Die Bestimmung des Fettanteils und Wassergehaltes von Hackfleisch mit dem spezifischen Gewicht

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Der Fett- und Wassergehalt von vakuum-verpackten Hackfleisch wurde mit dem spezifischen Gewicht des Fleisches geschätzt. Der Fleisch war vakuum-verpackt in Kunststoffbeuteln.

Die Beuteln wurden in Wasser und Luft geweigt, um das spezifischen Gewicht zu bestimmen. Der Fettgehalt wurde mit der NMR-Methode und der Wassergehalt durch Trocknen bestimmt.

Hoch signifikante Korrelationskoeffizienten wurden zwischen dem spezifischen Gewicht des Fleischsampel und dem Fett- (-0,95) resp. Wassergehalt (0,94) erhalten. Die korrelationen scheinen gross genug für die Anwendung als Schätzung des Fett- und Wassengehalts in dem Rohmaterial für die Wurstwarenerstellung. Wennman Saltzlösungen mit standardisierten spezifischen Gewichten anwendet, keine wiegen ist benötigt. Die Durchführung dieser Methode ist dafür sehr einfach, und die Methode könnte ohne grosse Kosten in der Fleishindustrie dienen.

Using specific gravity for determining fat and water content of chopped meat

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The amount of fat and water in vacuumpacked chopped meat was estimated by measuring the specific gravity of the meat. The meat was vacuumpacked in plastic bags.

The determination of the specific gravity was carried out by weighing the bag in water and air. The fat content was determined by the NMR-method and the water content by drying.

Highly significant correlation coefficients were obtained between the specific gravity of the sample and the fat (-0.95) and water content (0.94) respectively. It seems to be high enough to be used as an estimate of fat and water content of the raw products, used in the manufacture of sausages. By using salt solutions with standardized specific gravity no weighings are needed. Thus the method will (in that way) be very simple to handle and can easily be used in the meat industry without great costs.

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Méthode d´utiliser le poids spécifique de la viande, pour en déterminer le contenu d´eau et de graisse

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Pour déterminer le poids spécifique, la viande hachée, en emballage à vide, a été pesée en eau et en l´air. La quantité de graisse a été déterminée par la méthode NMR. La quantité d´eau sera obtenue après séchage.

Des coefficients de correlation obtenues pour le poids spécifique et la quantité de graisse (-0,95) et la quantité d´eau (0,94) respectivement, ont été trés frappantes. La correlation semble être suffisamment haute pour pouvoir servir d´instrument à déterminer le contenu d´eau et de graisse dans la viande utilisée pour la production industrielle de saucisses.

Si on se sert des solutions de sel au poids spécifique standardisé, le pesage sera inutile. C´est une méthode simple, commode et peu couteûse, et qui se prête, avantageusement a l´usage industriel.

Определение остановки жира и воды в фарше методом удельного веса

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Определение остановки жира и воды в вакуумупакованным фарше проведено методом удельного веса. Для определения удельного веса, упаковки фарша вешались в воде и воздухе. НМР-метод применялись для определения остановки жира, остановку воды определено методом высушивания.

Коэффициент корреля ции показал заметное соотношение между удельным весом упакованного фарша и остановкой жира /0,95/ и тоже воды /0,94/ в фарше.

Такое соотношение кажется достаточно заметным, чтобы метод удельного веса употреблялсь для определения жира и воды в говядине для продукции колбас.

Метод, когда он употребляется в промышленности, кажется тоже несложным и недорогим.

Use of specific gravity for determining fat and water content of minced meat

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Introduction

The need for rapid fat analyses in the meat industry has stimulated the development of a variety of methods. In a recent review, Ruschmann et al. (1977) discussed and compared the different methods in use. They found wide variations in applicability of the methods tested. In the in-factory work with standardization of raw material for sausage products, rapid methods are of special interest. If the analyses can be performed without destroying any of the test materials, costs can then be kept low.

It is a well-known fact that fat and muscle tissues differ in their density. The specific gravity of a joint or a whole carcass has therefore been studied and found to have a close relationship with the content of fat (Barton et al., 1956; Standal, 1965; Ledger et al., 1973; Schroder & Rust, 1974). The specific gravity method has also been used for estimating the fat content of minced meat. The volume of the meat was estimated by a specially developed apparatus (Honeywell, Inc.,), using a piston to extrude all air from the sample (Whitehead, 1970).
The object of this experiment was to study the possibility of extruding all air in a meat sample by vacuumpacking the meat in an air-tight plastic bag. The volume could then be estimated by immersing the bag in water.

Material and Methods

The experiment was performed on 99 samples of minced meat. The samples were choosen so as to be representative of the raw material, obtained when cutting beef carcasses of different fatness. The fat- and water contents therefore ranged between 10-30 per cent and 55-70 per cent respectively. The minced meat-fat mixture (cubes of 30 by 30 by 30 mm in greatest size) was put into air-tight plastic bags (Curevac, Otto Nielsen Emballage AB, Denmark), about 5 kg in each, the air extracted by vacuum and the bags sealed. The volume was measured by weighing the samples immersed in water and in air at constant temperatures. After weighing, the meat was ground in a meat mill and small samples were taken for water and fat analyses.

