ANALELE UNIVERSITATII DIN ORADEA, Fascicula Ecotoxicologie, Zootehnie si Tehnologii de Industrie Alimentara

THE TECHNOLOGY AND THE QUALITY CHECKING FOR THE ANIMAL FATS OBTAINED WITHIN THE "C" UNIT

Oneț Cristian, Oneț Aurelia

University of Oradea – Faculty of Environmental Protection , Gen Magheru, nr. 26
cristyonet@yahoo.com

Abstract

The main development trends of food industry are oriented towards: increasing and mounting of the raw material, improving the technological processes, diversifying the production, improving the products' quality and packaging, ameliorating the hygiene conditions within the manufacturing and selling processes. Within the meat industry area, along with the main product - the meat -, there are being obtained a series of secondary products among which the tallow represents an important part both for people' nourishment and for industry.

Key words: animal fats, quality, technological processing.

INTRODUCTION

The alimentary value of the pork tallow is raised when it is obtained from good quality raw material while the processing technological process was completed with the full respect provided to the hygiene and sanitary standards. Both the researches carried out during the last years and the data gathered during the field activity have shown that the pork tallow, considered both as raw material and in a melted state is slightly perishable when it is deposited in certain storing conditions.

Taking into account the high percentage represented by the tallow, both in the case of human alimentation and in the industry case, the present paper' objective is to present some processing methods for the alimentary fats and to show their influence on the quality and on the preservation of the fats/tallow.

The researches endeavored sought: the quality of the fat raw material provided by the animals slaughtered in the "C" slaughter house, the industrial processing, the productive level accomplished by the installations used for fat melting, the quality of the finished product and the modifications of the lard (grease) during the storing.

In order to estimate the raw material quality, there were established: the melting point for all grease assortments (lard, fat/bacon, detached skin and bovine fat), the iodine value, the refraction index, the acidity and the Kreiss reaction.

During the technological processing, the technological flux of fat processing was carefully monitored. After they had been produced, a total number of 180 grease samples of 1^{st} and 2^{nd} quality level were immediately analyzed in the factory laboratory.

MATERIAL AND METHODS

Melting point determination is done by the intermediate of the Sukov device support.

Working method: the mercury head of a thermometer is introduced in the researched grease, so that the entire mercury part to be covered. The thermometer is fixed by the intermediate of a stopper to a test tube filled with water. The test tube along with the thermometer are attached with the help of another stopper to another empty test tube which, at its turn, it is attached to a Berzelius glass filled with water.

The entire device thus created is placed on a tripod covered with an asbestos sieve and it is heated at flame. The melting point is considered the temperature read at the moment when the grease is completely limpid.

The refraction value determination: the refraction index represents the report between the speed of light in the air and the speed of light in the grease at a certain temperature. The refraction index is established, at 40ºC temperature, by the intermediate of the Abbe-Zeiss refractometer apparatus for the solid greases. In order to maintain a steady temperature, the apparatus is coupled with an ultra-thermostat.

Required materials: an Abbe-Zeiss refractometer, ultra-thermostat, gauze, benzene, scalpel.

Iodine value determination: by the intermediate of the iodine index value we understand the number of grams of iodine that can be added to 100 grams of grease. The iodine value determination is made by the intermediate of the Hanus method.

The method principle: the fats solved in chloroform add iodine mono-bromide to the double chains connections of the fat non-saturated acids. The excess of bromine iodide frees the iodine from the potassium iodide, which titrates with the solution of sodium tio sulphate n/10 in the presence of amidine.

Required reagents: Hanus reagent, sodium tio sulphate solution n/10, potassium iodide 10% solution, amidine 1% solution.

Working method: from the researched grease we weigh 1 gram which is introduced in an Erlenmayer vessel of 300 cm^3. One adds 1ml of chloroform, one stirs until the grease solving and then we add 25ml of Hanus reagent. In another vessel considered as witness vessel, one puts the same substances less the grease; both decanters are well stirred, afterwards they are placed at dark for 60 minutes; one adds 20 ml from the solution of potassium iodide and 100ml of distilled water in each decanter. One titrates with sodium tio sulphate until it becomes straw yellow. At this moment one adds 1ml of amidine solution and one keeps titrating until its decolourisation.

