Case Study AirSolution de-germination technology at Sling lines for cold cuts

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2. Introduction

To stabilize the hygienic status of cold cuts the whole processing area after the thermal treating (cooking, slicing, packing) has an important influence on the product hygiene. To stabilize it over the complete processing area, including the cooling process and the slicing, until the packaging production plants have been equipped with the AirSolution hygiene technology. Following this installation there was an analytical support, to get transparent results.

3. Installation for hygienic implementation

The installation of in total 5 AirSolution fogging units in a cooling, prior to the slicing process, and then along the complete Slicer line including the packing unit was executed:

- Cooling room after the thermal processing
- Slicer-Knife
- Conveyor belt
- Inlet feeder
- Packing unit

Picture 1 und 2: Fogging units at SIcier-Knife and a conveyor belt

The controlling of the 5 fogging units works via a central control cabinet with a dosing pump and tank.

At the control cabinet following connections are needed:

- Electrical Connection: 230 V / 50 Hz
- Oil- and water-free pressurized air: min. 7 bar
- Internet connection for remote service

For using the de-germination system, the liquid agent ***AirSolution L.O.G. four*** is used.

The system has been used with the following out-bringing values:

Position	Value	Unit
Cooling room (360 m³)	50	ml / h
Slicer-Knife	100	ml / h
Conveyor Belt	80	ml / h
Inlet feeder	80	ml / h
Packing unit	50	ml / h
Total	**360**	**ml / h**

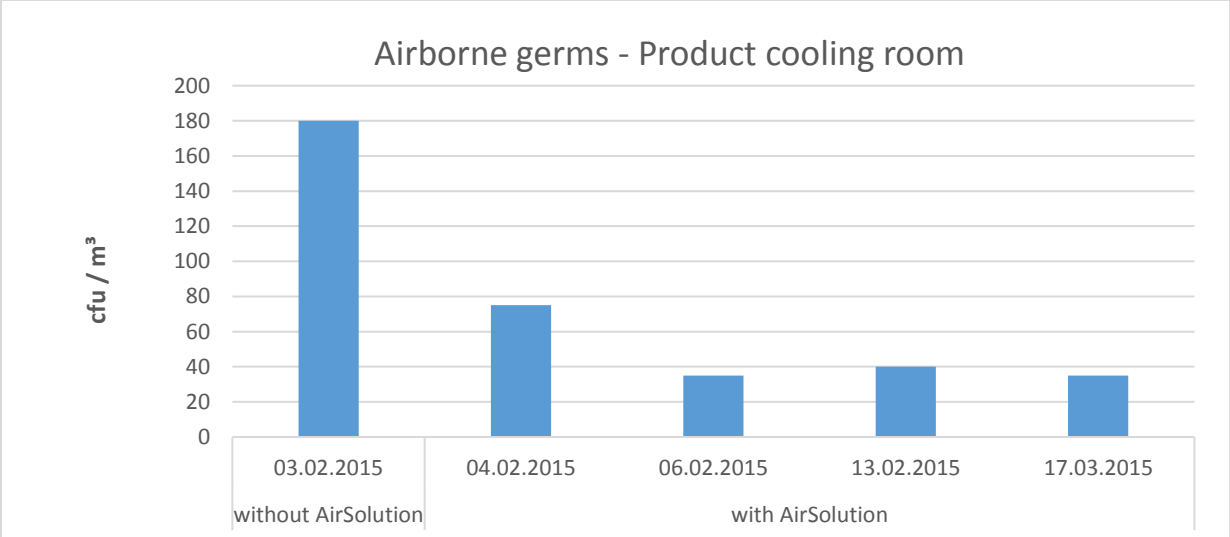
The liquid consumption is therefor for this and comparable applications at 350 - 400 ml/h which means there are costs from 4.50 – 5.20 EUR / h L.O.G.

4. Results of air germ collection and surface tests in the cooling room

In the cooling room for not yet sliced cold cuts (after thermal impact) there is a fogging unit installed, to optimize the room air as well as the surfaces (evaporator, walls, etc.) hygienically.

