PE9.22 Total fat content of meat products consumed in south of Brazil 158.00

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***Abstract*—The meat and its derivatives are still desired sensory value of foods. The world health organizations recommend moderate consumption of these products because they are a source of saturated fat and cholesterol. In Brazil, the availability of meat increased 50%, and the inlaid meat products increased by 300%. Aiming to know the total fat content of this type of food, 855 samples were analyzed, and sausages and bologna in the period 2005 to 2009. The fat content was extracted, after drying process, by the method of Soxlet. The results show that on average the products meet the parameter with a standard deviation (s) of 3,15 to 3,45 for bologna and sausages. Introducing including 43% less than the maximum content allowed by Brazilian legislation and lower average compared to other countries, demonstrating that the products can be incorporated into the diet with moderate consumption.**

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***Index Terms* — mortadela, sausage, total fat, nutrition.**

I. INTRODUCTION

THE meat is each time more the main world-wide animal protein source of high nutritional value for feeding human being providing to the amino acids and essential the structural fats [25, 28, 29]. Moreover, the derivatives of animal products are the only source of B12 vitamin, indispensable to the health human being [27].

The basic ingredients for the attainment of the meat products, as the hot dog sausage and *mortadela*, are the fat and the protein, emulsified in a watery phase with too much condiments; the gotten mass is inlaid in natural wrap or artificial and according to the product passes for a process of scalding in hot water, for smoking and/or optional cure [3, 15, 24]. Sausages, salames and other cold meats, are fats transformed into meats [27]. Mortadela, also known as bologna sausage, is a popular meat product and very consumed in some European countries, with relatively high content of fat and protein around 13,5% [14]. The sausage of chicken and type hot dog have the same contains of cholesterol and saturated fat that the *calabresa* sausage [12]. The fat plays basic role on the color, flavor, texture and baking properties of the meat derivatives, its reduction in the formulation aiming at the energy reduction without affecting the physicist-chemistries properties and sensory attributes, results in the reduction of the firmness, cohesiveness and occurs losses in the income of the end item cooked [6, 13, 21]. In the search of ingredients that substitute the fat adequately, in order to reach the texture characteristics, as well as the capacity of water retention in these meat products, are distinguished mainly the alimentary staple fibres [13, 16] soy protein [18, 22, 26], meat of fish with vegetable addition, spices [8], olive oil [7, 20] and meat of goat [17].

The participation of the fat in the diet of the Brazilians who live in the regions South, Southeastern and Center-west if approaches and until it surpasses 30%, fellow creature what it occurs world-wide in the more industrialized regions [29] and shows the decline of traditional foods in the table of the Brazilian, as the rice and the beans [11]. The update of the alimentary pyramid with the inclusion of physical activity and of the insaturated oil category; the increase in the portions of fruits and vegetables; the reduction of the portion of meats and the limitation in the sugar ingestion is one of the actions to guide the world-wide population in alimentary re-education [10]. In the Brazilian metropolitans areas the domiciliary availability of the meats in general increased in 50%, meat of chicken 100%, inlaid 300%, vegetal oils and fats 16%, biscuits 400%, ready meals 80%; fish had diminished 30% in the diet, and the consumption of fruits and vegetables remained constant in 3- 4%, below of the recommended (7%) [11]

This growth in the consumption confirms that the meat and its derivatives continue being foods of sensorial value desired although to be source of cholesterol and saturated fat, as suggested for the WHO. In view of that the organizations of the health in the whole world recommend to the reduction the consumption of saturated fat and cholesterol and that

increased the ingestion of the fat in the feeding of the Brazilians, the present work purpose to evaluate the participation of the fat in the composition of the meat products, as mortadela and sausage, produced in the state of the Rio Grande Do Sul, and commercialized in the Valley of the Taquari, Brazil.

II. MATERIALS AND METHODS

A. Samples:

Samples of mortadela and, hot dog sausages, manufactured in the state of the Rio Grande do Sul, and commercialized in the region of the Valley of the Taquari, in the period of 2005 the 2009, were analysed. Table 1 presents the description of the samples how much to the marks and analyzed amounts, the identity and in agreement quality the Brazilian legislation.

Table 1. Description of the samples used in the study.

