LIFE ACLIMA

Elke druppel telt

The ACLIMA-project has received funding from the LIFE Programme of the European Union. under contract number LIFE 20 CCA_BE_001720

PROEFBEDRIJF PLUIMVEEHOUDERIJ

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Waterverbruik stalkoeling



Recuperatie hemelwater

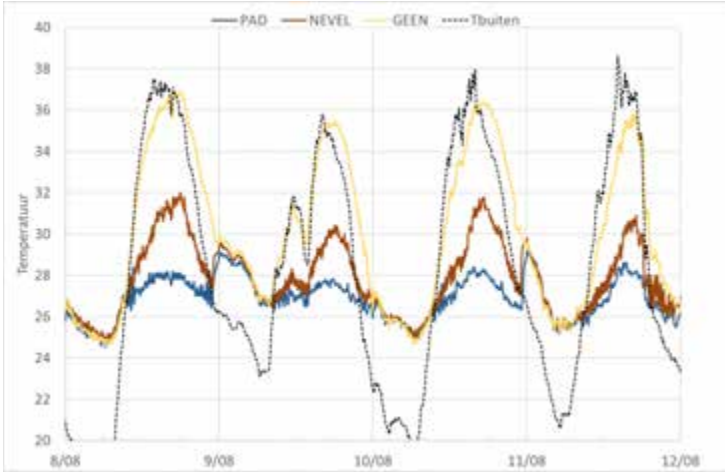


Circulair gebruik spoelwater



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Waterverbruik stalkoeling



Recuperatie hemelwater



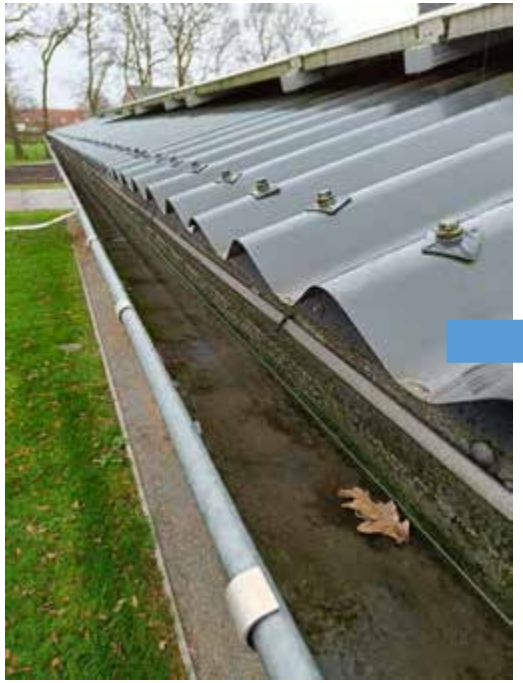


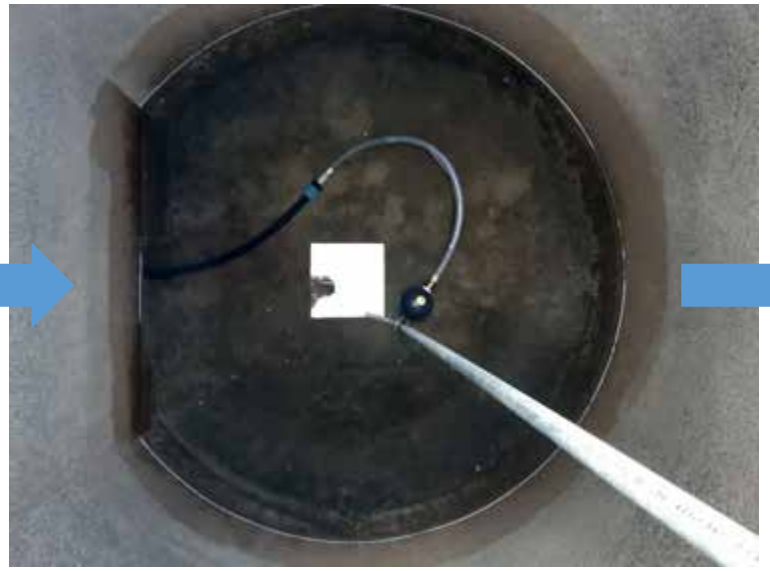
Circulair gebruik spoelwater



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RECUPERATIE HEMELWATER





Nano-ultrafiltratie (NUF)



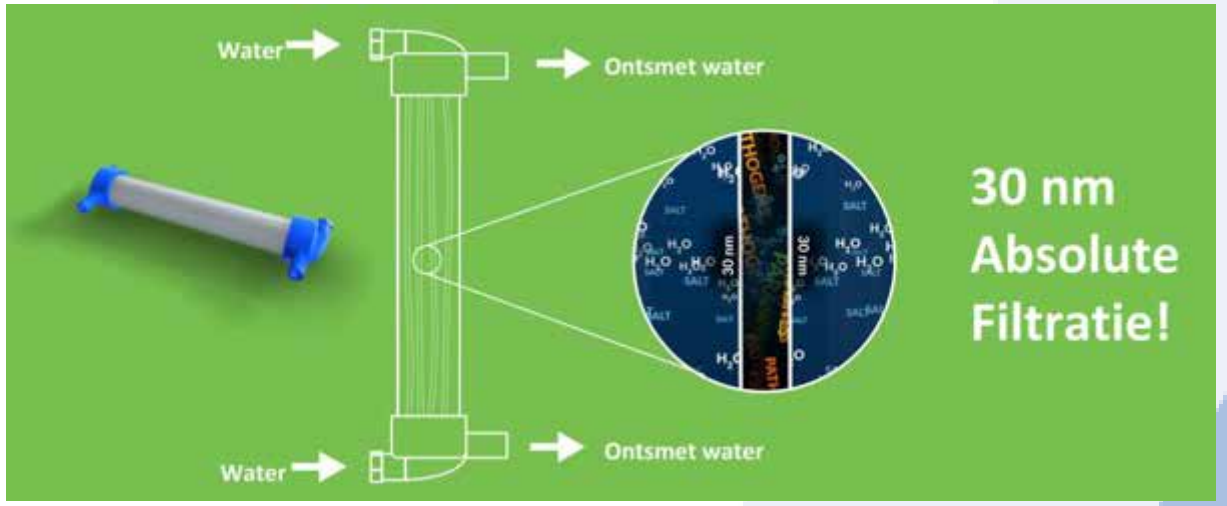


Zuiveringstrein

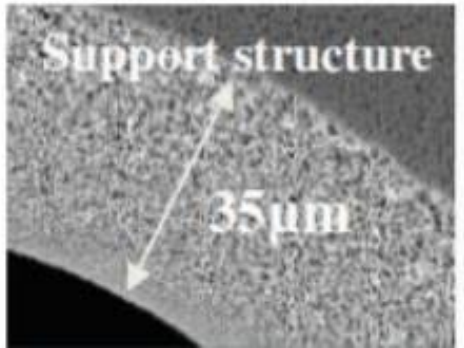
The ACLIMA-project has received funding from the LIFE Programme of the European Union. under contract number LIFE 20 CCA_BE_001720

