



## BactoCEASE® NV Dry acetic acid uptake levels during brine dipping of salmon.

### OVERVIEW

Fish quality and safety are key elements for fish manufactures. Furthermore, consumers are looking for ingredients they can easily recognize. BactoCEASE NV Dry buffered vinegar contains acetic acid as its key active ingredient and is a clean label solution to protect processed fish against spoilage bacteria.

The product can be applied to fish in different ways including dissolving it in the brine that is used for dipping. Sufficient acetic acid uptake by the fish extends its shelf life and protects the product against the outgrowth of spoilage bacteria.

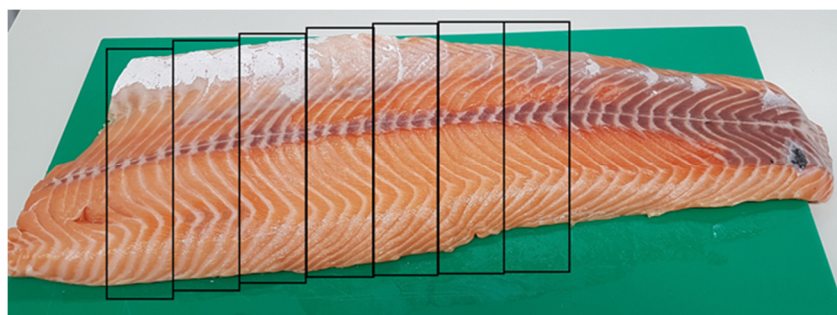
This study was set up to determine how both application process parameters and product parameters influence the acetic acid uptake level. Furthermore, the study evaluates how fish skin, salt levels and BactoCEASE NV Dry concentration in the brine have an influence on acetic acid uptake kinetics by the fish during brine dipping.



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### MATERIALS & METHOD

Salmon was chosen as a fatty fish and three 5 cm wide fillet pieces were submerged in brines with different compositions at a fish/brine ratio of 1/3. Different brining periods were applied from 0 up to 30 hours at a temperature of 4 °C. After brining, the acetic acid content of the fish was determined as a function of brining time.



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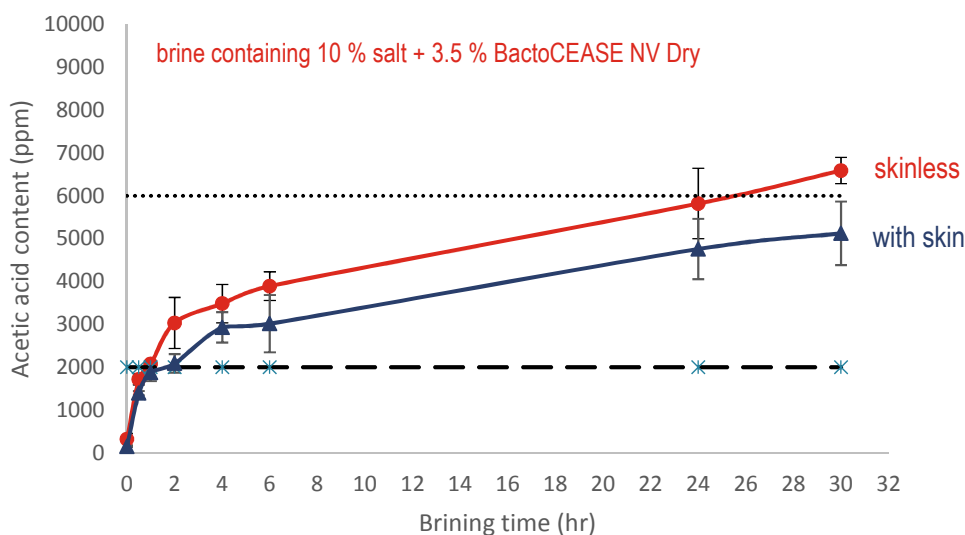
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Table 1. Brine composition

Brine composition		
Type	Salt content	BactoCEASE NV Dry
Salmon with skin	10%	3.5%
Skinless salmon	10%	3.5%
Skinless salmon	24%	3.5%
Skinless salmon	10%	2.0%
Skinless salmon	10%	7.0%