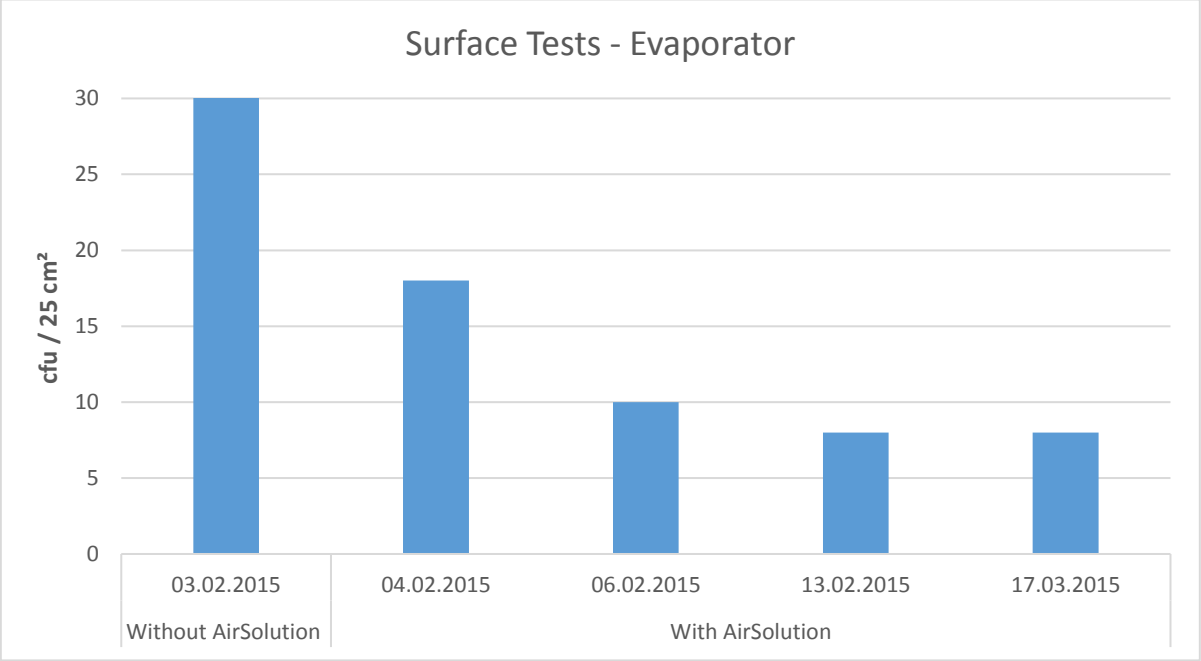
Picture 3: Fogging unit in cooling room

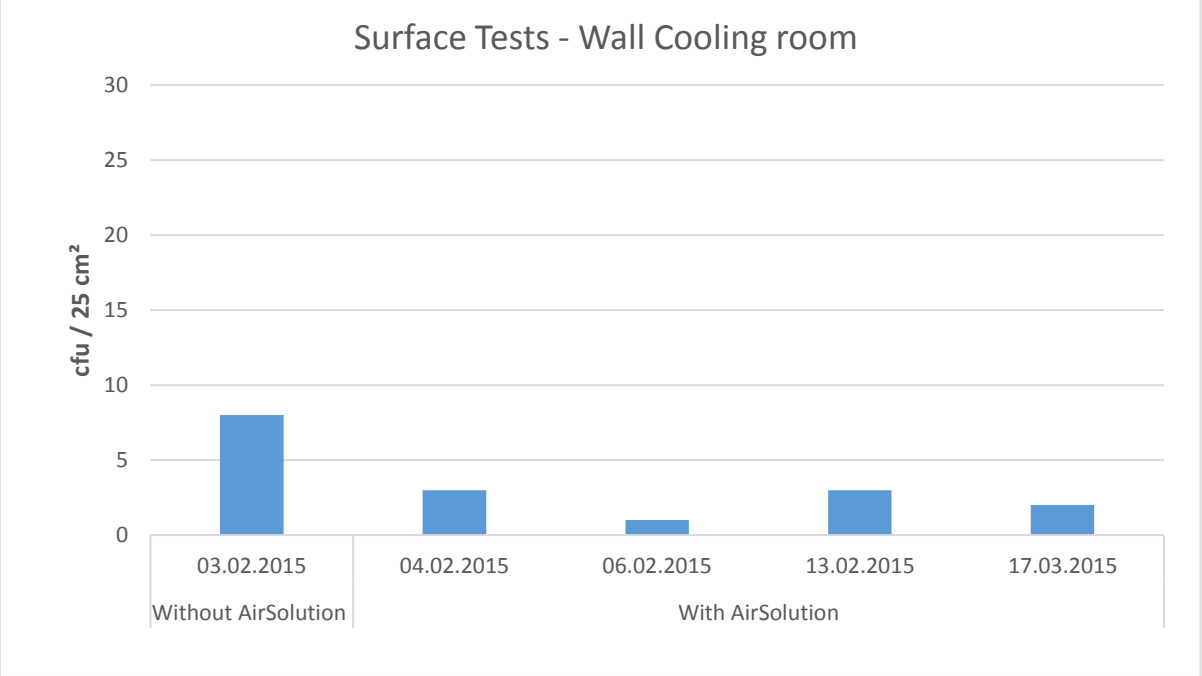
Air germ collections have been executed in the cooling room before using the AirSolution technique and two times during the use of AirSolution and the results are shown on the following graphs.
The further measurements showed a continuous stabilization of this low air germ status.