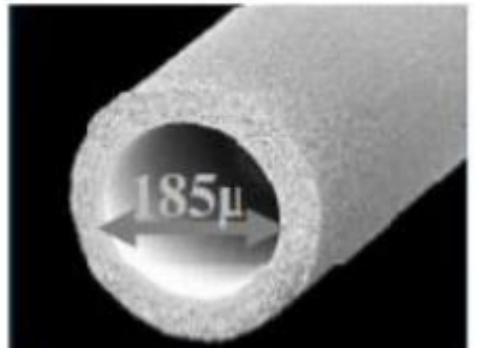
NANO ULTRAFILTRATIE (NUF)





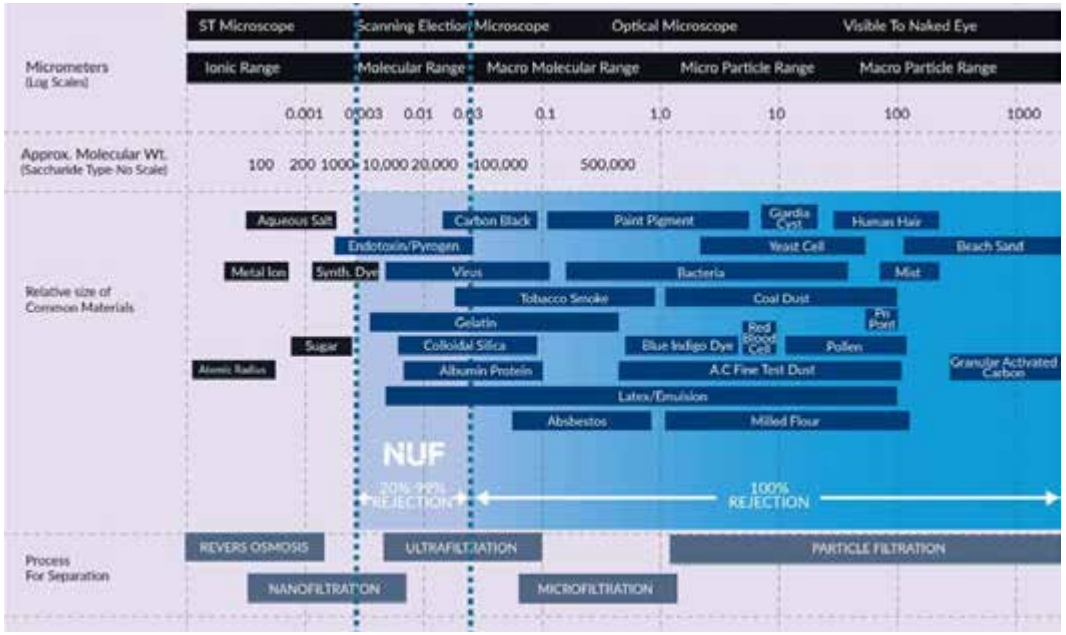






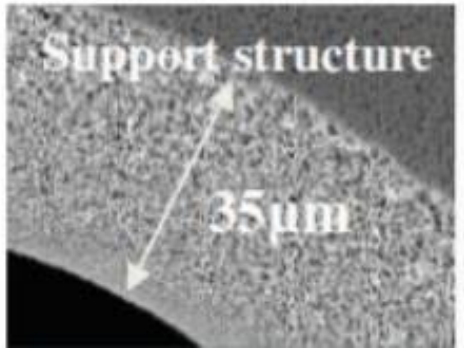
NANO ULTRAFILTRATIE (NUF)

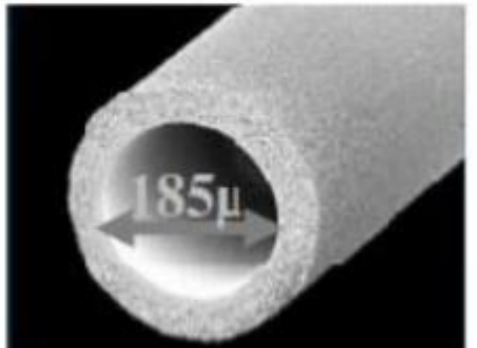
100% van de deeltjes groter dan 30 nm (0,03 micron)



PATHOGEN	TYPE	SIZE (µM)
Poliovirus	Virus	0.03
Bacillus	Bacteria	0.25-1 .0
E. Coli (Escherichia coli)	Bacteria	0.5
Xanthomonas	Bacteria	0.4 – 1.0
Rhizobia (Crazy Roots)	Bacteria	0.5 - 0.9
CMM Clavibacter michiganensis	Bacteria	0.5 - 1.0
Pseudomonas	Bacteria	0.5-1.0
Salmonella	Bacteria	0.7 - 1.5
Fusarium	Fungi	4 – 7
Botrytis	Fungi	5 – 9

