

## THE ROLE OF MEAT IN HUMAN NUTRITION: THE ITALIAN CASE

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The term meat is widely used to define flesh and offal, including their naturally associates skin and gristle, derived from the carcass of any animal and bird normally used for human consumption. A meat product is defined as "any food which consists of meat or of which meat is an ingredient" (Robinson 2001).

Meat is an important source of dietary energy and nutrients, such as high quality protein, long-chain fatty acids, vitamins and highly bio-available minerals. However, concern has been raised over its high consumption and the fat content, in particular saturated fatty acids, which can highly expose to the risk of cardiovascular diseases and some type of cancer (Slattery et al 1991, Norat, Riboli 2001), even if up to now there is not a scientific justification for eliminating lean meat from the diet.

Some people do not choose to eat meat for a variety of reasons. In this case, a varied and well-balanced vegetarian diet can provide all necessary nutrients to maintain a good health. Several studies have shown that vegetarians have lower mortality rates than meat-eaters with respect to some disease conditions (Dwyer 1991). However, the interpretation of health statistics is complicated by life style factors that can play an important role on these diseases.

There is also who tries to demonstrate that the meat is not necessary to men (Jannelle, Barr 1995), also in those periods of life (i.e. growth) during which the organism demands proteins of very high biological value like those contained in the meats. This aspect will be better discussed by analysing the nutritional components that meat provides.

### Nutrients in meat

The main nutrients in meat are: protein, long-chain fatty acid saturated, mono e polyunsaturated, iron, zinc, and vitamins B group and D.

Dietary proteins are the only source of amino acids that we need. Our body continuously demolishes and rebuilds proteins, so requiring nine essential amino acids that animal proteins contain in the best "proportion". The quantitative and qualitative protein need increase proportionally during particular physiological condition, such as growth, pregnancy and lactation (SINU 1997). The intake of high quality protein, derived from animal source, shows an important effect on muscular strength and on the physical endurance even in old age (bb).

It is accepted that the protein quality of meat is highly useful and metabolically economic. This is due to a property that only animal proteins have: there is a great similitude between the amino acid pattern of meat and that one necessary to man (Turchetto 1989). Out of the properly nutritional valence, this is very important because allows to save metabolic work with greater efficiency of use and minor metabolic slag production.

Several types of fat are present in the meats. The different content depends on both the cut of the meat and the animal species. Ruminants, by means of the enzyme desaturase, tend to saturate the unsaturated fatty acids ingested before the storage in the tissues, while the non ruminant animals did not. Thus, ruminants show a higher proportion of saturated fats with respect to the non ruminants. However, even in the ruminants the composition of fat vary from saturated, to mono and polyunsaturated fatty acids. The main saturates in red meat are palmitic and stearic, with minor quantity of myristic acid. The stearic acid is not thought to rise blood cholesterol level (Kelly at al 2001), while the myristic appears the most atherogenic and has four times the cholesterol rising effect of palmitic acid (Ulbricht, Southgate 1991). Most of common meats provide similar proportion of saturated and monounsaturated fatty acids and provide also a small quantity of polyunsaturated fatty acids (Carnovale, Marletta 1997), some of which have healthy effects with regard to the cardiovascular diseases (i.e. docosahexaenoic and eicosapentaenoic acids).

Iron is an other important nutrient for human beings because it enters in the process of oxygen transport from lungs to the several tissues by means of haemoglobin to which is linked. Iron also enters in many metabolic reactions like catalyst. Its absence provokes anaemia in particular in the more sensitive individuals of the population like the children, the women and the elderly people (Maiani 1995, Salvioli 1993). Its requirement varies between the two sexes: the women in fertile age have iron requirement nearly double with respect to the men.

Meat represent without any doubt the best source of iron, even if not the greatest one. In fact, iron of meats is found in the "heme" form, linked to the haemoglobin, and it is the best condition to be absorbed. Conversely, the presence of some acid compounds (oxalic acid, phytic acid) in vegetables reduces iron availability, even when it is present in higher quantities than meat. The amount of iron in the several meats is rather similar and it only partly contribute to make meat more or less red.