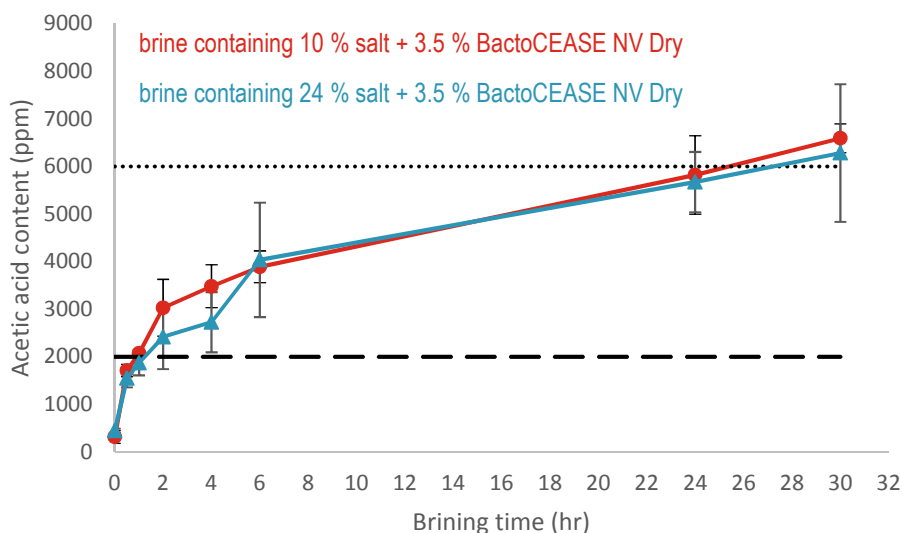
## RESULTS

The results showed that the **presence of skin on the salmon delayed the acetic acid uptake** indicating fish skin to be a barrier of uptake (Figure 1). For skinless salmon the desired acetic acid content of 2000 ppm was reached after approximately 1 hour and a 6000 ppm uptake was reached after 25 hours. However the salmon with skin only reached an acetic acid content of 2000 ppm after 2 hours of brine dipping. An uptake level of 6000 ppm acetic acid was not reached within the time frame studied.



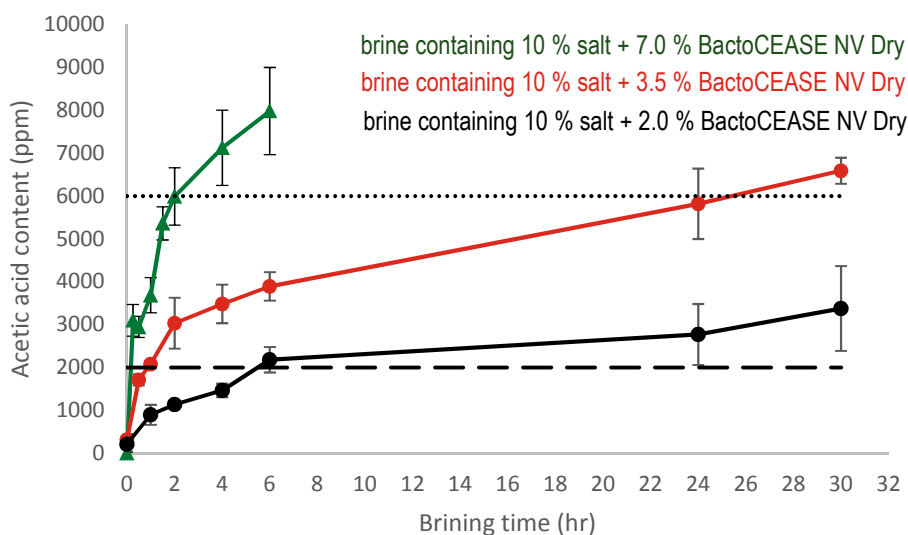
**Figure 2. Acetic acid content** of skinless salmon (—) and salmon with skin (—) after brine dipping. Desired acetic acid content after brining is 2000 ppm (—) or 6000 ppm for export (·····). The brine contained 10 % salt and 3.5 % BactoCEASE NV Dry. Error bars represent standard deviations (n = 3).

Figure 2 indicates that the **salt concentration** in the brine had **no effect on the acetic acid uptake**.



**Figure 2: Acetic acid content** of skinless salmon after brine dipping. The brine contained either 10 % salt and 3.5 % BactoCEASE NV Dry (—) or 24 % salt and 3.5 % BactoCEASE NV Dry (—). Desired acetic acid content after brining is 2000 ppm (—) or 6000 ppm for export (·····). Error bars represent standard deviations (n = 3).

**Increasing the BactoCEASE NV Dry concentration** in de brine from 2.0 % to 3.5 % and 7.0 % **accelerated the acetic acid uptake** (Figure 3). Brining time and BactoCEASE NV Dry concentration are clearly parameters which can be regulated to obtain the desired acetic acid content in the fish.



**Figure 3: Acetic acid content** of skinless salmon after brine dipping. The brine contained either 10 % salt and 2.0 % BactoCEASE NV Dry (—) or 10 % salt and 3.5 % BactoCEASE NV Dry (—) or 10 % salt and 7.0 % BactoCEASE NV Dry (—). Desired acetic acid content after brining is 2000 ppm (—) or 6000 ppm for export (.....). Error bars represent standard deviations (n = 3).

## CONCLUSION

Brining time and BactoCEASE NV Dry buffered vinegar concentration are clearly parameters which can be regulated to obtain the desired acetic acid content in the fish. The optimal BactoCEASE NV Dry dosages for brine dipping strongly depend on the brining parameters and type of fish. Kemin can help determine your optimal dosage for your specific fish products.



## REFERENCES

<sup>1</sup> Kemin Internal Document 18-00075

<sup>2</sup> Illustrative Shutterstock Picture and Kemin Pictures