Sampling	There were 3 samples / day taken at beginning, middle & end of production		
Temperature	6,5 °C		
Rel. humidity	89%		
Outside-parameter	21 °C; 65 % rel. H		
Consumption	50 ml/h	14 hours	700 ml

Furthermore, an evaporator in the cooling room and a wall inside was tested regarding the surface contamination.

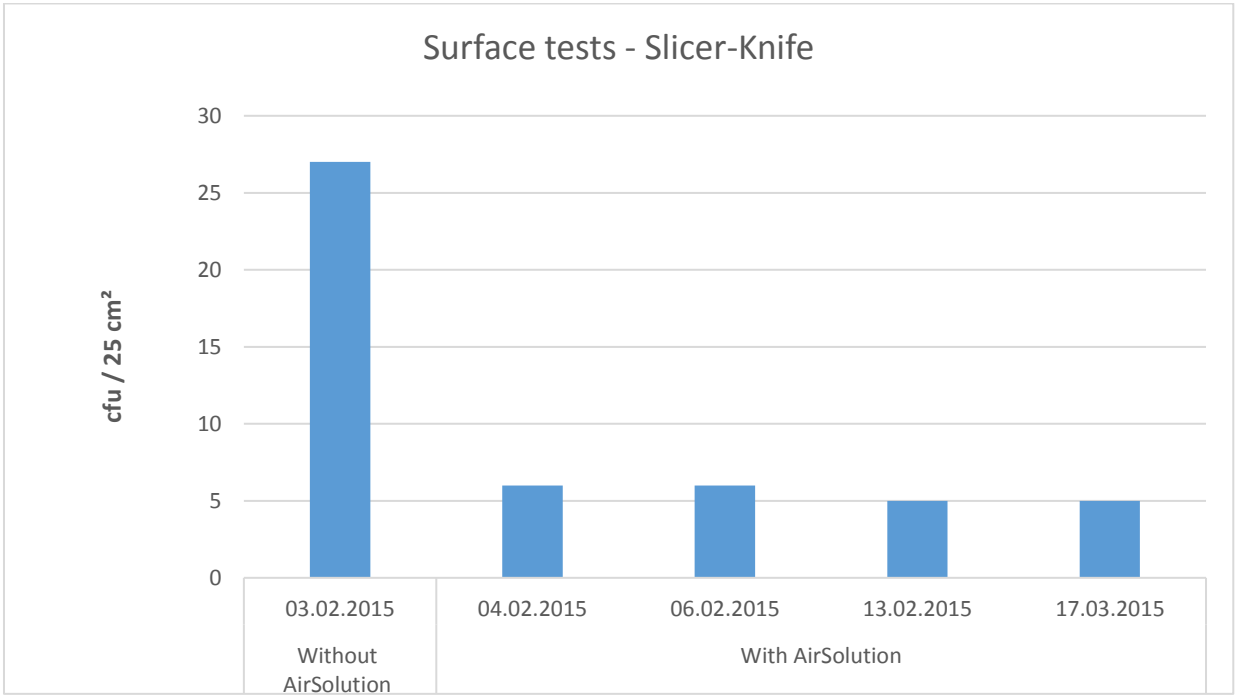


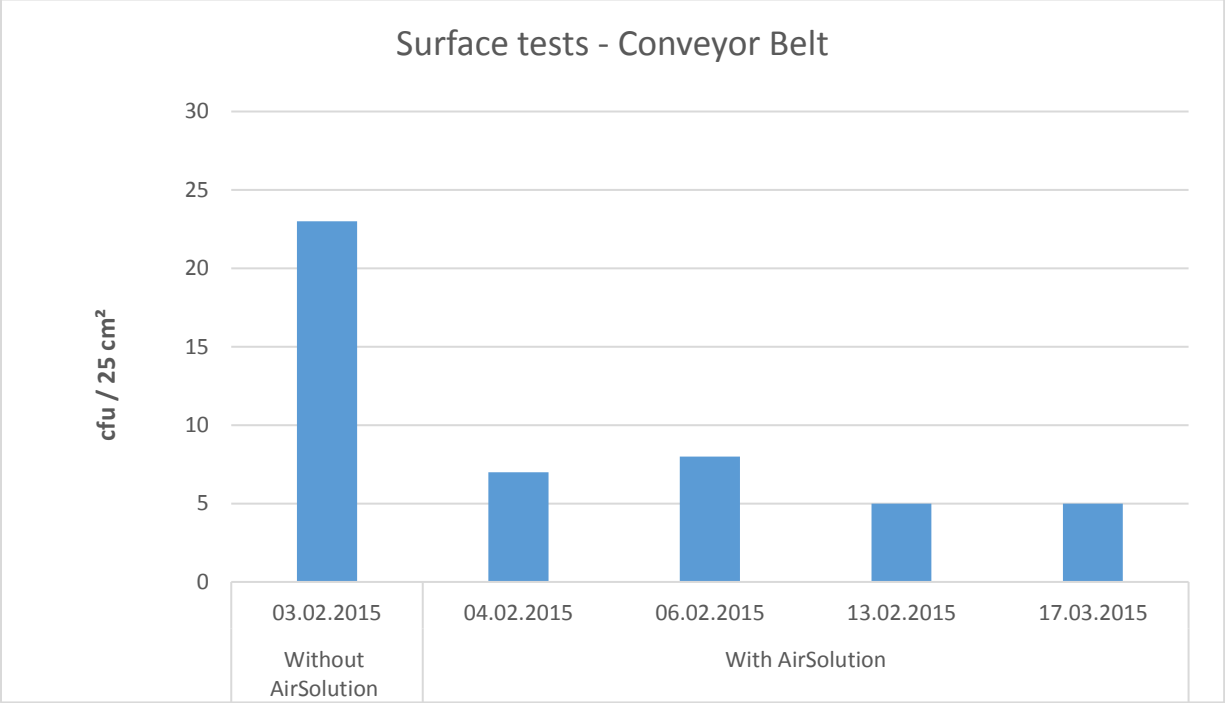


The results show a significant reduction of the status of bacteria (but also yeasts and moulds) in the room air and on the surfaces in the cooling room.
So there is also an optimal process environment for the products, to prevent it to the entry of germs before the processing continues (***safe germ prevention***).

5. Results of surface tests at the Slicer-line

Surface germ tests in form of dip-slides before the use of the AirSolution hygiene technique at neuralgic points (directly at the Slicer-Knife as well as the conveyor belt) of the line have been done.
The measurement have been repeated on 4 days at the same points during the use of the AirSolution technique
The results are shown on the following graphs.



