SENSORY TEST OF DIFFERENT PIG PRODUCTION SYSTEMS IN EUROPE

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I. INTRODUCTION

Comparison of pig production systems, i.e., husbandry conditions (space – enrichment), breed combinations, feeding regimes and slaughter methods, have been investigated in the EU project mEAT-Quality [1]. The eating quality was one of the parameters studied. To obtain the most accurate comparisons, the sensory tests of the meat were carried out in one laboratory ensuring that all samples were evaluated by the same panel. Especially differences in feed composition can influence the sensory attributes [2], and therefore muscle and lard were prepared and assessed independently in this study. The aim was to analyze the sensory quality in fat and meat from pigs raised in different production systems.

II. MATERIALS AND METHODS

136 boneless pork loins with a top layer of fat from females and castrates were used for the sensory test. The loins came from 3 European countries and represented 7 different production systems with approx. 20 loins per treatment. The loins were frozen prior to transportation and stored at -18°C upon arrival and until the start of the test. The loins were thawed 48 hours prior to the sensory test, and the day before the test, the lard and the rind were removed from the loin (*M. longissimus thoracis*). 10 panelists participated in the analyses and received two days of training (3 hours each day) prior to the test, during which the vocabulary was agreed upon. The training was conducted according to ISO standards [3]. The sensory tests were carried out according to the guidelines of the accredited descriptive analysis [4,5] in ISO certified facilities. The outer fat layer (closest to the rind) was cut into 2x2x10 cm bites, boiled for 15 minutes in salted water, and stored at 5°C for 24 hours. On the day of the sensory test, the loins were cut into 20 mm pork chops. The pork chops were pan fried at 170°C for 8 min, to a core temperature of 68-70°C. The pork chops were weighed before and after cooking for calculation of the cooking loss. The fat bites were heated for 2 minutes on a Klemgrill (180°C) and served with the corresponding pork chop on a heated plate coded with a three-digit number. The assessors used a 15 cm intensity line scale with 25 attributes for the meat assessment and 10 attributes for the fat. The differences between production systems were analyzed with a model using an ANOVA with Post Hoc Tukey test (participant+sample+ participant*sample) from RedJade [6].

III. RESULTS AND DISCUSSION

The 7 production systems represented in total 3 control systems (one from each country) and 1-2 experimental treatments per country. Thus, the difference in sensory quality between control and experiment can be compared within country, and the overall significance in the sensory quality of meat and fat between the 7 production systems were calculated.

Some of the attributes (hardness, chewing time, tenderness) were highly correlated, as were the attributes describing taste and/or smell. Table 1 lists the attributes that describe the main difference between production systems with the exact statistical differences. Figure 1 shows the differences for the same attribute between the 7 systems in a spiderweb plot. The average cooking loss is shown in Figure 2. The meat from production systems 2-1 and 2-2 had a significantly lower cooking loss, was juicier and with more visible fat in the cutting line compared to meat from the other production systems. More intense sweet taste led to a lower intense piggy flavor. The sensory attributes of the fat showed that the ranking between the 7 production systems deviated from the ranking based on visible IMF, thus the fat attributes rated independently contributed to the assessment of the effect from treatment.

Table 1 – Selected sensory attributes, describing the differences* between 7 different production systems.

