



EFFECT OF FREEZING DURATION ON OXIDATION OF BACKFAT FROM PIGS FED N-3 PUFA RICH DIETS

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Background

In meat products, lipid oxidation affects:

1. the safety due to the formation of secondary peroxidation products ; ☹️
2. the nutritional value with the degradation of essential fatty acids ; ☹️
3. the sensory quality with changes of flavor and color ; ☹️

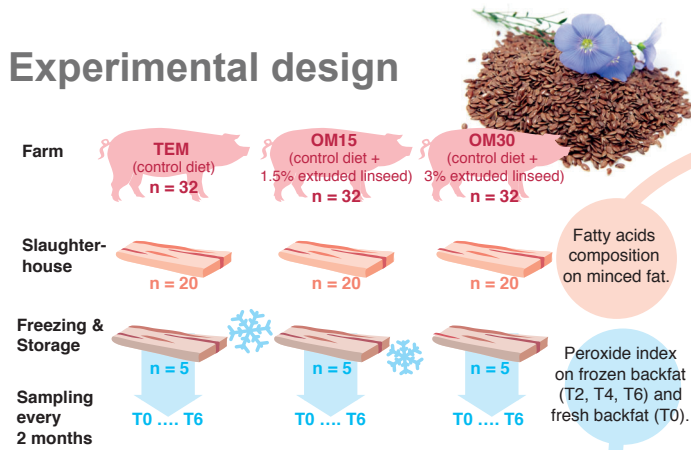
Unsaturated fatty acids are highly sensitive to the oxidation process.

We assessed the effect of freezing duration on lipid oxidation of backfat enriched with polyunsaturated fatty acids (PUFA) by feeding pigs with linseed.

Conclusion

This study showed an increase of PUFA levels in n-3 PUFA rich diets. This effect produces pork backfat which is more sensitive to the oxidation process (OM30 > OM15 > TEM) that occurs during the freezing storage. Higher oxidation in adipose tissue could impact the final products made with frozen backfat. We have planned to study this effect on fermented dry sausage.

Experimental design



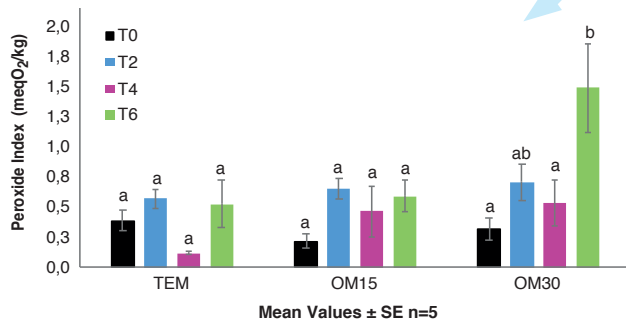
Results: Effect on lipid composition

| % of total fatty acids | TEM | OM15 | OM30 | P-Value |
|-----------------------------|---------|---------|--------|---------|
| Σ SFA | 38.67a | 38.65a | 36.80b | 0.002 |
| Myristic C14:0 | 1.28a | 1.29a | 1.20b | 0.008 |
| Palmitic C16:0 | 24.23a | 23.78a | 22.98b | 0.001 |
| Margaric C17:0 | 0.235 | 0.245 | 0.235 | 0.757 |
| Stearic C18:0 | 12.48ab | 12.96a | 12.04b | 0.020 |
| Arachidic C20:0 | 0.195 | 0.150 | 0.170 | 0.249 |
| Behenic C22:0 | 0.030 | 0.010 | 0.005 | 0.067 |
| Σ MUFA | 49.19a | 47.42b | 46.70b | 0.000 |
| Palmitoleic C16:1 | 2.41a | 2.12b | 2.21ab | 0.005 |
| Elaidic C18:1 (ω9) | 0.080 | 0.060 | 0.065 | 0.373 |
| Oleic C18:1 (ω9) | 41.58a | 40.51b | 39.79c | 0.000 |
| c-Vaccenic C18:1 (ω7) | 3.11a | 2.82b | 2.81b | 0.000 |
| Gadoleic C20:1 (ω9) | 0.915a | 0.885ab | 0.820b | 0.035 |
| Σ PUFA | 12.15a | 13.94b | 16.51c | 0.000 |
| Total (ω3) | 1.35a | 2.80b | 4.50c | 0.000 |
| α-linolenic C18:3 (ω3) | 1.08a | 2.33b | 3.72c | 0.000 |
| Eicosatrienoic C20:3 (ω3) | 0.150a | 0.285b | 0.515c | 0.000 |
| Eicosapentaenoic C20:5 (ω3) | 0.000a | 0.010a | 0.070b | 0.000 |
| Docosapentaenoic C22:5 (ω3) | 0.100a | 0.155b | 0.190c | 0.000 |
| Docosahexaenoic C22:6 (ω3) | 0.015 | 0.015 | 0.010 | 0.867 |
| Total (ω6) | 10.75a | 11.13ab | 11.98b | 0.003 |
| Linoleic C18:2 (ω-6) | 10.04a | 10.41a | 11.23b | 0.002 |
| ω6 / ω3 | 8.01a | 4.00b | 2.67c | 0.000 |

SFA: saturated fatty acids; MUFA: monounsaturated fatty acids;
PUFA: polyunsaturated fatty acids.

Results

Results: Effect on lipid oxidation



- Pig diet and freezing duration significantly increased lipid oxidation, respectively (P<0.01) and (P<0.001); ☹️
- Maximum value was obtained with OM30 diet and after 6 months; ☹️
- The maximum storage recommended for backfat is therefore 6 months.

- Total lipid content was in the range of 83.68g and 84.93g per 100g of adipose tissue and diets had no effect on this content (P = 0.531);
- PUFA increased with increasing level of linseed with +14.7% for OM15 and +35.9% for OM30; 😊
- ω3 level doubled for OM15 diet and tripled for OM30. 😊