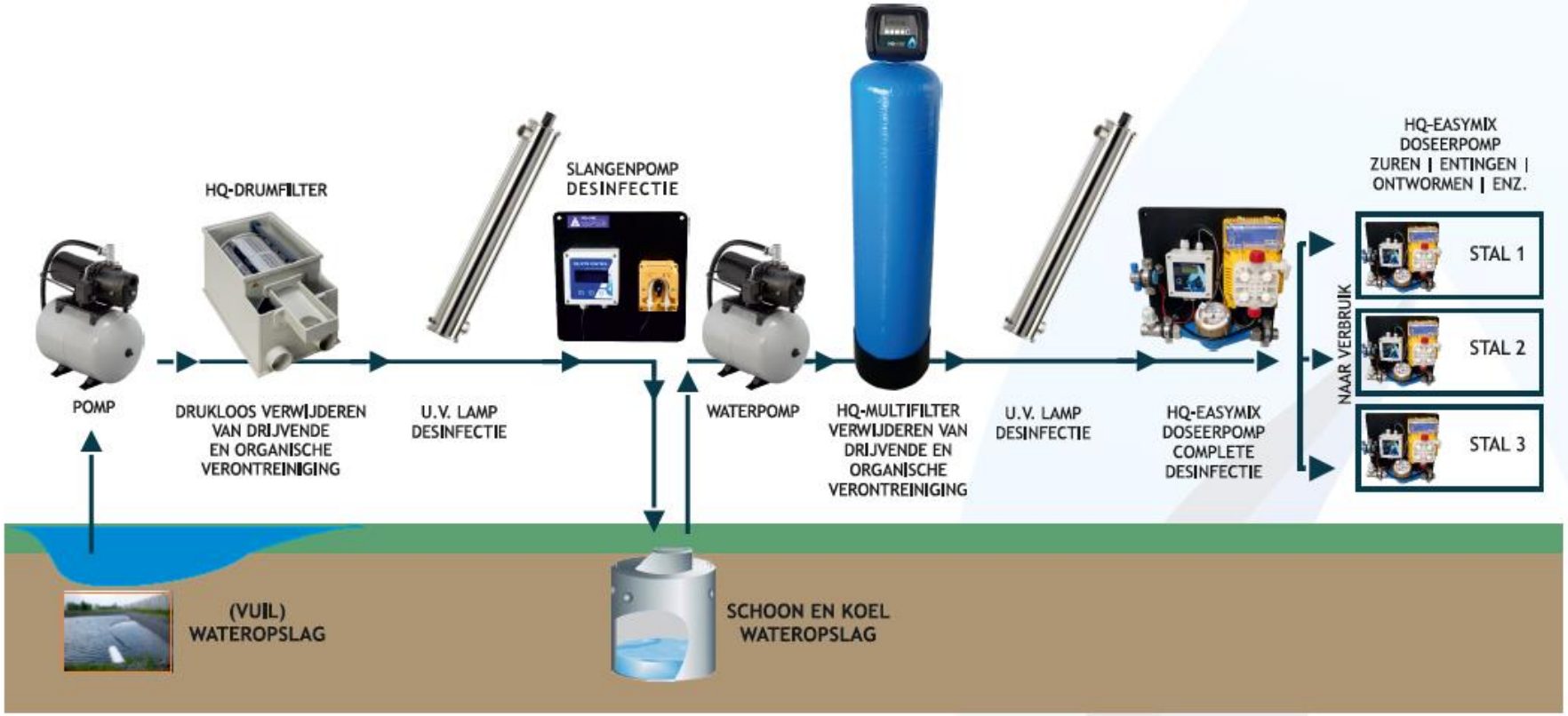






ZUIVERINGSTREIN





Life ACLIMA

Seizoensinvloeden

Max. buitentemperatuur
25/08: 33°C



23°C



26°C

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Analyseresultaten regenwater

Chemische parameters	Regenwater	Behandeld regenwater	Regenwater	Behandeld regenwater	Regenwater	Behandeld regenwater	Regenwater	Behandeld regenwater	Regenwater	Behandeld regenwater	Norm
Datum	08/04/2022	08/04/2022	02/06/2022	02/06/2022	08/07/2022	08/07/2022	02/08/2022	02/08/2022	25/08/2022	25/08/2022	
pH	7,5	7,7	5,7	6,5	7,2	6,8	7,1	7,0	6,0	6,4	4 - 9
Mg mg/L	<1,0	1,0	<1,0	<1,0	<1,0	<1,0	<1,0	<1,0	<1,0	<1,0	
Ca mg/L	19,0	21,0	5,0	5,2	4,4	4,4	5,7	5,7	6,0	6,1	
Na mg/L	2,4	3,8	<1,0	<1,0	<1,0	<1,0	<1,0	<1,0	<1,0	<1,0	<200 mg/L
Tot Hardheid	4,7	5,7	5,0	1,3	1,1	1,1	1,4	1,4	1,5	1,5	<20°D
SO4 mg/L	8,9	9,5		1,8	1,4	1,4	1,6	1,6	-	-	<200 mg/L
Nitriet mg/L	<0,020	<0,020		0,18	<0,010	0,02	<0,010	<0,010	-	-	<1,0 mg/L
Ijzer mg/L	0,060	0,210	0,060	0,090	0,026	0,040	0,031	0,280	0,11	0,14	<= 2,5 mg/l

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Analyseresultaten regenwater

Biologische parameters	Regenwater	Behandeld regenwater	Regenwater	Behandeld regenwater	Regenwater	Behandeld regenwater	Norm
Datum	08/04/2022	08/04/2022	02/06/2022	02/06/2022	08/07/2022	08/07/2022	
Tot. Kiemgetal 22°C per ml	3.100	17.000	7.400	2.100	6.600	59.000	<= 100.000 kve/ml
Tot. Kiemgetal 36°C per ml	2.500	15.000	390	15.000	6.700	15.000	<= 100.000 kve/ml
Coliformen per 100ml	720	9	150	<1	240	<1	
E. Coli per 100 ml	690	3	3	<1	13	<1	<= 1000 kve/100ml
Enterococcen per 100 ml	88	<1	88	<1	24	<1	<= 1 kve/100ml
Schimmels per ml	20	10	60	50	80	50	<= 10.000 kve/ml
Gisten per ml	90	<10	<10	<10	60	<10	<= 10.000 kve/ml
Sulfietreducerende anaeroben per 100 ml	<1	<1	20	<1	<1	<1	
Clostridium perfringens	<1	<1	<1	<1	<1	<1	
Salmonella	NA	NA	NA	NA	NA	NA	NA

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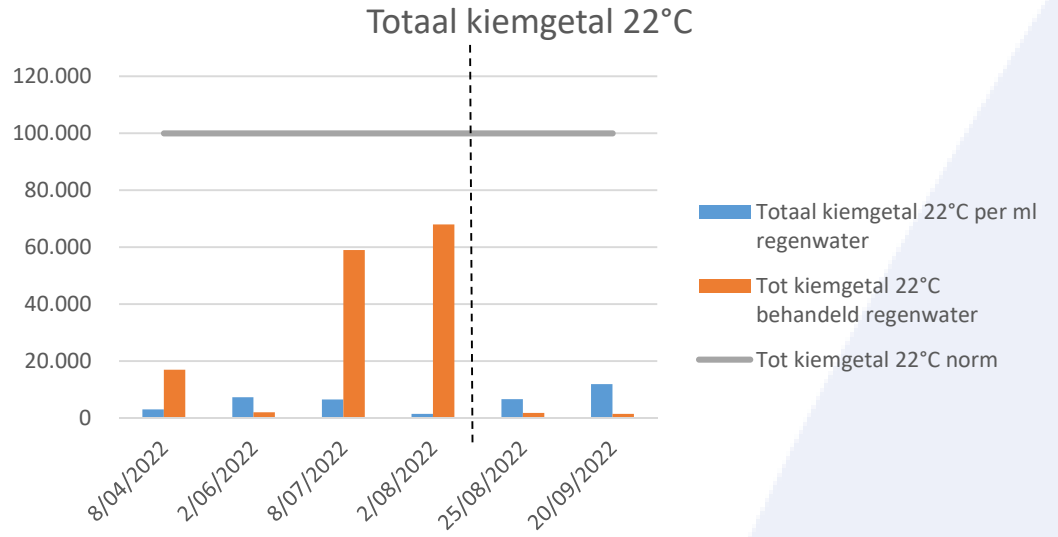
Analyseresultaten regenwater

Biologische parameters	Regenwater	Behandeld regenwater	Regenwater	Behandeld regenwater	Regenwater	Behandeld regenwater	Norm
Datum	02/08/2022	02/08/2022	25/08/2022	25/08/2022	20/09/2022	20/09/2022	
Tot. Kiemgetal 22°C per ml	1.500	68.000	6.700	1900	12.000	1.500	<= 100.000 kve/ml
Tot. Kiemgetal 36°C per ml	65	16.000	3.400	<1	6.500	630	<= 100.000 kve/ml
Coliformen per 100ml	4	7	450	<1	230	<1	
E. Coli per 100 ml	4	7	380	<1	3	<1	<= 1000 kve/100ml
Enterococcen per 100 ml	21	1	160	<1	300	<1	<= 1 kve/100ml
Schimmels per ml	20	100	10	<10	40	<10	<= 10.000 kve/ml
Gisten per ml	1.400	200	50	<10	360	<10	<= 10.000 kve/ml
Sulfietreducerende anaeroben per 100 ml	10	<1	230	<1	1.400	<1	
Clostridium perfringens	<1	<1	230	<1	<1	<1	
Salmonella	NA	NA	NA	NA	NA	NA	NA

