

Comparison of sucuk casing made of different fabric materials as alternative to natural and synthetic casings

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Hasan Yetim¹, Gokcegun Ciritci², Fatih Bozkurt³, Abdulatef Ahmed³

¹ Istanbul Sebahattin Zaim University, Food Engineering Department, Faculty of Engineering and Natural Science, Istanbul, Turkey; ² Erciyes University, Food Engineering Department, Faculty of Engineering, Kayseri, Turkey; ³ Yildiz Technical University, Food Engineering Department, Chemical and Metallurgical Engineering Faculty, Istanbul, Turkey

Introduction

Sucuk is a traditional Turkish sausage that is semi-dry fermented type usually produced from ground beef and fats. In the current study, it is produced with/without starter cultures, garlic, and salt and different spices. The mixture is then stuffed into collagen-based or natural casings and ripened for several weeks at different temperatures and relative humidity. In this study, as an alternative to the commonly used natural and artificial materials sausage casings, it is aimed to compare new casing materials made of different fabrics with similar or enhanced properties. The effects of fabric type, structural features and fabric thread density on the quality of the sausage were studied.

Methods

Meat and fat used in sucuk production were provided from a local butchery (in Kayseri, Turkey). *Pediococcus pentosaceus* and *Staphylococcus carnosus subsp. putillus* (CHR HANSEN BFL T03) were used as commercial starter cultures. The sausage dough with/without starter culture was filled in 6 different casings made of natural, artificial (collagen) and 4 different fabric materials (casings types given in Table 1). The samples were subjected to fermentation in a ripening chamber for 12 days. The chamber conditions during fermentation were as follows: 24 ± 1°C - 90% relative humidity for first 3 days, 22°C - 85% relative humidity for the following 4 days and 18°C - 80% relative humidity for 5 days. After fermentation, the sausages eventually were packed and stored at +4°C for 32 days. The dry matter, ash, protein and fat contents of the sausages were analyzed using proximate composition analysis (AOAC, 2006). The pH levels of the product were determined using a Mettler Toledo pH meter (Columbus, US). Color measurement was performed using a CR-5 colorimeter (Minolta Chroma Meter, Japan). The TMAB number of the sausage samples was determined by drop plate method in the plate count agar (PCA, Merck) medium. The petri dishes were incubated at 30°C for 24-48 hours. The total count of LAB was determined using MRS agar (Oxoid, U.K.) incubated at 37°C for 72 hours. Meanwhile, the total population of total yeast and mold was determined using Dichloran Rose Bengal Chloramphenicol agar (DRBC, Merck) and incubated at 25°C for 3 to 5 days. Violet Red Even Agar (VRB, Merck, Germany) was used for coliform bacteria counting

Results

The initial protein % of semi-dry fermented sausage samples with (S) and

without starter culture (K) during fermentation and storage were 16.06 and 16.00, respectively. The protein content was significantly ($p \leq 0.05$) increased (range 26.63 - 29.55 %) in all samples at the end of fermentation period. The initial pH values of S and K were 6.06 and 6.13, respectively. pH values of all samples during storage showed downward tendency (range 4.90–5.38). pH levels in sausages with starter culture were higher compared to that of the sausage without starter culture. The trend in fat content was similar to protein content as significantly ($p \leq 0.05$) increased (41.40 and 47.85%) in all samples during storage period. Ash content was almost significantly ($P \leq 0.05$) increased in all samples during the fermentation period. Dry matter contents of all samples ranged from 76.10 to 81.01 % were higher compared to that of fresh samples (47.90 for S and 47.65 % for K) at the end of the fermentation period. L^* values of the samples were found to be in the range of 44.57-47.13 on 12th day and the darkest sample was K6 and the brightest sample was K3. In addition, it was observed that the samples of natural and artificial sheathed sausages had a higher a^* value than the samples with fabric casings. The b^* value of the all samples decreased during the fermentation (day 0-12). The lowest b^* value was observed in K4 sample and the highest b^* value was observed in S1 sample on 12th day. As illustrated, an increase was observed in the number of *total mesophilic aerobic bacteria* (TMAB) during the fermentation period (day 0-12), while a decrease was observed in the number of TMAB during the storage period (12-32 days). On day 12 of fermentation the number of TMAB of the fabric sheathed samples was higher than the natural and artificial sheathed samples. On day 32 of storage, it was observed that the LAB number of the samples ranged between 8.20 and 8.82 log cfu/g, in which it was the lowest in K3 sample (8.20) and the highest was in the S5 sample. Furthermore, on day 32 of storage the total number of yeast and molds of the samples was in the range of 4.41-6.94 log cfu/g, where it was significantly higher in fabric sheathed sausages than in the natural and artificial sheathed samples.

Conclusion

The data indicates that the different fabric casing did not negatively affect the physicochemical properties of sucuk as compared to the commonly used casing. In short article proposes that innovation in mixing the components of casing tissue designed for sausages may enhance the quality parameters of sucuk which results in better perception of consumers. The fabric materials

could be an alternative casing materials for the sausages due to its high durability, good water and gas vapor permeability, resistance to stress and external factors, the ability to non-interact with the product and to produce in standard sizes etc.

Type of Sausage Casing	Without starter culture	With starter culture
Natural casing (beef small intestine)	S1	K1
Artificial casing (collagen)	S2	K2
100% cotton case with Ne20 yarn number	S3	K3
100% cotton case with Ne30 yarn number	S4	K4
100% polyester case with Ne20 yarn number	S5	K5
35% cotton / 65% polyester case with Ne20 yarn number	S6	K6

Table 1. The types of casings used in sucuk processing Ne: Expressed as the length of a pound of yarn as a hank.

Notes