The calculation formula:

$$\text{Iodide value} = \frac{(M\text{-}A) \times 0.01269 \times 100}{G}$$

Where:

M= the number of ml of tio sulphate n/10 used for witness sample titrating;

A= the number of ml of tio sulphate n/10 used for grease sample titrating;

G= grease for analysis.

0.01260 = the iodine equivalent of 1 ml from an n/10 tio sulphate solution.

Acidity level fixing: by the intermediate of this procedure we emphasize the hydrolytic processes affecting the greases.

The method principle: - neutralizing the free acidity with the n/10 sodium hydroxide in the presence of phenolphthalein as indicator.

Required reagents: ether-alcohol solution 1/1, sodium hydroxide n/10 solution, phenolphthalein alcoholic solution 1%.

Working method: one puts 1 g of grease in an Erlenmayer vessel on which one adds 20ml from the ether-alcohol solution; one is stirring it until the grease solves, after that one titrates the mixture as soon as possible with the n/10 sodium hydroxide solution in the presence of the phenolphthalein.

The calculation formula:

$$\text{G acid oleic \%} = \frac{V \times 0.0282 \times 100}{G}$$

where:

V = the number of ml of NaOH n/10 used at titrating;

G = the amount of analyzed grease;

0.0282 = the amount of oleic acid expressed in grams corresponding to 1 ml of NaOH, n/10.

Aldehydes revealing (Kreiss reaction): by the intermediate of the present reaction, one can reveal the oxidative processes; thus, one can estimate the presence of the epihydrinic aldehyde, resulted after the oxidative decomposition of the linoleic acid. The epihydrinic aldehyde can be found in the rancid greases under the form acetal which is saponified by HCl and thus set free.

Required reagents: hydrochloric acid (d=1.19), phloroglucinol ether solution 0.1%

Working method: One introduces, into a test glass, appreciatively 3 cm^3 of melted grease to which on add the same amount of HCl and, after stirring it, one adds the same volume of phloroglucinol. One homogenizes it again and one monitors for the eventual color changes that might occur. The fresh grease should remain colorless. The occurrence of a red coloration indicates the fact that it becomes rancid.

RESULTS AND DISCUSSION

The estimation on the quality of the raw material destined to the industrial processing can be follow in the Table No.1

Table 1

The quality of the raw material

No. crt.	Name	Melting point	Refractometric degrees	Iodine Value	Oleic acid acidity %	Kreiss Reaction
1	Grease	35-45	43,4	53,93	0,31	-
2	Back Lard	36-47	46,6	56,47	0,28	-
3	Belly Lard	37-48	47,7	55,96	0,33	-
4	Skin Lard	37-46	47,8	56,72	0,70	-
5	Bovine fat	44-52	34,4	40,60	0,42	-

The table data reflect some variations regarding several physic-chemical invariables function of the raw material quality, thus, the iodine higher values of certain fat categories are caused by the higher content in fat unsaturated acids present at these categories (covering fats). At the high quality fats the level of the melting point lower. The values obtained are characterizing, in general, o fresh grease introduces in the processing process.

In the case that the lard resulted from detached skin processing is not immediately introduce in the processing process, due to its very deepen breaking up and to the structural disintegration of the adipose tissue, hydrolyze and oxidation processes occur very fast.

The grease obtained after processing the raw material of this kind presents exceed several physical-chemical characteristics (the acidity and the Kreiss reaction).

Following to the researches performed one perceived that in all the continuous installation cases, the melting point values are higher than those obtained in the discontinuous installation.

The quality of the finished product increased after its obtaining, function of the raw material introduced for processing and the technological processing system. One monitored the organoleptical and physical-chemical modifications of the 1st quality level grease, obtained in the continuous flux and of the 2nd quality level grease, obtained in the discontinuous flux. The analysis took place within the 1 of March -30th of June 2007 period in the “C” slaughter house unit.

