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# Simultaneous determination of total lipid, cholesterol and fatty acids in meat and backfat of suckling and adult pigs

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**Abstract**

Total lipid, cholesterol and fatty acids were determined in the meat, backfat and skin of suckling pigs and in meat cuts and backfat of adult pigs. Mean total lipid was similar (3.2–3.8%) in the meat of the suckling pigs and the adult pork loin, but lower (2.4%) in fresh ham. In the backfat, the values were 50, 68 and 92% for suckling (15 and 21 days) and adult pigs, respectively. Mean cholesterol levels were similar (98 and 95 mg/100 g) in the meat of the suckling pigs, and higher than those of pork loin and fresh ham (49 and 44 mg/100 g). The values obtained in the backfat were 102, 79 and 33 mg/100 g for the 15 and 21 day old and adult pigs, respectively. Of 47 fatty acids quantified, the principal components were 18:1n9, 16:0, 18:2n6, 16:1n7, 18:0, 18:1n7 and 14:0, although there was some inversion of the order. 

*Keywords:* Effect of age; Pork; Cholesterol; Fatty acids; Lipid; HPLC; CG

## 1. Introduction

Generally, pork is the most widely produced and consumed meat. It is estimated that in 2001, pork production in tons will surpass 90 million, compared with less than 61 million for beef and a little over 66 million for chicken (FAO, 2001). Among the principal consuming countries are Denmark (76.3 kg/inhabitant/year), Spain (66.2 kg/inhabitant/year), Germany (56.8 kg/inhabitant/year) and Italy (39.6 kg/inhabitant/year; USDA, 2001). Brazil is among the 10 major producing countries but ranks 30th in terms of consumption. Presently, Brazil exports 150,000 tons of pork per year, principally to Hong Kong, Argentina, Uruguay, Switzerland, Germany and Russia.

As in other countries, the demand for low-fat, low-cholesterol products has increased in Brazil. In line with this trend, producers of pork have sought tasty, high-yield pork with low-fat content, through cross-breeding or selection of new breeds. Genetics is responsible for part of the evolution of swine culture, the rest coming from operational manipulation, including formulation and administration of the feed and the rearing system (confined or in pasture).

Pork has been linked to cardiovascular diseases because of its high fat and cholesterol levels. However, unlike other domesticated animals, the pork's fat is not high in the meat. Of the pork's fat 70% forms a subcutaneous layer as protection against cold temperatures, which can be removed before consumption.

The cholesterol content of pork reported in the literature varies. The discrepancy can be attributed to natural variation bought about by factors such as age and breed of the animals, diet and rearing system, as well as to different analytical methods.

Human plasma cholesterol depends not only on dietary cholesterol but also on the amount of fat and the fatty acid composition of the diet. Thus, an integrated analysis of these three components was carried out in meat and backfat of suckling and adult pig.

## 2. Materials and methods

### 2.1. Samples

The meat, backfat and skin from five 15-day and five 21-day suckling pigs were separated and analysed

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separately. Meat cuts (pork loin and fresh ham) and backfat from adult pigs were also analysed. The suckling pigs weighed about 6.5 kg. From the adult pig (110-day old), the pork loin and the fresh ham were chosen for being the most consumed cuts. A previous work showed that no significant difference in the cholesterol content existed among the different pork cuts available in the Brazilian market (Bragagnolo & Rodriguez-Amaya, 1995).

The suckling and adult pigs resulted from the cross-breeding of Agpic 405 (Hampshire with Landrace×Large White) and Camborough 15 (Duroc Pic with Landrace Pic×Large White Pic).

The animals came from the same farm, Fazenda Barra Dourada, Rio Brilhante, Mato Grosso do Sul, Brazil, the suckling pigs being fed only with the mother's milk and the adult pigs reared in the pasture, supplemented by a ration based on corn, wheat soybean and vitamins.

