Cleaning of the air from the manure channel with a biological scrubber: the effects on gas emissions and indoor climate

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Abstract:

- A biological scrubber was used to clean the air from the manure channel (35 % of the air) in a grower-finisher house.

- 50 % of the ammonia emission from the housing system was reduced (second batch).

- Indoor air quality was improved by 24 % compared to evacuating all air via the wall.

- Energy consumption during winter time was 2,6 times higher, and during summer time 3,7 times higher as compared to the control treatment.

- During summer time, emissions of nitrous oxide were more then 10 times higher as compared to the control treatment (52 kg higher CO_2eq per pig place per year).

Material and methods:

- Two batches (winter and summer, 56 grower-finishers per batch).

- Cleaning of the air from the manure channel with a biological scrubber (SKOV, BIO 1-U).

- Measurements: Air flow, temperature, electricity consumption, concentrations of ammonia, carbon dioxide, nitrous oxide with Innova equipment.

Results:

Measurements during batch 2 (summer time)

	With scrubber (period 1)	Without scrubber (period 2)	With scrubber (period 3)
Air flow (m3/pig/hour)			
fan in wall	102	111	103
scrubber	54	-	57
total	156	111	160
NH_3 conc (ppm)			
outside	0.64	0.75	0.67
fan in wall	1.18	1.21	0.73
before scrubber	1.80	-	0.78
after scrubber	**0.59**	-	**0.53**
N_2O conc (ppm)			
outside	0.31	0.33	0.31
fan in wall	0.29	0.34	0.30
before scrubber	0.35	-	0.39
after scrubber	**0.59**	-	**0.52**

Energy consumption

	With scrubber	Without scrubber
Batch 1 (winter time) kWh per produced pig (115 days)	31.5	12.0
Batch 2 (summer time) kWh per produced pig (115 days)	54.3	14.5

Conclusions:

- 50 % lower ammonia emission with cleaning of 35 % of the air.

- Improved indoor climate.

- Much higher energy consumption.

- High emission of nitrous oxide from the biological scrubber (52 kg higher CO_2eq per pig place per year).

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