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LABORBERICHT
Reduktion von Keimen durch UV-C

EC-Box = Einkaufswagen. Bestrahlung von flächenrelevanten Stellen.
PH-Box = Bestrahlung aller Flächen.

Wirkungsgradabhängig von der eingesetzten UV-C-Lampe und Zeiteinstellung.
Für die hier dargestellten Labortests wurden 400-Watt-UV-C-Lampen verwendet.

Log-Reduktion: Reduktion in % Reduzierung von 100.000.000 Mikroorganismen auf

1	90	10.000.000
2*	99	1.000.000 EC-Box: Bestrahlungszeit 10 Sekunden
3	99,9	100.000
4**	99,99	10.000 PH-Box: Bestrahlungszeit 10 Minuten
5	99,999	1.000
6	99,9999	100
7***	99,99999	10 PH-Box: Bestrahlungszeit 15 Minuten
8	99,999999	1

*Die Log-Stufen beschreiben jeweils die Reduktion um eine Zehnerpotenz. Somit bedeutet 1 Log Stufe 10 eine Reduktion der Keime um 90 %. Von der Ursprungspopulation 100 (10 × 10) haben nur 10 Keime überlebt. Eine 99-prozentige Reduktion (2 Log Stufe 10) entspricht in etwa der Wirkung von Seife.

**Im nicht-medizinischen Bereich spricht man von einer Desinfektion bei einer Reduktion aller Keime um den Faktor ≥ log 4 bzw. 99,99 %. In diesem Fall kann von 10.000 Keimen maximal 1 Keim überleben.

***Im medizinischen Bereich sind die Anforderungen höher. Gemäß den Anforderungen der ASTM (American Society for Testing and Materials) und der FDA (Food and Drug Administration) darf erst ab Log 7 von einer Sterilfiltration gesprochen werden.

DR. BRILL + DR. STEINMANN
INSTITUTE FOR HYGIENE AND MICROBIOLOGY

TEST REPORT

09/09/2021

Test report L21/00901BC.1

Evaluation of the effectiveness of

Easy Clean Box EKW-UVC

Test virus:	bovine coronavirus (BCoV) (surrogate of human coronaviruses)
Method:	based on EN 16777:2018 (clean conditions) Chemical disinfectants and antiseptics – Quantitative non-porous surface test without mechanical action for the evaluation of virucidal activity of chemical disinfectants used in the medical area – Test method and requirements (phase 2/step 2)

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1. Introduction

The objective of this study was to evaluate the virus-inactivating properties of the Easy Clean Box EKW-UVC against bovine coronavirus as surrogate of human coronaviruses using the quantitative carrier test based on EN 16777 (1) under clean conditions.

2. Identification of test laboratory

Dr. Brill + Partner GmbH, Institute for Hygiene and Microbiology, Norderoog 2, DE - 28259 Bremen

3. Identification of sample

Manufacturer	Samoht Medien GmbH
Name of device	Easy Clean Box EKW-UVC
Internal product identifier	21/00956-001
Confirmation no.	224393
Product diluent recommended by the manufacturer	-
serial number	10112020-01
Application	surface disinfection
Production date	-
Active compound (s)	UV light
Date of arrival in the laboratory	21/07/2021

4. Materials

4.1 Culture medium and reagents

- Eagle`s Minimum Essential Medium with Earle`s BSS (EMEM, Biozym Scientific GmbH, catalogue no. 880120)
- fetal calf serum (Sigma, article no. BCCC6626)
- Decon 90® (Zinsser Analytic GmbH, article no. 80000)
- Aqua dest. (SG ultrapure water system, type Ultra Clear; serial no. 86996-1)
- PBS (Gibco, article no. 18912-014)
- BSA (Sigma-Aldrich-Chemie GmbH, Cohn-Fraction V, article no. CA-2153)
- glutaraldehyde (AppliChem [2 %], article no. A4316)
- Penicillin/ streptomycin (Sigma-Aldrich, article no. P-0781).

4.2 Virus and cells

The bovine coronavirus strain L9 was obtained by Dr. G. Zimmer, Institute of Virology at the School of Veterinary Medicine Hannover (Tierärztliche Hochschule, DE - 30559 Hannover).

