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Optimization of replacing pork backfat with animal and plant-based fat for development of shelf stable Buffalo (*Bubalus Bubalis*) meat emulsion-type sausages (#421)

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Introduction

Meat and meat products are enriched with essential nutrients important for the optimal growth of body tissues *(2)*. Urbanization, improving living standards and life routines has changed eating habits of majority of population particularly in urban areas, showing an increase in the consumption of processed food commodities which are cost effective, innovative particularly with traditional taste *(5)*. In these circumstances consumers are increasingly relies on convenience (sometimes based on the exotic recipes) and (ready to eat) RTE products *(3)*. Many food companies are exploring these new business opportunities and marketing products, varying significantly in quality and price *(4)*. Among these exotic dishes which are getting popularity is, sausages. These are cost effective, rich in protein, shelf stable, tasty and less technological demanding meat products.

Buffalo is main beef source animal in south Asia with distinctive taste and meat characteristics. In this study, buffalo meat is used to develop sausages (wiener sausages) with different fat sources i.e. animal and plant, by replacing the pork fat to satisfy the requirements of certain ethnic groups, while evaluation of shelf stability is checked at high temperature to counter the needs of electricity shortage. Sensory evaluation will give the idea about the adoption patter and taste requirement of sausages in the local society.

Methods

Per experiment ca. 2 kg beef (Longissimus dorsi) (Male, Buffalo calve, 14-month age), taken from the processing facility of dept. of Meat Science and Technology, UVAS. Animal fat (Kidney pelvic heart (KPH), Sheep tail fat) and vegetable fat (Palm kernel) were used as a replacement of pork back fat to satisfy the needs of ethnic groups. Commercial spice mix was acquired from Gewuerzmueller, (FRUTAROM Savory Solutions GmbH, Siemensstraße 1, Korntal-Münchingen, Germany).

Sausage mass was prepared according the standard "Wiener" procedure as given in *(1)*. All ingredients were minced together with a 3-stage cutter Mado primus with 3 mm sieve and then stored at +4°C for 2 hrs. Sausage batter was prepared from beef and ice, by emulsification in a MADO Garant bowl chopper fitted with four blades rotating at 2800 rpm with a bowl speed of 24 rpm. Sausage mass was stored at 0-4 °C for providing curing time so that salts and enzyme could show their action for better manufacturing.Fiber securex casing with 33 mm diameter were softened by immersion into warm water for 30 min before stuffing. After stuffing with batter, cooking performed in pre- heated hot air oven at 80°C. Core temperature was measured in 30 min. intervals. When +70°C had been reached, temperature was held for 20 min. Then the sausages were hung overnight in a cooling room.

After this preparation, parameters like color, pH, TBAR, Cooking lose, water activity, TVC and sensory evaluation was performed and results were calculated through factorial ANOVA, assuming fat source as main effect and storage temperature and duration as sub-effects and their interaction was also checked. PROC GLM was employed in SAS software (Version, 9.1). Significant treatment means were separated through Duncan's Multiple Range test at $P \leq 0.05$ probability level.

Reference:

1. Doppler, F., & Eibensteiner R. (2007). Rezepte für gebrühte. p. 57-68. In, Würste und Pasteten: Herstellung und Vermarktung. AVBuch publishers.

