

Usability of meat from immunologically castrated male pigs for the production of dry fermented sausages

Gallas, L.¹, Borilova, G.¹, Svobodova, I.¹, Steinhäuserova, I.¹, Steinhäuser, L.¹

¹University of Veterinary and Pharmaceutical Sciences Brno, Brno, Czech Republic

Abstract - Immunological castration is used as an alternative to the physical castration of male pigs. The aim of this study was to evaluate the technological usability of meat from immunologically castrated male pigs for the production of dry fermented sausages. We compared dry fermented sausages made of meat from physically castrated male pigs and immunologically castrated male pigs. Both groups of male pigs came from the same breed and were kept under the same conditions. Both types of dry fermented sausages were manufactured under the same conditions (lactic acid bacteria starter culture, spice mixture, temperature, relative humidity, etc.). The period of ripening of the sausages was 4 weeks. After production the ripened sausages were wrapped in a vacuum and stored for 60 days at 6–8 °C. The sausages were analysed by chemical, microbiological and sensory methods. Analyses were performed during production and one and two months after ripening during storage. No differences were found in the base microbiological and chemical parameters, such total viable count, lactic acid bacteria count, pH, content of NaCl, content of dry matter, fat content or aw. A paired comparison test method according to ISO 5495 was used for the sensory comparison of samples. The panel of sensory evaluators compared the two samples (Improvac vers. physically castrated male pigs) to determine whether there were any differences in aroma, texture or taste. No differences were found in these sensory parameters. This study showed that meat from immunologically castrated male pigs (Improvac) is appropriate for the production of dry fermented sausages.

Keywords – Improvac, boar taint, dry fermented sausages

I. INTRODUCTION

Boar taint is a sensory defect that affects pig meat quality and it is mainly due to the presence of androstenone, a compound with urine like odour and skatole, a compound with faecal odour. Skatole (3-methyl-indole) is the product of the anaerobic degradation of the tryptophan amino acid in the gut. Androstenone (5 α -androst-16-en-3-one) is a steroid synthesized in the testis of the maturing pigs. Its content mainly depends on the slaughter weight/age

(maturity of the pig), testis size and genetics and to a lesser extent on rearing and feeding conditions. Elimination of the testes (physical castration) is the most efficient method to reduce androstenone levels. Surgical castration without anaesthesia is the most common methodology used in Europe to control boar taint but it is detrimental from the animal welfare point of view. Vaccination against gonadotropin releasing factor (GnRF) (also known as immunocastration) is an efficient alternative to physical castration as it reduces androstenone and skatole content [1, 2]. A commercial GnRF vaccine (ImprovacTM, Pfizer Animal Health) is registered for use in pig industries in the EU, Switzerland, Russia and in countries outside Europe such as Australia, Mexico and Brazil [3]. Vaccination strongly reduced the weight of testes and accessory reproductive glands. Regarding growth performance, the immunocastrated males showed comparable feed intake, feed efficiency and growth rate as boars in the growth period [4]. Vaccinated boars have lower content of fat and higher content of lean meat in carcass [4, 5]. The aim of this study is to characterize usability of a meat from immunocastrated pigs compared with meat from physically castrated male pigs for the production of dry fermented sausages.

II. MATERIALS AND METHODS

A. Animals

The experimental design included two groups of pigs (crossbreeds from Danish Duroc x (Danish Landrace x Danish Large White)). The first group included surgically castrated male pigs. Surgical castration was performed at the age of one week. The second group included vaccinated male pigs. Improvac vaccine was administered to pigs ten and six weeks before slaughter. The two groups of pigs were raised under the same husbandry and feeding condition. Pigs were slaughtered at the age of 25 weeks at an average live weight of about 110 kg.

