WWTPs. Samples are grouping after sampling location (Influent, Process tank and Effluent) with a clear difference between Influent (Green) and Process tank (Blue) composition, and Effluent (Red) community composition appearing in between.

<table>
<thead>
<tr>
<th>Process tank</th>
<th>Influent</th>
<th>Effluent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Influent</td>
<td>10^8 Cells mL^-1</td>
<td>10^7 Cells mL^-1</td>
</tr>
<tr>
<td>Effluent</td>
<td>10^7 Cells mL^-1</td>
<td>10^6 Cells mL^-1</td>
</tr>
</tbody>
</table>

Relative abundance

The 10 most abundant genera are shown at different time points in influent, process tank and effluent of a Danish WWTP. Calculation of net growth rates and mass balances for all OTUs confirmed that Arcobacter did not grow in the plants. This indicates that Arcobacter cells found in the effluent originated from the influent wastewater.