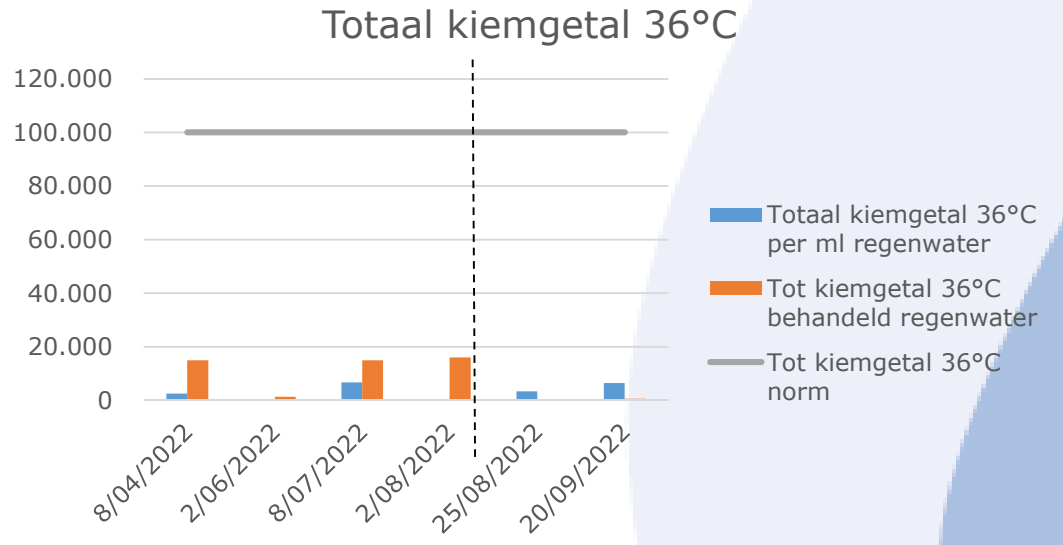
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Analyseresultaten regenwater

Datum	8/04	2/06	8/07	2/08	25/08	20/09
Totaal kiemgetal 22°C per ml regenwater	3.100	7.400	6.600	1.500	6.700	12.000
Tot kiemgetal 22°C behandeld regenwater	17.000	2.100	59.000	68.000	1.900	1.500



Datum	8/04	2/06	8/07	2/08	25/08	20/09
Totaal kiemgetal 36°C per ml regenwater	2.500	390	6.700	65	3.400	6.500
Tot kiemgetal 36°C behandeld regenwater	15.000	1.400	15.000	16.000	<1	630



Analyseresultaten regenwater

Biologische parameters	Regenwater	Behandeld regenwater	Regenwater	Behandeld regenwater	Regenwater	Behandeld regenwater	Norm
Datum	08/04/2022	08/04/2022	02/06/2022	02/06/2022	08/07/2022	08/07/2022	
Tot. Kiemgetal 22°C per ml	3.100	17.000	7.400	2.100	6.600	59.000	<= 100.000 kve/ml
Tot. Kiemgetal 36°C per ml	2.500	15.000	390	15.000	6.700	15.000	<= 100.000 kve/ml
Coliformen per 100ml	720	9	150	<1	240	<1	
E. Coli per 100 ml	690	3	3	<1	13	<1	<= 1000 kve/100ml
Enterococcen per 100 ml	88	<1	88	<1	24	<1	<= 1 kve/100ml
Schimmels per ml	20	10	60	50	80	50	<= 10.000 kve/ml
Gisten per ml	90	<10	<10	<10	60	<10	<= 10.000 kve/ml
Sulfietreducerende anaeroben per 100 ml	<1	<1	20	<1	<1	<1	
Clostridium perfringens	<1	<1	<1	<1	<1	<1	
Salmonella	NA	NA	NA	NA	NA	NA	NA

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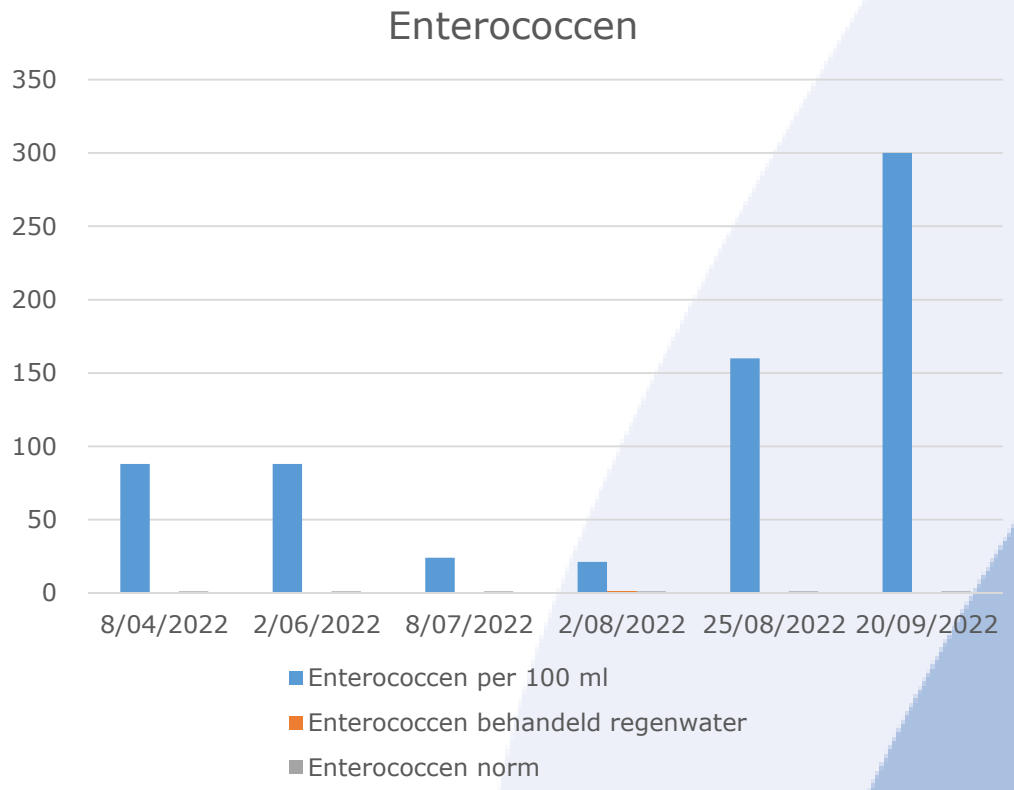
Analyseresultaten regenwater

Biologische parameters	Regenwater	Behandeld regenwater	Regenwater	Behandeld regenwater	Regenwater	Behandeld regenwater	Norm
Datum	02/08/2022	02/08/2022	25/08/2022	25/08/2022	20/09/2022	20/09/2022	
Tot. Kiemgetal 22°C per ml	1.500	68.000	6.700	1.900	12.000	1.500	<= 100.000 kve/ml
Tot. Kiemgetal 36°C per ml	65	16.000	3.400	<1	6.500	630	<= 100.000 kve/ml
Coliformen per 100ml	4	7	450	<1	230	<1	
E. Coli per 100 ml	4	7	380	<1	3	<1	<= 1000 kve/100ml
Enterococcen per 100 ml	21	1	160	<1	300	<1	<= 1 kve/100ml
Schimmels per ml	20	100	10	<10	40	<10	<= 10.000 kve/ml
Gisten per ml	1.400	200	50	<10	360	<10	<= 10.000 kve/ml
Sulfietreducerende anaeroben per 100 ml	10	<1	230	<1	1.400	<1	
Clostridium perfringens	<1	<1	230	<1	<1	<1	
Salmonella	NA	NA	NA	NA	NA	NA	NA

