

Fat content in raw and cooked pork cuts

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Background and Objectives

It is well known, that a diet rich in fat is associated with an increased risk of ischaemic heart disease, obesity and certain cancers. From dietary surveys it has been shown that 18% of the fat content in the Danish diet comes from meat and meat products, particularly pork (Andersen et al., 1995). This figure is based on fat content in raw meat corrected for an estimated change due to cooking. A more accurate estimate of the change in fat content after cooking is lacking. The primary aim of the present study was to obtain data on fat content in different pork cuts before and after cooking.

Materials and Methods

Eight different pork cuts were selected for analysis - tree joints with rind, two joints without rind and tree joints cut into slices (chops). Further one of the joints cut into chops was cooked with and without crumb. There were 16 of each cut, eight analysed in the raw condition and eight analysed after cooking. Raw and cooked cuts were randomly selected from the right and left side of the same animals. All cuts were performed at the slaughterhouse according to written specifications (weight of carcass ranged from 76-78 kg, and lean meat content ranged from 59-61 %). Cuts for analysis in the raw condition were vacuum packed and frozen. Cooking was performed no less than two days after cutting, and then vacuum packed and frozen until analysis.

Cooking was carried out by trained laboratory technicians in two kitchens: a household kitchen and an institutional kitchen. The cuts were weighed before cooking and 20 minutes after cooking. End point core temperature was measured at the end of the cooking period with a calibrated thermometer. Cooking conditions were as indicated in table 1.

All samples were analysed for fat, protein and water (double determination), but only the fat content is presented here. Cuts were homogenised twice in a mincer (Bizerba FW 70, 2 mm hole). The rind was separated from the joints, weighted, homogenised and analysed separately. The fat content was determined by gravimetric method (modified SBR, Nordic Committee on Food Analysis NO. 131, 1989).

Results and discussions

The correlation between the fat content (wt %) in the raw and cooked joints, and raw and cooked sliced joints were very high as shown in figures 1 and 2, respectively. Also, a high correlation between the fat loss in connection with cooking and the initial fat content of the raw joints was demonstrated ($r = 0.85$; $P < 0.001$; data not shown).

Table 1 shows changes in fat content and cooking loss in the different cuts after cooking in two kitchens (the sum of the fat, protein and water were within 98-102 %, except for the cut with crumb, that also contained carbohydrate). The average weight loss for joints was between 21 % and 36 %, and fat loss was between 1 % and 8 %. The corresponding losses for sliced joints were 7-49 % and -4-9 %, respectively. As can be seen from table 1 fat content (wt %) in the cooked cuts were somewhat larger than in raw cuts. Barnes et al. (1996) has measured the fat content in 13 raw and cooked cuts and found, as in this study, that the fat content of the cuts was increased after cooking. There were no consistent changes in weight loss of the cuts in the two kitchens.

The cooking method, and the end point temperature, may be important for how much fat is lost during cooking, and thus for the content of fat in the meat. Differences in cooking loss is mainly due to different end point temperature (Clausen et al., 1997; Martens et al, 1982), raw meat quality (e.g. pH) and crumb. A small experiment (data not published) indicated a higher fat content in loin with rind (about 3 g/100 g) when cuts were cooked to end point temperatures of 67°C compared to 77°C. This is a relative small difference, considering the variations in the fat content in similar type of raw meat. As an example, it has been found that the fat content of raw loin with rind purchased at the retailer can vary from 12-32 g/100g (Okholm-Hansen & Knuthsen, 1998).

In the present study the high correlation between the fat content in the raw and the cooked meat was obtained in spite of different end point temperature or frying conditions and large variations in cooking loss. By using the regression equation from figures 1 and 2 it is possible to calculate fat content in cooked cuts from raw meat.

Conclusions

Although fat is lost during cooking of pork joints and joints cut into slices, expressed per 100 g meat the fat content actually appears to increase. To calculate fat content in cooked joints and joints cut into slices from raw meat, a simple regression equation can be used regardless of the end point temperature, oven or frying conditions.