The *U373 cells* (passage 13) were as well obtained by Dr. G. Zimmer, Institute of Virology at the School of Veterinary Medicine Hannover (Tierärztliche Hochschule, DE - 30559 Hannover).

The cells were inspected regularly for morphological alterations and for contamination by mycoplasmas. No morphological alterations of cells and no contamination by mycoplasmas could be detected.

4.3 Apparatus, glassware and small items of equipment

- CO_2 incubator
- Agitator (Vortex Genie Mixer, type G 560E)
- pH measurement 315i (WTW, article no. 2A10-100)
- Centrifuge (Sigma-Aldrich-Chemie GmbH, type 113)
- Microscope (Olympus, type CK 30)
- Centrifuge 5804 R (Eppendorf AG)
- Water bath (JULABO, Julabo U 3)
- Adjustable and fixed-volume pipettes (Eppendorf AG)
- Polysterol 96-well microtitre plate (Nunc GmbH & Co. KG, Wiesbaden, Germany)

- Cell culture flask (Nunc GmbH & Co. KG, Wiesbaden, Germany)
- Container, flat bottom, 25 cm, with cap (Sarstedt AG & Co., Nümbrecht, Germany)
- Stainless steel discs (2 cm diameter discs) with Grade 2 B finish on both sides (article no. 4174-3000, GK Formblech GmbH, Berlin, Germany)
- Glass petri dishes (Nunc GmbH & Co. KG, Wiesbaden, Germany).

5. Experimental conditions

Test temperature (range given in the norm)	room temperature (18 °C ± 1 °C to 25 °C ± 1 °C)
Test temperature (measured during test performance)	21.5 – 21.6 °C
Contact time(s)	Position 1: 10 seconds Position 2: 3 minutes
Interfering substance(s) in the virus inoculum(s)	clean conditions: 0.3 g/l bovine serum albumin (BSA)
Diluent	not applicable
Procedure to stop action of disinfectant	immediate dilution with ice-cold cell medium
Test virus	bovine coronavirus strain L9
Period of analysis	01/07/2021 – 07/09/2021
End of testing	09/09/2021

6. Methods

6.1 Preparation of test virus suspension

For preparation of test virus suspension, *U373* cells were cultivated in a 175 cm^2 flask with in EMEM supplemented with L-glutamine, non-essential amino acids and sodium pyruvate and 10 % fetal calf serum. Before virus infection, cells were washed two times with phosphate buffered saline (PBS), incubated for 3 h with EMEM without FCS and were washed once with EMEM supplemented with trypsin. For virus production, BCoV strain L9 was added to the prepared monolayer. After an incubation period of 24 to 48 hours (cells showed a constant cytopathic effect), cells were lysed by a rapid freeze/thaw cycle. Cellular debris was removed by low speed centrifugation. After aliquotation of the supernatant, test virus suspension was stored at –80 °C.

6.2 Preparation of the stainless steel discs

Prior to use the discs shall be placed in a container with an appropriate quantity of 5 % (v/v) Decon 90® for 60 minutes. Subsequently, the discs were rinsed with running freshly demineralised water for 2 x 10 s, dipped in a bath containing 70 % (v/v) propan-2-ol for 15 min and rinsed again with distilled water for at least 3 x 10 seconds. Finally, the discs were sterilised by autoclaving (steam sterilisation) according to EN 16777, section 5.3.3.

6.3 Preparation of the virus inoculum

Nine volumes of test virus suspension were mixed with one volume of interfering substance solution (EN 16777, section 5.2.2.8).

6.4 Setup of the test in the device

The device (figure 1a and b) was prepared according the manufacturer´s instructions.

For the first test with an exposure time of 10 seconds at position 1, the carriers were placed in the middle of the upper plate and were irradiated directly (see figure 1b and c).

For the second test with an exposure time of 3 minutes at position 2, a metal strip with small clamps was attached below the lower plate with the bracket. The carriers were attached to the small clamps (see figure 1b and d) with the inoculated side facing up which resulted in an indirect (in the shadow) irradiation.