B. Samples and sample preparation

For production of dry fermented sausages were used 35 % pork shoulder, 35 % pork leg, 30 % pork back fat, nitrite curing mix (28 g/kg), BFL-F04 starter culture (Chr. Hansen, Danmark), seasoning mix with added saccharides (RAPS, Germany), cellulose casings (55 mm in diameter). Before work on sausage emulsion began, all the meat necessary to produce one batch of sausage emulsion was weighed. The meat was then vacuum packaged and frozen to minus 18 °C. Before making sausages, it was necessary to increase the temperature of lean muscle tissue to about minus 4 °C and the temperature of fat to about minus 7 °C. Together with spices and starter culture, the meat was made into sausage emulsion that was filled to casings. After they were washed in water and warmed up, the sausages made were put to the aging chamber. Initial temperature in the aging chamber was 22 – 24 °C. Initial relative air humidity in the aging chamber was 92 – 94 %. After ripening and drying (4 weeks) were sausages placed in AMILEN-OX 80 (VF Verpackungen GmbH, Germany) and packaged under vacuum. Packaged sausages were maintained at 6-8 °C until microbiological, chemical, and sensory analyses. Analyses were performed at 0, 7, 14, 21, 28 days of production and 30 and 60 days of storage.

C. Microbiological analyses

Total viable counts (TVC) were performed in accordance with ISO 4833. **Lactic acid bacteria counts** (LAB) were performed in accordance with ISO 13721. Results were converted to log values and used for statistical analyses of data.

D. Physical and chemical analyses

The **pH** was measured in duplicate with a pH meter (pH 340i, WTW GmbH, Weilheim, Germany) with a needle tip pH electrode (SenTIX SP, WTW GmbH, Weilheim, Germany). The a_w value was measured using the NOVASINA apparatus at 25 °C. The analysis was performed in accordance with ISO 21807. Mean values were used for statistical analyses of data. **Dry matter content** was determined by drying the samples at 105 °C to constant weight. Determination of dry matter content was performed in accordance with ISO 1442. Determination of **fat content** was performed in accordance with ISO 1444. Determination of **NaCl content** was performed in accordance with ISO 1841-1. Measurements were made in duplicate. Mean values were used for statistical analyses of data.

E. Sensory analyses

Sensory analysis was performed between both types of sausages. Aroma, taste and texture were evaluated. Evaluations were performed by 18 specially trained panellists from among employees of the Institute of Meat Hygiene and Technology (Univ. of Veterinary and Pharmaceutical Sciences Brno). Samples were compared by a paired comparison test according to ISO 5495. Sensory evaluations were performed in a sensory lab equipped with twelve separate sensory booths. The sensory lab, sample preparation room as well as the other premises meet the requirements of ISO 8589.

F. Statistical analyses

Data analysis was performed with StatSoft, Inc. (2005). STATISTICA Cz, version 7.1. Student's t-test and analysis of variance (ANOVA) were used.

III. RESULTS

A. Microbiological parameters

As a result of addition of starter cultures consisting of lactic acid bacteria are the numbers of TVC and LAB of the same. The initial values were approx. 6.0 log CFU.g⁻¹. This values increased to approx. 8.0 log CFU.g⁻¹ during ripening. Differences in the numbers of total viable counts and lactic acid bacteria between the both groups of samples (physically castrated and vaccinated) were not statistically significant during production and storage.

B. Physical and chemical parameters

The initial values of pH ranged from 5.7 to 5.8 in fresh meat. The pH values decreased to approx. 4.6 during ripening. NaCl content value was 3.5 % in ripened sausages. The value of a_w was 0.850 in the both groups of samples after ripening. The dry matter content value in ripened sausages was 70 % in both groups of samples. The fat content value in ripened sausages was 45.5 %.

Differences in pH, NaCl content, values between both groups of samples were not statistically significant during production and storage.

C. Sensory parameters

The sensory evaluation found no differences in aroma, taste and texture between these two groups of samples (physically castrated male pigs and vaccinated male pigs).

IV. DISCUSSION

Microbiological parameters and physical and chemical parameters of experimental dry fermented sausages are the same as in dry fermented sausages described in other studies. [6, 7].

V. CONCLUSIONS

This study showed that meat from vaccinated male pigs (Improvac) is appropriate for production of dry fermented sausages. The results of microbiological, chemical and sensory analysis shows that between dry fermented sausage produced of meat from physically castrated pigs and vaccinated pigs are no differences.

VI. REFERENCES

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