

EATING QUALITY OF FIVE DIFFERENT PIG CROSSBREEDS USING SENSORY AND CONSUMER SCIENCE

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Abstract - The eating quality of whole pork roasts with cracklings was investigated in five crossbreeds: Mangalitza x Duroc (MD), Iberian Blackfoot x Duroc (ID), Mangalitza x (Landrace x Yorkshire) (MLY), Iberian Blackfoot x (Landrace x Yorkshire) (ILY) and Duroc x (Landrace x Yorkshire) (DLY) by combining sensory profiling analysis with consumer studies.

Roasts from ID were most tender and were also most often chosen as the best by young consumers in a central location test and as one of the two most liked by families in a home-use test. Furthermore, it was described as being suited for restaurants, delicious and harmonic. DLY was least tender and with most piggy odour and was most often chosen as one of the least liked by the young consumers and in the home-use test. On this background it can be concluded that for whole roast with cracklings, ID is the best suited crossbreed when aiming at a special gourmet product with high eating quality.

Key Words: Alternative pig crossbreeds, eating quality, sensory profile, consumer studies

I. INTRODUCTION

The meat quality of pork has through intensive breeding become very uniform with a low amount of intramuscular fat (IMF). This meat quality is good for further processing, but at the same time a demand for meat with superior eating quality has developed. To gain more insight into the potential of increasing the eating quality by using different genetics, five different crossbreeds were compared: Mangalitza x Duroc (MD), Iberian Blackfoot x Duroc (ID), Mangalitza x (Landrace x Yorkshire) (MLY), Iberian Blackfoot x (Landrace x Yorkshire) (ILY) and Duroc x (Landrace x Yorkshire) (DLY). The latter is the common slaughter pig in Denmark. Previously, boneless chops from MD and ID have shown to be most tender and juicy followed by MLY and ILY whereas DLY chops were least tender and juicy [1]. However, a production of MLY and ILY will become more expensive compared with DLY due

to higher production expenses, and the gained eating quality should therefore be superior not only for chops, but also for other cuts of meat. Furthermore, it is important to combine investigations of the objective eating quality, as a sensory profile analysis using a trained sensory panel, with consumer studies to evaluate consumer reactions towards the meat. In Denmark, whole roast with cracklings is a common and well-liked way of cooking the loin, especially in the winter, and the eating quality of this dish is therefore important to investigate.

The aim of this study was to investigate the eating quality of whole roast with cracklings from five different pork crossbreeds by a sensory profile combined with various consumer study techniques, to describe the potential of these crossbreeds as a gourmet pork production.

II. MATERIALS AND METHODS

Traditional crossings were made between boars of Duroc (D) and sows of Landrace/Yorkshire (LY), and other crossings were made between boars of Iberian Blackfoot (I) or Mangalitza (M) with sows of either D or LY. After slaughter, longissimus dorsi (LD) was cut out, vacuum packed and aged for 4 days at 4°C and frozen until the analyses.

Sensory profile: Four roasts per crossbreed were used for a sensory profile. The meat was cooked as a whole roast with cracklings in an oven at 200°C oven temperature until a core temperature of 65-68°C. The roasts were sliced into 5 mm thick slices, and a piece of 3x4 cm of the core was served for each assessor together with a crackling. The attributes were assessed on a 15 cm unstructured line scale with an anchor 1 cm from each side going from "no intensity" to "very high intensity".

Central location test, Holistic by DMRI and ranking: One roast of each crossbreed was used for a consumer study involving 19 young consumers. The meat for this investigation was cooked as described for the sensory profile. Each serving was half a slice of roast and a crackling. The consumers started with a ranking analysis comparing all five samples. Then the roast with a crackling was served one sample at a time. On a 15 cm unstructured line scale going from "not at all", to "very much", they were asked to assess how much they found that the following words described the roast and crackling: Full-bodied, delicious, harmony, Nordic, well-known, complex, boring, traditional, suited for restaurants, different.

Home-use test: Four roasts of each crossbreed were used for the home-use test. One roast of each crossbreed was given to four different families, and they were instructed to cook them simultaneously at home the way they preferred, and then serve them for as many guests as possible. Individually, everyone evaluated the liking of the roast and of the cracklings on a 15 cm unstructured line scale going from "do not like at all" to "like extremely much". As the fat cover was very different on the five crossbreeds, a short introduction to the crossbreeds was given to the cook.