After closing the safety gate, irradiation of the UV-C lamps started for the respective exposure time.

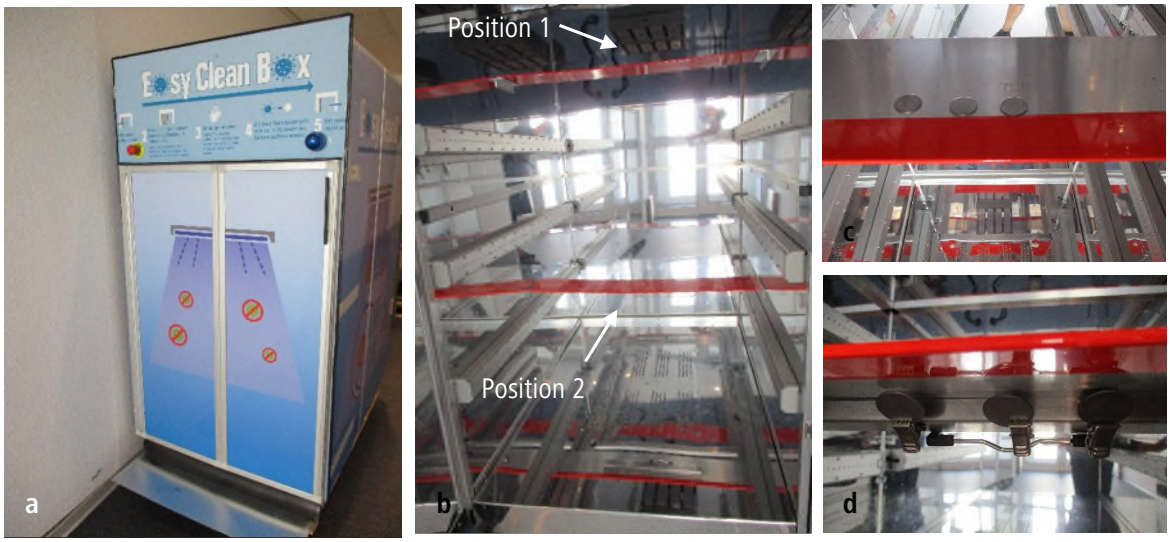

Figure1: Easy Clean Box EKW-UVC (a), inside (b) with the two tested positions. Position 1 on the upper plate (c) and position 2 at the lower plate (d)

6.5 Inactivation assays and controls

Tests were carried out based on EN 16777 (1) at room temperature. For each test 3 discs per position and exposure time plus control discs were prepared.

Test discs were placed aseptically in a Petri dish and inoculated with 50 µl of the virus inoculum (EN 16777, section 5.5.2). After drying, the carriers were placed in the device as described in 6.4.
For the controls, carriers were stored in the lab without irradiation in parallel for each run. After the appropriate contact time each carrier was transferred to 9.9 ml ice-cold medium (1:100 dilution) in a separate container (25 cm with cap). Container was vortexed for 60 seconds to re-suspend the virus. Directly after elution, series of ten-fold dilutions of the eluate in ice-cold maintenance medium were prepared and inoculated on cell culture (see EN 16777, section 5.5.2).

Titrations of the virus controls were performed before drying, directly after drying (VCt0) and after drying at the respective contact times.

In addition, a control of efficiency for suppression of activity was included (EN 16777, section 5.5.4).

For the control of cell susceptibility (EN 16777, section 5.5.3.2) one volume of the lowest apparently non-cytotoxic dilution of the product (or PBS as control) was added to one volume of double concentrated cell suspension. After 1 h at 37 °C the cells were centrifuged and re-suspended in cell culture medium.
Finally, a comparative titration of the test virus suspension with the virus inoculums was performed on the pre-treated (disinfectant) and non-pre-treated (PBS) cells as described above.

Determination of cytotoxicity was performed as described in EN 16777, section 5.5.3.1. Stainless steel discs were inoculated with 45 µl cell culture medium (with FCS) and 5 µl interfering substance instead of the virus inoculum.

