P-12-12

High Pressure Treatment of Dry Aged Beef Trimmings for Fresh Meat Exchange in Raw Fermented Sausages (#142)

Franziska Witte, Dirk Steinriede, Christian Trumme, Frank Schilling, Volker Heinz, Nino Terjung, This IGF project of the FEI is supported via AiF within the programme for promoting the Industrial Collective Research (IGF) of the German Ministry of Economics and Energy (BMWi), bases on a resolution of the German Parliament.

German Institute of Food Technologies, Quakenbrück, Germany

Introduction

From 2014 to 2017, beef consumption in Germany increased by 8.25 % per capita and in addition over the past 10 years, consumption of high-quality meat products, such as *dry aged beef*, increased significantly [1]. Through the variation of the aging period, selection of the breed and the segment cuts, the selling prices can vary (12 to 100 €/kg). Within the project AiF 162 EN "OptiDryBeef", an idea developed to use a side stream product - dry aged trimmings. Moreover with this approach, ripening of raw fermented sausages, which is industrial needed [2], is accelerated.

To reduce microbiological contamination, trimmings were treated with high pressure processing (HPP) to ensure a microbial stable product. Among others, trimmings were incorporated to exchange fresh beef in a raw fermented sausage.

Methods

Trimmings from more than 21-days dry abed beef loins were treated with high pressure (Wave 6000/55, Hiperbaric S.A., Burgos, Spain) at 600 MPa for three minutes holding time, frozen and then incorporated such as fresh, frozen beef into a raw fermented sausage. As pre-dried beef control, freeze-dried beef (FDB) was utilized [3]. In Table 1 an overview of the exchanged amount of pre-dried beef is given as well as further ingredients. Samples were taken at day 0 and after 2, 5, 7, and 9 days of ripening. Microbiological analysis was conducted before and after HPP as well as during fermentation process. Furthermore, weight loss, water content (ASU L06.00-3) and pH-value (testo 480, Lenzkirch, Germany) was determined during ripening. Colour of samples was analyzed via L*a*b* measurement with CM-600d (Konica Minolta Sensing Inc., Marunouchi, Japan), whereas in this abstract only redness (a*-value) is considered.

Table 1: Overview of utilized amount of pre-dried beef and further ingredients.

Species	Segment	GEHA-Standard	Condition	Type and amount of pre-dried beef (%)				
0 %-DAB	100 %-DAB	50 %-DAB	7.5 %-DAB	7.5 %-FDB				
Pork	Shoulder	S II	Frozen	10	20	10	10	10
Fresh	30	30	30	30	30			
Bacon	S VIII	Fresh	20	10	20	20	20	
Beef	Beef	R II	Frozen	40	0	20	37	37
DAB	/	Frozen	0	40	20	3	3	
Further ingredients								Amount (%)
Curing salt (with 0.5 % sodium-nitrite)								2.80
Salami spice with fermentation sugar (CL) (Pacovis, Stetten, Swiss)								0.85
Lyocarni VBY 81 (SACCO, Cadorage, Italy)								0.02

Results

Microbiological analysis before HPP indicates high counts for yeasts, *Enterobacteriaceae*, *Pseudomonas spec*. and lactic acid bacteria, whereas after HPP counts decreased to counts of fresh beef, whereby a maximum of 3.0 x 10^3 CFU/g was found for yeasts. Microbiological analysis of raw fermented sausages showed no significant differences between modifications [data not shown]. Due to the exchange of fresh beef by dry aged trimmings, already after three days of ripening a comparable water content to 0 %-DAB (control) was reached. Furthermore, caused by the lowest water content at beginning of ripening, 100 %-DAB has the lowest weight loss (19 w/w %), followed by 50 %-DAB (Fig. 1). Minor differences between 0 %-DAB, 7.5 %-DAB and 7.5 %-FDB underline that amount of pre-dried beef is too less to obtain a significant accelerated ripening time. Additionally, the displayed regression analysis in Fig. 1 indicates a continuous drying of all salamis over whole ripening time. Higher pH-values at the beginning of ripening for 100 %-DAB are a result of the lower water content and therefore contribute to a slightly different acidification (Fig. 2). Redness of salamis with DAB are similar to control since myoglobin, which usually changes its modification while HPP, is denaturized/stabilized due to dry aging (Fig. 2). Contrary to these results, Figure 3 illustrates visual differences due to DAB content and consequently HPP since chopping of dry trimmings causes more smear due to a more difficult comminution in comparison to fresh beef.

