
TEST REPORT**N° P-20.164**

REPORT DATE: 29/06/2020**SUBJECT:** Climatic Study of different types of carton boxes for chicken**BY ORDER OF:** **Smart Packaging Solutions**
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Recognition:



Introduction

Commissioned by Smart Packaging Solutions, the IBE-BVI performed a study to compare the freezing speed of chicken in solid and corrugated board. The study was executed with different types of boxes which were filled with chicken meat. The temperature probe was placed always in the geometric center of the box.

Corrugated cardboard

Quality corrugated board: B-wave 186K/135B/190T

Dimensions of the boxes: 60 x 40 x 9 (cm)

Corrugated Board 4 point glued with air holes (CB+)

Corrugated Board 4 point glued without air holes (CB-)

Solid cardboard

Dimensions of the boxes: 60 x 40 x 9 (cm)

Quality solid board lid: 700 g/m² - white testliner/brown testliner

Quality solid board bottom: 900 g/m² - brown testliner/white kraftliner

Solid Board 4 point glued with air holes (SB+)

Solid Board 4 point glued without air holes (SB-)

Solid Board double long side (DLS) with air holes (DSB+)

Solid Board double long side (DLS) without air holes (DSB-)

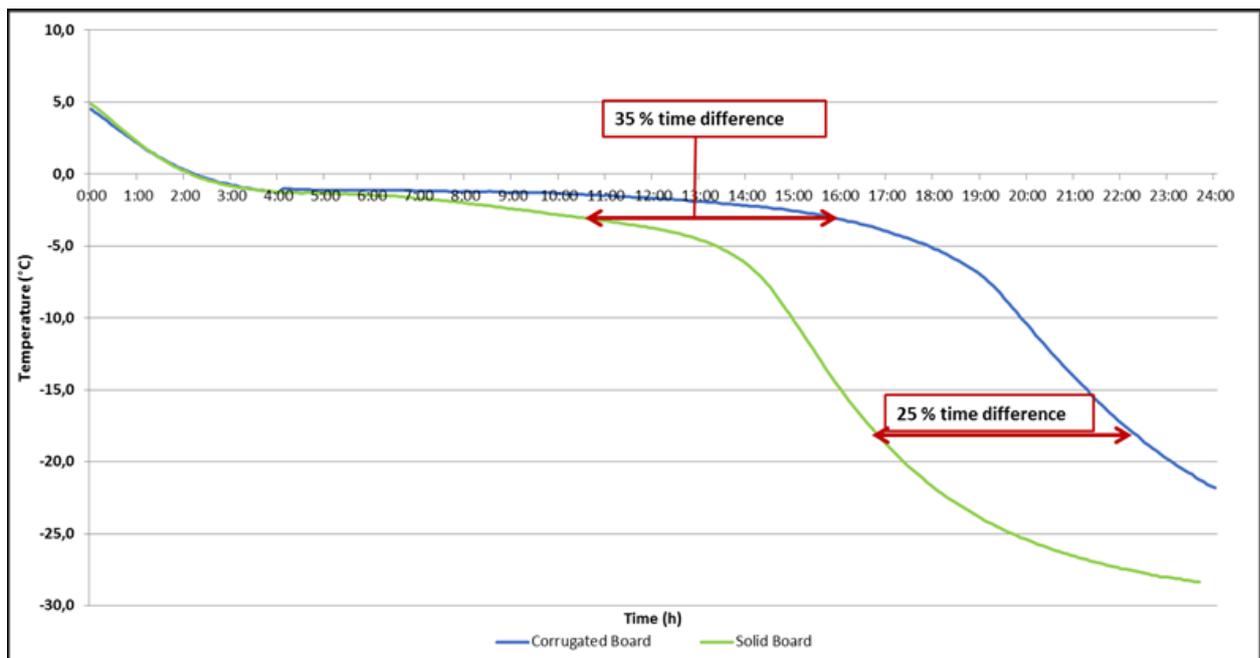
The results were interpreted by the IBE-BVI and resulted in a full report of which the most important results are presented in this summary report. All the data in this report is intellectual property of Smart Packaging solutions and cannot be used without their explicit permission.

Results

The table below shows the most important measurements during testing.

Type	Type short	Test run	Start temperature	Δ time 5 °C → -3 °C	Average	Δ time 5 °C → -18 °C	Average
Corrugated Board	CB-	1	4.7	15:35		22:25	
4 point glued without air holes		2	5.3	16:45		22:40	
		4	4.1	15:15	15:51	22:25	22:30
Corrugated Board	CB+	1	4.5	12:50		21:25	
4 point glued with air holes		2	4.3	16:10		22:55	
		3	4.3	18:50	15:56	21:30	21:56
Solid Board	SB-	6	4.0	9:55		16:00	
4 point glued without air holes		7	5.3	10:15		16:25	
		9	4.8	6:55	9:01	15:25	15:56
Solid Board	SB+	1	4.8	11:50		17:40	
4 point glued with air holes		3	4.0	11:05		17:00	
		4	3.9	10:25	11:06	16:45	17:08
Solid Board	DSB-	5	5.1	8:45		16:25	
Double long side (DLS) without air holes		7	5.5	9:40		16:30	
		8	5.6	11:40	10:01	17:55	16:56
Solid Board	DSB+	5	5.2	8:30		16:30	
Double long side (DLS) with air holes		6	4.6	13:45		17:05	
		9	5.5	12:10	11:28	17:20	16:58

The graph below shows the average temperature of the central probed chicken fillet during its time in the freezer (-30 °C) for the solid and corrugated cardboard. The time differences for the most crucial temperatures (-3 °C and -18 °C) are mentioned in the graph.



Conclusion

There is a significant difference in freezing speed between the use of corrugated board and solid board (single and double). The usage of air holes or a double long side don't seem to have a significant influence on the freezing speed. The fact that a freezer without blasting (high wind speeds) was used might explain the lack of difference concerning the presence of air holes.

The average time necessary to reach -3 °C (starting from around 5 °C) is approximately 35% faster with solid board in comparison to corrugated board. This means that the product that is frozen in solid cardboard will be of a significant higher quality due to the significant faster freezing because the natural rotting or decay process of the product is stopped earlier.

To reach -18°C (starting from around 5 °C), the goods packed in solid board (single and double) freeze around 25 % faster in comparison with the corrugated board boxes. This means that a productivity increase of 25 % can be achieved by choosing for solid board boxes to freeze the product instead of corrugated board boxes.

Differences between the repetitions with the same packaging type are observed. This is because the test material is of natural origin: differences in full capacity weight, difference in position of the temperature probe. Nevertheless, the difference between solid and corrugated cardboard is undisputable significant. This experiment was executed with solitary boxes and the noticed difference in freezing times will likely increase further in stacked formations of boxes.

This experiment was executed using solitary boxes.