

## RESEARCH ARTICLE

**(Open Access)****Effects of nitrates and chilli peppers on stability of meat products**

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**Abstract**

The oxidation of lipids is fundamental reactions in food chemistry, and oxidation of lipids has several consequences for food quality. The most important factor of shelf life of meat is its oxidative stability. Lipid oxidation not only produces unpleasant flavours and loose of it native colour, but also decrease the nutritional quality. Nitrates are added to the meat products, like bacon, salami or sausage for colouring them and extending shelf live. The chilli pepper i added to make it spicy and works as an antioxidant to prevent lipid oxidation. The oxidation of meat products is an chemical oxidation of fat promoted by oxygen, light, high temperature, metal traces. We measured the oxidation with Oxitest reactor, with accelerating two factors, increasing the temperature up to 90 degree and oxygen pressure up to 6 Bar. The instrument measures the absolute pressure change inside the chambers, and monitoring the oxygen uptake and automatically generates an IP value. Aim of the study is to measure the oxidative stability of salami and others products of meat. Results obtained from oxitest shows that the nitrates and chilli peppers effects the oxidation stability of meat products. Compare with raw material which has low oxidation stability.

Keywords; Meat, salami, nitrates, chilli pepers, oxitest

**Introduction**

Meat itself and meat products could be decay by microbial agent or chemical products, the common form is oxidative breach [1]. The stability of meat products will depend lipid peroxidation and metal ions. Lipid peroxidation is a primary mechanism of quality of meat products [1]. Lipid oxidation may have negative effects on the quality of meat and meat products. The deterioration of meat is manifested with flavour, color, texture, and production of toxic elements. Depending on the dietary faty source, lipds in meat may be more or less susceptible to oxidation [2]. Lipid oxidation in muscle systems is initiated at the membrane level in the intracellular phospholipid fractions. How this occurs has still not been resolved, although it is generally believed that the presence of transition metals, notably iron, is pivotal in facilitating the generation of species capable of abstracting a proton from an unsaturated fatty acid [3].Lipid oxidation reduce meat nutritional value, may pose a health risk to humans resulting on accumulation of oxidation products. This can be reduced by adding antioxidants [4].The oxidation of lipids is promoted

and facilitated by the presence of catalytic systems such as light, heat, enzymes, metals and microorganisms and determines the development of off-flavors and nutritional losses. Consequences of lipid oxidation activity is loss of flavour, development of off-flavors, Myoglobin (red) is changed in metmyoglobin (brown), loss of carotenoid, accumulation of oxidation products with potentially detrimental health implication, protein denaturation, functionality changes, loss of nutrient value [5].Antioxidants can prevent lipid peroxidation, decreasing level of oxygen, binding with metal ions to prevent initiating radical generation, chain breaking to prevent continued hydrogen seclusion by active radicals[6]. Antioxidants can be of synthetic or natural origin, they have been used successfully to delay the oxidation process in meat and meat products [7]. Nitrites used alone or in conjunction with nitrate as a color fixative in cured meat. Helps prevent growth of *microorganisms*, which can cause diseases at humans. At the same time their use effects a color and flavour of meat and its products. These compounds added to processed food as a preservative, give a lot of

confusion to people if they are harmful and can cause cancer. However, nitrites are the reason why processed meat is pink or red. Nitrites turn into Nitric Oxide, which reacts with oxygen-binding proteins in the meat.[8]. Processed meat products must be properly categorised and only preservatives permitted for that category may be added. Many centuries the spices and herbs have been used to extend the shelf life of foods and to improve flavour characteristics. [8, 9].A different herbals and spices like thyme, rosemary, garlic, clove, coriander, ginger, pepper etc., have shown antimicrobial and antioxidant potential [10]. Green and spicy vegetables may improve the quality reduce production cost of products. Also, vegetables has sensory ability, they have propertiesbinding water and emulsification. [11]. Some studies showed that marinated meat with onion oleoresins, black pepper, and rosemary reduce lipid oxidation [12].

## Material and Methods

We used fresh meat material, processed meat like Salami, Ham, blended meat, and “sugjuk”type of home made salami in the Kosova territory with lot of natural herbs like onions and chilli peppers. For each sample we used basedon protocol of company VELP Scientifica Italy. The samples were measured in electronically scales, 30 gram of product, very well blended, was added on sample holder and placed in titanium chamber. The oxidation technique is based

on the change of oxygen under absolute pressure 6 bar in a closed thermostatic chamber under high temperature 90 C. The samples were let overnight 24 hours. After 24 hours the results were analysed .Each products was measured using three samples, and the mean is taken as finally results. Determination of Induction period of meat and processed meat was done with an innovative technique as oxidation test reacto (OXITEST) produced by VELPScientifica Italy. The oxitest reactor is connected with a PC and software helped calculating automatically the Induction period (IP) before fat oxidation. The results are calculated by software OXISoft™.