### 2.2. Methods

The lipids were extracted with chloroform-methanol (2:1) according to Folch, Lees, and Stanley (1957). Aliquots were taken and the total lipid content was determined gravimetrically. Other aliquots were saponified, the unsaponifiable material extracted by the procedure of Bohac, Rhee, Cross, and Ono (1988) and cholesterol quantified by high performance liquid chromatography (HPLC). Aliquots of the lipid extract were also saponified, the fatty acids esterified with $BF_3$-methanol (Metcalfe, Schmitz, & Pelka, 1966) and the fatty acid composition determined by gas chromatography (GC).

#### 2.2.1. Liquid chromatography

For HPLC, a Varian chromatograph was used, equipped with a ternary solvent delivery system (Model 9010), rheodyne injector with a 10 μl loop, Waters diode array detector (Model 990) and a Hewlett-Packard recorder (Model 2225 D). The analytical column was 4.6×150 mm Spherisorb ODS-2 (5 μm), preceeded with a 4.6×10 mm Spherisorb ODS-2 (5 μm) guard column. The mobile phase (flow rate, 1ml/min) consisted of acetonitrile:isopropanol (70:30, v/v). Each run took 15 min. Absorption spectra were taken at 190–300 nm and the chromatograms at 210 nm. All solvents were reagent-grade for extraction and HPLC grade for chromatography. Quantification was carried out by external standardization. The standard curves passed though the origin, were linear and bracketed the samples' concentrations. Calibration was done on each day of analysis. Aside from spiking, the peak's identity and also its purity were verified by means of the spectra obtained with the photodiode array detector, taken at the maximum and at the ascending and descending slopes of the peak.

#### 2.2.2. Capillary gas chromatography

For GC, a Varian 3300 chromatograph was used, equipped with a split/splitless injector (split ratio, 100:1), a flame ionization detector and a fused silica capillary DB-WAX columm (30 m×0.30 mm, 0.25 μm film thickness; J & W Scientific, USA). The columm temperature was held at 150 °C for 11 min and programmed at 3 °C/min to 210 °C. Other operating conditions were: carrier gas, hydrogen at 1.26 ml/min; make-up gas, nitrogen at 30 ml/min; detector temperature, 280 °C; injector temperature, 250 °C. Retention times and peak area percentages were computed automatically by a Varian 4290 computing integrator. Fatty acids were identified by the adjusted retention times compared with those of standards, spiking and equivalent chain length (Christie, 1988) as applied to fish fatty acids. A total of 36 saturated, monounsaturated and polyunsaturated fatty acid standards (Sigma and Polyscience, USA) were used, along with PUFA-1 and PUFA-2 of Supelco (USA). In addition, the equivalent chain length results were found to correlate well with mass spectrometric data in our laboratory (Maia, Rodriguez-Amaya, & Hotta, 1995). Quantification was carried out by normalization and transformation of the area percentage to mg per 100 g of edible portion, using the lipid conversion factor of Holland, Welch, Unwin, Buss, Paul, and Southgate (1994).

#### 2.2.3. Statistical analysis

To verify significant differences in relation to age, the results were submitted to analysis of variance (ANOVA) at the 5% level of confidence.

## 3. Results and discussion

No significant difference was found in the total lipid content (means of 3.8, 3.2 and 3.5%, respectively) of the meat of the suckling pigs of 15 and 21 days and the pork loin of the adult pig, but the level was lower in the fresh ham (mean of 2.4%). Mean values in the skin were 19 and 32%, respectively, for the animals of 15 and 21 days, and in the backfat 50, 68 and 92%, respectively, for the 15-day, 21-day and adult pigs, (Table 1), showing substantial increase with age.

Total lipids of the meat of the suckling pigs in the present work are in agreement with those reported by Lodge, Sarkar, and Kramer (1978) (3.2 and 2.9%, respectively, for 14-day and 21-day-old pigs). For the backfat, the values obtained in this study are lower than those of Lodge et al. (1978) who found 69.8 and 77.5% in pigs of 14 and 21 days, although a tendency to increase with age was also observed.

The cholesterol content did not differ significantly (98 and 95 mg/100 g) in the meat of the suckling pigs, but was considerably lower in the pork loin and fresh ham

(49 and 44 mg/100 g). In the skin, there was a significant decrease from 15 (mean of 109 mg/100 g) to 21 days (94 mg/100 g). Cholesterol in the backfat also decreased significantly from 15 to 21 days, on to the adult pig (means of 102, 79 and 33 mg/100 g, respectively). These results contradict the popular belief in Brazil that younger animals would have lower cholesterol levels.