Production system**	Visual IMF	Tender-ness	Juici-ness	Sweet Taste	Piggy Flavor	Fried meat Flavor	Fried fat Flavor	Fat crisp-ness
1-1	1.1 ^{a}	7.8 ^{a}	7.5 ^{ab}	4.0 ^{a}	3.3 ^{ab}	8.5 ^{ab}	9.4 ^{ab}	5.8 ^{ab}
1-2	1.0 ^{a}	8.0 ^{a}	6.9 ^{a}	4.1 ^{a}	3.6 ^{a}	8.3 ^{ab}	9.8 ^{b}	6.1 ^{a}
1-3	1.2 ^{a}	7.4 ^{a}	7.1 ^{a}	4.0 ^{a}	3.2^{abc}	8.3 ^{a}	9.4 ^{ab}	6.1 ^{a}
2-4	2.5 ^{cb}	5.8 ^{c}	8.2 ^{b}	5.7 ^{b}	2.0 ^{bc}	9.0 ^{ab}	8.3 ^{a}	4.2 ^{c}
2-5	3.0 ^{c}	7.3 ^{a}	9.1 ^{c}	6.4 ^{b}	1.9 ^{c}	9.6 ^{b}	9.8 ^{b}	4.7 ^{cd}
3-6	1.3 ^{a}	6.1 ^{bc}	7.3 ^{ab}	4.2 ^{a}	3.4 ^{a}	8.1 ^{a}	9.2 ^{ab}	4.8 ^{bcd}
3-7	1.5 ^{ab}	7.0 ^{ab}	7.1 ^{a}	4.4 ^{a}	3.6 ^{a}	8.5 ^{ab}	9.3 ^{ab}	5.7 ^{abd}

* Columns with different letters are significantly ($p<0.05$) different.

** First number represents country; second number represents treatment.

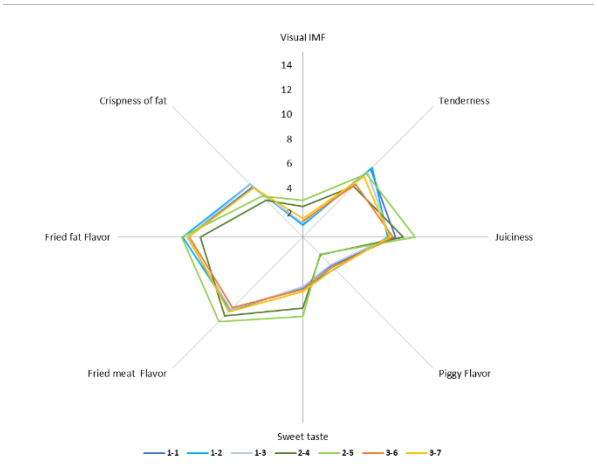

Figure 1. Spiderweb plot of sensory attributes from Table 1.

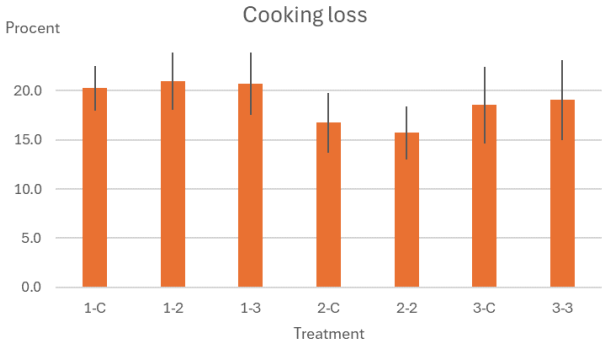

Figure 2. Average cooking loss measured in meat from the 7 production systems. The black line is the standard deviation (n=20).

IV. CONCLUSION

The sensory tests contribute to the understanding of differences between meat from pigs reared in different production systems. The sensory test of fat and meat prepared separately, but served together, provided some new nuances to the overall understanding of the eating quality of meat from different production systems.

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REFERENCES

1. Ludwiczak A., et al. (2023). Husbandry practices associated with extensification in European pig production and their effects on pork quality. Meat Science 206, 109339
2. Tikk K., et al. (2007). Significance of fat supplemented diets on pork quality – Connections between specific fatty acids and sensory attributes of pork. Meat Science 77:275–286.
3. International Organization for Standardization. (2017). Selection and training of sensory assessors (ISO Standard No. 8586:2023).
4. International Organization for Standardization. (2003). Guidelines for the use of quantitative response scales (ISO Standard No. 4121:2003)
5. International Organization for Standardization. (2016). Methodology. General guidance for establishing a sensory profile (ISO Standard No. 13299:2016)
6. https://redjade.net/ sensory software RedJade (version 6.0)