## Results and Discussion

The results obtained in this study shows e contradictory data. We saw that fresh meat three hours after the calve was killed, shows very low level of oxidation or Induction period is very high 17:58 hafter 25 hours staying overnight (see Table 1). On the other hand the prepared meat it was very fast oxidized,we got very low results with IP 0:50h. Also Salami processed and stayed on the fridge in the temp 4-8C for one month shows bed results, with high oxidation value or with low induction period (2:19 h). The part of calves was stored at 18C overnight and then analysed shows low IP 1.51 h. The ‘suxhuk’ the traditional sausage prepared with meat of cows, which has a lot of onions and red chilli peppers we got very good results with high IP 15:11 (See Graphic 1).

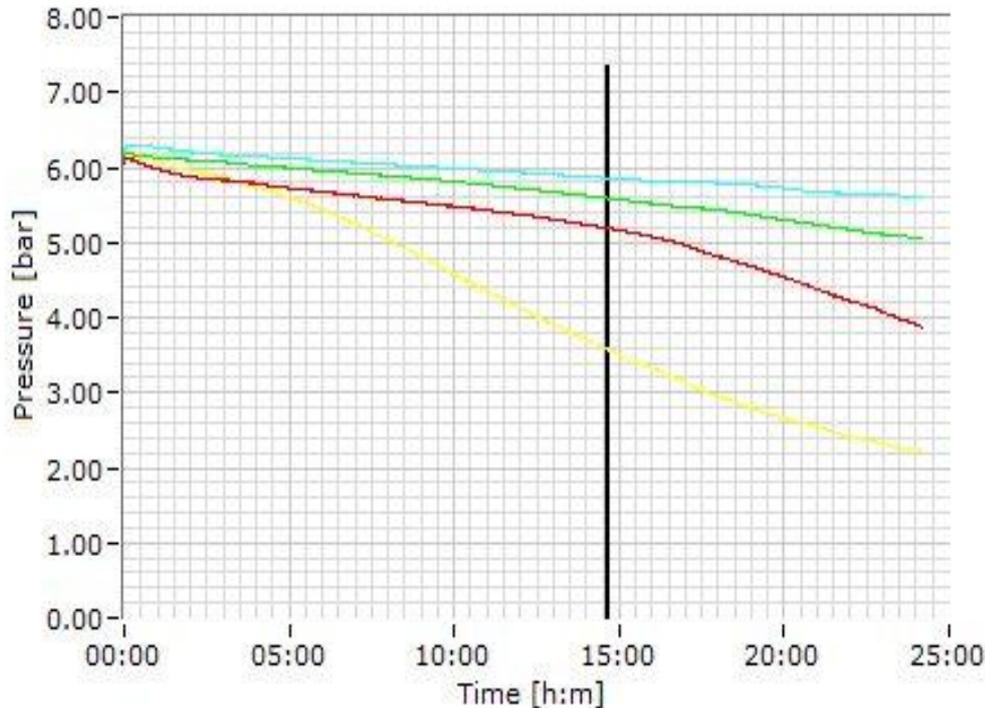
**Table 1** The dataanalysed with oxidative reactor “OXITEST”

<i>Nr</i>	<i>Sample</i>	<i>Analysis time [h;mm]</i>	<i>S/N</i>	<i>Weight g</i>	<i>Reactor</i>	<i>P* [bar]</i>	<i>T**</i>	<i>IP***</i>
1	Blended meat	24:11	349481	30	A	6	90	12:12
2	Salami	24.11	349481	30	B	6	90	2:19
3	Sausage	24.25	349481	30	A	6	90	15:11
4	Calve fresh meat	25:00	349481	30	B	6	90	17:58
5	Claves not fresh meat	25:00	349481	30	A	6	90	1:51
6	Prepared meat	24:33	349481	30	B	6	90	0:50

\*Set point of pressure

\*\* Set point of temperature,

\*\*\*Induction period



**Figure 1** . Comparison of products under pressure 6 bar. Is shown the shelf life of products

Due to statistical analysis of software OXITEST was shown that the fresh meat and traditional sausage has the longest shelf life compare with other products (see Graphic 1). The adding natural antioxidants, like onions, chilli peppers, rosemary and other products have positive effects on meat. First of all helps positively on taste of product and during the oxidation process reacting with free radicals, breaking the chain reaction by donating electrons [13]. We saw on our study that onion and chilli pepper has positive effect and increase the shelf life of products, even the prepared meat (pre-processed product) shows low value of IP, with adding the herbal products the IP is increased. Also, in our study shows that high temperature has negative effect on meat, with increasing of oxidation a lowering the IP and shelf life of product.

## Conclusion

Natural herbal antioxidants and vegetables may effect positively on quality parameters as taste and increasing the shelf life of products. Not only that, but also has positive impact on safety of food system.

Having in mind that chilli pepper and onions except of anti-oxidation has also negative impact on growth of microorganisms. However the storage has a big role on shelf life of meat products, temperature, and humidity, light may suppress the effect of natural antioxidants. In this study the meat product with natural herbals showed increase in the stability compare with meat product treated with nitrates and nitrites. However, needs more deep study to see the effect of herbal antioxidants on meat products, because is important the feeds of animals before slaughtering, other additives added during meat process. With this simple method of measuring the oxidation is possible in the future to predict the shelf life of products stored in market. The study would help the food safety agencies to monitor better the chain of selling the products.

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