7:4

INVESTIGATION ON OXIDATIVE CHANGES IN LONG RIPENED DRY SAUSAGE

ANNA NAGY, VILMA MIHÁLYI, and K.INCZE

Hungarian Meat Research Institute,
1453 Budapest, P.O.B. 17

SUMMARY

Changes in fats and fatty acids as well as color stability of long ripened dry sausage with surface mold have been investigated by measuring some characteristic parameters /benzidine number, acid number, TBA-number, peroxide number/. Tests have been carried out during ripening and storage. Comparing auto-oxidation changes of fat tissue /bacon/ and changes of fats in dry sausage no similarity has been found. A definite increase of acid number can be detected in dry sausage during ripening, yet no sign of rancidity is detectable either organoleptically or by peroxide number. Raise of acid number is mainly due to the activity of lipolytic microorganisms. Smoking adds to the increase of acid number. Longer storage in cardboard boxes is detrimental to surface color causing greyish-brownish discoloration.

INTRODUCTION

Questions of rancidity-development during ripening and storing of dry sausage is not completely understood. Although some older data are available, no investigations have been carried out since amount of added curing salts was drastically reduced. Szeredy /1/ compared changes in peroxid and acid number of lard and salami, and concluded that only little increase in acid number takes place in lard but rancidity is detectable at a value of 2, while five times as high value was shown in salami during the same period of storage without any sign of rancidity. Peroxide number in lard increased rapidly on the contrary to salami where it decreased mainly after smoking. Similar increase in acid number of salami was found by Mihályi and Körmendy /2/. They further showed a difference in acid number of outer and inner layers, being lower in the outer layer after smoking, yet the inversion was found after 4o days. Kevei et al. /3/ could also detect free fatty acids in salami and found an increase in palmito-oleic and oleic acid and a decrease in linolic and linolenic acid. With these results Hadziosmanovic et al. /4/ agreed too. The increase of fatty acids during ripening of dry sausage was explained by lipolytic activities of lactobacilli /Coretti, 5/. Lipolytic activity of molds plays a role in dry sausages according to Dolazelek et al /6/, while lipolytic and proteolytic activity of Aspergillus and Penicillium strains was shown by Fathy et al /7/.

MATERIALS AND METHODS

Dry sausage samples of different age /o, 1o, 4o, 7o, 1oo days/ as well as samples after storage were taken at random and examined. Storage took place at 18-22°C, 65-7o % rel. humidity partly hung partly in cardboard boxes with perforation. Parameters examined were as follows: pH /INDUNORM/, moisture /8/ total pigment /9/ number of lipolytic microorganisms /1o/, peroxid-, acid-, benzidine number /11/, TBA number /12/, sensory evaluation.

RESULTS AND DISCUSSION

Changes in moisture during ripening and storage are shown in fig.1. Moisture content decreases also during storage, evidently more when hung, less in boxes. pH-changes can be detected too /fig.2./: initial value goes down after smoking /effect of acetic acid/, and acetic acid is detectable in fatty acid spectrum of dry sausage. A significant raise of pH takes place during ripening both in the surface and inner layer. This pH-raise in the core is slower than in the rind, but an overall increase is characteristic during ripening and storage.

CHANGES IN RANCIDITY PARAMETERS

Fig. 3. shows the changes of benzidine-, and fig.4. show peroxid and TBA number. Initial values decrease after smoking but increase later. Results do not suggest rancidity in dry sausage, supported by data of Sedlacek /13/ too.

CHANGES IN ACID NUMBER

There is a significant change in acid number during ripening, being mainly remarkable after smoking. A further change /increase/ takes place during storage as well /fig.5./. No correlation has been found between higher acid number and rancidity, higher acid number is namely caused by increase in free fatty acids. This elevation is likely caused by the lipolytic activity of microorganisms shown also on tributyrin medium. /Fig.6./

SENSORY EVALUATION

Significant difference has been found between quality and color stability of dry sausages stored hung or in boxes. In latter case surface becomes wet, undesired microorganisms may grow on the surface, unpleasant odor is detectable, although intensive aeration eliminates this odor. This odor and flavor has no relation to rancid flavor. After longer period of storage /3o days/ discoloration of outer layer takes place parallelly with a definite decrease in total pigment content compared with the core, which phenomenon suggests the break-down of myoglobin. Acid number in outer layer is two times as high as that of the core. A change in microflora on dry sausage packed in boxes cannot be excluded either, caused by either altered circumstances of rel.humidity, lipolysis etc. Pigment-oxidation may take place in presence of free fatty acids, forming not only met-myoglobin, but also leading to a break-down of the hematin ring.

