

EFFECT OF FREEZING TIME ON FAT AND WATER HOLDING CAPACITY OF PORK

MARKKU HONKAVAARA

Finnish Meat Research Institute

Box 56, FIN-13101 Hämeenlinna, Finland

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Background

It is well known that long freezing time has a negative effect on the functional properties of the proteins of food (Shenouda 1980). Hertzman et al. 1988 found that the fishmeal of pig feed had a negative influence on the freezer storage stability of pork. Due to the overproduction of the pork trimmings which are used for cooked sausage manufacture they must be frozen from some weeks to a couple of months. The effect of freezing time on the fat and water holding capacity of these trimmings is not known.

Objective

The purpose of this work was to determine the effect of freezing time on the fat and water holding capacity of pork.

Methods

The studied Finnish Landrace and Yorkshire crosses came from seven farms. There were four different feed types: concentrate plus home grown cereals (typed as "normal"), "normal" plus vegetable fat ("energy"), "normal" plus dried distiller's grain ("barley") and "normal" plus dried distiller's grain and animal fat ("barley plus animal fat"). Mean slaughter weight was 110 kg. After a 24 hour chill at 4°C the belly and leg of pig carcasses were trimmed.

The trimmings were cut into 2 cm pieces which were analysed fresh and after freezer storage at -20°C for 1, 2, 3, 4, 5 and 6 months, respectively. During storage, they were kept in polyethylene bags. Fat and water holding capacity were analysed by the Pohja method (1974). Moisture and fat were determined by the Nilsson and Kolar Method (1971). Protein (Kjeldahl Nx6.25) was analysed by the ISO/R 937 method.

Results and discussion

During freezer storage at -20°C the average water holding capacity of pork trimmings decreased significantly from 35 to 17 % (=17 grams of added water bound by 100 g of pork). Figure 1 shows the significant correlation between freezing time and water holding capacity of pork ($r=-0.322$, $n=49$ $P<0.05$). However, freezing had no influence on the fat holding capacity of pork.

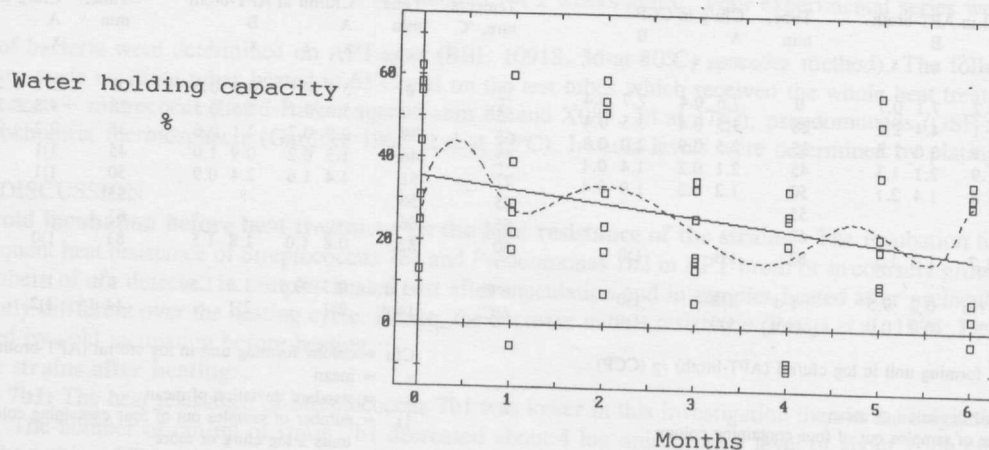


Figure 1. Effect of freezing time on the water holding capacity of pork trimmings.

There were also highly significant correlations between freezing time and pH value of pork ($r=0.712$, $n=49$ $P<0.001$) and protein content of pork ($r=0.382$, $n=49$ $P<0.01$).

Table 1 presents the average water and fat holding capacity and the gross chemical composition of the pork trimmings. "Energy trimmings" had the highest water and fat holding capacity. Actually, these trimmings had the highest protein content and pH value and the lowest fat content which resulted in the good binding properties. On the other hand, the binding properties of "barley + animal fat trimmings" were lowest due to the lowest protein content and pH value and highest fat content.

Table 1. The fat and water holding capacity of pork trimmings of different feed types.

| Variable | Normal | Energy | Barley | Barley + animal fat |
|-------------------|--------------------|--------------------|---------------------|---------------------|
| Water holding*, % | 18.9 ^a | 40.0 ^b | 26.2 | 14.3 ^a |
| Fat holding*, % | 2.9 ^m | 9.9 ^{an} | 4.3 ^m | 1.0 ^b |
| Protein, % | 16.0 ^{ac} | 16.6 ^{Aa} | 15.4 ^{Abc} | 12.9 ^{Bb} |
| Fat, % | 30.2 ^{ac} | 28.6 ^{Aa} | 34.6 ^{Ac} | 47.6 ^{Bb} |
| Moisture, % | 53.8 ^a | 54.9 ^{Am} | 50.0 ^{An} | 39.5 ^{Bb} |
| pH | 5.66 ^a | 5.83 ^{Ab} | 5.74 ^{ab} | 5.60 ^{Bc} |
| n | 14 | 14 | 14 | 7 |

*Grams of added water or fat bound by 100 g of meat.

Means within a row with different superscripts are significantly different ($P<0.05$)^{m,n}, ($P<0.01$)^{a,b,c} and ($P<0.001$)^{A,B} (t-test).

Conclusions

During freezer storage of 6 months at -20°C the water holding capacity of pork trimmings decreased significantly. Compared to fresh pork, almost half of the water holding capacity was lost after 6 months' storage. Fat holding capacity of pork trimmings was not affected by the storage. Moreover, a high protein content and pH value and low fat content resulted in elevated water holding capacity of pork trimmings used for cooked sausage manufacture.

Literature

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