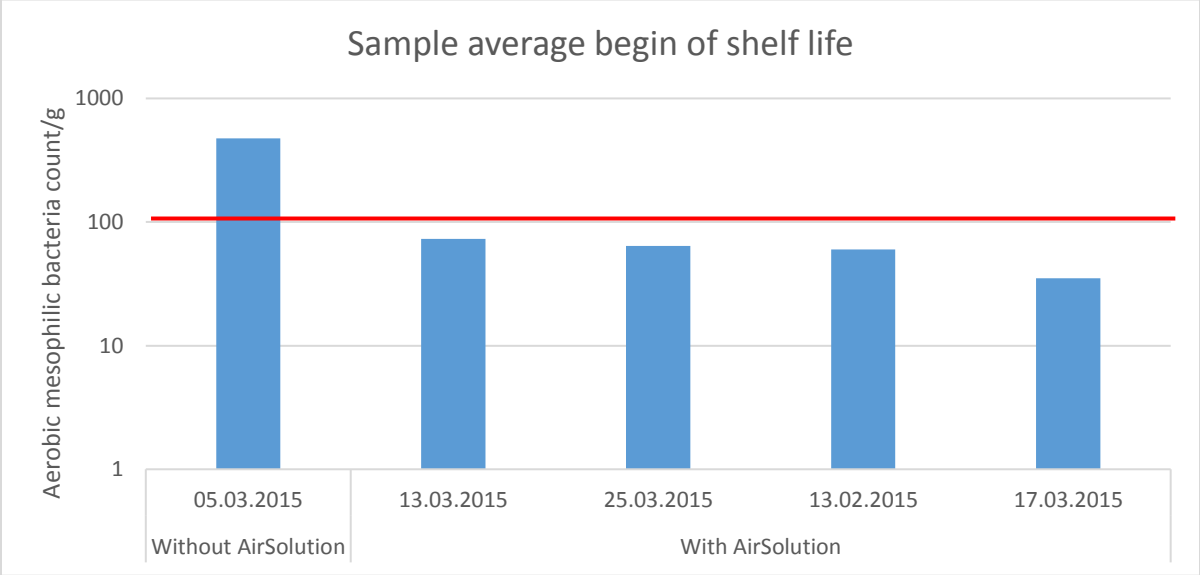


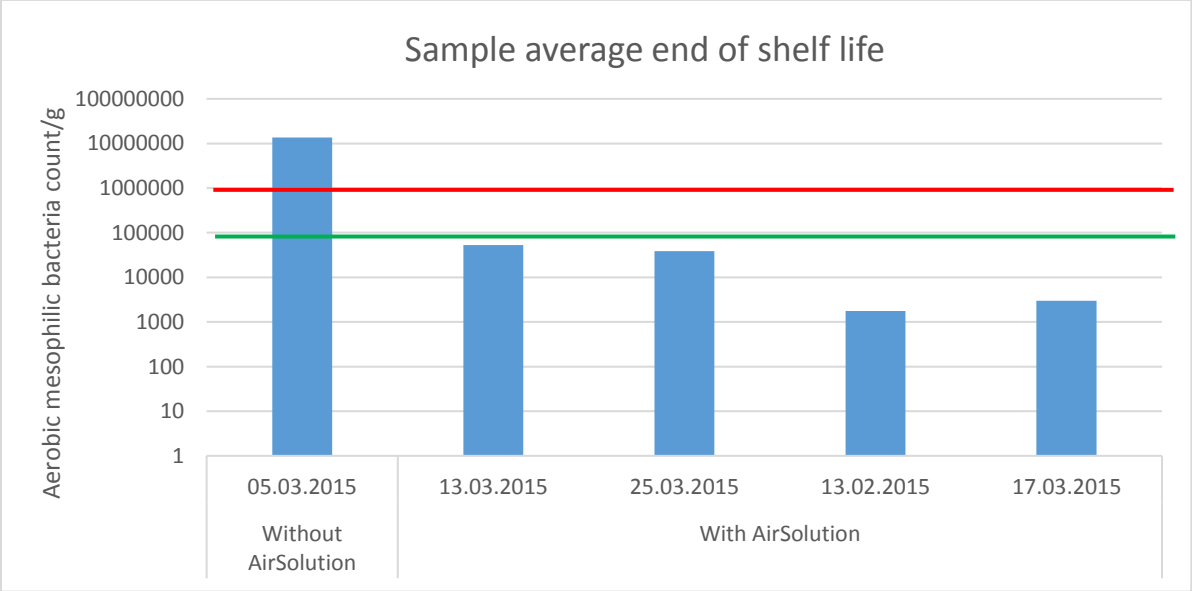
Sampling	There were 9 samples / day taken beginning, middle & end of production		
Temperature	6,8 °C		
Rel. humidity	68%		
Outside-parameter	21 °C; 65 % rel.H		
Consumption Slicer-line (Include a break or fail time of 1 hour)	310 ml/h	8 h/day	2170 ml / day