Similar findings were reported for beef by Morris, Kirton, Hogg, Brown, and Mortimer (1995). However, Stromer, Goll, and Roberts (1966) found no effect of age in the beef muscle but observed an increase of cholesterol in the internal and external subcutaneous fat layer.

The present values for the adult pork are similar to those obtained in a previous work in which a colorimetric method was used (Bragagnolo & Rodriguez-Amaya, 1995). The cholesterol content of the backfat is lower (54 vs. 33 mg/100 g) in the present work. The discrepancy can be attributed to the new breed analysed in the present investigation, this breed being introduced with the objective of offering the consumers low-fat and low-cholesterol pork, and the rearing of the animals in the pasture.

Bohac et al. (1988) and Swize, Harris, Savell, and Cross (1992) reported higher values and Hutchison, Greenfield, and Wills (1987) and Csallany, Kindom, Addis, and Lee (1989) lower levels of cholesterol in pork than those obtained in our work. Higher levels were found by Bohac et al. (1988) and by Hutchison et al. (1987) in the fat.

Forty-seven fatty acids were identified in pork, the principal components in all samples, regardless of the age or cut, being 18:1n9, 16:0, 18:2n6, 16:1n7, 18:0, 18:1n7 and 14:0 (Tables 2 and 3). This was the quantitative order in the skin and backfat of the suckling pigs. In the meat, 16:0 predominated over 18:1n9, the other fatty acids being in the same order. In the pork loin and fresh ham, 18:0 surpassed 18:1n7 and 16:1n7. The backfat of the adult pig showed the most different pattern. Although 18:1n9 and 16:0 were the first and second fatty acids, the order of the other five principal fatty acids was different from that of the other samples.

The main difference in the meat of the suckling pigs was the significantly lower concentrations of the fatty acids 16:0, 16:1n7 and 18:1n9 in the 21-day-old animal. The pork loin, in comparison with the suckling pigs, had significantly lower 16:1n7 and 18:2n6 and higher 18:0 and 18:1n9. Also, in comparison with the suckling pigs, the fresh ham was significantly lower in 16:0, 16:1n7, 18:1n7 and 18:2n6. Some differences in the minor fatty acids could also be noted. In terms of the total percentages, practically the same total of saturated fatty acids was found in the different meat samples. The total monounsaturates was slightly higher and the polyunsaturated fatty acids lower in the pork loin and fresh ham.

In the skin of the suckling pigs, all the principal fatty acids increased significantly, except 18:0, from 15 to 21 days. A significant increase with age was also seen in the backfat, except for 16:1n7 which decreased significantly in the fresh ham. Most of the minor fatty acids also increased significantly with age, both in the skin and the backfat. In terms of the overall percentages, however, similar values were obtained for the total saturated, monounsaturated and polyunsaturated fatty acids in the skin of the 15 and 21-day animals. In the backfat, the percentages were also similar for the 15 and 21-day suckling pigs, but higher in total saturated fatty acids and slightly lower for polyunsaturated fatty acids in the adult pig.

Aside from age, the changes in the fatty acid composition could also be due in part to the diet, the suckling pigs being fed only with maternal milk while the adult animals fed on the pasture and a supplementary ration. According to Rhee, Davidson, Knabe, Cross, Ziprin, and Rhee (1988) and Morgan (1992), the fatty acid composition of pork would be greatly influenced by that of the diet.

Lodge et al. (1978) encountered small changes in the fatty acid composition of suckling pigs of 14 and 21 days. The fatty acids 16:0 and 18:1 decreased and 18:2 increased in the muscle. In the backfat, 16:0 decreased while 18:2 increased.

Brooks and Davis (1969) analysed suckling pigs of −6 to 6 days and found 14:0, 16:0, 16:1, 18:1 e 18:2 as principal fatty acids, making up 95% of the total. Although a direct comparison cannot be made, considering the difference in ages, their results also showed a tendency of fatty acids 14:0 and 18:0 to decrease.