REFERENCES

1. Szeredy I.: Élelmezésipar, 8 /5/, 158 /1954/
2. V.Mihályi; L.Körmendy.: Food Tech., 21 1398 /1967/
3. Keveiné, Pichler E., Blazovich M.: Élelmiszertudomány, 2, 163 /1968/
4. M. Hadziosmanovic; J.Zukovic; J.Martincic: E. Fulgosi: Veterinarski Archiv, 49, /4/, 177 /1979/
5. K.Coretti: Fleischwirtschaft, 1, 21 /1965/
6. J.Dolezalek; S.Klein; J.Brendl: Sbornik Wysoké skoly Chemickotechnologické Praze, 4, cast 1 /1969/
7. Fathy E; El-Gazzar; Elmer H; Marth: J.of Fd. Protection, 49 /1/, 29 /1986/
8. OHKI Füzetei 4. Budapest 1975
9. H.C.Hornsey: J.Food and Agriculture 7, 534 /1956/
1o. Kiss J: Testing Methods in Food Microbiology Akadémiai Könyvkiadó, Budapest 1984
11. Untersuchung von Lebensmittel VEB Fachbuchverlag, leipzig 1972
12. Yago; Kunio: Med.Technol., /Tokyo/ 8 /12/
13. B.A.J. Sedlacek: Die Nahrung, 8, 59 /1964/

Fig.1. Changes in moisture during ripening /X/ and storage
• = hanging on sticks
▲ = cardboard boxes