Furthermore, a cell control (only addition of medium) was incorporated.

As reference for test validation according to EN 16777, section 5.5.5, glutaraldehyde (50 ppm) was included. 5 minutes were chosen as contact time.

6.6 Determination of infectivity

Infectivity was determined by means of end point dilution method according to EN 16777, section 5.5.2 by transferring 0.1 ml of each dilution into eight wells of a microtitre plate containing 0.1 ml freshly splitted cells per well, beginning with the highest dilution. This cell suspension was adjusted to reach 10-15 x 10^3 cells per well. Microtitre plates were incubated at 37 °C in a 5 % CO_2-atmosphere. The cytopathic effect was read by using an inverted microscope. Calculation of the infective dose $TCID_{50}$/ml was calculated with the method of Spearman (2) and Kärber (3).

6.7 Calculation and verification of virucidal activity

The virucidal activity of the test disinfectant was evaluated by calculating the reduction of virus titre of dried virus inoculum after treatment with the disinfectant in comparison with the virus control titration treated with water. The difference is given as reduction factor (RF).

According to EN 16777, section 5.8.2, a disinfectant or a disinfectant solution at a particular concentration is having virus-inactivating efficacy if within the recommended exposure period the titre is reduced at least by 4 log_{10} steps.

7. Results

7.1 Determination of cytotoxicity

In parallel with the inactivation tests, cytotoxicity of the test product (position 2, longest incubation time) and of 50 ppm glutaraldehyde was measured.

The cytotoxicity control as well as the glutaraldehyde solution (50 ppm) showed no cytotoxicity in the first dilution. This corresponded to a log_{10} CD_{50}/ml of 1.50 (tables 6 and 7).
These tests to measure cytotoxicity are imperative, because in this manner the lower detection threshold for non-inactivated bovine coronavirus could be determined.

7.2 Control of efficiency for suppression of activity

The logarithmic titre of this virus control without drying was 7.00 ± 0.38 versus 6.75 ± 0.33 log_{10} $TCID_{50}$/ml for the disinfectant (tables 4 and 7). As prescribed in the EN 16777 (section 5.5.4.1), the difference of the logarithmic titre of the control for suppression of disinfectant's activity was ≤ 0.5 log_{10} compared to the virus inoculum.

7.3 Control of cell sensitivity

A non-cytotoxic concentration of the disinfectant might inhibit the virus replication. Therefore, cell sensitivity in a non-cytotoxic concentration was evaluated by a comparative titration.

This comparative virus titration on cells treated with the disinfectant (virus titre: 6.88 ± 0.45 $\log_{10}$ $TCID_{50}$/ml) or PBS (virus titre: 6.88 ± 0.45 $\log_{10}$ $TCID_{50}$/ml) resulted in a difference of < 1.0 $\log_{10}$ demonstrating that virus replication was not inhibited (tables 5 and 7).

7.4 Virus-inactivating properties of reference control(s)

Results of inactivation tests are found in tables 3 and 7. Glutaraldehyde (50 ppm) reduced the virus titre after 5 minutes by 1.81 ± 0.57 $\log_{10}$ steps. Here, the RF of glutaraldehyde was in the range of the values from different other tests in our lab.

7.5 Virus-inactivating properties of disinfectant

The Easy Clean Box EKW-UVC was tested in two different positions with corresponding incubation times at room temperature.

Results of examinations are shown in tables 1 to 7. Tables 1 to 5 demonstrate the raw data, whereas tables 6 and 7 give a summary of results.

Easy Clean Box EKW-UVC tested with carriers placed on the upper plate with a direct irradiation was not able to inactivate bovine coronavirus after 10 seconds exposure time under clean conditions in the quantitative carrier test. The average reduction factor and its 95 % confidence interval achieved 2.25 ± 0.51 at this time point (tables 2 and 6).

Easy Clean Box EKW-UVC tested with carriers placed at the lower plate with an indirect irradiation was not able to inactivate bovine coronavirus after 3 minutes exposure time under clean conditions in the quantitative carrier test. The average reduction factor and its 95 % confidence interval achieved 1.08 ± 0.45 at this time point (tables 2 and 6).