Also at these points a significant reduction of the status of germs due to the use of the AirSolution technique was measured also at the same amount of production output.

6. Results of the product tests for a cold cut product (Lyoner):

Product shelf life tests have been done with products (Lyoner) that was sliced and packed on the line after method § 64 LFGB L 00.00-88 (according to ISO 4833).
There have been taken numerous samples of the product at beginning of shelf life and at the end of shelf life.
Again there have been made a comparison of the processing with and without use of AirSolution at the cooling room and the slicer line.
The results as well as the guiding value and the critical value according to DGHM are shown in the following graphs.





Sampling	There were 24 samples / day taken beginning, middle & end of production		
Temperature	6,8 °C		
Rel. humidity	68%		
Outside-parameter	21 °C; 65 % rel. H		
Consumption Slicer-line (Include a break or fail time of 1 hour)	310 ml/h	8 h/day	2170 ml / day

The results are showing a clear stabilization of the product for the start of shelf life and the end of shelf life values, which was laying also obvious under the guidance value and critical value according to DGHM.
Long time evaluations have proved these results continuously.

7. Maximum allowable concentration (MAC) (measured by the Employer's Liability Insurance Association):

In order to prove the safety of the procedure for the employees in the production, there have been done measurements by Employer's Liability Insurance Association measurements of the content of hydrogen peroxide in the air, measured next to the fogging units.

The measured values have been significantly below the maximum allowable workplace exposure limit. For this measurement, it must be taken into account that in the same process environment used detergents and disinfectants have also an impact on the concentration of hydrogen peroxide in the air, which have not undergone any detailed recording here.

Working areas	Substance	Max. allowable concentration after TRGS 900 [mg / m³]	Measured concentration [mg / m³]
Meat production and processing, packaging, slicer	Hydrogen peroxide	0,71	0,25
Meat production and processing, packaging, conveyor belt	Hydrogen peroxide	0,71	0,17

8. Conclusion

Through the influence of the AirSolution Hygiene technology in continuous use along the production chain after the thermal treatment in the cooling room and along the slicer line until the packaging unit, a significant reduction in airborne bacteria and the surface stress was achieved and maintained permanently at several customer applications, resulting in sustainable hygiene protection results, which safeguards and possibly extends also the MHD of the final product significantly.

9. Methods

Air monitoring

Enumeration:
- Determination of total count, yeast and moulds

Implementation:
- Air born collector: MERCK MAS – 100® ECO; Fa. MERCK KGaA
- Air volume: 200 L

Incubation and evaluation:
- Total count: Plate Count Agar (Fa. OXOID) + 32°C / 48 h
- Yeasts and moulds: Sabouraud 4% Glucose (Fa. OXOID) +23°C / 96 h

Representation:
- Results are given as CFU / m³ (Colony Forming Units).
- Measured results were multiplied as follows: e.g. 100 CFU / m³ = 20 CFU / (200 L x 5).
- Overgrowth = Sample surface before end of incubation period overgrown with germs and therefore not countable.

Surface tests

Enumeration:
- Determination of total count, yeast and moulds

Incubation and evaluation:
- Total count : Plate Count Agar (Fa Biotest AG) + 32 ° C / 48 h
- Yeasts and molds: Sabouraud 4% glucose (from Biotest AG) + 23 ° C / 96 h

Representation:
- Results are given as CFU / 25 cm² (Colony Forming Units).
- Overgrowth = sample area before the end of incubation period overgrown with germs and therefore not countable.