

## Report about the investigations on germ inactivation in air by the AVAHLi technology using the WATTCONTRACT black box of Wattcontract GmbH

Investigation period: October 2022

S2 Laboratory of the Institute for Animal Hygiene and Public  
Veterinary Medicine, Faculty of Veterinary Medicine,  
An den Tierkliniken 1, 04103 Leipzig, Germany

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### Disclaimer:

This translation was drawn for information purposes only. It communicates the proceedings and results of the test series performed at Leipzig University and described in this documents to international reader. Thus said, in cases of aberrations in between this translation and the German original, the German version is binding.

**Summary:**

In summary, we can state that the Wattcontract Blackbox as supplied by the manufacturer is suitable to inactivate the tested pathogen Felines Coronavirus in air. Under test conditions, there was a depletion of more than 99.9% in certain cases.

**Introduction**

The spread of viruses and bacteria through the air poses a risk for the spread of infectious diseases. Examples of this are the annual influenza epidemics, some of which are severe, and more recently, with particular ferocity, the SARS-CoV2 pandemic.

The reduction of germs in the air at workplaces is therefore an effective measure for occupational health and safety and for maintaining the health and well-being of humans and animals.

One form of disinfection, that in other words an untargeted inactivation of microorganisms, is represented by physical processes, such as UVC irradiation, in which the virus particles are inactivated by destruction of the nucleic acid as they flow past the UVC source. According to the manufacturer, the system tested here is based on a combination of ionization using conductive plates with a special arrangement and design and UVC light.

**Test organisms, test germs**

The effectiveness of the Wattcontract Blackbox system in inactivating the following test germs was evaluated: Feline coronavirus

**Experimental procedure**

Execution of the experimental investigations: Mrs. Dana Rüster and Mr. Mario Reinhardt

**Experimental setup:**

The Wattcontract Blackbox system from Wattcontract GmbH was used to treat an aerosol containing feline coronavirus. The device consists of a black box in which a UVC source, an ionizer for generating an electrostatic field using conductive plates with a special arrangement and design, and a fan are placed. The fan generates an air flow through the device in the longitudinal direction. The device was powered by a 24V power supply. No other specifics were given.

The device was placed in a 53 liter aquarium and sealed airtight. Using the aerosol generator ATM230 from the company TOPAS, the test germ suspensions were nebulized and fed into the aquarium. Pressure equalization was provided by a tube placed directly into the filter stand equipped with Hepa filters.

After a virus introduction of 5 minutes, it was ensured that the entire air volume of the experimental chamber (aquarium) was replaced by the virus mist.

Now the device was switched on and operated for 5, 15 or 30 minutes. After that, air samples were taken from the experimental chamber and their content of infectious virus was determined. For this purpose, the pathogens were recovered from the system by filtration with a gelatin filter, pore size 50nm, using an air sampler (Flite3/ SKC) with a volumetric flow rate of 1100l/h. Thus, the collection time of 5 min results in approximately twice the chamber volume. Virus titer was determined by infection of cell cultures.

The effect of the system was evaluated by comparing the pathogen titers in the air samples after this setup with the device off versus on.

The infectivity in the air was cleaned after flowing through the device through 2 Hepa filters of the institute's own filter stand connected in series to exclude the release of residual virus.

**Number of examinations:**

A total of 16 measurements were performed. The details of the measurements and the results can be found in the tables in the appendix.

**Results:**

The experimental setup allowed the investigation of high pathogen concentrations in the air and evaluation of the reduction by the system.

As a result, we were able to show that under the test conditions, the amount of infectious coronavirus in the air was completely eliminated. Under the test conditions, we were able to demonstrate a titer reduction, that is, a depletion of >99.9%. A detailed summary of the pathogen titers can be found in the table in the appendix.

The test setup only allows the evaluation of the entire device. The contribution of the various parts of the device (fan, UVC source, electrostatic field or ionizer) to the effect was not investigated.

**Discussion:**

The tests with the Wattcontract Blackbox of the company Wattcontract GmbH showed a depletion of the coronavirus infectivity. The reduction reached values of up to > 99.9 % for the Feline Coronavirus.

High test germ concentrations of  $10^5$  infectious units per  $\text{m}^3$  of air were used in the trial. This is certainly considerably higher than the amount to be expected in a natural, non-polluted environment.

# Appendix: Data feline corona virus

Date				Setting: Titer KID50		Reduction (%) infectious virus after treatment	
					Virustiter / ml		
Oct. 5 <sup>th</sup> , 2022	FeCoV	Blackbox	K15	Device off	10 <sup>2.25</sup>	1.78E+05	
			K30		10 <sup>2.0</sup>	1.00E+02	
			K60		10 <sup>2.0</sup>	1.00E+02	
			P15	Device on	10 <sup>1.0</sup>	1.00E+01	94.38 %
			P30		<10 <sup>0.5</sup>	<3.16E+00	96.84 %
			P60		<10 <sup>0.5</sup>	<3.16E+00	96.84 %
Date				Setting: Titer KID50		Reduction (%) infectious virus after treatment	
					Virustiter / ml		
Oct. 10 <sup>th</sup> , 2022	FeCoV	Blackbox	K15	Device off	10 <sup>3.75</sup>	5.62E+03	
			K30		10 <sup>3.25</sup>	1.78E+03	
			K60		10 <sup>3.0</sup>	1.00E+03	
			P15	Device on	<10 <sup>0.5</sup>	<3.16E+00	99.94 %
			P30		<10 <sup>0.5</sup>	<3.16E+00	99.82 %
			P60		<10 <sup>0.5</sup>	<3.16E+00	99.68 %
Date				Setting: Titer KID50		Reduction (%) infectious virus after treatment	
					Virustiter / ml		
Oct. 14 <sup>th</sup> , 2022	FeCoV	Blackbox	K15	Device off	10 <sup>3.75</sup>	5.62E+03	
			K30		10 <sup>3.0</sup>	1.00E+03	
			P15	Device on	<10 <sup>0.5</sup>	<3.16E+00	99.94 %
			P30		.75	5.62E+00	99.44 %