Table 1
Total lipid and cholesterol contents in the suckling and adult pigs[a]

| Samples | $N$[b] | Total lipid (g/100 g)[c] | Cholesterol (mg/100 g)[c] |
|---|---|---|---|
| *Meat* | | | |
| Suckling pig, 15 days | 5 | 3.8±0.9 a | 98±9 a |
| Suckling pig, 21 days | 5 | 3.2±0.6 ab | 95±29 a |
| Pork loin, adult | 3 | 2.4±0.8 b | 44±3 b |
| Fresh ham, adult | 3 | 3.5±1.4 ab | 49±3 b |
| *Skin* | | | |
| Suckling pig, 15 days | 5 | 19±7 b | 109±15 a |
| Suckling pig, 21 days | 5 | 32±5 a | 94±10 b |
| *Backfat* | | | |
| Suckling pig, 15 days | 5 | 50±6 c | 102±13 a |
| Suckling pig, 21 days | 5 | 68±7 b | 79±8 b |
| Adult | 3 | 92±1 a | 33±3 c |

[a] Means in the same column for meat, for skin and for backfat with different letters are significantly different ($P<0.05$).

[b] Number of samples analysed.

[c] Values are means and standard deviations of samples analysed individually in duplicate.

Table 2
Fatty acid composition (mg/100 g)[a] of the meat of suckling and adult pigs