The chemical analyses were performed at the Meat Research Center. The water content was calculated by drying to constant weight and fat content was calculated by the NMR method (Nilsson & Kolar, 1971). The statistical analyses were carried out with the Statistical Analysis System, SAS (Barr et al., 1976).

Results

The means and standard deviations for fat and water contents of the analysed samples are given in Table 1. The way in which the samples were chosen give rise to wide variations in composition.

Table 1. Overall means for fat- and water content and the specific gravity of analysed meat samples

Trait	Mean	S.D.
Fat content %	21.24	5.12
Water content %	60.87	4.25
Specific gravity	1.0449	0.0068

Table 2. The correlation between specific gravity and the water and fat content

	Fat %	Water %
All samples (99)	-0.95	0.94
Samples with (17) less than 15% fat	-0.81	0.77
Samples with (20) 15-20% fat	-0.68	0.63
Samples with (39) 20-25% fat	-0.57	(0.28)
Samples with (23) more than 25% fat	-0.77	0.75

The correlations between the specific gravity of the samples and their fat and water content are shown in Table 2. Based on all the samples, the correlation coefficients were calculated to -0.95 and 0.94, for fat and water respectively. As the samples showed such a wide variation in fat and water content, they were divided into groups, according to their fat content. Within these groups, the correlation between fat content and the specific gravity of the samples decreased to between -0.6 and -0.8, all values being highly significant (Table 2). The connection between fat content and specific gravity is also illustrated in Fig. 1.

Discussion

As both fat and water content were determined in the samples, the high correlation, -0.99, obtained between these parameters could be of interest. For ordinary routine analysis it might suffice to determine the water content of the meat, as this is the easier and cheaper technique.

The high correlation coefficients found between fat content and specific gravity indicate that the vacuum packing was effective enough in extracting the air to make it possible to estimate the volume of chopped meat. The correlation was of the same magnitude as Standal (1965) obtained for hams and Schroder & Rust (1974) found for bellies.

With this simple technique for determining the specific gravity of chopped meat mixture, the fat content of the raw material can be estimated on-line at the abattoir. As both the balance and the vacuum packing machine are routinely used, no new investment is necessary. In addition the meat samples can be re-used, which also helps to keep the cost of the testing to a minimum. Because the analysis procedure is so rapid and can be done in the same department as the mixing of the meat-fat samples specimens can be analysed from every batch. Necessary corrections and standardizations are easily done.

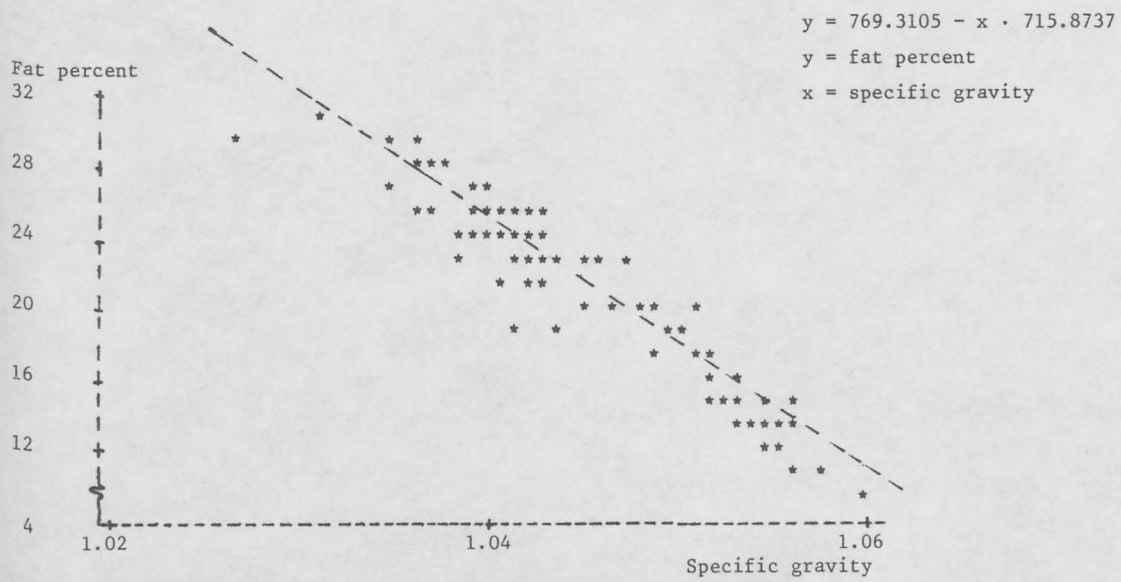

Fig. 1. Scatter diagram showing the connection between the fat content and specific gravity of all samples.

The method can also be used as a check of the fat content of ready-made meat mixtures. By immersing vaccum-packed camples of meat in salt solutions of adjusted density, the test can easily and quickly be done on the production line. By using two or more containers with solutions of different densities, the samples can be divided into groups of different fat contents.

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