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How meat consumption benefits balanced nutrition

“Never again meat?” – that excerpt from the German consumer magazine “Stern” is but one example of the many negative press headlines concerning meat, meat products and their consumption. The battle for maximum circulation can apparently only be won by those publications which present the most nauseating scandals affecting, if at all possible, both the readers/consumers and their personal health; packaged in high-gloss format and touted in a bally-

Table 1: Essential and nonessential nutritional components

essential nutritional components	nonessential nutritional components
mineral substances – macroelements – trace elements vitamins essential fatty acids essential amino acids	carbohydrates nonessential fatty acids lipoids (phosphatides, sterins) nonessential amino acids creatine, creatinine pyrimidine and purines

2.0 mg daily. Table 2 shows the iron contents of various foodstuffs relative to 100 g of the respective food listed.

More important than the iron content of a foodstuff is how the human's organism can absorb iron. Only minor portions of iron as occurs in the food are actually available to the body, in other words can be absorbed by the intestine and from there be transferred into the bloodstream. Because iron is so poorly absorbed, particularly that stemming from plant-origin foods, and as a further result of a decrease in consumption of animal origin foodstuffs (meat and meat products) up to 50 per cent of women of menstruating age suffer from latent iron deficit. To this group of people, regular consumption of meat and meat products is therefore strongly recommended. It should also be added that meat and meat products act to practically double the bio-availability of iron from plant-origin food, given the regular consumption of a typical mixed menu. Iron from plant-origin nutrients is utilized by the human body only at a rate of 1 to 7 per cent, whereas iron originating from animal-origin foodstuffs has a utilization rate, on average, of up to 22 per cent. As a result, meat and sausage products must therefore be regarded as some of the most valuable iron sources in the human diet.

In table 3, figures underlined or shown in bold print indicate which foodstuffs are recommendable for meeting the human requirements and for making up a reasonably balanced nutrition. As is known from empirical data, the minerals sodium, phosphorus and chlorine are normally taken in at sufficient levels, sometimes even exceeding sufficiency. For this reason, those foodstuffs possessing high content values of these minerals are not so conspicuously presented as to stand out in the table. As far as sulphur is concerned, statistically secured requirements are not available. Table 3 provides impressive evidence of the high ranking of meat in supplying humans with needed mineral substances. Iron contents of up to 22 100 µg, zink contents up to 5900 µg or copper contents

Table 2: Iron contents of selected foodstuffs

food product	iron content	food product	iron content
meat	mg/100 g	fruit	mg/100 g
chicken liver	7.9	strawberries	1.0
beef liver	6.5	bananas	0.7
veal liver	5.4	peaches	0.6
beef/corned beef	4.3	cherries	0.5
veal (cutlet)	2.9	plums	0.5
pork (roast)	2.8	oranges	0.4
chicken (roaster/broiler)	1.8	grapefruit	0.3
		apples	0.3
milk/dairy products	mg/100 g	vegetables	mg/100 g
sour cream, lean grade	0.40	spinach	3.1
butter	0.30	head lettuce	2.0
buttermilk	0.10	Brussels sprouts	1.5
mother's milk	0.05	potatoes (peeled)	1.0
cow milk	0.04	tomatoes	0.6

up to 5500 µg per 100 g food can be found in no other but animal-origin foods.

Vitamins

Whenever the word vitamin is dropped, everyone first of all thinks of fruit and vegetables, while milk and dairy products are possibly also remembered, while hardly anyone comes to think of meat in this connection. But meat and meat products nevertheless contain substantial vitamin depots.