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Analyseresultaten regenwater

Datum	8/04	2/06	8/07	2/08	25/08	20/09
Enterococcen per 100 ml	88	88	24	21	160	300
Enterococcen behandeld regenwater	<1	<1	<1	1	<1	<1
Enterococcen norm	1	1	1	1	1	1



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Analyseresultaten regenwater

Biologische parameters	Regenwater	Behandeld regenwater	Regenwater	Behandeld regenwater	Regenwater	Behandeld regenwater	Norm
Datum	02/08/2022	02/08/2022	25/08/2022	25/08/2022	20/09/2022	20/09/2022	
Tot. Kiemgetal 22°C per ml	1.500	68.000	6.700	1.900	12.000	1.500	<= 100.000 kve/ml
Tot. Kiemgetal 36°C per ml	65	16.000	3.400	<1	6.500	630	<= 100.000 kve/ml
Coliformen per 100ml	4	7	450	<1	230	<1	
E. Coli per 100 ml	4	7	380	<1	3	<1	<= 1000 kve/100ml
Enterococcen per 100 ml	21	1	160	<1	300	<1	<= 1 kve/100ml
Schimmels per ml	20	100	10	<10	40	<10	<= 10.000 kve/ml
Gisten per ml	1.400	200	50	<10	360	<10	<= 10.000 kve/ml
Sulfietreducerende anaeroben per 100 ml	10	<1	230	<1	1.400	<1	
Clostridium perfringens	<1	<1	230	<1	<1	<1	
Salmonella	NA	NA	NA	NA	NA	NA	NA

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Analyseresultaten regenwater

Biologische parameters	Regenwater	Behandeld regenwater	Regenwater	Behandeld regenwater	Regenwater	Behandeld regenwater	Norm
Datum	02/08/2022	02/08/2022	25/08/2022	25/08/2022	20/09/2022	20/09/2022	
Tot. Kiemgetal 22°C per ml	1500	68.000	6700	1900	12000	1500	<= 100.000 kve/ml
Tot. Kiemgetal 36°C per ml	65	16.000	3400	<1	6500	630	<= 100.000 kve/ml
Coliformen per 100ml	4	7	450	<1	230	<1	
E. Coli per 100 ml	4	7	380	<1	3	<1	<= 1000 kve/100ml
Enterococcen per 100 ml	21	1	160	<1	300	<1	<= 1 kve/100ml
Schimmels per ml	20	100	10	<10	40	<10	<= 10.000 kve/ml
Gisten per ml	1400	200	50	<10	360	<10	<= 10.000 kve/ml
Sulfietreducerende anaeroben per 100 ml	10	<1	230	<1	1400	<1	
Clostridium perfringens	<1	<1	230	<1	<1	<1	
Salmonella	NA	NA	NA	NA	NA	NA	NA

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Opslag regenwater



Microbiologie		
Totaal kiemgetal 22°C per ml	45.000	*<=100.000 kve/ml*
Totaal kiemgetal 36°C per ml	4.800	*<=100.000 kve/ml*
Coliformen per 100 ml	1.400	
E. coli per 100 ml	1.400	*<=1000 kve/100ml*
Enterococcen per 100 ml	460	*<= 1 kve/100ml*
Schimmels per ml	<10	*<= 10.000 kve/ml*
Gisten per ml	3.200	*<= 10.000 kve/ml*
Sulfietreducerende anaeroben per 100 ml	10.000	
Clostridium perfringens	10.000	
Salmonella	niet aangetoond	

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Conclusie

- Waterbehandeling van regenwater start bij schone daken, dakgoten en wateropslag
- Op het Proefbedrijf worden twee zuiveringssystemen getest
  - Nano ultrafiltratie
    - Metingen opnieuw gestart
  - Zuiveringstrein
    - Behaalt drinkwaternormen voor pluimvee na behandeling
- Extra aandacht voor hoog kiemgetal in de zomermaanden

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LIFE ACLIMA
Opwaarderen hemelwater tot drinkwater Hooibeekhoeve

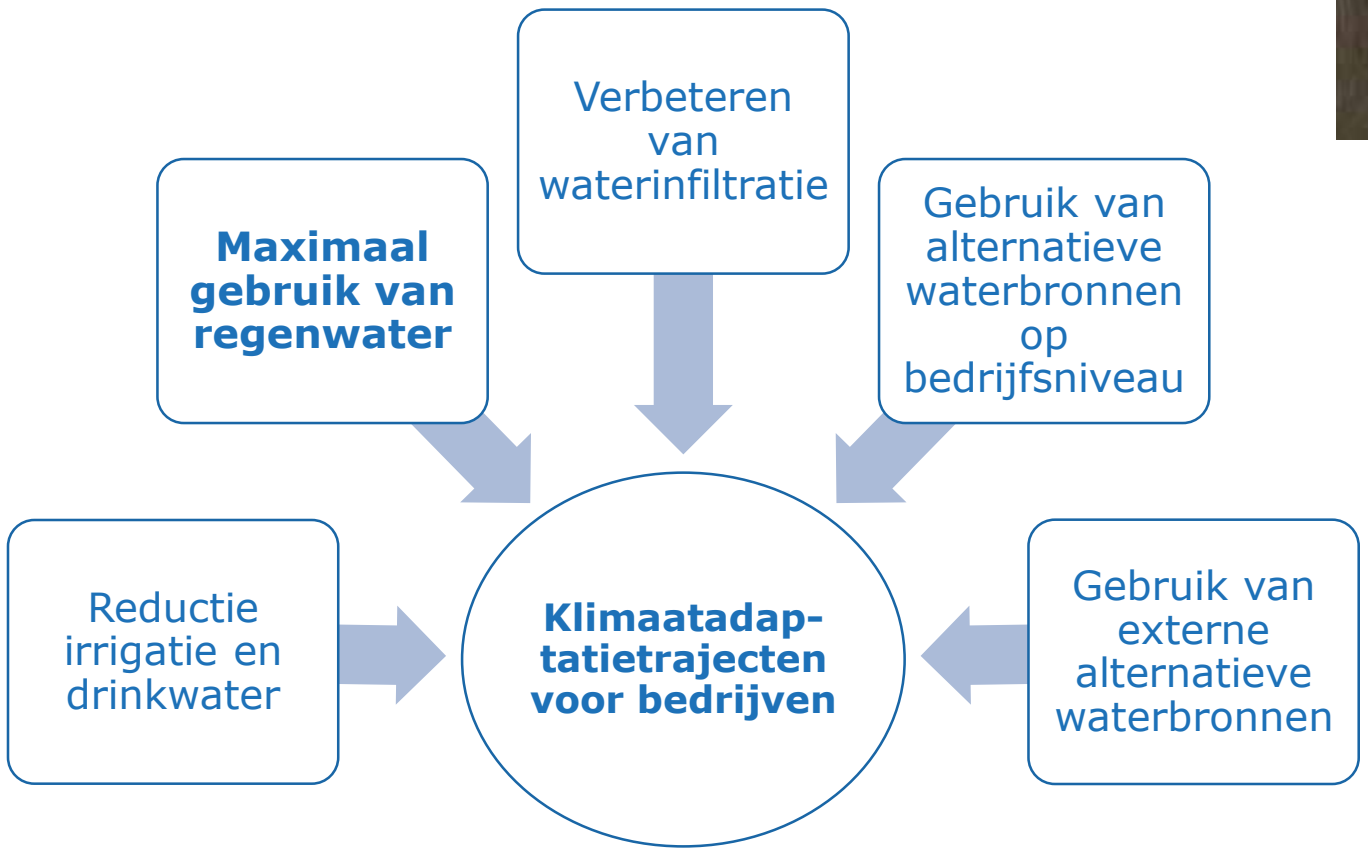
Water bubble Life ACLIMA – 4 oktober 2022