Product	Amount of Samples	Amount of marks	Quality and Identity
Mortadela	305	10	Fat max. 30%
Hot dog Sausage	550	13	Fat max. 30%

B. Fat determination

The fat composition of both the products was evaluated as follows the method of Soxlet [4], in similar method that AOAC [2]. The extration carried through in dry base, with n-hexane solvent on the equipment Velp Scientifica SER 148. The glasses with the extract were dried in aerated oven at 105 ºC. The results was expressed without estimating of uncertain measurement and in humid base. The level of cholesterol was not determined due toi unavailability of resources.

III. RESULTS AND DISCUSSION

A. Mortadela

Table 2 presents the average and the standard deviation (s) of the results gotten for each analyzed product. It is verified that both the products, on average contains practically the half of the concentration of fat allowed for the Brazilian legislation. Average and standard deviation of the results gotten for the analyzed products.

Table 2. Average and shunting line standard of the results gotten for the analyzed products.

Product	% Fat	s
Mortadela	15,36	3,15
Hot dog Sausage	17,37	3,45

Table 3 shows the behaviour of the results in average, grouped in periods of one year each.

Table 3. Average of the results of the samples.

% Fat Average	2005	2006	2007	2008	2009
Mortadela	15,61	13,53	13,50	15,84	15,66
Hot dog Sausage	17,61	18,87	17,69	15,51	16,84

It is observed that the average results of fat for period for the sausage samples tend for bigger values to the samples of mortadela, except in 2008, being the differences of 2,0; 5,3; 4,2 and 1.2% since 2005 than 2009, respectively. Observing the difference between the biggest and the lesser results for each product, it is verified that throughout the periods it had little variation in the samples of mortadela, since the difference was of 2,3 for mortadela and 3,4 for sausages.

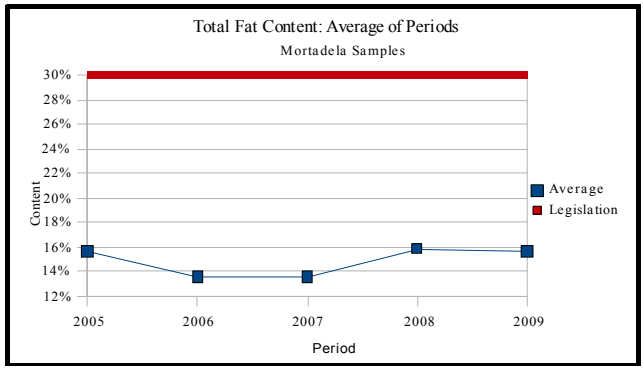

Figure 1.

Evaluating the results gotten in the analysis of fat of the samples of mortadela, presented in Figure 1, it is verified that it has a steady behavior in relation to the average of the fat content.

Moreover, the results are presented very distant of the maximum allowed for the Brazilian legislation.

Analyzing the gotten rude data in the fat analysis, presented in Figure 2, it is verified that of the total of 327 analyzed samples 36% they present text of fat between 12 and 15%. A study lead for [14], that it analyzed Polish and Italian marks of mortadela how much to the composition, verified that the fat content on average was of 28,7% in the Italians and 18,6% in the Poles. Already [5] in the evaluation of three Brazilian marks of mortadela of chicken how much to the fat content, it found a 15,37% average. In comparison of that, the samples analysed in this work have in average lesses values of fat content.

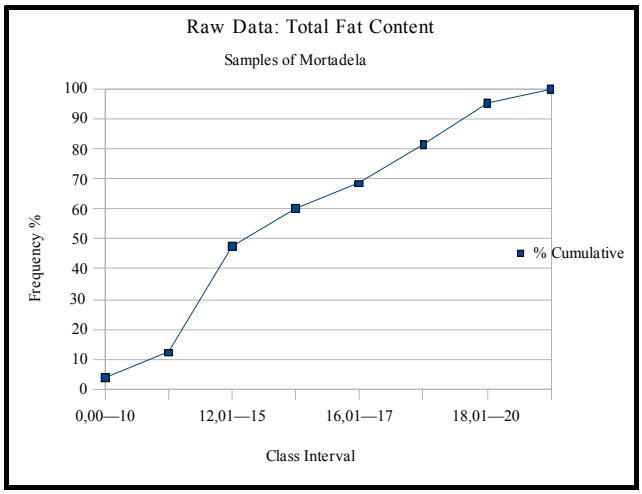

Figure 2.