As has already been described for minerals, it is not primarily the absolute quantity which counts in vitamin supply, but rather the availability to or utilizability by the human organism. The word bio-availability has become a frequently used term in this context. And here again, it is meat and the products made from it which are distinguished by a particularly high bio-availability of vitamins. Vitamin deficit leads to health problems known as so-called hypovitaminoses. These conditions are most often diagnosed in people whose eating habits entail a single-sided nutrition. Numerous studies show that older people and vegetarians are most often affected. But hypovitaminoses of minor or medium degree are also seen in pregnant and nursing mothers, school children and people who are fasting over a longer period of time. Critical vitamins, in other words those which, as experience shows, are not ingested in sufficient quantities given an unbal-

anced, plant-oriented nutrition, include vitamin A (axerophthol, retinol), B₁ (thiamine), B₂ (riboflavin), B₆ (pyridoxine) and, to a particular extent, folic acid. In people sternly following vegetarian eating habits, vit. B₁₂ under-supply should also be expected. All the above-named vitamins – plus more – naturally occur in meat at high concentrations.

▶ Vit. A (axerophthol, retinol): Apart from its important functions with respect to the human eye and the seeing process vit. A also contributes to cell membranes stabilization in a major way. It is only in animal origin foodstuffs that this vitamin can be found in its effective form.

Naturally occurring in plants is only the vit. A precursor, known as β-carotin. Only in the intestinal tract does a conversion, to a very limited extent, occur as a result of microorganisms' activities. If fat as a nutrient is not simultaneously present, the vitamin A formed is not absorbed, however. In plain language, this means that the carotene content of a raw, all-vegetable diet cannot be utilized for meeting the human body's vit. A requirement.

So, if nutrient tables indicate that 100 g of carrots can satisfy the daily vitamin requirement, this statement is actually correct in a very limited way only – and only on the precondition that fat is also present. As a side note: the daily vit. A requirement is met by 9 g chicken liver, 12 g beef liver or 60 g lean liver sausage already, and that without any qualifying restrictions.

Do you have problems with adapting your acuity during the changeover from light to dark, or do you belong to the risk group of people not regularly consuming meat and sausage products? If so, you have already experienced the first forebodings of slight vit. A deficit symptoms. After having read and digested this article, you'll know to eliminate these deficit symptoms in a problemless manner.

▶ Vit. B₁ (thiamine): The conversion of nutrients into energy ranks among the main tasks of thiamine. A deficit situation, in other words an allowance of less than 1 mg per day, primarily expresses itself through loss of appetite, digestive disorders and fatigue. If these symptoms go disregarded, damaging of the central nervous system can be the dire result. The German Society for Nutrition (Deutsche Gesellschaft für Ernährung, DGE) recommends 1.4 mg thiamine per day for grown-up males. When rummaging through the available nutrient tables, vit. B₁ concentrations of meaningful magnitude will hardly be found except for the mentionings of pork and poultry. 130 g pork fillet or 200 g of chicken are already enough to meet the daily requirement. But if the thiamine requirement is supposed to be satisfied by vegetables only, one pound (500 g!) of green peas or one kg asparagus are needed. "So what about cereals and grain or cereal products?", is a statement frequently put forward from vegetarian circles. Of course: with 550 g whole bread, the daily thiamine requirement can also be met, no question about it, unless one starts thinking twice about the quantity needed.

▶ Vit. B₂ (riboflavin): Are you having a hard time seeing clearly of late? Is your skin loosing its healthy appearance? If so, a riboflavin undersupply could be the cause. Now then, before you go out and shop for products of the likes of Ellen Betrix brands or Merz Special Pills, why not first try a piece of liver or kidney from your local butcher store and get something to eat at the same time? No other foodstuff comes close to beef, pork or veal liver or kidneys, respectively, in terms of so

Table 3: Mineral contents of selected important foodstuffs

stance. For this reason Cyanocobalamin primarily occurs in foodstuffs of animal origin. In the group of plant-origin foods, this vitamin can only be identified in fermented products, as in sauerkraut, and then in small quantities only.

As a result, milk and dairy products, fish and meat as well as meat products are the only meaningful sources of vit. B₁₂.

Even at the risk of repetition, let it be restated here again that meat and meat products can be virtual vitamin bombs.