Els Stevens - Hooibeekhoeve

The ACLIMA-project has received funding from the LIFE Programme of the European Union. under contract number LIFE 20 CCA_BE_001720

Life ACLIMA



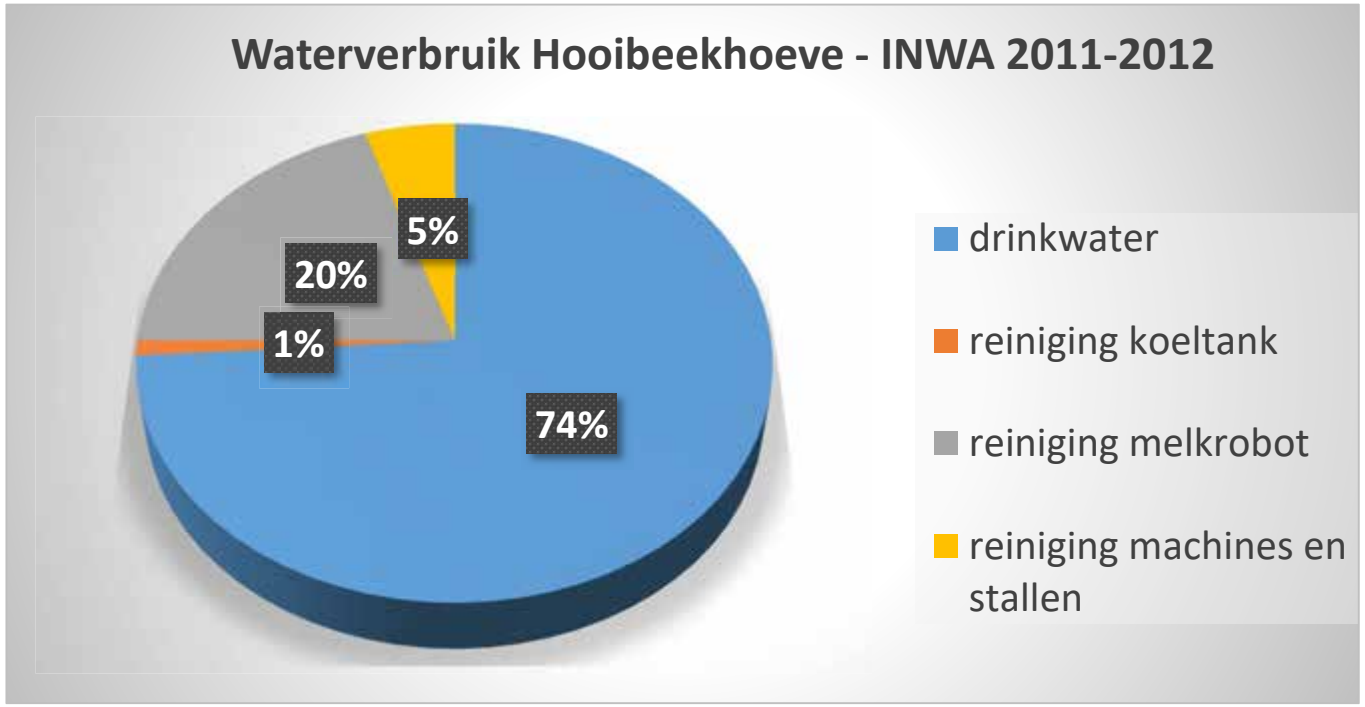


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Verbruik van water in Vlaamse melkveesector

Project 'Interactief Waterbeheer' (2008-2012)

Deelproject 'Waterhergebruik en –zuivering op melkveebedrijven' – samenwerking Hooibeekhoeve, PVL Bocholt, Innovatiesteunpunt



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Gebruik van regenwater als drinkwater op een melkveebedrijf Case Hooibeekhoeve



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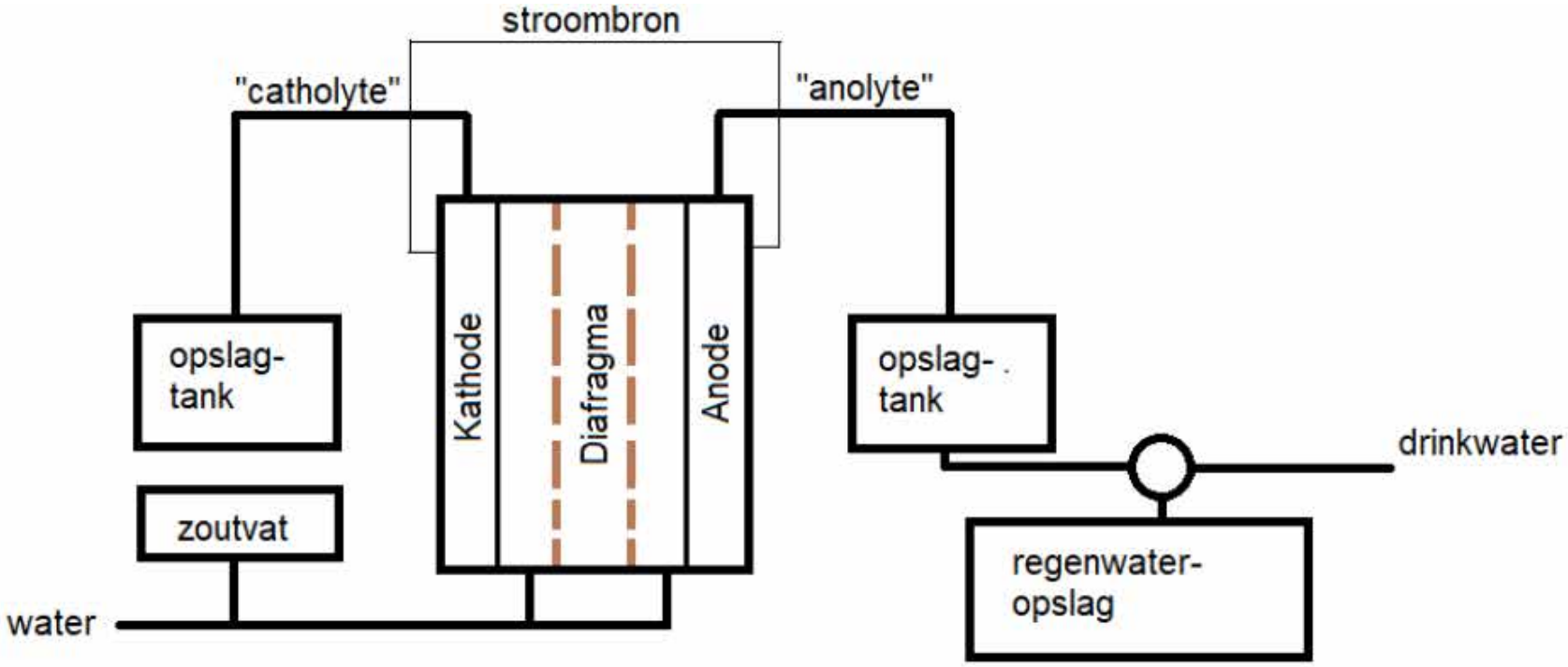
Regenwater behandelen met ECA