| Fatty acids | Suckling pig | | Adult pig | |
|---|---|---|---|---|
| | 15 days[b] | 21 days[b] | Pork loin[b] | Fresh ham[b] |
| 10:0 | 3.9±0.0 a | 3.4±0.7 a | 5.5±0.0 a | 4.3±2.0 a |
| 12:0 | 5.0±0.8 a | 7.6±0.7 a | 6.7±0.4 a | 6.3±1.9 a |
| 14:0 | 115±32 a | 84.2±17.6 ab | 63.1±3.7 b | 50.4±15.1 b |
| 14:1n7 | 2.3±0.7 a | 1.8±0.0 a | tr b | tr b |
| 14:1n5 | 4.1±0.7 a | 4.5±0.7 a | 1.3±0.0 b | 1.8±0.0 b |
| i-15:0 | 3.9±0.0 a | 2.1±0.0 a | tr b | 0.8±0.0 b |
| 15:0 | 4.8±0.8 a | 3.3±0.2 b | 1.7±0.4 c | 1.8±0.2 c |
| 15:1n9 | 6.2±0.9 a | 8.5±1.4 a | 1.8±0.2 b | 2.1±0.3 b |
| 16:0 | 964±70 a | 766±97 b | 801±13 ab | 525±28 c |
| 16:1n9 | 29.1±4.3 a | 30.8±5.3 a | 9.9±1.3 b | 9.6±0.6 b |
| 16:1n7 | 315±52 a | 210±47 b | 109±4 c | 66.6±9.6 c |
| 16:1n5 | 2.2±0.3 a | 2.9±0.0 a | 2.7±0.0 a | 1.9±0.5 a |
| 16:2n7 | 3.4±0.0 a | tr b | 3.2±0.0 a | 2.0±0.0 a |
| 16:2n6 | 3.2±0.4 a | 3.3±0.4 a | 2.5±0.5 ab | 2.0±0.2 b |
| ai-17:0 | 0.8±0.0 b | 2.2±0.4 a | 2.9±0.2 a | 2.9±0.0 a |
| 17:0 | 5.3±0.8 a | 3.9±0.5 b | 4.8±0.1 ab | 4.7±0.3 ab |
| 17:1n5 | 10.7±2.5 a | 8.6±2.3 a | 7.5±1.3 a | 7.1±2.6 a |
| 18:0 | 166±24 bc | 146±32 c | 310±32 a | 209±19 b |
| 18:1n9 | 891±37 b | 680±69 c | 1298±105 a | 847±75 b |
| 18:1n7 | 115±4 a | 101±10 a | 110±10 a | 67.1±8.1 b |
| 18:1n6 | 3.0±0.3 b | 2.7±0.6 b | 3.8±0.3 ab | 5.4±1.7 a |
| 18:1n5 | 4.0±1.1 a | 2.2±0.7 a | tr b | 4.7±0.0 a |
| 18:1n4 | tr b | tr b | 2.1±0.3 a | 2.9±0.0 a |
| 18:1n3 | tr b | tr b | 4.8±0.0 a | 4.2±0.0 a |
| 18:2n6 | 612±101 a | 572±99 a | 287±91 b | 283±53 b |
| 18:2n4 | 2.0±0.0 b | tr c | 2.3±0.2 b | 3.5±0.1 a |
| 18:2n3 | 0.7±0.0 a | tr b | 1.4±0.0 a | 1.2±0.0 a |
| 18:3n6 | 3.1±0.7 ab | 3.7±0.3 a | 2.2±0.0 ab | 1.5±0.0 b |
| 19:1n9 | tr c | 3.2±0.0 b | tr c | 9.0±0.0 a |
| 18:3n3 | 31.8±5.8 a | 25.7±6.8 a | 9.5±1.2 b | 11.6±3.9 b |
| 18:4n3 | 3.8±0.3 b | 2.4±0.2 b | 11.6±1.1 a | 9.9±1.5 a |
| 20:0 | 1.2±0.0 b | 2.0±0.2 b | 4.4±1.1 a | 2.7±0.2 ab |
| 20:1n9 | 7.3±1.2 c | 8.7±1.7 bc | 19.2±2.9 a | 12.5±0.3 b |
| 20:1n7 | 2.2±0.0 a | 2.3±0.0 a | 1.7±0.0 a | 2.2±0.9 a |
| 20:1n5 | 11.7±1.1 a | tr c | tr c | 6.4±0.6 b |
| 20:2n9 | 2.2±0.3 c | 10.3±1.0 a | 6.9±0.0 b | 1.6±0.2 c |
| 20:2n6 | tr b | 3.2±0.8 a | 2.2±0.1 a | 3.0±0.1 a |
| 20:3n6 | 7.4±0.6 ab | 9.0±1.0 a | 3.4±0.0 c | 5.5±0.0 bc |
| 20:4n6 | 87.3±4.1 ab | 133±18 a | 57.6±0.0 b | 45.2±0.0 b |
| 20:3n3 | 2.1±0.4 a | 2.2±0.6 a | 1.5±0.0 a | 1.8±0.0 a |
| 20:5n3 | 2.7±0.8 a | 3.8±0.3 a | 2.6±0.0 a | 1.7±0.0 a |
| 22:1n9 | 1.7±0.0 a | 3.0±0.0 a | tr b | 1.8±0.1 a |
| 22:3n3 | tr b | 7.9±0.0 a | 7.0±0.0 a | tr b |
| 22:4n6 | 12.4±1.2 ab | 15.0±2.2 a | 3.1±0.0 b | 5.7±0.0 b |
| 23:0 | 3.3±1.0 a | 4.9±0.5 a | tr b | 0.8±0.0 b |
| 22:5n3 | 12.5±1.1 ab | 13.6±2.0 a | 6.0±0.0 b | 4.4±0.0 b |
| 22:6n3 | 6.8±0.0 ab | 9.9±2.0 a | 1.6±0.0 b | 3.3±0.0 b |
| Total SFA (%) | 37 | 35 | 38 | 36 |
| Total MUFA (%) | 41 | 37 | 49 | 47 |
| Total PUFA (%) | 23 | 28 | 13 | 16 |
| PUFA/SFA | 0.62 | 0.80 | 0.34 | 0.44 |
| Total n3 (%) | 1.7 | 2.3 | 1.4 | 1.7 |
| Total n6 (%) | 21.0 | 25.5 | 11.3 | 15.6 |
| n6/n3 | 12.4 | 11.1 | 8.1 | 9.2 |

i, iso; ai, anteiso; AGS, saturated fatty acid; AGM, monounsaturated fatty acid; AGP, polyunsaturated fatty acid.

[a] Means in the same row with different letters are significantly different ($P < 0.05$).

