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TÜRK FERMENTE SUCUĞUNUN OLGUNLAŞMASI SIRASINDA TYRAMİN DÜZEYİNDEKİ DEĞİŞİKLİKLER

CHANGES IN TYRAMINE LEVEL DURING THE RIPENING OF TURKISH FERMENTED SAUSAGE

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SUMMARY: This research was conducted to examine the changes of tyramine levels during the ripening of Turkish fermended sausage and to determine the relationship between tyramine levels and some parameters (pH value, dry matter content) of sausages.

Sausage samples were analysed for pH, dry matter and tyramine level during ripening.

The tyramine content showed a marked rise during the first three days of the ripening and it reached maximum level at the sixth day. After that, the reduction of tyramine level was observed.

A significant negative correlation ($r = -0.80$, $p < 0.05$) was found between pH and tyramine level of sausages. It is concluded that pH value would be of great importance for obtaining sausages with low tyramine level.

ÖZET: Bu araştırma, Türk fermente sucuğunun olgunlaşması süresince tyramin düzeylerindeki değişiklikleri incelemek ve sucukların tyramin düzeyleri ile bazı parametreleri (pH değeri, kuru madde miktarı) arasındaki ilişkiyi belirlemek amacıyla yapıldı.

Sucuk numuneleri olgunlaşmaları süresinci pH, kuru madde ve tyramin düzeyleri yönünden incelendi.

Tyramin miktarı olgunlaşmanın ilk üç günü süresince önemli bir artış göstererek altıncı günde maximum düzeye ulaştı. Daha sonraki günlerde, tyramin düzeyinde azalma gözlendi.

Sucukların pH ve tyramin düzeyi arasında önemli negatif bir korelasyon ($r = -0.80$, $p < 0.05$) bulundu. Düşük düzeyde tyramin içeren sucukların elde edilmesinde pH değerinin çok önemli olabileceği kanısına varıldı.

INTRODUCTION

Tyramina, decarboxylation product of the amino acid tyrosine, is strongly vasoactive amine that cause migraine headaches and hipertensive crises in patient with monoamine-oxidase therapy following consumption of foods with high tyramine content or long term consumption of low levels (HANNA et al., 1988; McCABE, 1986; MOWER et al., 1989; UZOGARAet al., 1987).

Some researchers (DIERICK et al., 1974; EITENMILLER et al., 1978; SANTOS-BLUELGA et al., 1986; VANDEKERCKHOVE, 1977) reported the tyramine formation during the ripening of several kinds of sausages VANDERKERCHOVE (1977) showed that tyramine levels of 26 dry fermented sausages ranged from 10,18 to 150,63 mg per 100 g of dry matter. This researcher also concluded that a large variation in the amine content and composition was possibily related to different fabrication methods and to the spesific flora of the sausages. Some researchers (DIERICK et al., 1974; EITENMILLER et al., 1978; SANTOS-BUELGA et al., 1986) observed that the greatest increase of tyramine levels occured during the first two-three days of ripening. EITENMILLER et al. (1978) and SANTOS-BUELGA et al. (1986) reported that pH influenced tyramine formation of the sausage.

At present no published information about tyramine level of Turkish fermented sausages. Therefore the aim of this study was to examine the changes of tyramine levels during the ripening of Turkish fermented sausages and to determine the relationship between tyramine content and some parameters (pH value, dry matter content) of sausages.

MATERIALS AND METHODS

Sausage Manufacture

The basic formulation of sausage was as follows: 20 kg beef meat, 3 kg sheep tail fat, 400 g salt, 200 g sugar, 200 g red repper, 120 g black pepper, 200 g cumin, 500 g garlic, 10 g sodium nitrate and 10 g ascorbic acid. Beef meat and sheep tail fat were cut into 2-4 cm cubes. All the other ingredients were added to beef meat and fat, and mixed altogether. This mixture was pased through 3 mm plate. The sausage mixture was introduced into cleaned cattle small intestines with a hydraulic stuffer. The sausages

thus obtained were hung in a fermentation chamber at 24±2°C with approximately 90-95 % relative humidity and left for 5 days. Following this, they were left at 22±2°C with 80-85 % relative humidity for 6 days. The remainder of the ripening was carried out at about 13±2°C with 70 % relative humidity.

Two sausage samples were removed periodically during fermentation and drying. The samples were withdrawn, homogenized and then used for analysis. All chemical analysis were carried out in duplicate on each sausage sample.

Laboratory Analysis

Dry matter was determined by the gravmetric method (ANONYMOUS, 1984). The pH value was measured using a Orion Research Model 701 Digial pH meter (ACTON and KELLER, 1974). The method of HUI and TAYLOR (1983) was used for extraction of tyramine from samples. Tyramine monohydrochloride (Merck) was used as a standard tyramine solution. For the quantitative determination, the tyramine extract was reacted with α-nitroso-ß-naphtol to form a florescent compound (SANTOS-BUELGA et al., 1981) and the tyramine content was determined in a Beckman spectrophotometer by measuring the absorbance at 455 nm (UZOGARA et al., 1987).

Data Analysis

Correlation coefficients and regression analysis were performed by using the software package SPSS/PC+(version 5.0).

RESULTS AND DISCUSSION

Figure 1 shows the changes in pH, dry matter and tyramine levels during ripening of Turkish fermented sausages.

The initial pH of the sausages was fairly high (6,05). A marked drop in pH was observed during the first 6 days. Following that no significant variations were observed.

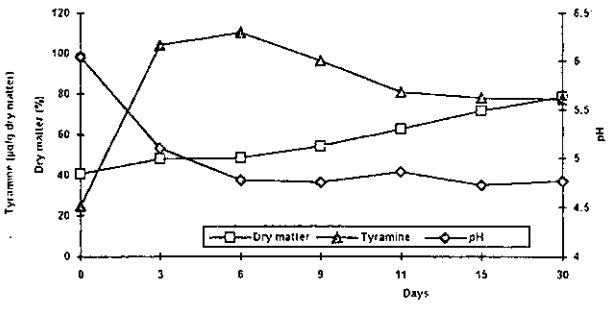

Figure 1. Changes in pH, dry matter and tyramine levels during sausage ripening

An increase in dry matter content between 6 and 15 days was higher than that of other periods. The relationship between dry matter content and pH value was not statistically significant ($r = -0,64$, $p > 0,05$).

The tyramine level showed a marked rise during the first three days of the process and reached maximum level of 110,1 µg per g dry matter at the sixth day. After that, the slight reduction of tyramine level was observed. A similar situation for 2-3 days of the process was observed by DIERICK et al. (1974), EITENMILLER et al. (1978), SANTOS-BUELGA et al. (1986). But EITENMILLER et al. (1978) and SANTOS-BUELGA et al. (1986) reported that there were no significant variations in tyramine level during the drying stage.

There was no significant correlation ($r = 0,12$; $p < 0,05$) between dry matter and tyramine. pH influenced tyramine formation. Highly significant negative correlation ($r = -0,80$; $p < 0,05$) between pH and tyramine level of sausages was obtained. EITENMILLER et al. (1978) and SANTOS-BUELGA et al. (1986) also observed a relationship between the contents of tyramine and the pH of the sausage.

This study shows that the content of tyramine can be taken in safety level by regulating the pH value of sausages.

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