► **Folic acid:** Vit. B₁₂ and folic acid are mutually supplemental and synergistic in their work which contributes to the building and renewed formation of all body cells. Folic acid deficit is manifested by a number of dysfunctional symptoms. Among those, the most important are bone mutations, reduced antibody formation, reproductive disorders or changes in the mucosa. Those foodstuffs richest in folic acid are spinach, beef and pork liver as well as red beets. A factor deserving special attention is folic acid's low stability. Given careless preparation, the entire folic acid content of a foodstuff can be lost. The actual allowance, in other words the recommended daily intake quantity of folic acid, is still unclarified, also because intestinal bacteria may possibly be involved in satisfying the requirement.

Fats and essential fatty acids

In human nutrition, fat first and foremost fulfills two different

Table 4: Important content matter contained in animal musculat meat

content matter per 100 grams	meat	liver	kidneys
calories (kcal)	114	127	130
purines (calculated as puric acid in mg)	150	200	
fat (g)	3.0	3.3	5
cholesterol (mg)	70	300	380
vitamin A (µg)	3	3.5	340
vitamin B ₁ (µg)	660	310	340
vitamin B ₂ (µg)	170	320	1800
vitamin B ₆ (µg)	400	0.6	0.55
vitamin B ₁₂ (µg)	1	0.04	0.015
folic acid (µg)	2	0.074	—
niacin (µg)	3700	1600	8400
vitamin C	traces	traces	—
vitamin D (µg)	—	3	—
vitamin E (µg)	690	450	—
calcium (mg)	9	10	6
phosphorus (mg)	180	360	260
iron (mg)	2.3	22	10
sodium (mg)	58	77	170
potassium (mg)	260	350	240
magnesium (mg)	18	14	16
manganese (µg)	60	0.23	0.05
copper (µg)	310	50	0.15
zink (µg)	1900	6.7	0.32
iodine (µg)	3	0.01	0.03
chloride (mg)	28	100	170

relate to reciprocal fatty acid ratios. The fatty acids can be classed into three groupings: saturated fatty acids; mono-unsaturated fatty acids and multiply unsaturated fatty acids.

To bring it down to a simple common denominator: unsaturated fatty acids are evaluated as nutritionally healthier than their saturated counterparts.

One school of thought, widespread in teaching but nevertheless wrong, is that animal fats above all contain saturated and thus unhealthy fatty acids. Numerous trials and experiments have refuted this. Accordingly, animal fats contain more than 50 per cent unsaturated (primarily mono-unsaturated) fatty acids. On the other hand, the fact that palm and coconut butter contain up to 90 per cent saturated fatty acids is often enough not mentioned at all.

In an animal carcass, fats are not only present in the form of fatty tissue (depot fat), but also as structured lipids. These structured lipids, in turn, are involved in the building of body cells; as an example, the human brain contains more structured lipids than protein. Nutritionally, these lipids are attributed a much higher ranking than their structured lipid counterparts of plant origin.

When it comes to bashing and condemning meat consumption, the factor of fat content is frequently brought forward together with that of fat quality. As a rule, totally obsolete tables serve as the source from which the quotes most often come. But the data in these old tables refer to what was called the "post-war pigs" pigs

sable for the formation and development of the musculature, body organs, blood, skin, but also enzymes. The amino acid contents and the structural amino acid patterns of meat protein of various animal species are mostly identical. In the proteins, 20 different amino acids can be regularly found. Of these 20, 8 – and in the case of infants 10 – cannot be synthesized in the human body, even though they are essential. These amino acids are termed essential because they must be ingested with the food. Even if one single amino acid only is in lacking in the food ingested, this fact will inevitably lead to serious deficit symptoms as could, for example, be manifested in skin diseases or growth standstill. The names of these essential amino acids are: isoleucine, lysine, phenylalanine, tryptophane, leucine, methionine, threonine and valine; for infants, histidine and arginine, respectively, are also classified as essential.

Actual protein depots do not exist in human body. Therefore, a continual supply of the essential amino acids is necessary. While plant proteins must, for the most part, be classified as of low value, animal proteins are extremely high-value due to their composition and concentration and can be utilized by the human organism at a rate of up to 90 per cent. The reason for the inferior quality of plant proteins is primarily due to their amino acid composition, which clearly deviates from that of the human protein and is therefore patently unsuitable for protein synthesis in the human organism. Also, one or even several essential amino acids are principally in lacking. Moreover, plant-origin products also contain a lesser amount of proteins in absolute terms. It follows that an all-vegetarian diet comes with the inevitable requirement that, if sufficient protein supply is to be provided, an accurately adjusted combination of plant-origin foods must be chosen in order to circumvent protein deficit. Persons with a naturally increased protein requirement (children, pregnant women, people performing hard bodily work) should generally be discouraged from following such a diet plan, however.