[b] Values are means and standard deviations of five samples for the suckling pig and three samples of the adult pork cuts analysed individually in duplicate.

Considering the nutritional implications of the effect of age, the meat (trimmed of fat) of the suckling and adult pigs had less than 5 g of fat per 100 g and could be considered as low in fat (Food Advisory Committee, 1990).

The polyunsaturated/saturated ratio of 0.27–0.50 of the adult meat cuts and backfat generally fulfills the recommended minimum value of 0.45 (British Department of Health, 1994) for the whole diet. The n6:n3 ratio decreased with age, but was still above the maximum of 4.0 recommended for the whole diet. This implies a need for offsetting this deficiency with other components of the whole diet

Table 3
Fatty acid composition (mg/100 g)[a] of the skin and backfat of suckling and adult pigs

| Fatty acids | Skin[b] | | Backfat[b] | | |
|---|---|---|---|---|---|
| | 15 days | 21 days | 15 days | 21 days | Adult |
| 10:0 | 11.5±0.0 a | 25.5±1.7 a | 13.3±2.7 c | 39.5±4.5 b | 138±14 a |
| 12:0 | 22.7±0.9 b | 42.2±4.2 a | 41.3±3.3 b | 68.8±3.3 b | 393±54 a |
| 14:0 | 485±21 b | 780±114 a | 1140±114 b | 1579±273 ab | 2047±205 a |
| 14:1n7 | 9.5±0.3 b | 15.3±0.5 a | 20.4±0.6 a | 28.7±5.2 a | 33.3±0.0 a |
| 14:1n5 | 25.2±0.2 b | 39.0±1.9 a | 51.5±9.8 a | 62.8±2.3 a | 16.7±0.0 b |
| i-15:0 | 14.7±0.0 a | 6.2±0.2 b | 38.9±0.0 a | 13.3±2.9 b | 10.5±0.0 b |
| 15:0 | 17.3±2.0 a | 28.3±6.2 a | 43.2±7.4 a | 56.5±10.6 a | 58.3±4.4 a |
| 16:0 | 4715±100 b | 7375±487 a | 12332±527 c | 16280±883 b | 20596±1147 a |
| 16:1n9 | 119±21 b | 210±12 a | 294±41 a | 492±132 a | 277±74 a |
| 16:1n7 | 1655±14 b | 2824±360 a | 3851±265 b | 5033±361 a | 1393±101 c |
| 16:1n5 | 10.9±1.5 b | 21.0±4.8 a | 27.7±1.5 b | 37.8±2.0 a | 29.8±0.0 b |
| 16:2n7 | 14.0±0.0 a | 13.0±1.4 a | 15.2±0.0 b | 29.6±6.1 b | 64.4±0.7 a |
| 17:0 | 30.9±6.4 b | 46.0±6.9 a | 103±0.2 b | 122±3 b | 237±11 a |
| 17:1n5 | 55.7±17.5 b | 111±8.1 a | 167±0.1 b | 227±25 a | 181±5 ab |
| 18:0 | 877±246 a | 1251±312 a | 2594±494 b | 3680±597 b | 11894±568 a |
| 18:1n9 | 6130±69 b | 10987±297 a | 15949±853 c | 23160±1978 b | 35974±1247 a |
| 18:1n7 | 547±6 b | 1081±174 a | 1579±120 a | 2184±463 a | 2182±0.0 a |
| 18:1n6 | 18.4±0.0 a | 24.1±4.6 a | 50.5±3.0 b | 64.0±12.4 b | 174±0.0 a |
| 18:1n5 | 27.0±8.2 b | 49.7±3.4 a | 73.9±12.1b | 113±6 a | 148±0.0 a |
| i-19:0 | 6.9±2.3 a | 9.1±0.4 a | 22.4±3.2 b | 17.9±1.0 b | 368±0.0 a |
| 18:1n4 | 8.6±0.0 b | 20.6±0.0 a | 29.9±0.0 a | 30.2±4.0 a | tr b |
| 18:2n6 | 2815±259 b | 4301±175 a | 7191±483 b | 9207±880 a | 8057±993 ab |
| 18:2n4 | 10.2±0.0 a | 11.8±1.8 a | 18.5±1.4 b | 26.1±2.6 b | 114±25 a |