Zinc is important because it is involved in several metabolic reactions. Its deficiency reduces the immunological defences of the organism. The zinc requirement for humans is approximately 8 mg per day, and meats is its main source.

Niacin is an essential vitamin that enters in many metabolic cycles. Its deficiency determines the pellagra, a disease by now eradicated that has hardly hit the populations with a diet principally based on maize and practically lacking in meat and other cereals. Meats are rich in niacin and they provide nearly 50% of the total daily intake. Moreover, meat is also an important source of other vitamins, like thiamine and riboflavin, both important in the energy metabolism, and B12 necessary to the nervous system and exclusively present in the foods of animal origin.

### Meat consumption

Emotional, ideological and health concerns linked to meat consumption derive from recent events, e.g. the bovine spongiform encephalopathy (BSE) case; cultural changes, such as animalistic sensitiveness and vegetarianism; and attention to healthy nutrition that demands a low saturated fat diet. Consequently, two questions rise: Is the meat consumption declining? Can meat be totally or partially replaced by more suitable foods, or it still remains an important food within a correct and balanced diet? We try to give, if not definitive, at least partial answers.

Meat consumption is widely varied when comparing different countries. It depends on several reasons ranging from the influence of socio-economic factors to the religious beliefs. In order to analyse an example of western consumption, in this paper the Italian data are considered.

According to the National Household Budget Survey (ISTAT 1981,1997), the Italian demand of meat - especially beef - has been arrested and tends to decrease, after decades of systematic increase. In 1980 the total meat consumption was 168.5 g/day, this quantity has fallen to 134.1 g/day in 1996. It is not known whether this represents a simple adjustment of consumption patterns, coherent to the changes occurred in nutritional requirements because of the current life styles, or an independent tendency destined to last. More recently, a strong reduction of beef meat consumption was observed (ISMEA 2001) but it seems to be attributable to an emotional alarmism connected to the BSE event rather than a stable trend. Likely, it would have to stop so coming back either to the customary levels of consumption or at least to a new points of equilibrium, within reasonable times.

Analysing food supply data (FAOSTAT 2001), it would be supposed that too much meat is eaten. However, these type of data does not allow to distinguish between how much meat is eaten and how much of that theoretical amount ends in the litter. Therefore, data from dietary surveys can provide a more realistic picture of individual food intake patterns.

On the basis of a Nation wide seven days weighted food records survey, carried out in Italy by the Istituto Nazionale di Ricerca per gli Alimenti e la Nutrizione (INRAN) in 1994-96 (Turrini, Saba, Perrone, Cialfa, D'Amicis, 2001), two mammals and two birds supply about 85% of the meat consumed in Italy. As shown in table 1, beef and pork joint to chicken and turkey account for 109.5 g/day out of a total intake of 129.1 g/day. Within the pork meat, ham and salami account for 26.2 g/day. Ovine, goat, rabbits, equine account less. Game can be also cited among small consumptions (other meats). All these categories of meat differ only marginally for nutritional value. Their choice mainly depends on the taste and culinary traditions.

#### *The nutritional contribute of meats to the Italian diet.*

All foods can be grouped into five great groups, based on their nutritional affinity: cereals and cereal products; milk and dairy; meats, fish, eggs and dry legumes; vegetables and fruit; added oils and fat (INRAN 1997). Each group is source of one or more nutrient, therefore to assure all the nutrients it is opportune to eat daily foods belonging to different groups by alternating the various products there included and respecting both the amounts and the number of portions indicated by the dietary allowances (SINU 1997).

On the basis of the Nation wide food survey carried out by INRAN (Turrini 2001) and of the Italian Food Composition Tables (Carnovale, 1997), it is possible to calculate and to compare the contribution of the five food groups to the daily mean intake. Percentage contribution of the five food groups to the intake of nutrients usually provided by meats are shown in table 2. It can be observed that meats group is the main contributor to the intake of protein (42.1%), zinc (37.6%), niacin (46.0%) and vitamin B6 (38.7%). This group also gives an important contribute to Iron and other vitamins.