Data was analysed using PanelCheck (ver. 1.4.0).

III. RESULTS AND DISCUSSION

The five different pork roasts differed in sensory profile as can be seen in Figure 1 and Table 1. The main variation (PC1) was between DLY, characterized by piggy odour, flavour and hardness of the cracklings, and ID characterized by crispy cracklings, meat odour and tenderness and to some extent juiciness. MLY was mainly characterized by not being juicy and with less piggy flavour (PC2). MD and ILY are centred in the plot meaning that they are intermediate in eating quality.

As can be seen in Table 1, roasts from ID are significantly most tender. However, all the samples were very tender. In contrast, none of the samples were assessed as being very juicy – not even the ID sample, which is the juiciest.

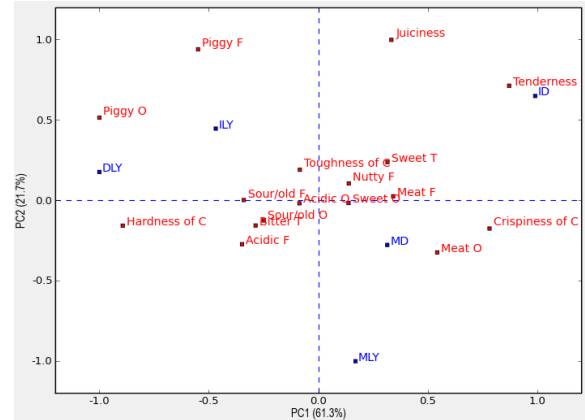


Figure 1. PCA biplot of the sensory profile of pork roasts with cracklings from five different pig crossbreeds

Table 1. Sensory profile of whole roasts with cracklings from five different pig crossbreeds. Only significantly different attributes are presented.

	DLY	MD	MLY	ID	ILY
Piggy odour	3.4 ^a	1.7 ^b	2.0 ^b	1.7 ^b	3.4 ^a
Piggy flavour	3.6 ^a	2.4 ^b	1.9 ^b	2.8 ^{ab}	3.4 ^a
Acidic flavour	5.4 ^{ab}	5.7 ^a	5.6 ^a	4.7 ^b	6.1 ^a
Bitter taste	3.2 ^a	2.2 ^b	3.1 ^a	2.6 ^{ab}	2.7 ^{ab}
Juiciness	3.9 ^b	4.2 ^b	3.2 ^c	5.0 ^a	4.4 ^b
Tenderness	9.4 ^d	10.6 ^b	9.8 ^{cd}	11.5 ^a	10.4 ^{bc}
Crispiness of the cracklings	9.5 ^c	10.5 ^{ab}	10.7 ^{ab}	11.1 ^a	9.9 ^{bc}

Young consumers were invited for the central location test using a holistic approach. They represent the future consumers, and therefore they are an interesting segment to investigate. This test was performed as a central location test, and the cooking procedure was therefore similar to the sensory profile. As can be seen from figure 2, ID was the crossbreed which was most often chosen as the best or second best of the five samples, while DLY was the crossbreed which was most often chosen as the least or second least liked. This can be explained from the sensory profile, as these two samples also were the ones which spanned the plot most. ILY was the sample which next to ID was most often chosen as one of the two best samples even though it was situated near the DLY sample in the biplot of the sensory profiling data.

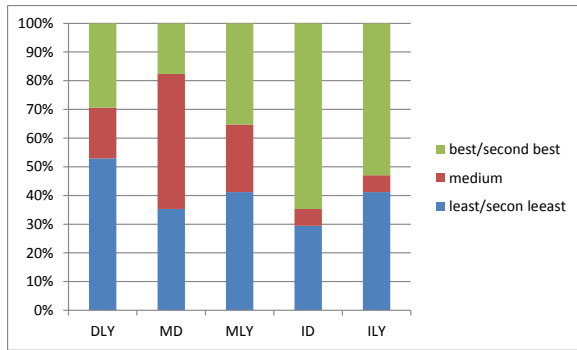


Figure 2. Ranking of liking of pork roasts with cracklings from five different pig crossbreeds

This might be caused by ILY being tenderer compared with DLY, and this could have been more important for the consumers compared with the piggy odour, which was high in both ILY and DLY.