8. Verification of the methodology

The following criteria as mentioned in the EN 16777, section 5.7 were fulfilled:

a) The titre of the test virus suspension allowed the determination of ≥ 4 $\log_{10}$ reduction.

b) The test product shows no cytotoxicity thus allowing the detection of a 4 $\log_{10}$ reduction of virus titre.

c) The difference of the logarithmic titre of the virus control minus the logarithmic titre of the test virus in the reference inactivation test with glutaraldehyde (EN 16777) was in the range of the values from different other tests in our lab.

d) The cytotoxicity of the product solution does not affect cell morphology and cell growth or the susceptibility of the test organism in the dilutions of the test product used for demonstration of a 4 log reduction.

e) The comparative titration on pre-treated (disinfectant) and non-pre-treated (PBS) cells showed an acceptable difference (< 1.0 $\log_{10}$; EN 16777) of virus titre.

f) The difference of the logarithmic titre of the control for suppression of activity was in the range to the specification of the norm (≤ 0.5 $\log_{10}$, EN 16777) compared to the virus control before drying.

Since all criteria according to EN 16777 5.7 were fulfilled, examination with bovine coronavirus based on EN 16777 was valid.

9. Conclusion

Under the tested conditions Easy Clean Box EKW-UVC was not able to demonstrate effectiveness against bovine coronavirus under clean conditions.

Bremen, 09/09/2021

- Dr. Britta Becker -
Head of Laboratory

- Dr. Dajana Paulmann -
Deputy Head of Laboratory

10. Literature

1. EN 16777: Chemical disinfectants and antiseptics – Quantitative non-porous surface test without mechanical action for the evaluation of virucidal activity of chemical disinfectants used in the medical area – Test method and requirements (phase 2, step 2), German version 2018.

2. Spearman, C.: The method of `right or wrong cases` (constant stimuli) without Gauss's formulae. Brit J Psychol; 2 1908, 227-242.

3. Kärber, G.: Beitrag zur kollektiven Behandlung pharmakologischer Reihenversuche. Arch Exp Path Pharmak; 162, 1931, 480-487.

Appendix

Legend to the tables

Table 1: Raw data of the virus controls

Table 2: Raw data of Easy Clean Box EKW-UVC tested against bovine coronavirus

Table 3: Raw data of the reference control(s) tested against bovine coronavirus

Table 4: Raw data of the control of efficacy for suppression of activity

Table 5: Raw data (bovine coronavirus) for cell sensitivity to virus

Table 6: Results with Easy Clean Box EKW-UVC and bovine coronavirus (summary 1)

Table 7: Results with Easy Clean Box EKW-UVC and bovine coronavirus (summary 2)

Table 1: Raw data of the virus controls (quantal test; 8 wells) (#7542)

Product	Concentration	Interfering substance	Contact time	Carrier	Dilutions (log_{10})								
					1	2	3	4	5	6	7	8	9
virus control before drying (virus inoculum)	n.a.	clean conditions	n.a.	n.a.	n.d.	4444 4444	4444 4444	4444 4444	4444 4444	4404 0004	0000 0000	n.d.	n.d.
				n.a.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
virus control after drying	n.a.	clean conditions	0	1	n.d.	4444 4444	4444 4444	4444 4444	0304 0004	0000 0000	0000 0000	n.d.	n.d.
				2	n.d.	4444 4444	4444 4444	4444 4444	4030 4440	0000 0040	0000 0000	n.d.	n.d.
virus control after drying	n.a.	clean conditions	10 s	1	n.d.	4444 4444	4444 4444	4444 4444	0004 0440	0030 0000	0000 0000	n.d.	n.d.
				2	n.d.	4444 4444	4444 4444	4444 4444	0404 4404	0000 0000	0000 0000	n.d.	n.d.
				3	n.d.	4444 4444	4444 4444	4444 4444	2040 0000	0000 0000	0000 0000	n.d.	n.d.
virus control after drying	n.a.	clean conditions	3 min	1	n.d.	4444 4444	4444 4444	4444 4444	4040 3004	0000 0000	0000 0000	n.d.	n.d.
				2	n.d.	4444 4444	4444 4444	4444 4444	4400 0000	0000 0000	0000 0000	n.d.	n.d.
				3	n.d.	4444 4444	4444 4444	4440 4444	0000 0000	0000 0000	0000 0000	n.d.	n.d.
virus control after drying	n.a.	clean conditions	5 min	1	n.d.	4444 4444	4444 4444	4444 4444	0400 0444	0000 0000	0000 0000	n.d.	n.d.
				2	n.d.	4444 4444	4444 4444	4444 4444	0044 0040	0000 0040	0000 0000	n.d.	n.d.

