

## PROTECTIVE FILMS FOR RAW AND COOKED DRY SAUSAGES

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**Background**

Due to hygienic reasons raw and cooked dry sausages have to be packed for sale in super markets. Instead of usual packaging the products can be coated with protective films by dipping them into a solution of a coating material and subsequently drying. Surface treatment of raw and cooked dry sausages with protective films is very common in Austria but also practiced in Germany and The Netherlands. Compared to vacuum packaging and other methods of packaging the application of protective films possesses several advantages making them a very interesting alternative. The protective films used in this study consist of modifications of natural (Aktivé C 500) or polymeric (Aktivé TR 300) resins or cellulose propionate (Skintex Super Alpha) in alcoholic solution (all films: Gewürzmüller, Salzburg, Austria). Aktivé TR 300 and Skintex Super Alpha are close fitting, translucent, shiny and extremely flexible films for cooked and raw dry sausages giving them an attractive appearance. Aktivé C 500 produces a translucent film with a matt shine and a considerable capacity for preventing weight losses. All investigated protective films manage an excellent protection against any form of contamination during handling and distribution and prevent mould growing on the surface of the products.

**Objective**

The objective of this study was to examine the influence of the protective films on shelf life, sensory quality characteristics and other features of cooked and raw dry sausages. Special interest was given to investigate the conditions to prevent growing of moulds on the surface of the products.

**Methods**

To investigate the capacity of the different films for prevention of mould growing, sausages were dipped in a mould suspension (*Penicillium nalgiovensis*, Gewürzmüller), dried, coated with the protective films and stored under highly humid conditions.

Fat oxidation, weight loss, changes in colour and sensory quality characteristics (smell, taste) were examined in a large-scale experiment using various types of raw and cooked sausages.

After appropriate drying/ripening the sausages were coated according to the instructions of the manufacturer and stored at ambient temperature and humidity. Reaching the sales expiration date and at the end of storage time (twice the time between surface treatment and minimum sales expiration date), the following examinations were carried out. Due to the similar weight losses, sausages treated with Aktivé TR 300 and Skintex Super Alpha were compared with untreated ones, and sausages dipped into Aktivé C 500 were compared with vacuum packed ones.

Fat oxidation

To characterize the quality of the fat the peroxide value (procedure according to SULLY, BGVV § 35 LMBG L00.13.-6), the acid value (BGVV § 35 LMBG L00.13.-5) and the thiobarbituric reactive substances (TBARS) (WITTE et al. 1970) were measured.

Weight loss

The weight loss of the sausages was investigated by weighing them in periodical intervals during the storage.

Colour changes

Colour changes were determined by measuring  $L^*a^*b^*$ -values with a Colorimeter (Codec 400, Fa. Größwein). Colour was measured on the surface as well as inside the products.

Sensory quality characteristics

Smell and taste of the products were examined by several members of the Institute for Meat Hygiene, Meat Technology and Food Science, University of Veterinary Medicine, Vienna, Austria.

**Results and discussion**Protection against mould growing

The growing of moulds on the surface of cooked and raw dry sausages is one of the important problems occurring on the long way from the manufacturer to the super markets and the consumers. In practice it is not possible to control transport and storage conditions in such a way as to avoid this phenomenon. However, the experiments showed that the protective films investigated offer an excellent possibility to prevent the growing of moulds on the surface of the sausages (see figure 1). Compared with untreated sausages coating with protective films allows mould growing only with a delay of several days up to weeks.

Alterations during storage

Rancidity of the fat was not observed, neither at the sales expiration date nor at the end of the storage experiment (values of TBARS see table 1). The acid values of the raw sausages increased during storage time, however, this is due to the metabolism of lactic acid bacteria.

The weight loss of the products during 24 days of storage are shown in figure 2. It can be seen that the weight loss of products treated with Skintex Super Alpha (26.3%) was similar to the losses of untreated sausages (26.1%). According to the information of the manufacturer (<http://www.stemmler.com>) of the protective films, a molecular gas exchange occurs between the surface of the meat and the formed film, which maintains the fresh state over a longer period of time. Products dipped in Aktivé TR 300 showed a restricted weight loss of 24.4 %. The best results were found with Aktivé C 500, which limited the weight loss to 6.7 %. These results show that the weight loss of the sausages can be controlled to a certain degree by choosing an adequate protective film. Colour changes occurring over the time were due to the weight losses of the sausages. No unattractive deviations in colour were observed. The sensory characteristics estimated were within the expected range. It was proved by sensorial evaluations (triangle tests at the high school for meat technology, Hollabrunn) at various intervals after surface treatment with protective films that the sensory quality was not influenced in a negative sense by the films.

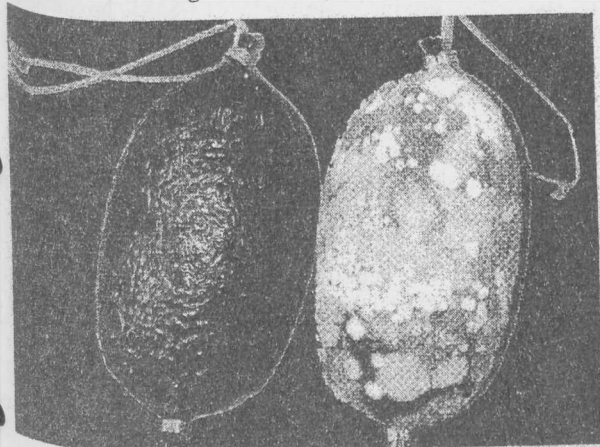


Fig. 1: Comparison of treated (Skintex Super Alpha) and untreated cooked sausages after one week of storage under highly humid conditions

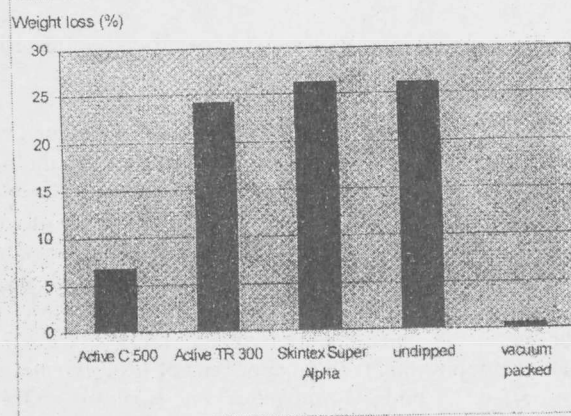


Fig.2: Weight loss of differently treated cooked sausages after 24 days of storage

Treatment	TBARS at the beginning of storage*	TBARS at the sales expiration date*	TBARS after twice the time between surface treatment and minimum sales expiration date*
Undipped	0.58	0.74	0.95
Vacuum packed	0.58	0.28	0.45
Aktivé C 500	0.58	0.30	0.65
Aktivé TR 300 LS	0.58	0.34	0.85
Skintex Super Alpha	0.58	0.32	0.94

Tab 1.:TBARS values after defined times of storage.  
\*mg Malondialdehyde/kg

### Conclusions

It could be demonstrated that coating of cooked and raw dry sausages with protective films is an excellent alternative to other methods of packing and wrapping. The advantages can be summarized as follows: The coatings give the sausages an appealing shine, they manage an excellent protection against any form of contamination, they prevent growing of mould on the surface and allow controlling of weight losses to a certain degree. Last but not least the use of protective films is a mean to reduce the amount of packing material and therefore to protect the environment.

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### References

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Further references can be requested from the first author.