Results

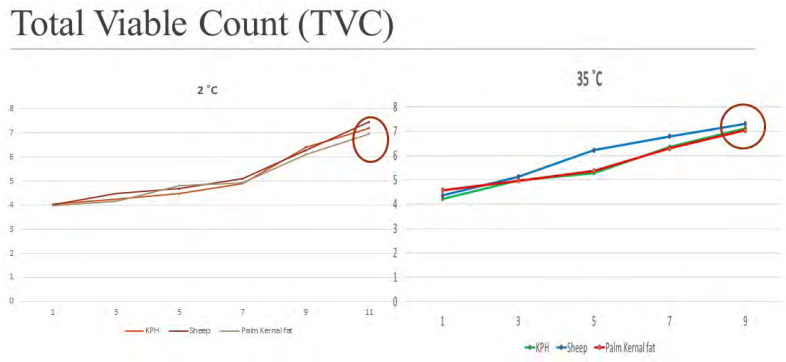
Results revealed that type of fat sources showed a significant ($P \leq 0.05$) effect on the instrumental color values. Lightness (L*), redness (a*) and yellowness (b*) were highly significant whereas non-significant results were observed for Chroma and hue values for the sausage samples. Highest L* values were recorded for the plant fat whilst lowest L* values were recorded in KPH fat sausages. Sheep tail fat sausages showed higher (a*) and (b*) values whereas lowest values were recorded for palm kernel butter fat sausages. Statistically significant ($P \leq 0.05$) differences between storage days were recorded for the lightness (L*), redness (a*) and yellowness (b*) amongst the samples while, no statistically significant results were observed for the product color. In TBARs analysis, Sheep tail fat sausages exhibited greater TBARs value and the lowest values were observed for sausages that were made from palm kernel butter fat indicating less oxidation in palm kernel fat sausages. Storage temperature and durations also have significant effect on the TBARs value.

Cooking loses are most prominent in sheep tail fat sausages. pH is observed lower at 2 ℃ in comparison to 35 ℃ which gets higher in similar fashion with storage duration. Water activity reduced significantly in palm kernel butter from 96.3 to 87.1 at 35 ℃ after 11 days while 5% sodium sorbate spray done externally to avoid fungal growth. TVC results are with in prescribed safe limits.

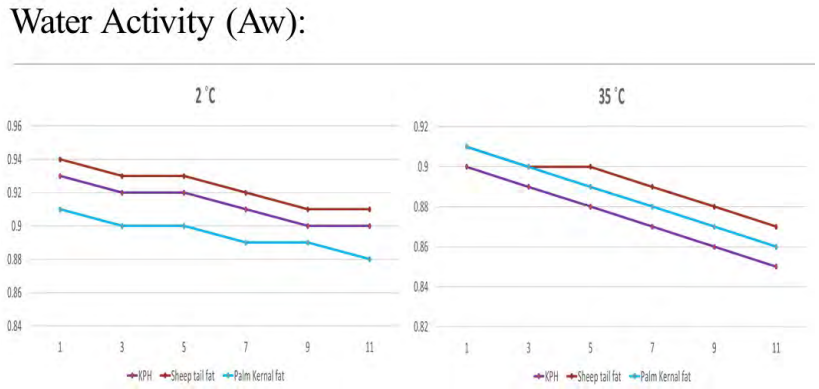
Conclusion

Development of sausages with KPH fat and palm kernel butter shows higher values of acceptance in sensory evaluation while analytical results also shows that stability measures of palm kernel fat based sausages has the most stable results in comparison to other fat sources. So further analysis trial should be conducted with vegetable fat source.

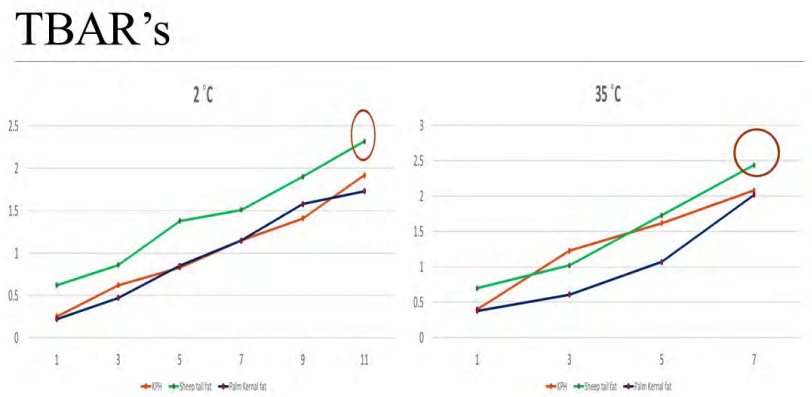
Notes



TVC at 2C and 35 C
Total viable count at different storage temperatures with animals and plant based fat sources



Water activity at 2C and 35 C
Water activity value at different storage temperature with animal and plant based fat sources



TBAR value at 2 C and 35 C
Lipid oxidation value at different storage temperature with animal and plant based fat sources

Notes