n.a. = not applicable 0 = no virus present t = cytotoxic
n.d. = not done 1 to 4 = virus present (degree of CPE in 8 cell culture units) (wells of microtitre plates)

Table 2: Raw data of Easy Clean Box EKW-UVC tested against bovine coronavirus (quantal test; 8 wells) (#7542)

Product	Position in the device	Interfering substance	Contact time	Carrier	Dilutions (log_{10})								
					1	2	3	4	5	6	7	8	9
Easy Clean Box EKW-UVC	1	clean conditions	10 s	1	4444 4444	4444 4444	4000 4440	0000 0000	0000 0000	0000 0000	n.d.	n.d.	n.d.
				2	4444 4444	4444 3434	4000 0000	0000 0000	0000 0000	0000 0000	n.d.	n.d.	n.d.
				3	4444 4444	4303 4444	0000 4000	0000 0000	0000 0000	0000 0000	n.d.	n.d.	n.d.
Easy Clean Box EKW-UVC	2	clean conditions	3 min	1	4444 4444	4444 4434	4444 3444	0000 0004	0000 0000	0000 0000	n.d.	n.d.	n.d.
				2	4444 4444	4444 4444	4444 4444	0000 4400	0000 0000	0000 0000	n.d.	n.d.	n.d.
				3	4444 4444	4444 4444	4404 4444	0003 0000	0000 0000	0000 0000	n.d.	n.d.	n.d.
product cytotoxicity	2	clean conditions	3 min	1	0000 0000	0000 0000	0000 0000	0000 0000	n.d.	n.d.	n.d.	n.d.	n.d.

n.a. = not applicable
n.d. = not done

0 = no virus present
1 to 4 = virus present (degree of CPE in 8 cell culture units) (wells of microtitre plates)

t = cytotoxic

Table 3: Raw data of the reference control(s) tested against bovine coronavirus (quantal test; 8 wells) (#7542)

Product	Concentration	Interfering substance	Contact time (min)	Carrier	Dilutions (log_{10})								
					1	2	3	4	5	6	7	8	9
50 ppm glutaraldehyde	undiluted	clean conditions	5	1	4444 4444	4444 4444	4404 0343	0000 0040	0000 0000	0000 0000	0000 0000	n.d.	n.d.
				2	4444 4444	4444 4444	0400 4440	0000 0000	0000 0000	0000 0000	0000 0000	n.d.	n.d.
50 ppm glutaraldehyde cytotoxicity	undiluted	clean conditions	5	1	0000 0000	0000 0000	0000 0000	0000 0000	n.d.	n.d.	n.d.	n.d.	n.d.

n.a. = not applicable 0 = no virus present t = cytotoxic
n.d. = not done 1 to 4 = virus present (degree of CPE in 8 cell culture units) (wells of microtitre plates)

Table 4: Raw data of the control of efficacy for suppression of activity (#7542)

Product	Concentration	Interfering substance	Dilutions (log_{10})								
			1	2	3	4	5	6	7	8	9
Easy Clean Box EKW-UVC	n.a.	clean conditions	n.d.	4444 4444	4444 4444	4444 4444	4444 4444	0040 0400	0000 0000	n.d	n.d
virus control	n.a.	clean conditions	n.d.	4444 4444	4444 4444	4444 4444	4444 4444	4404 0004	0000 0000	n.d.	n.d.

n.a. = not applicable 0 = no virus present t = cytotoxic
n.d. = not done 1 to 4 = virus present (degree of CPE in 8 cell culture units) (wells of microtitre plates)