Some final remarks

The discussion about undesirable heavy metal concentrations in inwards (edible organs of an animal's carcass) is certainly justified. But one thing should be borne in mind in this respect: for one, it is proven that the edible organs of young animals' carcasses contain a negligibly low amount of heavy metals, for another, the actual total intake of undesirable heavy metals only amounts to approximately 30 per cent of the WHO's maximum tolerance – with a further decreasing tendency. What's frequently also forgotten is that heavy metals not only occur in the edible viscera of slaughter animals, but are also accumulated in cereals, wheat or rye, for example.

There can be no doubt that meat is a foodstuff of extremely high value, and one of a distinctly high nutrient density as well. Plant-origin foods have no chance to compete with meat or meat products in terms of contents of vitamins of the B complex (B₁, B₂, B₆, B₁₂), folic acid, niacin, vitamin A, zinc, pantothenic acid and selenium – all coupled with good bio-availability. Because the human body is not at risk of being undersupplied with niacin, pantothenic acid or biotin, these vitamins have not been discussed in greater detail in this article.

Finally, table 4 gives a comprehensive overview of important content matter of animal muscular meat, liver and kidneys in perspicuous format. The respective meat values presented are based on averages incidental to fillet cuts of beef and pork.

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FI Europe 1994

To be held from 4 to 6 October, Food Ingredients Europe 1994 will take place in Earls Court, London. And Food Ingredients Europe's status of being the world's leading event on food ingredients and additives is likely to be consolidated this year. In 1993, FI Europe drew record attendance of 17,800 visitors, 25 % up on 1992. The exhibition confirmed its international character by attracting food technologists, food marketers and food traders from no less than 92 countries. With 514 companies exhibiting at the 1993 event, Expoconsult is confident that this amount will increase this year. Judging by the avid interest in the show – over 90 % of the exhibition space has been sold. FI Europe is likely to exceed last year's event. Convenience, ready-meals and microwaveable foods are currently the key factors driving the food and drink market. A trend which generates a growing demand of newly developed sophisticated semi-finished food products, such as

ready prepared sauces, bakery mixes, cheese analogues, toppings, snack pellets, processed fruits and vegetables, etcetera. In response to this trend, Food Ingredients Europe London will see a rise in exhibitors of semi-finished products.

Held concurrently with the exhibition is the Food Ingredients Europe Conference. This year's conference, organized in co-operation with the highly acknowledged Institute of Food Science and Technology, comprises a series of scientific sessions highlighting "behavioural, pharmacological and psychological effects of food" and new developments in "food processing". In addition, a range of applied sessions will focus on new developments and trends in food ingredients and additives.

Another event which has been established to broaden the scope of Food Ingredients Europe in London are the Food Ingredients Europe Awards. Commencing in 1994 FI Europe will launch these awards to recognize and honour innovation and quality in the manufacture and use of ingredients internationally. In 1995 FI Europe will be held in Germany again, from 7 to 9 November.

Hygienic wall panels

New wall panels manufactured from glass fibre reinforced polyester in the USA offer an alternative to conventional tiles. They have no difficult-to-clean cement grouting, require no maintenance, are resistant to chemicals and are simple to clean with a high pressure cleaner. They are normally easily mounted on a flat, smooth surface but can also be mounted over old tiles. According to the manufacturer's information the good cleaning properties virtually exclude any possibility of bacterial formation on the panels, which are available in sizes 1.22 × 2.44 m and 2.75 × 3.05 m. The wall panels are available in white as standard but can also be supplied in the colour of your choice. (NPI Nederland B.V., Postbus 150, 3430 AD Nieuwegein, Netherlands)