Original Paper

Determination Of Easily Hydrolysable Nitrogen In Meat Products

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ABSTRACT Growth and fermentation process of meat acidity is favored by muscle glycogen level. Fermented meat or "hot meat" contains a relatively high amount of acid, hydrogen sulfide but has very little alkali or ammonia. But under the influence of bacteria, typical decay processes occur which is actually classical method of altering and insanitary meat. Results depend on the nature of bacterial products, which are acting on anaerobiosis or aerobiosis as septic nature of meat in animals with bacteremia. In general, aerobic bacteria initiate and facilitate the action of the anaerobic and the result is very complex.

KEY WORDS *easily hydrolysable nitrogen, meat products*

Introduction

In this study, we determined easily hydrolysable nitrogen content in parizer, sausages, summer sausage, representative products for the three broad categories of products manufactured and marketed in Braila within validity term. The products were purchased from the store and kept in conditions specified by the manufacturer.

Determination of easily hydrolysable nitrogen was done by direct titration with hydrochloric acid. Easily hydrolysable nitrogen released with magnesium oxide (as ammonia) is trained by distillation with water vapor and captured in a boric acid solution in which is dosed by titration with hydrochloric acid.

Material and Methods

Reagents

- boric acid solution: 40 g boric acid dissolved in water and then water is added to 1000 cm^3;
- hydrochloric acid 0.1 N;
- calcined magnesium oxide, powder;
- neutral paraffin oil;
- Tashiro indicator: 0.2 g of methyl red and 0.1 g methylene blue dissolved in 100 cm^3 alcohol of 95 % vol.

We weigh about 10 g of sample with 0.01 g accuracy and pass quantitatively in distillation flask with 200 – 300 cm^3 water. 25 cm^3 boric acid solution are inserted into the collecting vessel and 4 drops of Tashiro indicator then we immersed condenser adapter with 4 – 5 mm in the solution of the collecting vessel. In the distillation flask where the sample was introduced are added 1 to 2 grams of magnesium oxide and 5 to 10 cm^3 paraffin oil (to avoid foaming) then wash the walls of the flask with water, shake, adapts to the distillation installation, pour hydrochloric acid and distillation takes place. As the ammonia uptake in the collecting vessel indicator turns from acid tempt (violet blue) to alkaline tempt (green). At this moment add a drop of hydrochloric acid until the indicator return to acid tempt (violet blue color persists for at least 5 minutes).

Easily hydrolysable nitrogen content, expressed as ammonia, in mg/100 g, is calculated by the formula:

$$\text{Easily hydrolysable nitrogen} = \frac{0.0017 \cdot V \cdot 1000}{m}$$

where:
0,0017 – ammonia quantity, in g, corresponding to 1 cm^3 of hydrochloric acid 0,1 N;
V – volume of 0.1 N hydrochloric acid used for titration of distillate, in cm^3;
m – mass of the sample taken for determination, in g.

Results and Discussion

The three analyzed meat products in the range of validity term had the following compositions, validity terms and storage conditions:

Parizer (hot smoked prepared / pasteurized without structure) has the following composition:

- Beef meat, pig meat, bacon, rind;
- Vegetable protein;
- Salt;
- Condiments and spices extract;
- Dextrose;
- Stabilizer: mixture of polyphosphates E 450, E 451;
- Preservative: sodium nitrite E 250;
- Antioxidant ascorbic acid E 300;
- flavor enhancer: monosodium glutamate E

621;
- color: carmine easily;
- inedible artificial membrane.

Storage temperature is +2 – +5°C and relative humidity 75 – 80 %.

Validity term is 7 days (29.06 – 04.07.2010).

Sausages (hot smoked prepared/ pasteurized with structure) has the following composition:
- Beef meat, pig meat, bacon;
- Salt;
- Natural spices;
- Stabilizer: sodium polyphosphates E 450, E 451;
- Antioxidant: ascorbic acid E 300;
- Preservative: sodium nitrite E 250;
- Edible membrane;

Storage temperature is +10 – +12°C and relative humidity 75 – 80 %.

Validity term is 15 days (29.06 – 14.07.2010).

Summer sausage (hot smoked prepared/ pasteurized/ cold smoked) has the following composition:
- Beef meat, pig meat, bacon, rind;
- Vegetable protein;
- Salt;
- Condiments and spices extract;
- Dextrose;
- Stabilizer: mixture of polyphosphates E 450, E 451;
- Preservative: sodium nitrite E 250;
- Antioxidant sodium ascorbate E 301;
- flavor enhancer: monosodium glutamate E 621;
- color: carmine ;
- inedible artificial membrane.

Storage temperature is +2 – +5°C and relative humidity 75 – 80 %.

Validity term is 15 days (25.06 – 09.07.2010).

For the three analyzed products, easily hydrolysable nitrogen maximum permissible content is given in Table 1.

Table 1 – Easily hydrolysable nitrogen maximum permissible content

Product	**mg NH_3/100 g**
Parizer	70
Sausages	50
Summer sausage	50

Evolution of easily hydrolysable nitrogen content of products within the validity term is given in Table 2, Figure 1.

Table 2 – Evolution of easily hydrolysable nitrogen content of products within the validity term

Product	29.06.10	01.07.10	06.07.10
Parizer	19,55	30,6	-
Summer sausage	22,1	22,95	25,16
Sausages	17	22,44	54,4

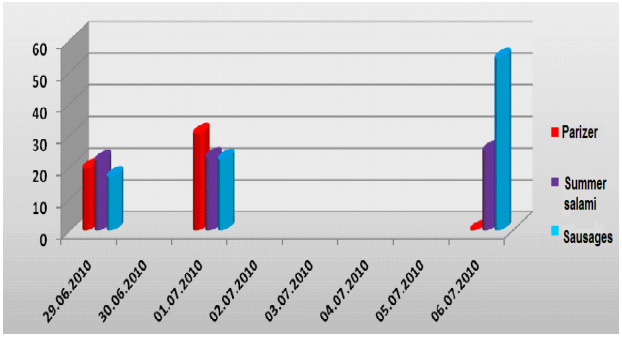

Figure 1 – Evolution of easily hydrolysable nitrogen content of products within the validity term

Conclusions

As seen in Figure 1 easily hydrolysable nitrogen increases in time at all products with 4 – 9 %.

At parizer is found that on 07/01/2010 (Third day) easily hydrolysable nitrogen exceeds maximum permissible value of 30 mg NH_3/100 g product.

At sausages shows that evolution of easily hydrolysable nitrogen is significantly increased on 06/07/2010 (eighth day) exceed the maximum amount allowed of 45 mg NH_3/100 g product.

This occurs as a result of bacterial alteration process producing rapid bacterial metabolisation of relatively simple compounds such as: amino acids, fat, lactic acid, sugars giving toxic amines, organic acids, CO_2, H_2S, NH_3, while strong proliferation of germs. The result is the appearance of „slime" and the product becomes unfit for human consumption.

References

1. Dumitrescu H, Milu C – (1997) Controlul fizico-chimic al alimentelor, Ed. Tehnică, București, 123 – 125.
2. STAS 9065/7 – 74.

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