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GROUPE TECHNOLOGIES DE SANTÉ

Analyses de l'Air, de l'Eau,
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07 July 2006

VERSTERGAARD FRANSEN

Subject: Efficacy of LifeStraw systems **LF 64**

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Test details :

The tests were performed with tap water (feed water) at a temperature of between 20-25° C.

The conductivity, total hardness and the turbidity of the feed water have been analyzed and are documented on this report.

The bacteria-elimination tests were performed with feed water with approximately 100 000 ufc per 2 liters of each research bacterium (challenge water).

The following bacteria were tested:

- Escherichia coli
- Enterococcus faecalis

The bacterial counts were performed according to these norms:

- NF EN ISO 9308-1 for Escherichia coli
- NF EN ISO 7899-2 for Enterococcus faecalis

The Straw was connected to the feed water source in such a manner that the water flow passed from the side of the water intake site to the suction mouthpiece (the operators were careful not to contaminate the mouthpiece of the straw during the experiment).

The flow/outflow of feed water and challenge water through the straw was fixed at a rate of 150 ml/minute.



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Protocol for 700 Liters

Day 1 (14/06/06)

Pass approximately 10 liters of feed water through the straw (\approx 1 hr)
Stop the water flow for 10 hrs (during the night)
Analyze the feed water

Day 2-3 (15-16/06/06)

Pass 2 liters of challenge water through the straw
Analyze the challenge water and purified water to determine the levels of bacteria present

Pass 100 liters of feed water (\approx 11 hrs)
Stop the water flow for 10 hrs (during the night)

Day 4-5 (17-18/06/06)

Pause the experiment (weekend and preparation of challenge water)

Day 6-10 (19-23/06/06)

Pass 2 liters of challenge water through the straw
Analyze the challenge water and purified water to determine the levels of bacteria present

Pass 100 liters of feed water (\approx 11 hrs)
Stop the water flow for 10 hrs (during the night)

Day 11-12 (24-25/06/06)

Pause the experiment (weekend)

Day 13 (26/06/06)

Pass 2 liters of challenge water through the straw
Analyze the challenge water and purified water to determine the levels of bacteria present



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Preparation of the challenge water

We use strains specified by the Lille Pasteur Institute (www.pasteur-lille.fr)

- *Escherichia coli* collection CIP 106 878
- *Enterococcus faecalis* collection CIP 106 877

Stage 1: Preparation of the contaminate master solutions

Escherichia coli solution:

- 2 specified tablets in 100 ml of Tryptone salt
- Incubation of the solution at $36^{\circ}\text{C} \pm 1^{\circ}\text{C}$ for 24 hrs

Enterococcus faecalis solution:

- 2 specified tablets in 100 ml of Tryptone salt
- Incubation of the solution at $36^{\circ}\text{C} \pm 1^{\circ}\text{C}$ for 48 hrs

Stage 2: Evaluation of the contaminate master solutions

The evaluation of the contaminated master solution was performed according to the following norms:

- NF EN ISO 9308-1 for *Escherichia coli*
- NF EN ISO 7899-2 for *Enterococcus faecalis*

And counted by Malassez's cell.

The master solutions were stocked at $5^{\circ}\text{C} \pm 3^{\circ}\text{C}$ for *Escherichia coli* and *Enterococcus faecalis*.

Stage 3: Preparation of the challenge water (one solution per day)

According to the results obtained, x ml of the master solutions of *Escherichia coli* and *Enterococcus faecalis* were added to 2 liters of feed water.

We thus obtained a solution containing approximately 100 000 ufc/2 liters of each bacterium.



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Feed Water Specifications

Feed water: Sorgues city water (84)

Specified Parameters	Results
Temperature	20°C
Stability	18.5 °F
Conductivity	575 µS/cm ² à 25°C
Turbidity	< 0.1 NFU

Control feed water

Specified Bacteria	Results
<i>Escherichia coli</i>	0 ufc/ml
<i>Enterococcus faecalis</i>	0 ufc/ml

Laboratoire agréé par le
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Product Tested : Lifestraw LF 64

Escherichia coli

Dates	Water Volume (L)	Nb Residual Bacteria (CFU/2L)	Bacterial Elimination (CFU/2L)	% Bacterial Elimination
15/06/2006	12	2000	298000	99,33
16/06/2006	114	0	>300000	100
17/06/2006	pause			
18/06/2006	pause			
19/06/2006	216	0	22200	100
20/06/2006	318	2000	298000	99,33
21/06/2006	420	400	85800	95,54
22/06/2006	522	0	>300000	100
23/06/2006	624	0	22200	100
24/06/2006	pause			
25/06/2006	pause			
26/06/2006	726	0	246000	100

