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Nutritive Value of Seven Varieties of Meat Products (Sausage) Produced in Jordan

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Abstract: In developing country including Jordan, the per capita consumption average is 31.1 kg/person per year. In Jordan there is an increased 10% per capita consumption of meat and meat products between 2006 and 2008. This increase in meat consumption is mainly due to the highly nutritive value that added by meat and meat products to the Jordanian consumer. This study described the quality of some sausages as Mortedella plan, Mortedella with olive, Mortedella with pepper, Mortedella with pistachio, silsisio, Frankfurters, Smoked salami and their proximate composition and nutritional values for Jordanian consumer. The proximate analysis as percentage of carbohydrate, fat, protein, ash, moisture and pH, of mentioned local sausages were: 4.3, 16.7, 12.7571, 2.2714, 63.9429 and 6.3429, respectively.

Key words: Meat, meat products, carbohydrate, fat, protein, ash, moisture, pH,

INTRODUCTION

Meat can be define as the whole or part of the carcass of any buffalo, camel, cattle, deer, goat, hare, sheep, poultry, or rabbit, slaughtered, but dose not include eggs, or fetuses (Williams, 2007). Meat as high energy type of food is considered to be the food of choice due largely to its nutritional value. Meat is well known as an excellent protein and energy source for our daily diets and after digestion, provides excellent nutrition (Chang and Huang, 1991). In most countries, meat consumption increases as economic development improves (Fuller, 1996). Meat is an excellent source of many nutrients, especially protein, B vitamins, iron and zinc. As a nutrient dense food, meat provides major nutritive contributions to your diet relative to the amount of calories it contains. For example, a 3 ounce cooked portion of lean beef containing 195 calories would provide 25 g of protein, 9 g of fat, over one-third of your daily requirement for zinc and nearly 15% of your daily iron needs (Boyle, 1994). In addition to its high protein content, meat provides an important source of high quality protein.

A Sausage is prepared food, usually made from ground meat animal fat. Salt, spices (some times with other ingredients such as herbs), typically packed in a casing, sausage making is a traditional food preservation technique traditionally, casings are made of animal intestine though are now often synthetic, some sausage are cooked during processing of the casing may be removed often that, sausage may be preserved by curing, drying in cool air and smoking.

Sausages as processed meet products are very common and popular that manufactured from lower-value trimmed meat to produce a higher-value product. Food additives are used to accomplish certain functions such as coloring, antimicrobial, antioxidant, preservation, improved nutrition, increased emulsification and altered flavor.

Many of the sausage products that enjoy today were developed originally in Europe. The kind of sausage produced by early European sausage makers was influenced by local customs, availability of spices, seasonings and the climate of the region. Fresh and smoked sausages originated in areas having cool climates while many dry sausages were developed in warm regions. Today there are 5 basic classifications of sausage. These are fresh sausage, uncooked smoked sausage, cooked smoked sausage, cooked sausage, dry and semi-dry sausages (Boyle, 1994).

Dry sausages are Meat products that can be stored at room temperature without the risk of microbial spoilage are considered to be shelf stable products.

Sausages that have been cured, smoked and cooked are classified as cooked smoked sausages. These products may have a coarse or finely ground texture and come in many shapes and sizes from large diameter products to long and narrow sausages. Once a package of cooked smoked sausages has been opened, they can usually be kept refrigerated up to seven days. Although this type of sausage is Ready-to-Eat (RTE), some are heated before serving. Frankfurters, bologna and cotto salami, coarse-ground German-style salami made of beef and pork that is spiced with garlic, are cooked smoked sausages.

Cooked sausages may be cured or uncured, are heat processed and sometimes smoked. They often contain a variety meat or organ meat such as liver.

Dry and semi-dry sausages are cured and sometimes smoked before the sausage is dried. These sausages have a tangy flavor due to a controlled bacterial fermentation or the addition of acids. Dry sausages are dried for a longer period of time than semi-dry sausages and are generally not heat processed. Uncut dry sausages should be stored in a cool, dry place. Semi-dry sausages, such as summer sausage, are usually heat processed and should be stored refrigerated.

More than 200 kinds of sausages, luncheon meats, hams and canned meats are available to consumers. The use of non meat ingredients, or additives, provides the meat industry with the flexibility needed for the development of a wide diversity of products. All processed meat products have an ingredient statement on the product label. The ingredients are listed in order of predominance so that the ingredient present in the greatest quantity is listed first while the ingredient present in the smallest amount is last. A typical ingredient statement might list "beef, pork, water, hydrolyzed vegetable protein, salt, dextrose, corn syrup, hydrolyzed milk protein, sodium phosphate, natural spices, smoke flavoring, sodium carbohydrate, sodium nitrite. Each additive has specific functions in the product.

Today, the world faces the problem of shortage food supply, which makes the malnutrition problem and its consequences in the undeveloped countries a major problem (Sheehy *et al*., 2005).

Between 2006 and 2008, per capita consumption of meat increased by 10%, meat consumption is the highest in developed country, in which the average per capita consumption is 82.9 kg/person per year. In developing country including Jordan, the per capita consumption average is 31.1 kg/person per year. People in world consume 42.1 kg/person per year (FAO, 2008). Research are limited on processed meat products in Jordan Literature, research on nutritional information on local meat or meat products revealed some food composition information. But there are no studies carried on the nutritional value of local meat products.

