

INFLUENCE OF FAT GRADE AND DIFFERENT CASINGS ON THE DRY AGING PROCESS

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I. INTRODUCTION

Although dry aging is not a novel technique, it is still an extremely complex process due to natural variations, such as microbial contamination and/or meat quality attributes. This is caused by a lack of knowledge in regard to process conditions (temperature, time, relative humidity, etc.) and therefore research is required. For that reason, in the scope of an international project, which deals with the dry aging process in general, the influence of different casings during ripening was evaluated. Therefore, left and right strip loin (bone-in) from Simmental cattle young bulls of different fat grades were encased with a polyester casing, a dry aging bag, beef tallow or ripened without a casing. The postulated hypothesis is that casings prevent intensive microbial growth during the dry aging process.

II. MATERIALS AND METHODS

Raw material: Left and right bone-in strip loins from Simmental cattle young bulls with fat grade 2 and 4 were utilized. According to the regulation in Germany [1], fat grade 2 carcasses have a low fat cover where most parts of the muscle are visible. For comparing the influence of fat cover on ripening attributes, likewise fat grade 4 with a high fat cover was used.

Ripening parameters: Strip loins were ripened for 21, 42 and 63 days at 2 – 3 °C and 75 % relative humidity, logged with a testo 480 (Testo, Lenzkirch, Germany) and evaluated via Easy Climate Software. Ripening was conducted without a casing (WO) for 7 loins, with a polyester casing (PC) (patent pending), a dry aging bag (DB) (Europlast, Osnabrück, Germany) and a self-made casing of beef tallow (BT) for 4 loins resp..

Analysis: Weight of strip loins was determined on day 0, 21, 42 and 63. Firmness of raw and cooked steaks was measured with a TA-XT2 texture analyser from Micro Stable Systems (Guildford, UK) using a Warner Bratzler shear force test (speed: 3.3 m/s, width: 1 mm). Samples with a wide of 1 cm were measured at least 15 times per trial perpendicular to muscle fibres. Twelve trained panellists compared samples of *M. longissimus lumborum* from day 0 (11 d wet aged), 21, 42 and 63 generated from the same treatment and animal with a quantitative descriptive sensory analysis. For evaluating microbial growth during the ripening process, a sterile cut from the surface of lean meat (5 cm²) and fat tissue (25 cm²) was sampled to detect total plate count (TPC), lactic acid-forming bacteria (LAB), *Enterobacteriaceae*, *Pseudomonas* spp., *B. thermosphacta*, fungi and yeasts.

III. RESULTS AND DISCUSSION

During ripening, temperature remained between 1 and 3 °C, whereas relative humidity decreased constantly from approx. 90 to 70 % because humidity is not adjustable in provided ripening chambers.

Significant differences between fat grades were found by comparing summarized results of fat grades ($p < 0.1$) and especially for WO ($p < 0.05$). Owing to a higher fat cover around strip loins with fat grade 4, evaporation of water was retarded, resulting in less weight loss of these samples. In contrast to other studies, ripening in different casings, particularly DB had no impact on weight loss [data not shown]. This fact could be due to the ripening of strip loins, which bones cause a barrier between meat surface and bag.

By comparing fat grades in regard to sensory tenderness, significant differences were detected for BT and so in sensory flavour for WO as well as in firmness for DB ($p < 0.05$) [data not shown]. Since fat content had no further influence, results of fat grade 2 and 4 were combined. Concerning rating of tenderness and flavour, differences ($p < 0.01$) were observed between WO compared to PC or DB and also for flavour rating of DB compared to BT. DeGeer *et al.* [2] as well as Dikeman *et al.* [3] found out that DB flavour and tenderness is equal to traditional dry aged beef (DAB). Hence, Ahnström *et al.* [4] concluded that these results stand for the bags effectiveness. Results of Li *et al.* [5], who compared sensory attributes of dry to in-the-bag and wet aged steaks, showed that DB-samples have attributes between wet (metallic, liver) and dry (umami, butter fried)

aged samples. Although variations in rating of tenderness between casings were observed no differences were analysed in firmness via texture analysis. This agrees with reviewed literature since solely Campbell *et al.* [6] spotted lower shear force values for DAB.

Less bacterial counts in regard to LAB, *Enterobacteriaceae* and fungi were detected for WO, PC and BT (Fig. 1). In contrast to these findings, Ahnström *et al.* [4] and DeGeer *et al.* [2] stated that aging in a bag reduces bacterial counts compared to traditional dry aging. Scientists agreed that TPC and yeasts are greater in DAB with increased ripening duration (mostly 21 days), due to a lower surface water activity, whereas LAB were greater for wet aged beef [2, 4-8]. Li *et al.* [5, 8] detected no or only a slight mould growth for WO and DB, while Gudjónsdóttir *et al.* [7] and our results (Fig. 1) showed that mould count can be high. According to the barrier between lean meat and PC or DB, microorganisms have a more suitable atmosphere to increase their populations. The hypothesis, that casings prevent intensive microbial growth, cannot be confirmed completely. Presented results show that BT and PC can prevent intensive growth of some micro-organisms.

IV. CONCLUSION

In summary, fat grade influences weight loss and slightly sensory ratings and firmness. However, fat grade has neither an impact on microbiology nor on further parameters like colour, pH or quantity of proteins [data not shown]. According to different casings, variations between sensory ratings and firmness mainly occur due to different individuals, seasons, feedings, etc. [9]. Even if dry aged flavour and enhanced tenderness were observed in each experimental set-up, ripening without a casing might be the most economic method for gathering DAB.

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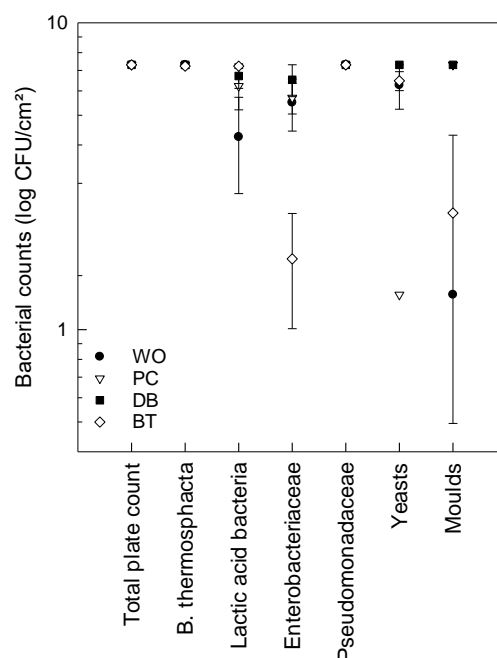


Fig. 1: Overview of microbial counts of ripening without a casing (WO), with a polyester casing (PC), a dry aging bag (DB) or in a layer of beef tallow (BT) (n = 4).