Enterococcus faecalis

Dates	Water Volume (L)	Nb Residual Bacteria (CFU/2L)	Bacterial Elimination (CFU/2L)	% Bacterial Elimination
15/06/2006	12	0	10400	100
16/06/2006	114	0	8000	100
17/06/2006	pause			
18/06/2006	pause			
19/06/2006	216	0	8800	100
20/06/2006	318	0	10000	100
21/06/2006	420	0	6000	100
22/06/2006	522	0	1000	100
23/06/2006	624	2400	20600	89,57
24/06/2006	pause			
25/06/2006	pause			
26/06/2006	726	0	274400	100



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Chart showing stops

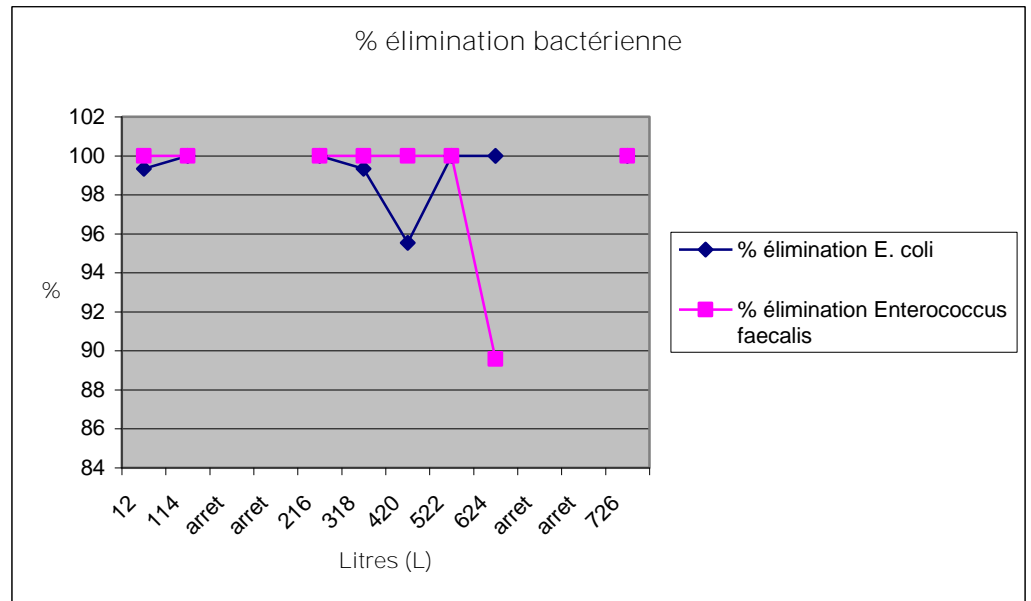
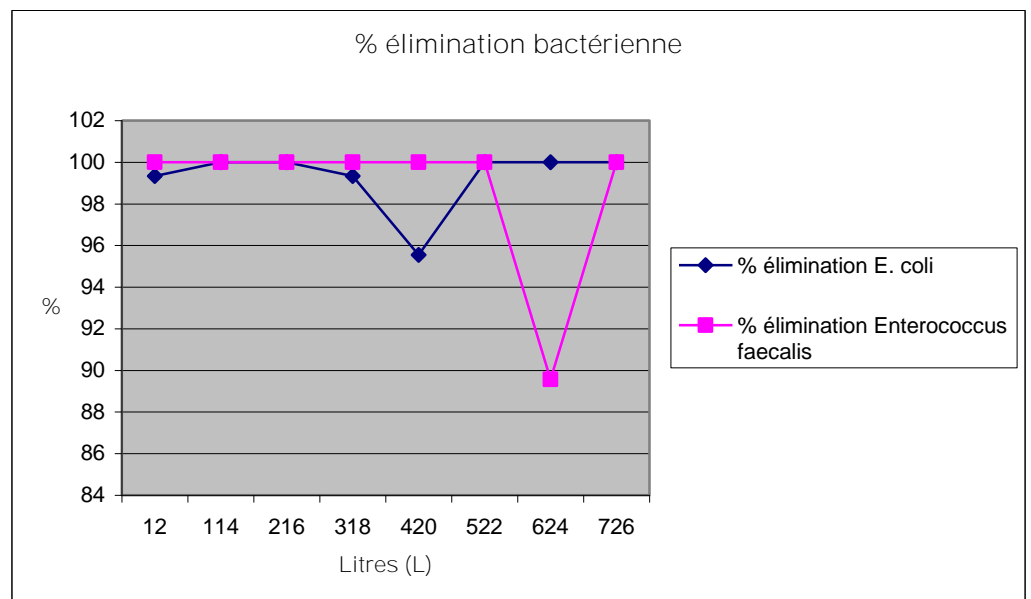


Chart without the stops



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