In the case of 1st quality grease, a number of 90 samples were analyzed. The organoleptical modifications presented according to standards but the smell and the taste were inadequate for a number of 4 samples, which represents 4.4% from the total number of 90 samples analyzed. These modifications may be caused by the raw material storing in thick layers at inadequate temperatures, which caused its heating and the beginning of the degenerative processes.

At a number of 3 samples, representing 3.3% from the total amount of samples, one perceived a water (humidity) percentage exceeding, due to the functional integrity of the installation. In the case of 5 samples the normal level of acidity was exceeded, which represents 5% of the total number of analyzed samples. The aldehydes revealing reaction was present at a number of 19 samples, which represents 21.1 % from the total number of analyzed samples. From the total number of 90 analyzed samples, one found 24 inadequate samples, so 26.6% from the total number of analyzed samples. This quite high percent shows the inobservance of the processing technology (the harvesting and the storing of the raw material), which leads to the occurrence of the raw material degradation processes.

At the 2nd level quality grease, within the same period of time, there were analyzed a number of 90 samples. From the organoleptical point of view there were identified no samples on color criterion, in exchange, from the total number of analyzed samples, 49 were inadequate due to taste and smell matters (54.4%), due to inadequate washing and to raw material storing at the environment temperature level. Form the physical-chemical point of view, the amount of water context (humidity) over the standards was found in the case of only one sample (1.1% from the total number of analyzed samples). Regarding the acidity issues, from the total of 90 analyzed samples, 49% were inadequate, which represents a percent of 54.4% from the total amount.

The aldehydes revealing reaction occurred to a number of 14 samples (16.5%). The higher percent of inadequate samples due to acidity level is caused by hydrolyze phenomena which are more intense than in the case of oxidation phenomena.

CONCLUSIONS

Following to the organoleptical and physical-chemical examination, one found 64 inadequate samples, which represents a total of 71.1%.

This inadequate sample percent suggests the noncompliance with the processing technology norms and, due to this cause, the grease obtained in discontinuous flux is delivered under the form of technical grease to the soap factories.

The researches developed regarding the continuous and discontinuous flux technology tallow processing reveal the fact that, in the cases when the process is not provided with fresh raw material, the finished product does not belong to the 1st class quality and to the 2nd class quality level, being inappropriate form the organoleptical and physical-chemical point of view, thus being destined to the technical consumption, a phenomenon which finally leads to economic loses by decreasing the delivery prices.

The fats obtained by technological processing in continuous flux present superior organoleptical and physical-chemical characteristics to those processed in discontinuous flux.

REFERENCES

1. FSA UK, Food Hygiene for the Meat Industry, 2005.
2. Gunstone FD. Animal fats. 5. The component acids of chimpanzee fat. *Biochem J.* 1955 Mar;59(3):454–455.
3. Gunstone FD, PATON RP. Animal fats. I. The component acids of deer fat and of camel fat. *Biochem J.* 1953 Jul;54(4):617–621.
4. Gupta SS, Hilditch TP. The component acids and glycerides of a horse mesenteric fat. *Biochem J.* 1951 Feb;48(2):137–146.
5. Hilditch TP, Sime IC, Maddison L. The component acids of some wild animal and bird fats. *Biochem J.* 1942 Feb;36(1-2):98–109.
6. Ionut C., et al., 2001, Food and nutrition Hygiene, Universitary and Medical Iuliu Hatieganu Publishing, Cluj-Napoca.
7.Oțel I., S. Plohotnic,1969, Meat and derivate products technology, “Tehnic” Publishing House, Bucharest.
9. Oțel I., Meat Technology,, 1959, “Tehnic” Publishing, Bucharest.
10. Plohotnic S., I. Ştefănescu, Meat technology, 1963, “Didactica şi Pedagogica” Publishing House, Bucharest.
11. Shorland FB, Bruce LW, Jessop AS. Studies on the composition of horse oil. II. The component fatty acids of lipids from fatty tissues, muscle and liver. *Biochem J.* 1952 Nov;52(3):400–407.