Literature

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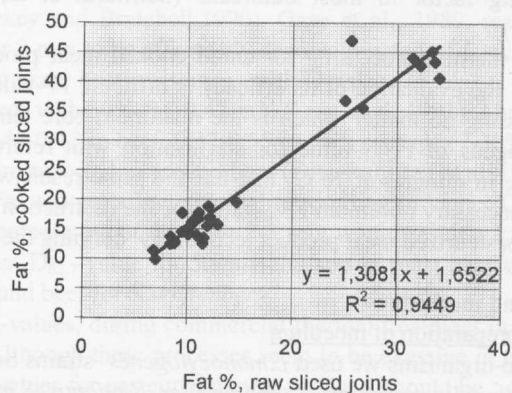
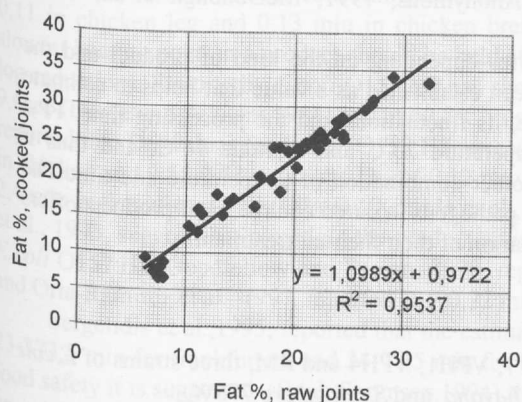


Figure 1 Relation in fat (wt %) between cooked and raw joints

Figure 2 Relation in fat (wt %) between cooked and raw sliced joints

Table 1: Fat % in raw and cooked joints and sliced joints and cooking loss. Cooking was carried out in an institutional kitchen (I) and in a household kitchen (H). Wt loss %: 100 (raw weight - cooked weight) / raw weight. Fat loss %: 100 (Total fat content in raw joint - fat content in cooked joint) / raw weight.

Cut		Fat wt % (mean(n=4) min. and max.)		Cooking loss % (mean(n=4), min. and max.)		Raw weight g (mean)	Cooking Methods Mean end point temp. °C/Oven temp °C
		Raw	cooked	Wt loss	Fat loss		
1) Collar boneless with rind	I	29 26-32	32 30-34	34 29-36	8 7-9	2845	80 / 225
	H	23 22-25	26 25-28	34 27-39	6 3-9	2004	79 / 200
2) Loin boneless with rind	I	21 18-24	25 24-29	36 34-38	5 3-7	2774	75 / 225
	H	18 16-20	19 16-22	32 26-36	6 4-6	2438	70 / 200
3) Thin belly with rind	I	22 19-24	26 24-28	34 33-35	5 3-6	2032	88 / 225
	H	24 20-27	27 24-31	26 23-27	4 3-5	1806	? / 200
4) Collar boneless, top fat removed	I	14 12-17	18 15-21	29 28-29	2 1-3	2223	79 / 200 (25 min) → 90
	H	12 10-14	15 14-17	31 28-37	2 1-3	1459	76 / 180
5) Loin, 1-3 mm fat on top	I	8 7-11	9 7-13	21 17-24	2 1-3	2901	71 / 200 (25 min) → 90
	H	7 6-8	8 7-9	26 25-28	1 0-2	1917	72 / 180
6) Slice of neck	I	12 10-15	17 15-20	41 38-43	2 1-3	162	Fried on pan followed by oven (120°C)
	H	11 10-12	16 15-18	25 19-30	-1 -2(-1)	129	Fried on pan for 10 min
7) Sliced thick belly without rind	I	31 26-34	44 41-47	49 46-52	9 1-12	137	Oven (170°C) for 1 hour 40 min.
	H	30 25-34	40 37-45	47 42-52	9 6-11	158	Oven (180°C) for 1 hour 50 min.
8) Pork chop, 1-3 mm	I	10 7-12	14 10-17	28 26-30	-1 -1,0	145	Fried on pan followed by oven (120°C)
	H	11 9-13	14 13-16	22 20-24	0 -1,1	122	Fried on pan for 8 min
Pork chop, 1-3 mm fat, crumb,	I	9 7-12	13 11-15	10 7-13	-3 -4,0	142	Fried on pan followed by oven (120°C)
	H	10 8-12	16 13-19	7 5-9	-4 -7(-2)	124	Fried on pan for 10 min