B. Hot dog Sausage

The gotten results of the sausage samples indicate the attendance of the parameters stipulated for the Brazilian legislation, and it have 12,6% below of the maximum permited in the same legislation. A study carried through for [15] with sausage samples commercialized in Warsaw (Poland) obtained the average of the results of the fat content was 18.6% with a standard deviation of 4,54, same behaviour can see in the Figure 3, that the results remains between 15-20% throughout the periods.

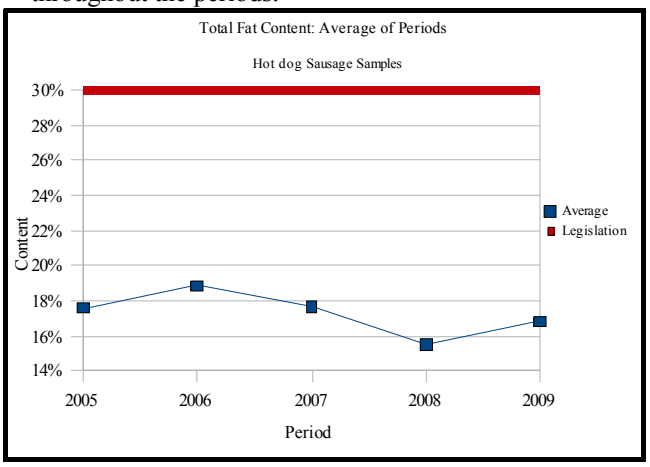

Figure 3.

Moreover, figure 4 shows that of the total of analyzed samples 34% of them presents fat content between 18,01 and 20% and 21% of analyzed sausages contains of 17,01- 18% of fat; that is, more than the half of the samples contains more than 17% of fat. A research carried through in Australia [1] how much to the participation of the fat in sausages, showed that of the 97 analyzed samples, 38% presented of fat content between 20 and 24,9% and 28% of the samples contained fat between 15,0 and 19,9%.

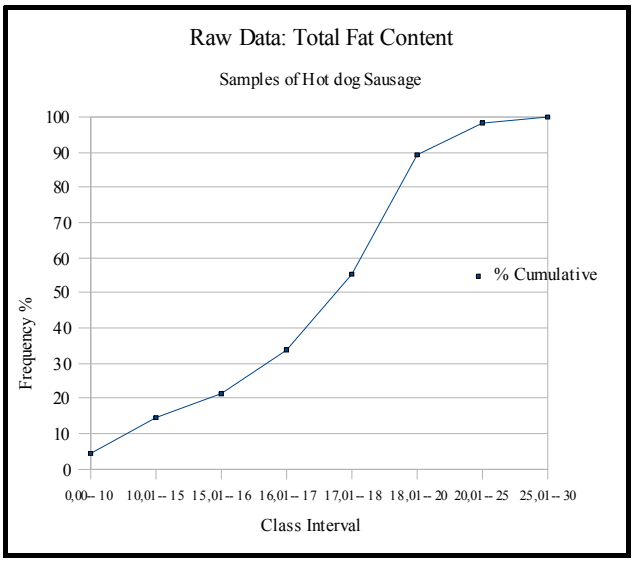

Figure 4.

Comparing the results of the samples of sausage and mortadela obtained in this study, it is verified that theoretically the first one presents higher fat content. However, as [23] the baking produces effect in the loss of fat in meat products, being that in the products light' s the loss of water is greater that of fat. This loss can vary of 18 to 44% [9], depending on the type of product, the loss of energy and fat more than depends the formulation and process on production of this food, that of the baking process.

IV. CONCLUSION

It can be concluded that the meat derivatives analysed, in general, attending the specific legislation in relation to the fat content. The results are lower than those found in other countries, however should be consumed in moderation because they are source of cholesterol. The results are important for the population that feeds are quick snacks, whether at work or university, and sausage and mortadela are important sources of protein, but the fat content is always a concern. To analyse the cholesterol content, to investigate the origin of the fats and of the proteins is a suggestion for the continuity of the research, because currently, great part of foods is added of the hidrogenated vegetal fat and in agreement literature the substitution of the fat for other ingredients affects the nutricional value how much to the proteinic content which had to the differences of digestibility of amino acids in agreement its origin.

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