| 18:3n6 | 17.7±0.2 b | 24.3±0.7 a | 42.5±3.6 b | 45.5±2.5 b | 65.7±0.0 a |
| 18:3n3 | 118±11.9 b | 273±18 a | 437±15 a | 510±86 a | 450±12 a |
| 18:4n3 | 27.8±0.6 b | 43.7±7.6 a | 71.9±5.5 b | 89.4±17.7 b | 506±29 a |
| 20:0 | 8.9±1.0 b | 18.8±2.6 a | 28.9±5.5 b | 52.4±10.2 b | 150±62 a |
| 20:1n9 | 56.5±3.0 b | 133±13 a | 159±17 b | 321±75 b | 889±147 a |
| 20:1n7 | 5.7±0.3 b | 15.2±2.0 a | 22.3±5.0 c | 37.0±6.4 b | 54.4±1.5 a |
| 20:1n5 | 63.3±2.1 b | 136±5 a | 7.8±0.4 b | 15.9±2.3 b | 35.0±0.0 b |
| 20:2n9 | 4.3±0.1 b | 8.8±1.5 a | 175±15 b | 310±28 a | 372±29 a |
| 20:2n6 | tr b | 4.8±0.0 a | 12.6±1.9 b | 16.8±0.0 b | 82.3±0.0 a |
| 20:3n6 | 25.3±0.0 b | 48.1±2.3 a | 64.5±2.4 b | 98.5±8.6 a | 38.6±0.0 c |
| 20:4n6 | 95.2±3.9 b | 144±15 a | 195±6 b | 260±44 a | 104±0.0 c |
| 20:3n3 | 11.5±1.3 b | 25.0±2.2 a | 32.0±3.7 a | 47.7±7.9 a | 60.5±0.0 a |
| 20:5n3 | 2.7±0.0 a | 5.6±1.1 a | 9.3±1.7 a | 11.4±2.6 a | 13.2±0.0 a |
| 22:4n6 | 22.6±2.0 b | 40.4±1.9 a | 53.0±2.9 b | 72.2±1.4 a | 20.2±0.0 c |
| 22:5n3 | 15.9±2.4 a | 25.0±1.8 a | 42.2±2.1 a | 51.4±8.1 a | 36.0±0.0 a |
| 22:6n3 | 11.1±0.0 a | 11.2±0.4 a | 54.1±4.7 a | 21.1±2.0 b | tr c |
| Total SFA (%) | 34 | 32 | 35 | 34 | 41 |
| Total MUFA (%) | 48 | 52 | 48 | 49 | 47 |
| Total PUFA (%) | 18 | 17 | 18 | 17 | 11 |
| PUFA/SFA | 0.53 | 0.53 | 0.51 | 0.50 | 0.27 |
| Total n3 (%) | 1.0 | 1.3 | 1.4 | 1.1 | 1.2 |
| Total n6 (%) | 16.5 | 15.1 | 16.2 | 15.1 | 9.8 |
| n6/n3 | 16.5 | 11.6 | 11.6 | 13.7 | 8.2 |

i, iso; ai, anteiso; AGS, saturated fatty acid; AGM, monounsaturated fatty acid; AGP, polyunsaturated fatty acid.

[a] Values are means and standard deviations of five samples for the 15 and 21 days and three samples for the adult analysed individually in duplicate.

[b] Means in the same row for skin and for backfat with different letters are significantly different ($P < 0.05$).

## 4. Conclusions

The cholesterol level decreased with age both in the meat and backfat. The total lipid decreased slightly with age in the muscle but increased substantially in the backfat.

In the meat, skin and backfat of suckling pigs, and in meat cuts and backfat of adult pigs, the same principal fatty acids were found, although there were significant differences in the concentrations. The percentage of total saturated fatty acids was maintained with age, but that of total monounsaturated fatty acids was slightly higher and that of polyunsaturated fatty acids lower in the meat of adult animals. In the backfat, the percentage of total saturated fatty acids increased while that of the total polyunsaturated fatty acids slightly decreased with age.

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