The role of meat in human nutrition for the supply with nutrients, particularly functional long-chain *n-3* fatty acids

Projekt: 337

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Food of animal origin, particularly meat, suffers from a bad image in terms of dietetic value. It is often not recognized that meat substantially contributes to the supply with several valuable or even essential nutrients. Furthermore, the contribution of less desirable compounds, like saturated fatty acids, is often overestimated because of inaccurate data in some food composition tables and because losses that occur during cooking, as well as trimming before eating, are not considered.

The main objective of this thesis was to determine the actual nutrient profile of raw meat as well as the influence of cooking and trimming of fatty tissue on the nutrient content. On the basis of these data, the contribution of meat to the dietary intake of nutrients was estimated. The second objective of the project was to update and improve the nutrient composition table of meat to reflect the current situation and to monitor possible changes.

For this purpose, meat cuts from different species were purchased from various supermarkets and butcheries, additionally considering different origins in terms of production system (meat labels) and anatomical location. Meat cuts from the following species were included: cattle, pig, calf, lamb, chicken, turkey, duck, goose, horse, ostrich, bison, deer, rabbit and wild boar. Commonly used cooking methods were applied to measure the influence of cooking on selected cuts. The influence of trimming of fatty tissue on the selected meat cuts was analyzed by separation of muscle and fatty tissue.

The outcomes of this project illustrates that although the chemical composition of muscles was found to be fairly constant (about 62 to 75% of water, 19 to 25% of protein, and around 1% of ash), some nutrients were found to be highly variable. The fat content within and between species varies greatly depending on the meat cut. However, over the past 15 years the fat content of meat, especially meat from beef, pork, veal and lamb decreased noticeably due to changes in breeding, feeding, slaughtering and preparation. Overall, the analyzed meat cuts contain similar proportions of saturated (SFA) and monounsaturated fatty acids (MUFA), although the exact proportions vary depending on the type of meat. Chicken meat cuts show the lowest proportion of SFA but the highest proportion of polyunsaturated fatty acids (PUFA). Regarding the micronutrients, remarkable differences were found for the concentrations in meat from different species as well as between the individual meat cuts for iron, zinc and selenium. Trace element concentrations showed high coefficients of variation which is important to include in food composition tables in order to provide an accurate overview and to consider the variation when calculating dietary intakes.

The cooking experiments showed that heat treatment had various effects on the different nutrients. The determining factors for the changes were the meat cut itself as well as the parameters related to the corresponding cooking process applied (time, medium and temperature). Cooking changes the palatability of meat by affecting appearance, tenderness, juiciness, and flavor. As meat is heated, it will loose some water due to evaporation and drip loss, fat because of its melting and vitamins due

to the destructive effect of heat as well as the leaching effect of the medium which also affects the minerals. The amount of the losses will depend on the temperature and length of time the meat is cooked, the water holding capacity of the meat as well as its fat content and the proportion of added oil. All this makes it very difficult to get reliable nutrient data of cooked meat particularly because meat cuts can be prepared by different cooking methods to various level of doneness. Moreover, it is important to note that trimming of visible fat can additionally reduce fat intake from meat. The amount purchased is, depending on the individual eating habit**,** not equivalent to consumption. Overall, it is important to update and improve nutrient data from meat with more detailed information about changes during cooking processes and trimming of fat so that individual eating habits can be taken into account for the calculation of the intake of nutrients from meat.

Meat and meat products can make an important contribution to nutrient intakes in the diet. They provide a number of essential nutrients, including, long-chain *n-3* PUFA, iron, zinc, selenium, essential amino acids and vitamin B_6. The reason why meat is an important source for some micronutrients is due to the fact that meat is either the only source or provides a substantially higher bioavailability of some micronutrients.