Notes

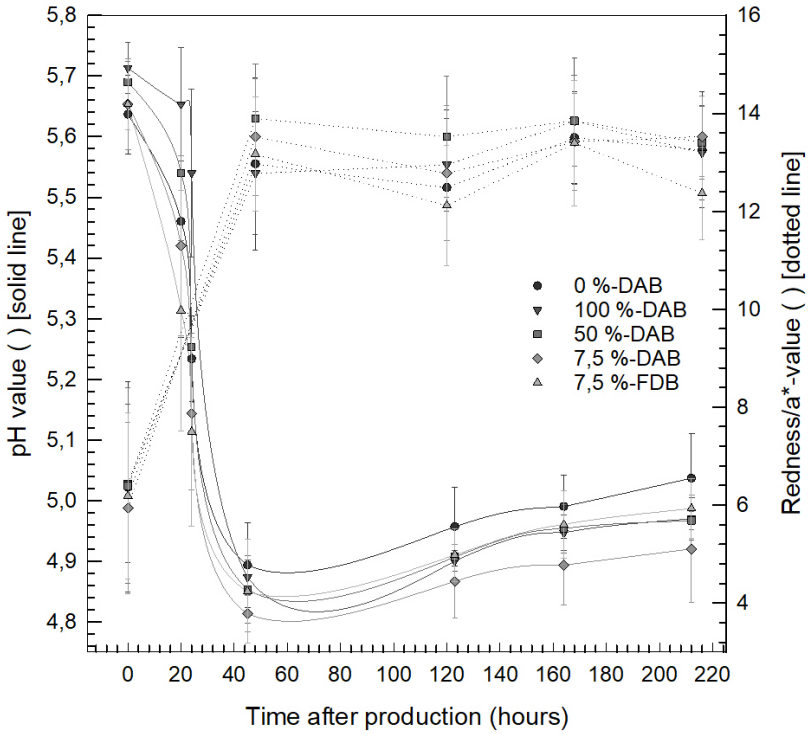
Conclusion

With HPP, microbiological spoilage of DAB trimmings is inhibited and thereby expensive treatment of the usually discarded trimmings becomes economical feasible. Therefore, an incorporation into raw fermented sausage is possible, while accelerating ripening time and operating sustainably. Furthermore, aroma of products can be enhanced by these trimmings, which is currently analyzed via aroma profile and sensory analyses.

References

1. BVDF. *Informationen in Zahlen*. 2018 [cited 2018 04.12.2018]; Available from: https://www.bvdf.de/in_zahlen/.
2. Fernandez, M., et al., *Accelerated ripening of dry fermented sausages.* Trends in food science & technology, 2000. **11**(6): p. 201-209.
3. Lu, J. and W.E. Townsend, *Feasibility of adding freeze-dried meat in the preparation of fermented dry sausage.* Journal of food science, 1973. **38**(5): p. 837-840.

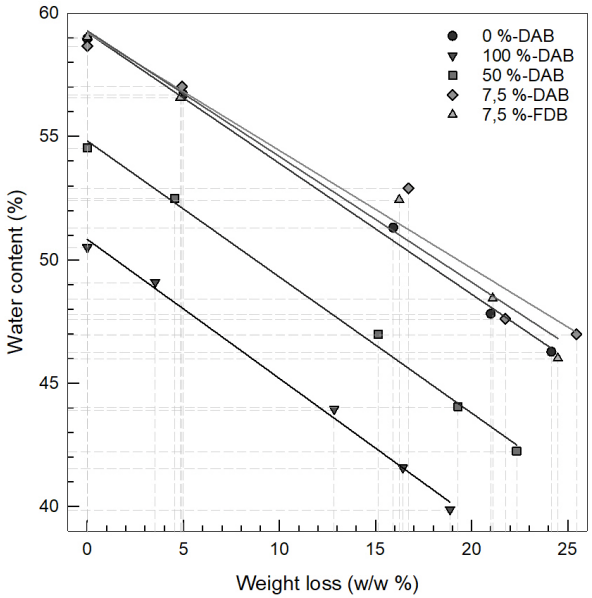
Notes



pH-value ( ) and a*-value ( ) plotted against time after production (hours)

Figure 2: pH-value ( ) [solid line] and redness/a*value ( ) [dotted line] over time after production (hours) from control (0 %-DAB), 100, 50 and 7.5 %-DAB (content of dry aged beef trimmings) as well as 7.5 %-FDB (content of freeze-dried beef).

Notes



Water content (%) plotted against weight loss (w/w %)

Figure 1: Water content (%) against weight loss (w/w %) from control (0 %-DAB), 100, 50 and 7.5 %-DAB (content of dry aged beef trimmings) as well as 7.5 %-FDB (content of freeze-dried beef).

Photos of salamis

Figure 3: Photos of salamis from left to right with 0, 100, 50, 25, 7.5 %-DAB (content of dry aged beef trimmings) and 7.5 %-FDB (content of freeze-dried beef).

Notes