

## Safe and qualitative dry aging of beef (OptiDryBeef) (CORNET)

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<b>Industrial Branch:</b>	<ul style="list-style-type: none"> <li>• Meat Processing Industry</li> <li>• Food Processing Machinery</li> </ul>
<b>Duration:</b>	2016 - 2018
<b>Volume:</b>	€ 498.560,-- (total)

### Initial situation:

In recent years, questions with respect to the dry aging process and parameters have arisen. Questions about the properties of dry aged meat, about food safety and sensory quality as well as the ideal process conditions to produce a high-quality and above all safe product.

The production of dry aged beef has become popular in the last few years as noticeable in the media and quite a few companies entered or are planning to enter this field of production. As there is no description of the process in form of a guideline or an official definition of the optimal/determining parameters, the dry aging is applied

by each manufacturer according to his empirical experience.

The whole meat market sector alongside the production and distribution chain of dry aged beef is covered by this project. Starting with agricultural production, over slaughterhouses to cutting and marketing companies, the meat industry, but especially small and medium-sized enterprises, are affected by this research project. The project also covers retailers, caterers and restaurants as well as machine manufacturers who can develop optimized maturing equipment based on the results.

For this reason, the interdisciplinary research project "OptiDryBeef" has identified necessary ripening parameters to produce high-quality dry-aged meat.

#### Research results:

In this project process conditions, influence of race and species, packaging, processing of the trimmings, microbiological status (pathogens and molds) and the hygienic condition of ripening chambers after dry aging were examined. At German and Belgian research units, parts of the project were implemented complementarily but also specific investigations were carried out according to the expertise.

At the beginning, a common sensory testing system was developed by conducting various training courses for dry aged beef. In addition, manufacturers and distributors in both countries were asked about parameters and raw materials used.

In the second step, the main part of the project, the influence of different process variables (maturation conditions, breed, fat cover, ripening with casings etc.) on the properties of the meat have been investigated. It was found that the higher the fat cover, the lower the weight loss and that the ripening temperature (2 vs. 6 °C) compared to the relative humidity (70 vs. 90 %) has only a minimal influence on results. The lower the humidity, the higher the weight loss and the less contaminated the meat surface. A reduction of the surface germs can also be achieved by applying a thin layer of beef tallow. The application of hydrocolloids as protection against strong microbiological contamination was found to be unsuitable, while germ-inhibiting substances without barrier function such as vinegar appear promising. However, in this case the legal situation has to be clarified.

It has been demonstrated by challenge tests that no propagation of pathogens (*E. coli*, *Salmonella*, *L. monocytogenes*) or germination of spores (*M. racemosus*, *P. commune*) occurs over dry aging duration or subsequent storage. However, the intensity of the reduction of the microorganisms described depends on the ripening conditions.

Storage or rather packaging after dry aging is recommended in vacuum or modified atmos-

phere for less than eight days. However, shock freezing is the best option for "preserving" optimal maturity status.

In addition, pork (Berkshire x dt. Landrace) was established under identical conditions in the process of dry maturation. The results obtained are comparable to those of beef.

Another innovative approach was the incorporation of the usually discarded dry trimmings. These were treated with high pressure, so that the microorganisms were lethally damaged, making the detected germ counts similar to fresh meat. The treated sections were incorporated into various products, whereby, among others a more intense aroma is created. With this approach it is possible for small, medium-sized but also large companies to reduce the loss due to dry aging and to work more economically and sustainably.

Finally, based on these results, a definition for process and ripening parameters can be formulated, which could be forwarded to the German Commission for the preparation of dry aging guidelines.

#### Economic impact:

In 2017, the meat industry with 24.3 % turnover and a turnover increase of around 5 % compared to the previous year, had the highest turnover in the food industry. Furthermore, with 8.5 % more than in the previous year and 19 % in total, the meat industry was the second largest employer in the food industry.

The importance of research in the beef sector is reflected by the increase in per capita consumption: 9.7 kg beef were consumed in 2017, while consumption in 2014 was still at 8.9 kg. These figures underline the noticeable change in consumer behavior towards a more conscious shopping of high-quality foods. In addition, consumption is developing towards value-added meat products such as dry aged beef. Through the dry aging process beef increase in value. The price for fresh beef is usually between 15-20 € per kg, while the price for dry aged meat is between 25-65 € per kg depending on the type and how the product is offered. The selection of price-determining parameters, such as ripening

duration, breed and section, vary greatly depending on the producer and consumer segment. Within the project, a comprehensive evaluation of the process was carried out to enable the meat industry to produce a high quality and safe product. These findings benefit not only meat-producing companies such as slaughterhouses, traders, distributors, but also small and medium-sized butchers as well as machine builders involved in the development and construction of maturing equipment and caterers and restaurants.

It is to be expected that the research results can be implemented by the companies directly after the end of the project. Since for the realization of the findings generally no alterations or restructurings are required. Rather, the input material and the process hygiene are crucial. For example, a higher fat cover results in less weight loss, and at the same time, the quantity of intramuscular fat makes it appear more tender and aromatic.

Extensive aroma profile and sensory analyzes in terms of ripening parameters and microbiological status enable optimized quality assurance or even product development. In addition, this study provides a good basis for the incorporation of the usually discarded dry trimmings. Due to an optimized ripening there is a reduced surface bacterial content, which can be reduced by a high-pressure treatment. After this treatment, the sections can be incorporated into various products to reduce total weight loss and thereby increase margins or reduce sales prices. Through the results several industries profit from "OptiDryBeef" – direct and indirect.

#### Publications (selection):

1. FEI-Schlussbericht (2019).
2. Witte, F., Steinriede, D., Trumme, C., Heinz, V. & Terjung, N.: Hochdruck-pasteurisierte Abschnitte der trockenen Rindfleischreifung in der Rohwurst-Produktion. Fleischw. 6, 92-96 (2019).
3. Terjung, N.: OptiDryBeef – Sichere und qualitative Trockenreifung von Rindfleisch. Jahresb. DIL 2017/18, 94-95 (2018).
4. Terjung, N.: OptiDryBeef – Sichere und qualitative Trockenreifung von Rindfleisch. Jahresb. DIL 2016/17, 96-97 (2017).

5. Grohn, J.: Sicher und effektiv zu mehr Aroma. Lebensmitteltechn. 9, 56-57, (2017).

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This CORNET project ("Collective Research Network") is a transnational collaborative research project with two participating countries under the coordination of the FEI. The idea of CORNET is to bring together national funding and research institutions in a transnational project and to create synergies across national borders. The German part of the CORNET project is funded under the program to promote Industrial Collective Research (IGF) from the Federal Ministry for Economic Affairs and Energy (via AiF) through the Research Association of the German Food Industry (FEI).

... a Project of the *Industrial Collective Research (IGF)*

supported by/via:



This IGF Project of the FEI is/was supported via AiF within the programme for promoting the Industrial Collective Research (IGF) of the German Ministry of Economic Affairs and Energy (BMWi), based on a resolution of the German Parliament.