The young consumers regarded the roasts from MD and MLY as boring (Figure 3) and this can explain why they were mainly chosen as the medium samples – not being the best and not the least liked – just boring!

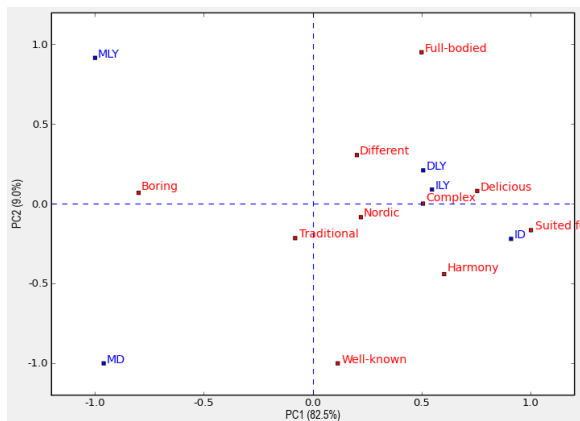


Figure 3. Holistic assessment by young consumers of pork roasts with cracklings from five different pig crossbreeds

In contrast, ID was assessed as being the most suited for restaurants and the most delicious and harmonic. The holistic approach of ILY and DLY are very similar to the sensory profile. Even though DLY and ID were ranked very differently for liking, this was not the case in the

holistic assessment, especially because they were similar in not being boring.

The home-use test was performed in families representing today's consumers. The test was performed as a home-use test to investigate the liking in a realistic consumer cooking situation. No control of the cooking was made, but the consumers were asked to report how they had cooked the roast and state the core temperature, if they had used a thermometer. Within the families, the roasts were cooked the same way. At the extremes, one family cooked the roasts for 80 min until a core temperature of approx. 65°C while another family cooked them for 135 min combined with 15-20 min rest until a core temperature of approx. 78°C. Figure 4 shows the liking of the roast and of the cracklings.

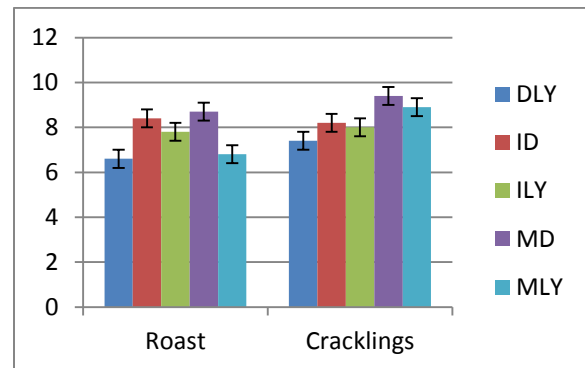


Figure 4. Liking of pork roasts with cracklings from five different pig crossbreeds in a home-use test. Std.err. are given on the bars

As can be seen in Figure 4, ID had together with MD the highest liking score of the roast ($P < 0.001$). The slightly lower liking of ILY could be caused by the more intensive piggy flavour (Table 1), while the low juiciness of MD and the low tenderness of DLY might explain the significant lower liking of these samples.

The difference between the crossbreeds in liking of the cracklings were smaller though significant ($P = 0.02$). Here, the boar breed seems most important as the two crossbreeds with Mangalitza (MD and MLY) had the highest liking followed by the two crossbreeds with Iberian Blackfoot (ID and ILY) while the DLY had the lowest liking score.

IV. CONCLUSION

By investigating the Danish traditional dish, whole pork roast with cracklings, it appeared that loins from ID were most tender and the most liked roast, assessed by both the future consumers and today's consumers. Furthermore, it was regarded as suited for restaurants, delicious and harmonic.

The traditional Danish crossbreed, DLY, was in this study most often chosen as the least liked by the future consumers and together with MLY less liked by today's consumers. MLY and MD were regarded as boring by the future consumers.

ID must therefore be regarded as most suited for a gourmet production of pork in respect to this cooking method.

This study shows the strength of combining sensory studies with different types of consumer studies to gain insight into the potential of increasing eating quality of meat.

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