If the contribution of the meats is analysed separately (data not shown), it is found that, the beef meat is the main contributor to the daily proteins intake (10.8%), followed by pork and salami (8.3%) and poultry (7.5%). The greater contribution to fat intake derives from salami together the pork meat (8.5%), then from poultry (2.4%) and the beef meat (2.3%). Beef meat supplies also the greater part of iron, riboflavin and niacin. In comparison with this large nutritional contribution, the beef meat is not a greater contributor to the daily energy intake. Thus, beef can be considered a nutritionally dense food. However, this is a common characteristic to all the meats, except for the fattest meat.

Is therefore meat a food we can do without? Considering the described characteristics; the content and quality of proteins and they effect in increasing and maintaining the muscular tone; and for the content of other nutrients, meat, consumed in the proper amount and frequency, is a suitable food for human. It is also true that does not exist an indispensable food or a complete food, while the same food can be nutritionally and proportionally equivalents to others. Therefore, a food can be replaced from another one, or a combination of others, when nutritional affinity occurs: in a wise and very balanced choices, it is possible to find alternative foods. Fish and eggs can be valid substitutes but, also in this case, their frequency of consumption cannot exceed a reasonable weekly number of portions. In table 3 some nutritional equivalences between several foods are shown that can help the consumer to make the wished choices and at same time nutritionally adequate.

In conclusion, at the light of the above described considerations, it can be said that today meat continues to be a versatile and appetizing food which adds variety to a balanced diet.

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Table 1- Meats intakes in Italy (mean±SD, median, % of consumers)<sup>a</sup>  
(g/day/capita)

Meat	Total sample (n=1978)		Consumer only		%
	Mean±SD	Median	Mean±SD	Median	cons.
Beef	45.2±39.5	37.7	54.0±37.7	44.8	83.7
Pork	8.0±16.7	0.0	29.9±21.2	24.8	26.6
Poultry	30.1±32.2	24.3	44.3±30.4	37.1	67.9
Ovine meat	3.2±15.1	0.0	40.0±44.9	25.0	7.9
Horse meat	2.4±11.1	0.0	32.6±34.7	25.7	7.3
Rabbit and other meat	6.7±20.1	0.0	41.4±34.9	33.9	16.3
Ham, salami, etc.	26.2±23.9	21.4	30.7±23.5	25.0	85.3
Meat, preserved	0.8±4.0	0.0	16.0±9.6	14.3	4.8
Offal and unspecified meat	6.5±15.9	0.0	28.5±23.8	22.9	22.9

<sup>a</sup>Turrini et al. 2001Table 2 Percent contribution of five food groups to the mean daily intake of some nutrients, as observed in Italy<sup>b</sup>

Food groups	Protein total	Fat total	Iron	Zinc	Tiamin	Riboflavin	Niacin	B6
Cereals e derivates	31.4	22.4	35.7	25.7	34.7	23.4	25.6	20.1
Milk and dairy	17.4	19.0	3.2	16.5	6.7	26.4	1.4	6.6
Meats, fishes and dry legumes	42.1	19.5	26.0	37.6	31.1	25.1	46.0	38.7
Vegetables and fruit	7.2	4.7	25.8	18.1	25.0	19.9	20.6	32.7
Added oils and fats	0	31.4	0.1	0.2	0	0	0	0

<sup>b</sup>D'Amicis, Turrini, unpublished data

Table 3. 100 g of beef (veal, beef),

as nutritional value, correspond to:

150 g	of fish (cod, trout, etc.)
160 g	of lamb steak
150 g	of chicken (leg)
100 g	of chicken (breast)
120 g	of rabbit
100 g	of turkey (breast)
100 g	of pork steak bone less
50 g	of ham (raw or cooked ham, bresaola, ecc.)
n. 2	eggs small/medium
n. 1	Canned tuna, oil less
150 g	of legumes (fresh)
50 g	of legumes (dry)

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