- **ECA = E**lektro**c**hemische **a**ctivatie
- Toestel aangekocht 2012
  - Methode inactiveert pathogene micro-organismen en zorgt voor de verwijdering van biofilms
  - Milieuvriendelijk

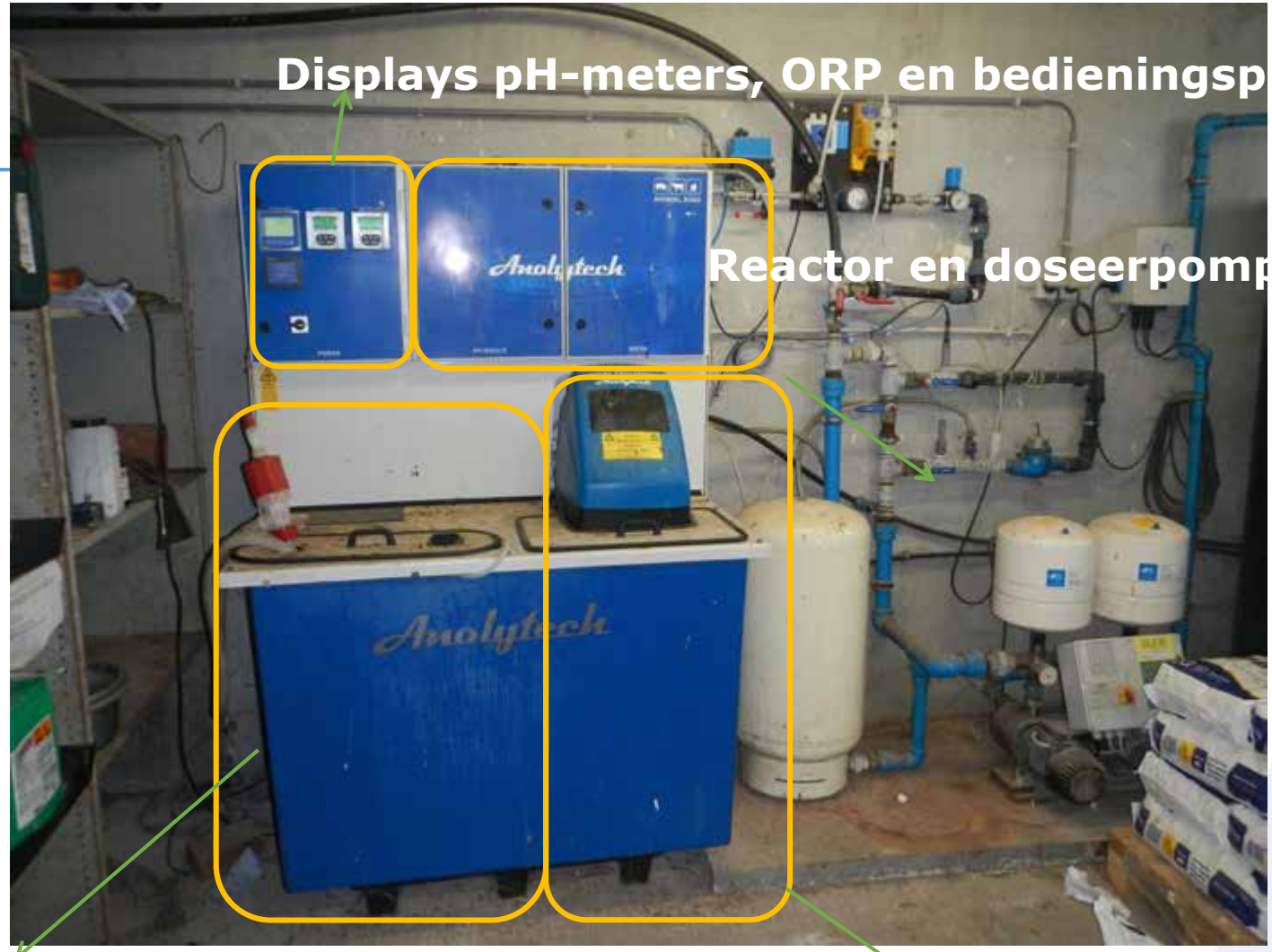


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Werking ECA



The ACLIMA-project has received funding from the LIFE Programme of the European Union. under contract number LIFE 20 CCA_BE_001720



Opslag anolyte en catholyte

Zoutvat met filter en pekelaanmaak

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ECA

- Eigenschappen Anolyte:
  - Gematigd zuur (pH 6-7)
  - 500 mg oxidanten/liter
  - 70-95% Waterstofhypochloriet (HClO)
  - Redoxpotentiaal 850 mV (650 mV dood alle pathogene micro-organismen)
  - Sterk ontsmettend effect

- Toepassingen HH:
  - Ontsmetting drinkwater (inclusief verwijdering van biofilm in de leidingen en drinkbak)
  - Ontsmetten van de klauwen in de melkrobot met Hoofboy

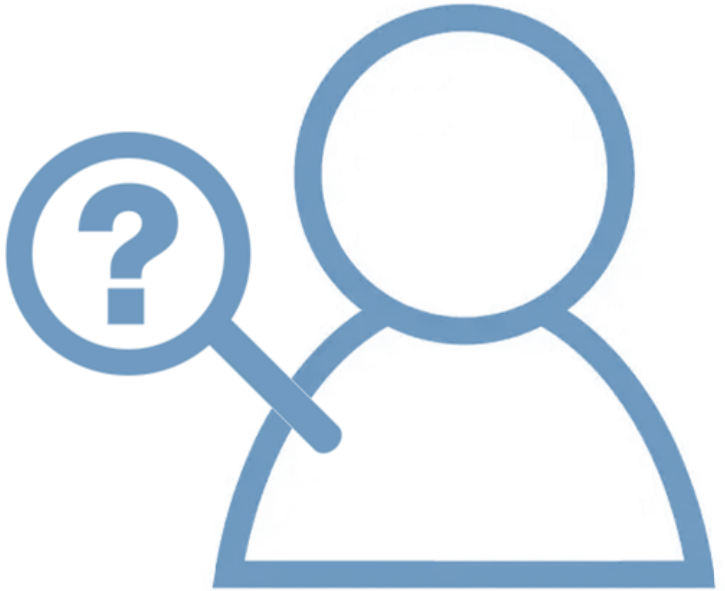


The ACLIMA-project has received funding from the LIFE Programme of the European Union. under contract number LIFE 20 CCA_BE_001720