MATERIALS AND METHODS

Seven type of sausage were included in this study, chemical composition, protein (N×6.25), crude fat and ash determined according to AOAC (1984), Carbohydrate content was calculated by difference.

Chemical analysis

pH measurements: Potentiometric measurements of pH were made with a pin electrode of a pH meter (Radiometer Copenhagen pH M82, Cecchinato, Italy) inserted directly into the sample. Three independent measurements were made on each sample.

Moisture: A sample was ground using mortar and the atmospheric oven method was used to determine the moisture content of sausage.

Protein: Total nitrogen content was determined by the macro Kjeldahl method.

Fat content: Fat was determined in sausage according to the AOAC (1984) methods.

Ash: Ash was determined in sausage according to the Pearson's chemical analysis of food.

Statistical Analysis of experiment data: The data obtained were analyzed for significance using the General Linear Model (GLM) procedure of the SAS Institute INC., CARY, NC and USA 1998 VERSION SEVEN SOFTWARE lsd mean were applied to determine significance between different treatment (SAS, 200).

RESULTS AND DISCUSSION

Meat is a major source of several essential nutrients. Table 1 shows the protein, fat, moisture, ash and carbohydrate contents of sausages. The lower protein content is due to substitution with non-meat components, since meat proteins are relatively more expensive than non-meat component.

Table 1 shows the proximate analysis, salt, pH and acidity of sausage. Protein content of sausage makes up 12.75% of its weight. This prove that Jordanians sausage is a good source of high quality protein.

Water is added to many products for several reasons. Some products would be dry and unpalatable without adding water. Using water improves tenderness and juiciness and it serves as a processing aid when the product is made. The amount of water added to the product is regulated by the Jordanian Standards of Specification (JSS816, 1996). Over all moisture content of sausage was 63.94, Fresh sausages had overall moisture percentage of 55.48 (Agnihotri, 2002) Agnihotri and pal (2000) mentioned that the moisture content of sausage is (66.7%).

Fat content did not exceed (25%) maximum amount stipulated in the Jordanian standard regulation. In this study fat content was 16.7, which is lower than those found by Dharmaveer *et al*. (2007) which is 17.05% Sausage may contain up to 30% fat which is the maximum amount which is allowed by Jordanian standards specifications, fat provides sausage with flavor, texture and juiciness and its role in meat emulsion.

Overall Protein content of sausage in this study was 12.76 (Dharmaveer *et al*., 2007) reported 18.36% Protein in sausages.

The ash content of different types of Jordanian sausages was 2.27, Pal and Agnihotri (1996) reported

Table 1: The proximate analysis and pH of sausage

Carbohydrate (%)	Fat (%)	Protein (%)	Ash (%)	Moisture (%)	pH	Sausage type
4.4C	14.8A	13.1C	2.2B	65.5C	6.4C	Mortedella plan
4.3C	17.9C	12.1A	2.5C	63.2C	6.3B	Mortedella with olive
5.0C	15.7B	12.3B	2.1B	64.9B	6.4C	Mortedella with peper
4.4C	17.7C	12.4B	2.1A	63.4B	6.4C	Mortedella with pistachio
2.8A	16C	12.3B	2A	66.9C	6.3B	silsisio
5.7C	15.4B	12.7B	2A	64.2B	6.4B	Franfurter
3.7B	19.4C	14.4C	3C	59.5A	6.2A	Smoked salami
4.3	16.7	12.8	2.3	63.9	6.3	Mean
30.3	116.9	0.796	0.364	2.34	0.079	Stadard deviation
>5 less	>25 less	<12 less	>3 less	<70more	>6.5	Jordanian standards of speciction

a,b,cMeans with no common letters within column differ significantly. Values are average of three replicates

that ash content of chevan sausage was 2.06-2.21% while (Dharmaveer *et al*., 2007) reported that the ash content of smoked chevron sausage was 3.00%, ash content in smoked chevron sausages.

The pH value of beef varies from 4.8-7.2 depending on the glycolytic potential at the time of slaughter but the normal variation is of pH 5.4-6.0 (Tarrant and Lister, 1989). The pH is an important determinant of microbial growth and the high pH beef has a high spoilage potential and a short shelf life (Newton and Gill, 1981), Walker and Betts (2000) reported that ultimate pH of meat was significant for its resistance to spoilage because most bacteria grow optimally at about pH 7 and not well bellow PH4 or above PH9 (Jamilah *et al*., 2008) (Dharmaveer *et al*., 2007) reported (6.44) initial pH of fresh sausage in our study. Deva and Narayan (1988) and Dharmaveer *et al*. (2007) reported that Microbial load increased with the increase in final pH of the meat product.

Conclusion: There are few investigations regarding Nutritional analysis and proximate composition of meat and meat products as sausages and other processed meat products in Jordan. The data presented in this paper is limited to some products; there is highly demand to conduct more researches on locally processed meat products. Overall Protein content of sausage in this study was 12.76, In addition to its high protein content, sausages provides an important source of high quality protein.

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