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Examining the evidence of impacts from Food Waste Disposers (FWDs) on sewer systems

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Opinions on FWD

Negative


FWDs will cause a bacterial explosion in the sewer system

Our sewer system is too old to withstand the extra material added by the FWDs

Positive


With FWDs the amount of build-ups in sewers will decrease

Convenient way to transport kitchen waste




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FWDs in Sweden



| City | Number of FWD |
|------------------------|---------------|
| Bokenäs | 150 |
| Skogaberg | 120 |
| Gällivare & Gothenburg | Investigated |
| Kalmar | 150 |
| Karlstad | 110 |
| Malmö | 210 |
| Smedjebacken | 660 |
| Staffanstorp | 60 |
| Stockholm | ? |
| Surahammar | 2000 |




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Additional load from the FWD

A literature review concluded the following additions to the sewer network:

- 21 – 49 % for suspended solids
- 22 – 77 % for BOD
- 14 – 77 % for Fat, oil and grease (FOG)


Source: Galil & Shpiner (2001)



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Aim of the study


- To investigate long term impacts of FWD on the sewer systems serving Surahammar and Smedjebacken.
- More specifically to examine impacts of FWD on observed levels of sediments, FOG-deposits and biofilms.
- To also explore the relative importance of e.g. the general status and self cleansing ability of a pipe.



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Method

- All households with FWD were plotted using GIS.
- Upstream sanitary sewer networks serving single family housing areas were selected for CCTV inspection.
- As reference, similar networks without load from FWDs were also inspected.



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Selection of pipes

- Only upstream networks were selected.
- 225mm concrete pipes, installed during the 1970s.
- In total almost 10km of sewer line was inspected.

○ = FWDs in households

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Grading of deposits

- The Swedish standard P93 were used to grade deposits.
- Grade 1-4 depending on how much of the cross section was covered
- The length of a deposit was also ascertained.

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Observed deposits

Number of deposits

Length (% of total pipe length)

Legend: ■ FWD, □ No FWD

More deposits in FWD-pipes, and a larger horizontal distribution. However, very few observed larger deposits.

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Sediment - Distribution

FWD pipes

NoFWD pipes

Length of deposit (m)

Inclination (%)

Legend: Grey – Grade 1, Black – Grade 2, Strips – Grade 3, Checkered – Grade 4

Please note: Slightly less NoFWD pipes were inspected.

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FOG-deposits - Distribution

FWD pipes

NoFWD pipes

Length of deposit (m)

Inclination (%)

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Biofilm development

FWD pipes

NoFWD pipes

Length of deposit (m)

Inclination (%)

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Important factor: Sagging!

The area for all sags on a pipe was added together and divided by the pipe length.

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Statistical test: ANOVA

- The deposit levels were analyzed using ANOVA.
- With a high load of FWD, the deposit levels were demonstrated to increase, in particular sediments ($p < 0.05$)
- Pipes with a gentle incline combined with a large extent of sags were especially vulnerable to deposits ($p < 0.05$).

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FWD and some type of food waste

Egg shells were observed in many locations.

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Hagbacken - Smedjebacken

- Comprised of two multi-family housing areas.
- One with FWDs in all apartments.
- One with none whatsoever.
- Served by two different sewers but with a connection point just downstream.

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Houses in grey = No FWD

Houses with stripes = FWD

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FWD and impacts on sewers

| Type of impact | Indication from this study |
|---|---------------------------------|
| Positive impact (i.e. deposition decreases) | Not supported |
| No impact whatsoever | Depends on the status of a pipe |
| Negative impact (i.e. deposition increases) | Depends on the status of a pipe |

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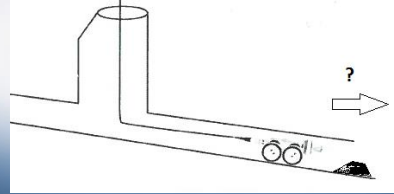
Practical implications

Two options available to address potential impacts from FWDs:

1. A closer examination of sewer systems to ensure self cleansing ability.
2. Public information regarding what is to be placed, and not placed, in an FWD.

Intermittent flow: Deposits stuck?

- Very low wastewater load in the inspected sewers. Are observed deposits later flushed down the network?



Conclusions

- The impact from FWDs on sewers is dictated by the status of individual pipes.
- Generally, the impact would seem to be minor as no large deposits were observed.
- The most evident impact was the documented large distribution of egg shells.
- An inventory of sewers and/or information about which material is not suited for FWDs could be necessary when planning introductions.