Waterkwaliteit - onderzoek

- Staalname
  - Opslagput
  - Melk- en jongveestal
- Wateranalyse

- Kwaliteit in opslagput
- Effectiviteit van ontsmetting



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Waterkwaliteit - resultaten

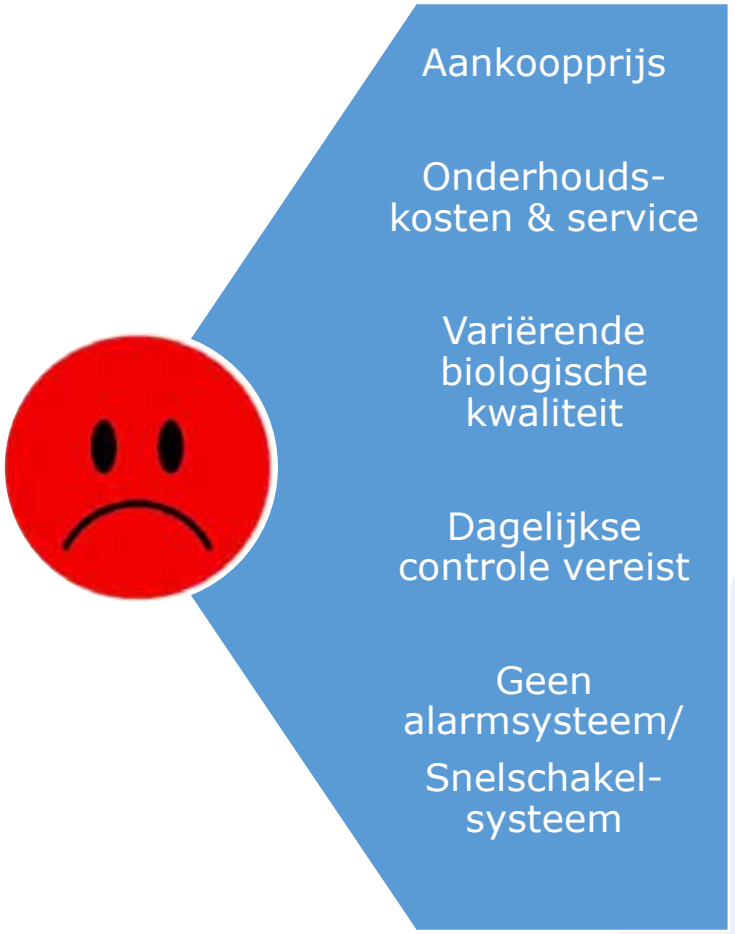
Bacteriële verontreiniging	% voldoet aan richtwaarde	
	voor	na
Aantal kiemen (< 100.000 kve/ml)	100	100
Coliformen (< 100 kve/ml)	100	100
Escherichia coli (< 100 kve/ml)	100	100
Enterococcen (< 1 kve/ml)	12	72
Clostridium perfringens (<1 kve/100 ml)	67	71
Sulfietreducerende clostridia (< 1 kve/20 ml)	22	35

number LIFE 20 CCA_BE_001720

Ervaringen Hooibeekhoeve ECA



- Besparing op waterfactuur
- Ongewijzigd drinkgedrag
- Andere toepassingen mogelijk



- Aankoopprijs
- Onderhouds-kosten & service
- Variërende biologische kwaliteit
- Dagelijkse controle vereist
- Geen alarmsysteem/ Snelschakel-systeem

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Conclusies

- Gebruik van gezuiverd regenwater als drinkwater voor melkvee heeft potentieel maar

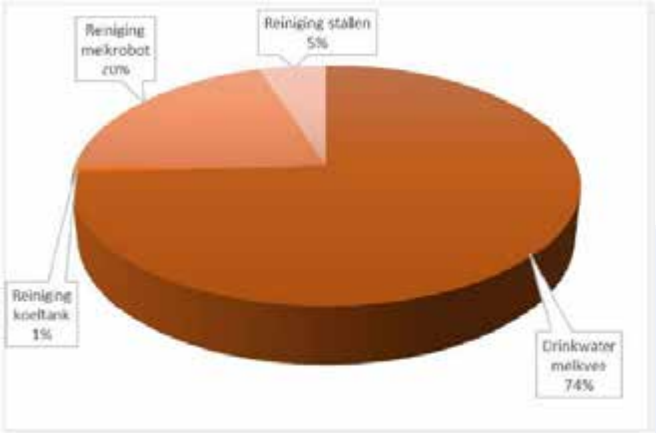
  - Regenwater = niet gratis
  - Kosten regenwateropslag
  - Kosten waterbehandeling → naast ECA meer mogelijkheden
  - Wisselende neerslaghoeveelheden
  - Biologische kwaliteit moet gegarandeerd zijn
  - Bij voorkeur alarm en 'slimschakel-systeem'

→ **In LIFE ACLIMA**

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Hemelwater opwaarderen tot drinkwater voor melkvee

- Situatie HH: opgevangen hemelwater kan tot 70% van de drinkwaterbehoefte invullen
- 4.000 m³ leidingwater besparen
- **MAAR: chemische en microbiologische waterkwaliteit!**
  - → Zuiveringsmethode noodzakelijk: demonstratie **waterbehandeling regenwater (zuiveringstrein)**
- Opvolging drinkwaterkwaliteit, productie- en gezondheidsparameters
- Bedrijfseconomische analyse





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Assuring water Availability in Agriculture under changing CLIMAte conditions

Demonstratiecases rundveehouderij

Hooibeekhoeve

Klimaatadaptatietrajecten

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Verbeteren van waterinfiltratie

Maximaal gebruik van regenwater

Gebruik van alternatieve waterbronnen op bedrijfsniveau

Reductie irrigatie en drinkwater

Klimaatadap - tatietrajecte n voor bedrijven

Gebruik van externe alternatieve waterbronnen

Life ACLIMA

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Wat is een klimaatadaptatietraject?

Maatregelen installeren die de **waterbeschikbaarheid** op jouw bedrijf **verhogen**

- ✓ **Gratis advies** over: waterbesparende technieken, waterkwaliteit, subsidiekanalen,…

- ✓ Bedrijfsaudit met **waterpaspoort**: *'waar zitten nog waterwinsten op jouw bedrijf?'*
  - ✓ Reductie irrigatie- en drinkwater
  - ✓ Maximaal gebruik van regenwater
  - ✓ Verbeteren van waterinfiltratie
  - ✓ Gebruik van alternatieve waterbronnen op bedrijfsniveau
  - ✓ Gebruik van externe alternatieve waterbronnen
  - ✓ Gebruik van droogteresistente grasmengels

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Life ACLIMA Klimaatadaptatietraject



Klimaatadaptatietrajecten

Wil je advies rond duurzaam watergebruik op jouw pluimvee- of rundveebedrijf? Contacteer ons!

Neil Van den broeck: Neil.vandenbroeck@provincieantwerpen.be

Peter Bleyen: peter.bleyen@provincieantwerpen.be

Els Stevens: e.stevens@provincieantwerpen.be

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