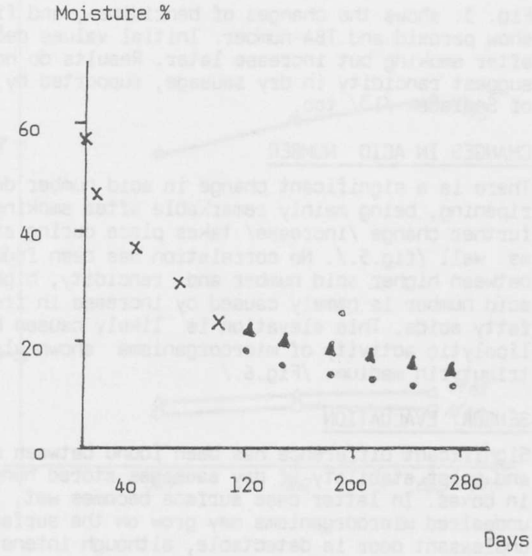

Fig. 2. Changes of pH during ripening and storage

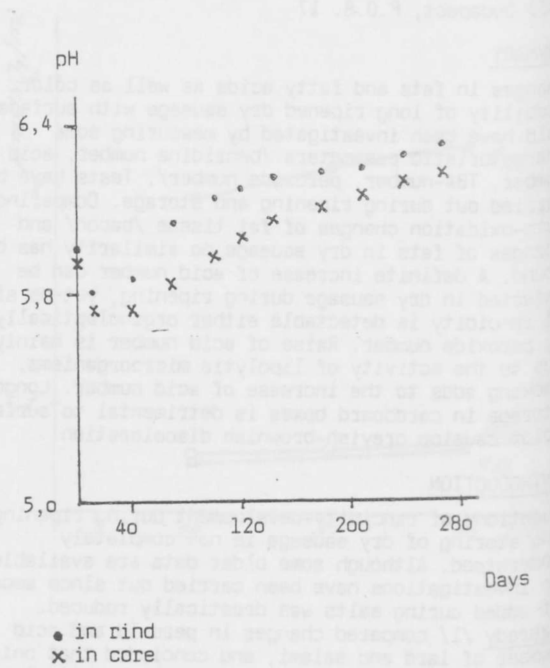

Fig.3. Changes benzidine number during ripening and storage

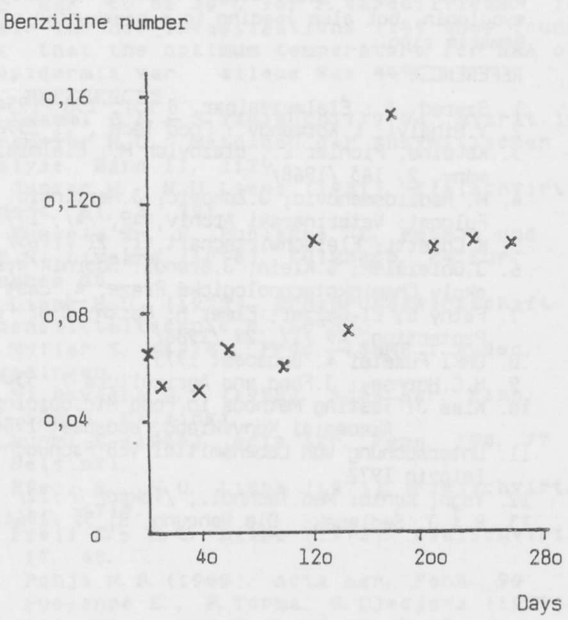

Fig.4. Changes of peroxidenumber and TBA number during ripening and storage

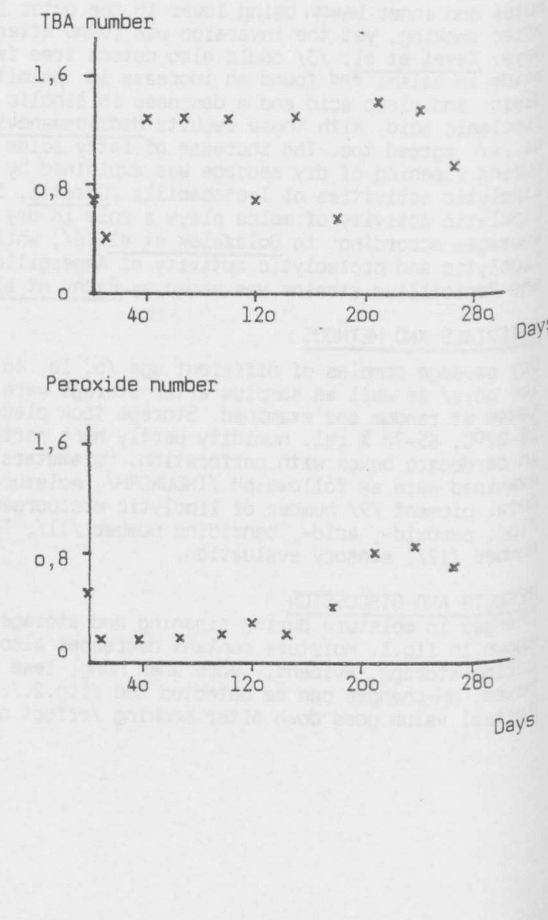

Fig.5. Changes of acid number during ripening and storage

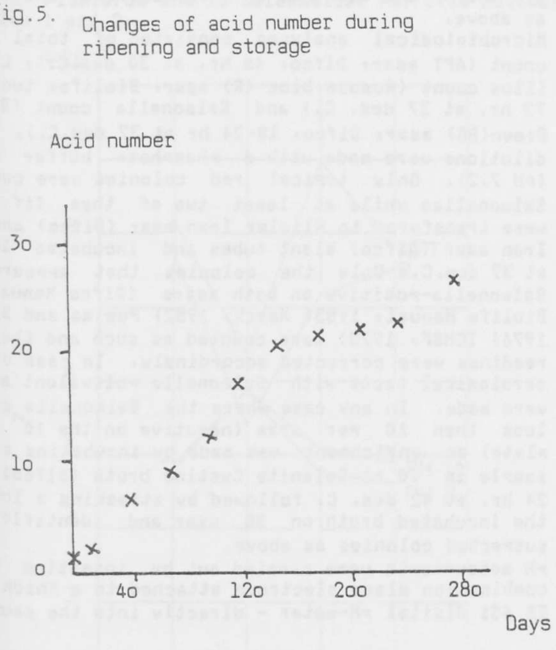

Fig.6. Correlation between acid number and viable count of lipolityc microorganisms