Table 5: Raw data (bovine coronavirus) for cell sensitivity to virus (#7542)

Product	Concentration	Dilutions (log_{10})								
		1	2	3	4	5	6	7	8	9
Easy Clean Box EKW-UVC	n.a.	n.d.	n.d.	4444 4444	4444 4444	4044 4344	4023 4000	0000 0000	0000 0000	n.d.
PBS	n.a.	n.d.	n.d.	4444 4444	4444 4444	0444 4444	0330 4040	0000 0000	0000 0000	n.d.

n.a. = not applicable 0 = no virus present t = cytotoxic
n.d. = not done 1 to 4 = virus present (degree of CPE in 8 cell culture units) (wells of microtitre plates)

Table 6: Results with Easy Clean Box EKW-UVC and bovine coronavirus (summary 1)

	Interfering substance in virus inoculum	log_{10} $TCID_{50}$/ml with 95% CI before drying		log_{10} $TCID_{50}$/ml with 95% CI after drying carrier 1	carrier 2	carrier 3	carrier 4	MV	mean 95 % CI	2xSD[1]	reduction RF	95 % CI
VC (virus inoculum)	clean	7.00±0.38	n.d.	n.a.	n.a.	n.a.	n.a.	**7.00**	**0.38**	**n.a.**	**n.a.**	**n.a.**
VCt0	clean	n.a.	n.a.	5.88±0.37	6.25±0.44	n.d.	n.d.	**6.06**	**0.41**	**0.53**	**0.94**	**0.56**
VCt10 s	clean	n.a.	n.a.	6.00±0.44	6.13±0.37	5.75±0.33	n.d.	**5.96**	**0.38**	**0.38**	**1.04**	**0.54**
VCt3 min	clean	n.a.	n.a.	6.00±0.38	5.75±0.33	5.38±0.25	n.d.	**5.71**	**0.32**	**0.63**	**1.29**	**0.50**
test product position 1 t10 s	clean	n.a.	n.a.	4.00±0.38	3.63±0.25	3.50±0.35	n.d.	**3.71**	**0.33**	**0.52**	**2.25**	**0.51**
test product position 1 t3 min	clean	n.a.	n.a.	4.63±0.25	4.75±0.33	4.50±0.35	n.d.	**4.63**	**0.31**	**0.52**	**1.08**	**0.45**

[1] - This value shows the spread of the parallel approaches

n.a. = not applicable CI = confidence interval RF = reduction factor MV = mean value
n.d. = not done SD = standard deviation VC = virus control

Table 7: Results with Easy Clean Box EKW-UVC and bovine coronavirus (summary 2)

	Interfering substance in virus inoculum	log_{10} $TCID_{50}$/ml with 95% CI	log_{10} $TCID_{50}$/ml with 95 % CI after drying					reduction	
		before drying	carrier 1	carrier 2	MV	mean 95 % CI	2xSD	RF	95 % CI
VC (virus inoculum)	clean	7.00±0.38	n.a.	n.a.	**7.00**	**0.38**	**n.a.**	**n.a.**	**n.a.**
VCt5	clean	n.a.	6.00±0.38	6.00±0.44	**6.00**	**0.41**	**0.00**	**1.00**	**0.56**
50 ppm glutaraldehyde t5 min	clean	n.a.	4.38±0.41	4.00±0.38	**4.19**	**0.40**	**0.53**	**1.81**	**0.57**
suppression of disinfectant (1:10)	clean	6.75±0.33	n.a.	n.a.	**6.75**	**0.33**	**n.a.**	**0.25**	**0.50**
PBS control	clean	6.88±0.45	n.a.	n.a.	**6.88**	**0.45**	**n.a.**	**n.a.**	**n.a.**
cell sensitivity (1:10)	clean	6.88±0.45	n.a.	n.a.	**6.88**	**0.45**	**n.a.**	**0.00**	**0.64**

n.a. = not applicable CI = confidence interval RF = reduction factor MV = mean value
n.d. = not done SD = standard deviation VC = virus control